Effects of compassion satisfaction, burnout, and secondary traumatic stress on current drug use among healthcare workers: Differences by occupational level

Sylvia A. Okon [a],[1], Tourna N. Khan [a],[2], Nora J. Duffy [b], Carson C. Roan [a], Rachel A. Hoopsick [a],[3],[*]

[a] Department of Health and Kinesiology, University of Illinois Urbana-Champaign
[b] Department of Psychology, University of Illinois Urbana-Champaign

ARTICLE INFO

ABSTRACT

Work-related stress has been well-examined among physicians, but little is known about how it might affect drug use or healthcare workers in lower-wage occupations characterized by high job demands and low occupational autonomy (e.g., medical assistants, nursing assistants). We collected data from a diverse sample of healthcare workers ($N = 200$) and separately examined the cross-sectional relationships between several work-related experiences (i.e., compassion satisfaction, burnout, and secondary traumatic stress) and measures of current drug use (i.e., non-medical use of prescription drugs [NMUPD], cannabis use, and illicit drug use). We then examined for differences in these relationships by occupational level (i.e., prescriber/administrator vs. other healthcare worker). In main effects models, greater burnout and secondary traumatic stress were both associated with higher odds of NMUPD, cannabis use, and illicit drug use ($ps < 0.01$). Greater compassion satisfaction was associated with lower odds of illicit drug use ($p < 0.05$), but not with NMUPD or cannabis use ($ps > 0.05$). There was a significant interaction between secondary traumatic stress and occupational level on NMUPD ($p < 0.05$) such that there was no relationship among prescribers/administrators, but the likelihood of NMUPD increased with greater secondary traumatic stress among other healthcare workers. Similar trend-level interactions were observed between secondary traumatic stress and occupational level on cannabis use ($p < 0.10$) and between burnout and occupational level on NMUPD. Burnout and secondary traumatic stress may contribute to drug use, and lower-wage healthcare workers may be especially vulnerable.

1. Introduction

The healthcare and social assistance sector in the United States (US) employs over 20 million workers and is expected to have about 1.8 million job opportunities annually (U.S. Bureau of Labor Statistics, 2021). This sector encompasses a diverse array of occupations, each with its unique educational prerequisites, training criteria, and job demands which can predispose healthcare workers to work-related stress, and the COVID-19 pandemic has exacerbated these stressors (e.g., Buselli et al., 2021; Pappa et al., 2020; Que et al., 2020).

Healthcare workers may encounter several occupational challenges such as demanding workloads, potential contact with hazardous medical waste and transmission of infectious diseases, and insufficient personal protective equipment and safety measures (Buselli et al., 2021; Pappa et al., 2020). These working conditions may act as stressors that can manifest in psychological distress, such as burnout and secondary traumatic stress (Pappa et al., 2020).

Burnout has been understood as the "result of chronic stress in the workplace that has not been successfully managed" (World Health Organization, 2024). Burnout is common among physicians and has contributed to turnover-related costs of approximately $4.6 billion and fewer clinical hours each year in the US (Han et al., 2019). Occupational burnout has been extensively studied among physicians and has been associated with increased mental health symptomatology, reduced help-

seeking behavior, and increased medical errors (Dyrbye et al., 2021; Hyman et al., 2017; Menon et al., 2020; Panagioti et al., 2018). However, emerging research has also shown that the prevalence of burnout is high among diverse clinical and non-clinical health professionals, like speech therapists, occupational therapists, social workers, nursing assistants, medical assistants, and housekeeping staff (Prasad et al., 2021).

Burnout develops gradually, whereas secondary traumatic stress swiftly materializes with a more accelerated onset (Jakimowicz et al., 2018). Secondary traumatic stress (STS) is defined as the "cost of caring" for others in emotional or physical pain (Figley & McCubbin, 1983). STS is a secondhand traumatic response that arises from empathetic engagement with patients and can be further exacerbated by workplace dynamics such as heavy workloads, safety concerns, and exposure to challenging environments within the healthcare setting (Chatham et al., 2023; Rauvola et al., 2019). Working conditions that are both physically and emotionally demanding increase susceptibility to secondary traumatic stress (Galek et al., 2011). Pandemic-era research suggests that secondary traumatic stress may contribute to anxiety, depression, and suicidality among healthcare workers (Ariapooran et al., 2022; İlhan & Küpeli, 2022). Importantly, secondary traumatic stress can be viewed in contrast to compassion satisfaction, which is the sense of fulfillment that is derived from providing care to patients (Joinson, 1992). This phenomenon describes the perception that one's work is yielding social value reflected in the mitigation of another person's discomfort (Ruiz-Fernández et al., 2020) and has been shown to ease challenges associated with patient care (Harr, 2013).

To cope with work-related stressors, some people may use substances. For example, several studies have shown that workplace violence, moral distress, and exposure to secondary traumatic stress are associated with alcohol and other substance use (Arble et al., 2023; Campbell et al., 2024; Halsall et al., 2023; Okoli & Seng, 2023). Importantly, a recent study of Brazilian healthcare workers suggests that substance use increased among this population during the pandemic and that the use of some substances varied by occupation (Gir et al., 2022). Although work-related stress and its effects on alcohol consumption have been well-examined among physicians, little is known about how it might affect healthcare workers in lower-wage occupations characterized by high job demands and low occupational autonomy (e.g., medical and nursing assistants) and other types of substance use, like non-medical use of prescription drugs, cannabis use, and illicit drug use. Gir et al. (2022) purported that the occupation and educational status of healthcare providers can amplify vulnerability to substance use. Moreover, prior work suggests that disparities in help-seeking and healthcare access among lower-wage healthcare workers may contribute to a greater risk of prescription drug misuse (Hoopsick et al., 2023). Therefore, this study seeks to investigate the effect of work-related experiences (i.e., compassion satisfaction, burnout, and secondary traumatic stress) on a range of drug use outcomes among healthcare workers in the United States, and whether these effects differ by occupational level.

