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Moral injury and substance use among United States healthcare workers

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Abstract

Moral injury (i.e., perpetrating, witnessing, failing to prevent, or being a victim of acts that transgress one's moral beliefs, values, or ethics) has largely been studied in military-connected populations and is associated with a range of adverse psychological sequelae. Emerging literature suggests that healthcare workers also experience moral injury, particularly in the context of the ongoing COVID-19 pandemic. However, it is not known if moral injury contributes to substance use among healthcare workers or whether these effects might differ by gender, race/ethnicity, or occupational level. In March 2022, we collected self-reported pilot data from a diverse sample of US healthcare workers (N = 200) We examined the cross-sectional relationships between moral injury and several measures of substance use (i.e., current non-medical use of prescription drugs [NMUPD], current cannabis use, current use of other illicit drugs, and hazardous drinking) using separate logistic regression models. Next, we used separate interaction models to examine if any of these relations differed by gender, race/ethnicity, or occupational level. In main effects models, healthcare workers reporting greater moral injury had greater odds of current NMUPD (adjusted odds ratio (aOR) = 1.07; $p < 0.001$), current use of other illicit drugs (aOR = 1.09; $p < 0.01$), and hazardous drinking (aOR = 1.07; $p < 0.01$). These relations did not differ by race/ethnicity or occupational level ($ps > 0.05$); however, men were more likely to report current NMUPD and hazardous drinking ($ps < 0.05$) in the presence of high moral injury than women healthcare workers. Our findings suggest that healthcare workers experience substantial distress related to morally injurious events, which may affect their likelihood of NMUPD, cannabis use, use of other illicit drugs, and hazardous drinking, and that men in healthcare may be particularly at risk. Healthcare organizations should address systemic issues driving moral injury (e.g., resource shortages, lack of psychosocial support) to prevent substance-related harms among healthcare workers.

KEYWORDS
hazardous drinking, healthcare workers, moral injury, substance use

1 | INTRODUCTION

Moral injury has historically been associated with and studied in military-connected populations (i.e., veterans, current military service members) and is defined as the long-lasting harm to an individual resulting from a potentially morally injurious event (PMIE) (Litz et al., 2009). Potentially morally injurious events are instances of "perpetrating, failing to prevent, or bearing witness to acts that transgress deeply held moral beliefs and expectations (Litz et al., 2009)." Noting that shame and anxiety of pending judgement are typically associated with moral injury, Litz et al. (2009) detail three characteristics of a PMIE: (1) that it be global (i.e., not tied to any specific context(s)), (2) internal, similar to a character attribute as opposed to circumstantial, and (3) stable or ongoing. However, recent events—particularly the COVID-19 pandemic—have further highlighted that PMIEs exist in various spheres and occupations, and a detailed examination of moral injury in civilian populations is warranted (Fani et al., 2021; Koenig & Al Zaben, 2021; Lathan et al., 2022).

For example, Fani et al. (2021) examined how moral injury is related to and distinct from trauma and posttraumatic stress symptomatology among a sample of civilians and demonstrated that although moral injury is associated with trauma exposure and posttraumatic stress, it is a distinct construct that is similarly associated with externalising sequelae, including suicide attempts (Fani et al., 2021). More research is needed to assess the role of moral injury in other externalising behaviours, including substance use. Additionally, a recent study investigating the relationship between moral injury and autonomic system dysregulation among a diverse sample of civilians suggests that PMIEs may independently contribute to stress-related problems with autonomic regulation including heart rate variability (Lathan et al., 2022). Moreover, additional studies (Hall et al., 2022; Nieuwsma et al., 2022) describe the similarities between military and healthcare contexts, specifically noting the high-stress circumstances and clear exposure to moral injury. Taken together, these studies suggest that PMIEs may have significant effects on the health and well-being of non-military populations through a number of pathways. While moral injury and posttraumatic stress disorder (PTSD) do share some overlapping causes and symptoms, they are best understood as distinct concepts. Litz et al. (2022) have highlighted the importance of recognising and distinguishing between the mechanisms acting behind each concept, particularly as moral injury relates to concepts of the self, while PTSD is linked to a traumatic event. For instance, many events that cause PTSD are life-threatening or sexually violent; however, PMIEs may appear in many forms, not only those instances that share these two characteristics (Litz et al., 2022).

Research has illustrated similarities between military populations and healthcare workers, particularly as it relates to issues of mental health and seeking care (Gardiner & Gardiner, 2020). While the connections between clinically observable outcomes (e.g., mental health sequelae) and moral injury have been well documented in military-contexts (Hall et al., 2022), burgeoning research suggests that moral injury is relevant to healthcare worker populations as well (Nieuwsma et al., 2022