2. Method

2.1. Participants and Procedure

We recruited a diverse sample of people working in various healthcare settings across the US in March of 2022 ($N = 200$) using a social media recruitment methods. Participants were recruited via Instagram, a popular social networking app with a focus on sharing photos and videos, using targeted advertisements. Using Instagram's Ads Manager feature, we were able to define our target audience location (US), age (18 – 64 years), sex (male and female), and Instagram-defined interest categories (healthcare, medicine, nursing, patient safety, public health, health & wellness). Our pilot study was advertised as the "Healthcare Worker Stress Study," and participants were informed that, if eligible, they would be asked questions about their "work and life experiences." To participate, participants needed to be at least 18 years of age and

currently working for wages in one or more of the following healthcare settings: hospital, ambulatory or outpatient clinic, nursing or residential facility, social assistance program, and/or home healthcare. Additionally, participants also needed to be able to read and understand the English language and be willing and able to participate. If eligible, participants were contacted by the study team to verify their identity and employment as a healthcare worker. Eligible participants were asked to complete one online survey on their own internet-connected device at a place of their choosing (e.g., home, work, public location), which took approximately 60 min to complete. All participants were compensated with a $50 gift card. The study protocol was approved by the Institutional Review Board of the University of Illinois Urbana-Champaign. Of those who were eligible for inclusion in the current study ($N = 284$), 70.4 % agreed to participate and completed the survey. We conducted sensitivity analyses and found that there were no statistically significant differences in the screening variables (i.e., age, gender, work setting) between those who were eligible and participated and those who were eligible but did not participate ($ps > 0.05$).

Our study sample included healthcare workers from 28 different US states plus Washington, DC. The sample was comprised of a wide range of different healthcare occupations, including low-wage healthcare support roles (e.g., nursing assistants, dietary aides, administrative support staff), licensed practical nurses, registered nurses, psychologists, case managers, social workers, physical therapists, healthcare providers with prescribing roles (e.g., physicians, nurse practitioners, physician assistants), pharmacists, dentists, and healthcare administrators. These healthcare workers reported working across a variety of healthcare settings, including ambulatory/outpatient clinics, home healthcare, hospitals, social assistance programs, and nursing/residential facilities. Our final sample was racially and ethnically diverse, ranged in age from 19 to 58 years, and included men (32.5 %), women (66.5 %), and non-binary people (1.0 %). Although the sample was mostly women healthcare workers, this is consistent with healthcare workers nationally (U.S. Census Bureau, 2021). Additional characteristics of the study sample are presented in Table 1.

2.2. Measures

2.2.1. Compassion Satisfaction, Burnout, and secondary traumatic stress

We assessed the positive and negative aspects of healthcare workers' experiences using the Professional Quality of Life Scale (ProQOL; Stamm, 2010). This 30-item measure assesses workers' experiences over the last 30 days and items comprise subscales on compassion satisfaction, burnout, and secondary traumatic stress over the last 30 days. Respondents are asked to rate how frequently they experience a number of affective states, feelings, and thoughts related to their work. Each item is measured on a 5-point Likert scale ranging from 1 (Never) to 5 (Very Often). Higher scores on each subscale indicate greater compassion satisfaction, burnout, and secondary traumatic stress. Example items from the compassion satisfaction subscale ($\alpha = 0.92$) include "My work makes me feel satisfied" and "I get satisfaction from being able to help people." The burnout subscale ($\alpha = 0.72$) includes items such as "I feel trapped by my job as a healthcare worker," "I feel overwhelmed because my workload seems endless," and "I feel "bogged down" by the system." Example items from the secondary traumatic stress subscale ($\alpha = 0.86$) include "I feel as though I am experiencing the trauma of someone I have helped," "As a result of my healthcare work, I have intrusive, frightening thoughts." and "I avoid certain activities or situations because they remind me of frightening experiences of the people I help.".

2.2.2. Current drug use

To assess current drug use, we used the NIDA Modified Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST) version 2.0 (WHO ASSIST Working Group, 2002), a measure of lifetime and current use of alcohol, tobacco, recreational and medical cannabis, non-medical use of prescription drugs (NMUPD), and illicit drug use. The

Table 1

Sample characteristics (N = 200 healthcare workers).

	% (*n*) or mean (± SD)
Age, years	30.8 (± 7.3)
Gender Identity	–
Man	32.5 % (65)
Woman	66.5 % (133)
Non-binary/genderqueer	1.0 % (2)
Race/Ethnicity	–
Non-Hispanic white	54.5 % (109)
Non-Hispanic Black	17.5 % (35)
Non-Hispanic Asian	14.0 % (28)
Non-Hispanic American Indian or Alaska Native	1.0 % (2)
Hispanic or Latinx	10.0 % (20)
Other	3.0 % (6)
Education	–
High school diploma or equivalent (GED)	3.0 % (6)
Some college (no degree)	5.0 % (10)
Associate's/Other Technical 2-year degree	14.0 % (28)
Bachelor's/Other 4-year degree	35.5 % (71)
Graduate or Professional degree	42.5 % (85)
Family Income	–
Less than $10,000	0.5 % (1)
$10,000 − $19,999	3.5 % (7)
$20,000 − $29,999	2.5 % (5)
$30,000 − $39,999	4.5 % (9)
$40,000 − $49,999	10.0 % (20)
$50,000 − $74,999	19.5 % (39)
$75,000 − $99,999	20.0 % (40)
$100,000 − $149,999	24.0 % (48)
$150,000 or more	15.5 % (31)
Years in Job	–
Less than 1 year	14.5 % (29)
1 − 5 years	61.0 % (122)
6 − 10 years	17.5 % (35)
11 − 20 years	6.0 % (12)
More than 20 years	1.0 % (2)
Hospital Setting	–
No	46.0 % (92)
Yes	54.0 % (108)
Prescriber/Healthcare Administrator	
No	75.5 % (151)
Yes	24.5 % (49)

SD = standard deviation.

current study focused on NMUPD, cannabis use, and illicit drug use. The NIDA Modified ASSIST defines NMUPD as using prescription stimulants, sedatives, opioids, or other prescriptions "on your own, that is either without a doctor's prescription, in greater amounts, more often, or longer than prescribed, or for a reason other than a doctor said you should use them." The NIDA Modified ASSIST assesses NMUPD with the following question: "In the past three months, how often have you used [substance]?" We considered any use in the past three months as a positive screen for current NMUPD and dichotomized current use (no/ yes). Given that cannabis has been decriminalized in many US states for medical and recreational purposes, cannabis use was examined separately from illicit drug use, including cocaine or crack, stimulants, inhalants, sedatives, hallucinogens, and street opioids. Current cannabis use and illicit drug use were assessed with the NIDA Modified ASSIST using the following question: "In the past three months, how often have you used [substance]?" We considered any use of the substance in the past three months as a positive screen for current use. We dichotomized current cannabis use and illicit drug use (no/yes).

2.2.3. Occupational level

Participants were asked to report their type of occupation in the healthcare sector. To examine for differences in the relations between compassion satisfaction, burnout, and secondary traumatic stress on current drug use by occupational level, we created a dichotomous variable (healthcare administrator/prescriber vs. other healthcare worker). To capture the potential differences between the high-earning high-autonomy positions from other roles, we first grouped healthcare

administrators and prescribers (e.g., physicians, nurse practitioners, physician assistants) and then grouped other healthcare professionals (e. g., registered nurses, nursing assistants, dietary aides, administrative support staff).

2.2.4. Covariates

Age. Participants self-reported their age. Given that some research suggests that work-related stress is more common among younger healthcare workers (Galanis et al., 2021) and that there are notable age differences in the rates of substance use in the general population (SAMHSA, 2020), we included age in years as a covariate in all adjusted models.

Gender Identity. National data suggests that there are significant differences in substance use patterns among US adults by gender (SAMHSA, 2020). Further, a recent *meta*-analysis examining more than 33,000 healthcare workers across 12 different studies conducted during the COVID-19 pandemic suggests that women in the healthcare workforce may be more likely to experience pandemic-related psychological sequelae (Pappa et al., 2020). Taken together, this suggests that gender might confound the association between healthcare workers' experiences and substance use. We controlled for participants' self-reported gender in all adjusted models.

Race/ethnicity. All participants self-reported their race and ethnicity. There are differences in the types of substances used among different racial and ethnic groups in the general population (SAMHSA, 2020). Additionally, non-Hispanic white healthcare workers are less likely to report work-related burnout than other racial/ethnic groups (Mercado et al., 2022). Thus, to control for potential confounding effects, we included race/ethnicity as a covariate in our adjusted models.

Annual Family Income. In addition to the aforementioned sociodemographic factors, research suggests that people with lower household incomes may also be more likely to experience problematic substance use (Baptiste-Roberts & Hossain, 2018). A pre-pandemic national survey of nurses suggests that nurses with lower income levels were more likely to leave their jobs due to burnout (Shah et al., 2021). Taken together, this suggests that annual family income might confound the relations between healthcare workers' work-related experiences (i. e., compassion satisfaction, burnout, and secondary traumatic stress) and substance use. We controlled for participants' self-reported family income in our adjusted models.

Type of Healthcare Setting. Work-related stress and burnout are prevalent across all healthcare settings (Green et al., 2020), but there is growing evidence suggesting that those working in hospital settings may be particularly vulnerable (Buran & Altın, 2021; Lasater et al., 2021; Sanghera et al., 2020; Shah et al., 2021). We included the type of healthcare setting (i.e., hospital setting vs. non-hospital setting) in all adjusted regression models.

2.3. Data analysis

We first used descriptive statistics to characterize the study sample. Next, we examined the separate effects of compassion satisfaction, burnout, and secondary traumatic stress on current drug use using logistic regression models. Odds ratios (ORs) and 95 % confidence intervals (CIs) are reported. We then added age, gender identity, race/ ethnicity, and annual family income as covariates to all regression models and reported adjusted odds ratios (aORs) and 95 % CIs. Finally, we added an interaction term to each fully adjusted model representing the cross-product of each ProQOL subscale and occupational level (healthcare administrator or prescriber vs. other healthcare worker) to examine for differences in the relations between compassion satisfaction, burnout, and secondary traumatic stress on current drug use by occupational level. We examined predictive margins to better understand statistically significant interactions and plotted the predicted probability of current drug use by ProQOL subscale and occupational level.

3. Results

3.1. Descriptive results

Current drug use was prevalent among our study sample. The prevalence of NMUPD was 21.0 %, which primarily (78.6 %) consisted of prescription sedatives and sleeping medications (e.g., Valium, Serepax, Ativan, Xanax), followed by prescription stimulants (26.2 %; e.g., Ritalin, Concerta, Dexedrine, Adderall), and other psychotropic medications (7.1 %; e.g., Zoloft, Trazodone, Lamictal, Seroquel). The prevalence of current cannabis use was 29.0 % and the prevalence of illicit drug use (excluding cannabis) was 7.0 %. There were no statistically significant differences in the prevalence of NMUPD ($\chi^2(1, N = 200) = 3.00, p = 0.08$), cannabis ($\chi^2(1, N = 200) = 0.01, p = 0.94$), or illicit drugs ($\chi^2(1, N = 200) = 0.84, p = 0.36$) by occupational level. Mean (M) subscale scores for compassion satisfaction ($M = 34.58$, standard deviation (SD) $= 7.52$), burnout ($M = 26.23, SD = 5.73$), and secondary traumatic stress ($M = 23.36, SD = 7.40$) were in line with the mean ProQOL subscale scores derived from a *meta*-analysis of studies examining compassion satisfaction ($M = 33.12$, 95 % CI [32.22, 34.03]), burnout ($M = 26.64$, 95 % CI [26.01, 27.27]), and secondary traumatic stress ($M = 25.24$, [24.69, 25.79]) among nurses (Xie et al., 2021).

3.2. Main effects of ProQOL subscales on current drug use

In unadjusted models, greater compassion satisfaction was not associated with NMUPD ($OR = 0.98$, 95 % CI [0.93, 1.02]; Table 2) or cannabis use ($OR = 0.98$, 95 % CI [0.94, 1.02]), but was associated with lower odds of illicit drug use ($OR = 0.93$, 95 % CI [0.87, 0.99]). After controlling for age, gender identity, race/ethnicity, annual family income, and hospital setting (yes/no), compassion satisfaction was still not associated with NMUPD ($aOR = 0.97$, 95 % CI [0.92, 1.02]) or cannabis use ($aOR = 0.98$, 95 % CI [0.94, 1.02]), and lower odds of illicit drug use ($aOR = 0.92$, 95 % CI [0.86, 0.99]). Greater burnout was associated with greater odds of NMUPD ($OR = 1.11$, 95 % CI [1.04, 1.19]), cannabis use ($OR = 1.09$, 95 % CI [1.03, 1.15]), and illicit drug use ($OR = 1.17$, 95 % CI [1.05, 1.31]) in unadjusted models. Greater burnout also remained associated with increased odds of NMUPD ($aOR = 1.13$, 95 % CI [1.05, 1.22]), cannabis use ($aOR = 1.11$, 95 % CI: 1.04, 1.18), and illicit drug use ($aOR = 1.27$, 95 % CI [1.09, 1.47]) in adjusted models. Greater secondary traumatic stress was associated with greater odds of current NMUPD ($OR = 1.13$, 95 % CI [1.07, 1.20]), cannabis use ($OR = 1.06$, 95 % CI [1.02, 1.11]), and illicit drug use ($OR = 1.12$, 95 % CI [1.04, 1.20]) in unadjusted models. After controlling for relevant covariates, greater secondary traumatic stress remained associated with increased odds of NMUPD ($aOR = 1.14$, 95 % CI: 1.07, 1.21), cannabis

use ($aOR = 1.07$, 95 % CI: 1.02, 1.12), and illicit drug use ($aOR = 1.11$, 95 % CI: 1.02, 1.21).

3.3. Interaction effects of ProQOL subscales and occupational level on current drug use

There was a significant interaction between secondary traumatic stress and occupational level on the odds of NMUPD ($aOR = 0.86$, 95 % CI: 0.75, 0.97; Table 3), such that there was no relation between the ProQOL Secondary Traumatic Stress subscale score and the odds of NMUPD among prescribers and healthcare administrators, but greater secondary traumatic stress was associated with an increased likelihood of NMUPD among other healthcare workers (Fig. 1). There were also trend-level interactions between burnout and occupational level on the odds of NMUPD ($aOR = 0.86$, 95 % CI: 0.72, 1.02; Fig. 2) and between secondary traumatic stress and occupational level on cannabis use ($aOR = 0.91$, 95 % CI: 0.83, 1.01; Fig. 3) that were similar in magnitude and direction, suggesting no relations between these work experience and drug use among prescribers/administrators and a positive relation among other healthcare workers.

4. Discussion

Results from the current study suggest that greater burnout and secondary traumatic stress are associated with higher odds of NMUPD, cannabis use, and illicit drug use among healthcare workers. Greater compassion satisfaction was associated with lower odds of other illicit drug use, but not with NMUPD or cannabis use. Importantly, we found a significant interaction between secondary traumatic stress and occupational level on NMUPD, such that there was no relationship between secondary traumatic stress and NMUPD among prescribers/administrators, but the likelihood of NMUPD among other healthcare workers increased with greater levels of secondary traumatic stress. Additionally, the small magnitude of associations observed in our study can be attributable to the continuous nature of the predictors (Burnout, Compassion Satisfaction, and Secondary Traumatic Stress), which reflect incremental changes in the odds of substance use per unit increase in ProQOL score. While this explains the modest effect sizes, it is also worth noting that the relatively small sample size may have constrained the study's ability to detect stronger associations.

Sorensen et al. (2021) developed a conceptual framework highlighting work as a critical determinant of health and the multiple levels of influence on worker health, safety, and welfare. It recognizes that work-related concerns comprise larger social, economic, and political forces in addition to occupational safety and health considerations. This

Table 2
Main effects of ProQOL subscale scores on current drug use.

	NMUPD		Cannabis Use		Illicit Drug Use	
	OR (95 % CI)	*aOR*[a] (95 % CI)	*OR* (95 % CI)	*aOR*[a] (95 % CI)	*OR* (95 % CI)	*aOR*[a] (95 % CI)
Compassion Satisfaction	0.98 (0.93, 1.02)	0.97 (0.92, 1.02)	0.98 (0.94, 1.02)	0.98 (0.94, 1.02)	**0.93*** **(0.87, 0.99)**	**0.92*** **(0.86, 0.99)**
Burnout	**1.11**** **(1.04, 1.19)**	**1.13**** **(1.05, 1.22)**	**1.09**** **(1.03, 1.15)**	**1.11**** **(1.04, 1.18)**	**1.17**** **(1.05, 1.31)**	**1.27**** **(1.09, 1.47)**
Secondary Traumatic Stress	**1.13***** **(1.07, 1.20)**	**1.14***** **(1.07, 1.21)**	**1.06**** **(1.02, 1.11)**	**1.07**** **(1.02, 1.12)**	**1.12**** **(1.04, 1.20)**	**1.11*** **(1.02, 1.21)**

[a]Adjusted models control for age, gender identity, race/ethnicity, annual family income, and hospital setting (yes/no).

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$; NMUPD = non-medical use of prescription drugs; OR = odds ratio; aOR = adjusted odds ratio.

Table 3
Interaction effects of ProQOL subscale scores and occupational level on current drug use.

	NMUPD	Cannabis Use	Illicit Drug Use
	aOR[a] (95 % CI)	*aOR*[a] (95 % CI)	*aOR*[a] (95 % CI)
Compassion Satisfaction X Occupational Level	1.02 (0.89, 1.17)	0.95 (0.85, 1.07)	1.06 (0.85, 1.32)
Burnout X Occupational Level	**0.86**[b] **(0.72, 1.02)**	1.00 (0.86, 1.17)	1.22 (0.71, 2.11)
Secondary Traumatic Stress X Occupational Level	**0.86*** **(0.75, 0.97)**	**0.91**[b] **(0.83, 1.01)**	1.03 (0.83, 1.27)

[a]Adjusted models control for age, gender identity, race/ethnicity, annual family income, hospital setting (yes/no), and main effect of occupational level (prescriber/healthcare administrator vs. other healthcare worker).

*$p < 0.05$; [b]$p < 0.10$; NMUPD = non-medical use of prescription drugs; aOR = adjusted odds ratio.
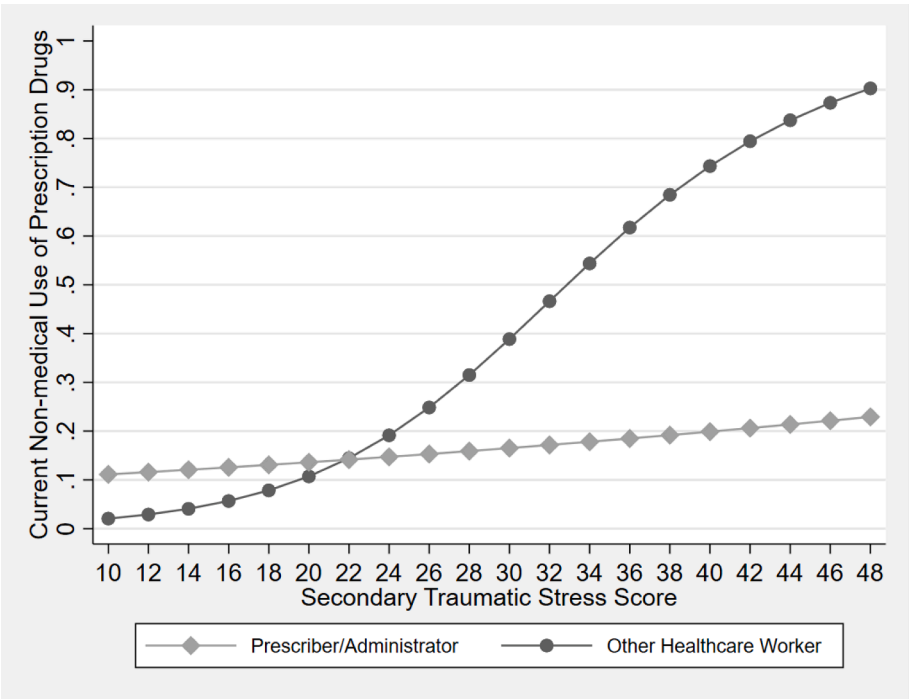
Fig. 1. Predicted Probability of Current Non-Medical Use of Prescription Drugs by Secondary Traumatic Stress Score and Occupational Level.
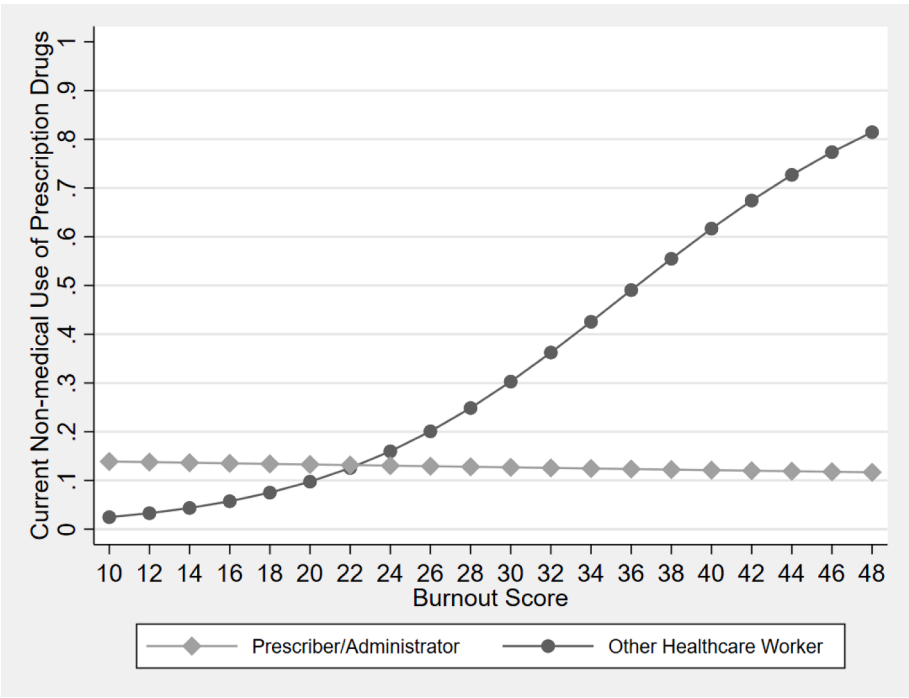

Fig. 2. Predicted Probability of Current Non-Medical Use of Prescription Drugs by Burnout Score and Occupational Level.

conceptual framework emphasizes how crucial it is to consider multiple levels of impact when examining the.

relationships between work-related experiences and health behaviors, including organizational policies, job design, the psychosocial work environment, and broader socioeconomic considerations. Within the context of this framework, findings from our study suggest that the work-related experiences of healthcare workers may affect their likelihood of coping with these stressors using a range of substances and that those in lower-wage occupations may be at disproportionately greater

risk.

Work by Prins et al. (2019) examined more than 12,000 full-time workers and demonstrated that occupations characterized by higher authority, autonomy, and expertise were associated with lower odds of binge drinking, heavy drinking, and mental illness. Although poverty and substance use are inextricably and bidirectionally related, differences may not be explained by social stratification based on individual attributes alone (e.g., socioeconomic status). Rather, mechanisms that produce social stratification may increase the risk for problems with
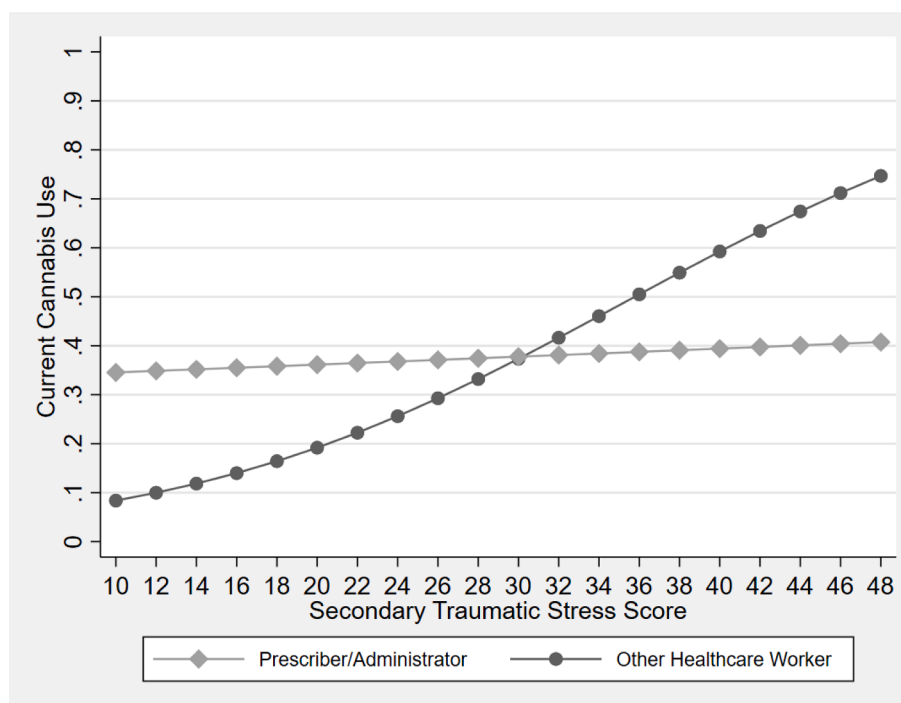
Fig. 3. Predicted Probability of Current Cannabis Use by Secondary Traumatic Stress Score and Occupational Level.

substance use and mental health. For example, a study examining data from the 1983 to 2017 waves of the Panel Study of Income Dynamics (Prins et al., 2021) showed that greater labor exploitation (i.e., working unpaid hours) was associated with greater psychological distress. Thus, despite the compelling evidence that work-related stressors have a deleterious effect on physicians, those working in lower-wage positions characterized by high demands and low autonomy may be at even greater risk. Findings suggest that workplace experiences are linked to substance use among healthcare workers, with lower-wage workers being particularly vulnerable. This is important to consider, especially as many employers of low-wage workers do not leverage effective substance use intervention strategies (e.g., substance use education and employee assistance programs) (Hoopsick & Samad, 2024).

It is important to situate our findings within the larger context of other research regarding pandemic-related effects on healthcare workers. Our results are generally consistent with other studies examining the psychological effects of the COVID-19 pandemic on healthcare workers. Recent research has demonstrated that adverse work-related experiences, particularly those in the pandemic era, are associated with an increased likelihood of substance use (Arble et al., 2023; Bryant et al., 2023; Campbell et al., 2024; Halsall et al., 2023; Hoopsick et al., 2023; Okoli & Seng, 2023). Similarly, we found that experiencing burnout and secondary traumatic stress may contribute to a greater likelihood of drug use. However, our findings also suggest that lower-wage healthcare workers may be made especially vulnerable. Importantly, findings from the current study extend prior research by demonstrating the differential effects of work-related experiences on the substance use of healthcare workers by occupational level.

5. Limitations

Evidence from this study should be interpreted within the context of some limitations. First, it is challenging to establish causal conclusions with cross-sectional data because we did not track the temporal sequence of these variables. While significant associations between workplace experiences (Burnout, Compassion Satisfaction, and Secondary Traumatic Stress) and substance use outcomes (NMUPD, illicit

drug use, and cannabis use) were identified, it remains unclear whether these experiences preceded the substance use behaviors or were consequences of them. Other work-related factors not examined in the current study (e.g., job demands, workplace support, job autonomy) might partially explain the relationships we observed. Second, participants provided self-reports, which are subjected to social desirability bias. However, we made use of audio computer-assisted self-interviewing (ACASI) methods, which has been shown to provide accurate estimates of substance use, mental health symptomatology, and other sensitive topics (Gerbert et al., 1999; Kumar et al., 2016; McNeely et al., 2016; Spear et al., 2016; Waruru et al., 2005) and is often preferred by research participants compared to face-to-face interview methods (Perlis et al., 2004; Waruru et al., 2005). Third, we used non-probability sampling, so our sample might not represent all US healthcare workers but with diverse demographic attributes. Finally, we used binary outcomes to measure substance use, which only indicates the presence or absence of use but does not capture the quantity or frequency of consumption. Future studies in this area should examine more nuanced substance use behaviors.

5.1. Strengths

Despite these limitations, this study also has notable strengths. First, our sample was made up of occupationally, demographically, and socioeconomically diverse healthcare workers across the United States. Second, considering the impact of COVID-19 on healthcare workers, our study is timely and relevant in identifying vulnerable populations within the healthcare sector. Finally, the administration of validated measures of the work-related experiences and substance use of these healthcare workers bolsters our research findings.

Our findings also highlight a possible disparity among healthcare workers in non-administrative or prescriber roles. Future studies should investigate these relationships using longitudinal data to better understand how work-related experiences can impact drug use over time. Additionally, studies conducted with larger nationally representative samples could illuminate potential occupation- and setting-specific effects.

6. Conclusion and Future direction

Our research begins to clarify some of the intricate connections between work-related experiences and drug use behaviors among healthcare workers. Lower-wage healthcare professionals may be made especially vulnerable to the negative effects of work-related stressors. Our findings underscore the need for systems-level changes that improve the working environments and mechanisms of support for healthcare workers, especially those who face high job demands and low autonomy in the workplace.

Future research should consider using continuous measures of substance use, such as frequency or quantity, for a better understanding of the relationship between work-related factors (e.g., burnout and secondary traumatic stress) and different levels of substance use. By researching the intensity and patterns of use, studies could better examine whether certain occupational stressors are associated with heavier or more frequent substance use, providing a nuanced understanding of these variables.

CRediT authorship contribution statement

Sylvia A. Okon: Writing – review & editing, Writing – original draft. **Tourna N. Khan:** Writing – review & editing. **Nora J. Duffy:** Writing – review & editing. **Carson C. Roan:** Writing – review & editing. **Rachel A. Hoopsick:** Writing – review & editing, Writing – original draft, Visualization, Supervision, Project administration, Methodology, Formal analysis, Data curation, Conceptualization.

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

Data will be made available on request.

References

Arble, E., Manning, D., Arnetz, B. B., & Arnetz, J. E. (2023). Increased substance use among nurses during the COVID-19 pandemic. *International Journal of Environmental Research and Public Health, 20*(3), 2674. https://doi.org/10.3390/ijerph20032674

Ariapooran, S., Ahadi, B., & Khezeli, M. (2022). Depression, anxiety, and suicidal ideation in nurses with and without symptoms of secondary traumatic stress during the COVID-19 outbreak. *Archives of Psychiatric Nursing, 37*, 76–81. https://doi.org/10.1016/j.apnu.2021.05.005

Baptiste-Roberts, K., & Hossain, M. (2018). Socioeconomic disparities and self-reported substance abuse-related problems. *Addiction and Health, 10*(2), 112–122. https://doi.org/10.22122/ahj.v10i2.561

Bryant, V. E., Sorna, M. J., Dana, A., Leon, K. G., Guastello, A. D., Sambuco, N., Huxhold, A., Allen, B., Cuffe, S. P., & Mathews, C. A. (2023). Protective and risk factors associated with substance use coping among healthcare workers during the COVID-19 pandemic. *Frontiers in Psychology, 14*, Article 1228517. https://doi.org/10.3389/fpsyg.2023.1228517

Buran, F., & Altın, Z. (2021). Burnout among physicians working in a pandemic hospital during the COVID-19 pandemic. *Legal Medicine (Tokyo), 51*, Article 101881. https://doi.org/10.1016/j.legalmed.2021.101881

Buselli, R., Corsi, M., Veltri, A., Baldanzi, S., Chiumiento, M., Del Lupo, E., Marino, R., Necciari, G., Caldi, F., & Foddis, R. (2021). Mental health of health care workers: A review of organizational interventions put in place by local institutions to cope with new psychosocial challenges resulting from COVID-19. *Psychiatry Research, 299*, Article 113847.

Campbell, B. M., Knipp, M. A., Anwar, S. S., & Hoopsick, R. A. (2024). Moral injury and substance use among United States healthcare workers. *Stress and Health, 40*(3), e3321.

Chatham, A. A., Petruzzi, L. J., Patel, S., Brode, W. M., Cook, R., Garza, B., … Valdez, C. R. (2023). Structural Factors Contributing to Compassion Fatigue, Burnout, and Secondary Traumatic Stress Among Hospital-Based Healthcare Professionals During the COVID-19 Pandemic. *Qualitative Health Research*. https://doi.org/10.1177/10497323231213825

Dyrbye, L. N., Leep Hunderfund, A. N., Winters, R. C., Moeschler, S. M., Vaa Stelling, B. E., Dozois, E. J., Satele, D. V., & West, C. P. (2021). The relationship between burnout and help-seeking behaviors, concerns, and attitudes of residents.

Academic Medicine, 96(5), 701–708. https://doi.org/10.1097/ACM.0000000000003790

Figley, C., & McCubbin, H. (1983). Catastrophes: An overview of family reactions. *Ariel, 129*(81), 82–190.

Galanis, P., Vraka, I., Fragkou, D., Bilali, A., & Kaitelidou, D. (2021). Nurses' Burnout and Associated Risk Factors During the COVID-19 Pandemic: A Systematic Review and Meta-analysis. *Journal of Advanced Nursing, 77*(8), 3286. https://doi.org/10.1111/jan.14839

Galek, K., Flannelly, K. J., Greene, P. B., & Kudler, T. (2011). Burnout, secondary traumatic stress, and social support. *Pastoral Psychology, 60*, 633–649. https://doi.org/10.1007/s11089011-0346-7

Gerbert, B., Bronstone, A., Pantilat, S., McPhee, S., Allerton, M., & Moe, J. (1999). When asked, patients tell: Disclosure of sensitive health-risk behaviors. *Medical Care, 37*(1), 104–111. https://doi.org/10.1097/00005650-199901000-00014

Gir, E., Baptista, C. J., Reis, R. K., Menegueti, M. G., Pillon, S. C., & e Silva, A. C.d. O. (2022). Increased use of psychoactive substances among Brazilian healthcare professionals during the COVID-19 pandemic. *Archives of Psychiatric Nursing, 41*, 359–367. https://doi.org/10.1016/j.apnu.2022.09.004

Green, S., Markaki, A., Baird, J., Murray, P., & Edwards, R. (2020). Addressing healthcare professional burnout: A quality improvement intervention. *Worldviews on Evidence-Based Nursing, 17*(3), 213–220. https://doi.org/10.1111/wvn.12450

Halsall, L., Irizar, P., Burton, S., Waring, S., Giles, S., Goodwin, L., & Jones, A. (2023). Hazardous, harmful, and dependent alcohol use in healthcare professionals: A systematic review and meta-analysis. *Frontiers in Public Health, 11*, Article 1304468.

Han, S., Shanafelt, T. D., Sinsky, C. A., Awad, K. M., Dyrbye, L. N., Fiscus, L. C., Trockel, M., & Goh, J. (2019). Estimating the attributable cost of physician burnout in the United States. *Annals of Internal Medicine, 170*(11), 784–790. https://doi.org/10.7326/M18-1422

Harr, C. (2013). Promoting workplace health by diminishing the negative impact of compassion fatigue and increasing compassion satisfaction. *Social Work and Christianity, 40*(1), 71.

Hoopsick, R. A., Las, S., & Sun, R. (2023). Differential effects of healthcare worker burnout on psychotropic medication use and misuse by occupational level. *Social Psychiatry and Psychiatric Epidemiology*. https://doi.org/10.1007/s00127-023-02496-y

Hoopsick, R. A., & Samad, A. (2024). The effects of workplace substance use programs, policies, and practices on current substance use among a national sample of low-income workers: differences by race/ethnicity and education level. *Occupational Health Science, 8*, 473–504. https://doi.org/10.1007/s41542-023-00170-y

Hyman, S. A., Shotwell, M. S., Michaels, D. R., Han, X., Card, E. B., Morse, J. L., & Weinger, M. B. (2017). A survey evaluating burnout, health status, depression, reported alcohol and substance use, and social support of anesthesiologists. *Anesthesia and Analgesia, 125*(6), 2009–2018. https://doi.org/10.1213/ane.0000000000002298

İlhan, B., & Küpeli, İ. (2022). Secondary traumatic stress, anxiety, and depression among emergency healthcare workers in the middle of the COVID-19 outbreak: A cross-sectional study. *The American Journal of Emergency Medicine, 52*, 99–104. https://doi.org/10.1016/j.ajem.-2021.11.051

Jakimowicz, S., Perry, L., & Lewis, J. (2018). Compassion satisfaction and fatigue: A cross-sectional survey of Australian intensive care nurses. *Australian Critical Care, 31*(6), 396–405.

Joinson, C. (1992). Coping with compassion fatigue. *Nursing, 22*(4), 116, 118–119, 120.

Kumar, P. C., Cleland, C. M., Gourevitch, M. N., Rotrosen, J., Strauss, S., Russell, L., & McNeely, J. (2016). Accuracy of the audio computer assisted self interview version of the alcohol, smoking, and substance involvement screening test (ACASI ASSIST) for identifying unhealthy substance use and substance use disorders in primary care patients. *Drug and Alcohol Dependence, 165*, 38–44. https://doi.org/10.1016/j.drugalcdep.2016.05.030

Lasater, K. B., Aiken, L. H., Sloane, D. M., French, R., Martin, B., Reneau, K., Alexander, M., & McHugh, M. D. (2021). Chronic hospital nurse understaffing meets COVID-19: An observational study. *BMJ Quality and Safety, 30*(8), 639–647. https://doi.org/10.1136/bmjqs-2020-011512

McNeely, J., Strauss, S. M., Rotrosen, J., Ramautar, A., & Gourevitch, M. N. (2016). Validation of an audio computer-assisted self-interview (ACASI) version of the alcohol, smoking and substance involvement screening test (ASSIST) in primary care patients. *Addiction, 111*(2), 233–244. https://doi.org/10.1111/add.13165

Menon, N. K., Shanafelt, T. D., Sinsky, C. A., Linzer, M., Carlasare, L., Brady, K. J. S., Stillman, M. J., & Trockel, M. T. (2020). Association of physician burnout with suicidal ideation and medical errors. *JAMA Network Open, 3*(12), Article e2028780. https://doi.org/10.1001/jamanetworkopen.2020.28780

Mercado, M., Wachter, K., Schuster, R. C., Mathias, C. M., Johnson, E., Davis, O. I., & Johnson-Agbakwu, C. E. (2022). A Cross-sectional Analysis of Factors Associated with Stress, Burnout and Turnover Intention Among Healthcare Worker During the COVID-19 Pandemic in the United States. *Health & Social Care in the Community, 30*(5), Article e2690-e2701. https://doi.org/10.1111/hsc.13712

Okoli, C. T., & Seng, S. (2023). The relationship between trauma and substance use among healthcare workers: A cross-sectional analysis. *Journal of Addictions Nursing, 34*(1), 80–88. https://doi.org/10.1097/JAN.0000000000000515

Panagioti, M., Geraghty, K., Johnson, J., Zhou, A., Panagopoulou, E., Chew-Graham, C., Peters, D., Hodkinson, A., Riley, R., & Esmail, A. (2018). Association between physician burnout and patient safety, professionalism, and patient satisfaction: a systematic review and meta-analysis. *JAMA Internal Medicine, 178*(10), 1317–1331. https://doi.org/10.1001/jamain-ternmed.2018.3713

Pappa, S., Ntella, V., Giannakas, T., Giannakoulis, V. G., Papoutsi, E., & Katsaounou, P. (2020). Prevalence of depression, anxiety, and insomnia among healthcare workers

during the COVID-19 pandemic: A systematic review and meta-analysis. *Brain, Behavior, and Immunity, 88*, 901–907. https://doi.org/10.1016/j.bbi.2020.05.026

Perlis, T. E., Des Jarlais, D. C., Friedman, S. R., Arasteh, K., & Turner, C. F. (2004). Audio-computerized self-interviewing versus face-to-face interviewing for research data collection at drug abuse treatment programs. *Addiction, 99*(7), 885–896. https://doi.org/10.1111/j.1360-0443.2004.00740.x

Prasad, K., McLoughlin, C., Stillman, M., Poplau, S., Goelz, E., Taylor, S., Nankivil, N., Brown, R., Linzer, M., & Cappelucci, K. (2021). Prevalence and correlates of stress and burnout among US healthcare workers during the COVID-19 pandemic: a national cross-sectional survey study. *EClinicalMedicine, 35*.

Prins, S. J., McKetta, S., Platt, J., Muntaner, C., Keyes, K. M., & Bates, L. M. (2019). Mental illness, drinking, and the social division and structure of labor in the United States: 2003-2015. *American Journal of Industrial Medicine, 62*(2), 131–144. https://doi.org/10.1002/ajim.22935

Prins, S. J., McKetta, S., Platt, J., Muntaner, C., Keyes, K. M., & Bates, L. M. (2021). The serpent of their agonies: exploitation as structural determinant of mental illness. *Epidemiology, 32*(2), 303–309. https://doi.org/10.1097/ede.0000000000001304

Que, J., Shi, L., Deng, J., Liu, J., Zhang, L., Wu, S., Gong, Y., Huang, W., Yuan, K., & Yan, W. (2020). Psychological impact of the COVID-19 pandemic on healthcare workers: A cross-sectional study in China. *General Psychiatry, 33*(3).

Rauvola, R. S., Vega, D. M., & Lavigne, K. N. (2019). Compassion Fatigue, Secondary Traumatic Stress, and Vicarious Traumatization: A Qualitative Review and Research Agenda. *Occupational Health Science, 3*, 297–336. https://doi.org/10.1007/s41542-019-00045-1

Ruiz-Fernández, M. D., Ramos-Pichardo, J. D., Ibáñez-Masero, O., Cabrera-Troya, J., Carmona-Rega, M. I., & Ortega-Galán, Á. M. (2020). Compassion fatigue, burnout, compassion satisfaction and perceived stress in healthcare professionals during the COVID-19 health crisis in Spain. *Journal of Clinical Nursing, 29*(21–22), 4321–4330.

SAMHSA. (2020). Results from the 2019 National Survey on Drug Use and Health: Detailed Tables. https://www.samhsa.gov/data/report/2019-nsduh-detailed-tables.

Sanghera, J., Pattani, N., Hashmi, Y., Varley, K. F., Cheruvu, M. S., Bradley, A., & Burke, J. R. (2020). The impact of SARS-CoV-2 on the mental health of healthcare workers in a hospital setting - A Systematic Review. *Journal of Occupational Health, 62*(1), Article e12175. https://doi.org/10.1002/1348-9585.12175

Shah, M. K., Gandrakota, N., Cimiotti, J. P., Ghose, N., Moore, M., & Ali, M. K. (2021). Prevalence of and factors associated with nurse burnout in the US. *JAMA Network Open, 4*(6), Article e2111197. https://doi.org/10.1001/jamanetworkopen.2021.11197

Sorensen, G., Dennerlein, J. T., Peters, S. E., Sabbath, E. L., Kelly, E. L., & Wagner, G. R. (2021). The future of research on work, safety, health, and wellbeing: A guiding conceptual framework. *Social Science and Medicine, 269*, Article 113593. https://doi.org/10.1016/j.socscimed.-2020.113593

Spear, S. E., Shedlin, M., Gilberti, B., Fiellin, M., & McNeely, J. (2016). Feasibility and acceptability of an audio computer-assisted self-interview version of the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) in primary care patients. *Substance Abuse, 37*(2), 299–305. https://doi.org/10.1080/08897077.2015.1062460

Stamm, B. H. (2010). *The concise ProQOL manual.* Pocatello, ID: ProQOL.org.

U.S. Bureau of Labor Statistics. (2021). Workforce statistics. https://www.bls.gov/iag/tgs/iag62-.htm#workforce.

U.S. Census Bureau. (2021). 2020 American Community Survey Subject Table: Class of worker by sex and median earnings in the past 12 months for the civilian employed population 16 years and over. https://www.census.gov/acs/www/data/data-tables-and-tools/subject-tables/.

Waruru, A. K., Nduati, R., & Tylleskär, T. (2005). Audio computer-assisted self-interviewing (ACASI) may avert socially desirable responses about infant feeding in the context of HIV. *BMC Medical Informatics and Decision Making, 5*, 24. https://doi.org/10.1186/1472-6947-5-24

WHO Assist Working Group. (2002). The Alcohol, Smoking and Substance Involvement Screening Test (ASSIST): Development, reliability, and feasibility. *Addiction, 97*(9), 1183–1194. https://doi.org/10.1046/j.1360-0443.2002.00185.x

World Health Organization. International Classification of Diseases 11th Revision. Retrieved 16 April 2024 from https://icd.who.int/en.

Xie, W., Chen, L., Feng, F., Okoli, C. T. C., Tang, P., Zeng, L., Jin, M., Zhang, Y., & Wang, J. (2021). The prevalence of compassion satisfaction and compassion fatigue among nurses: A systematic review and meta-analysis. *International Journal of Nursing Studies, 120*, Article 103973. https://doi.org/10.1016/j.ijnurstu.2021.103973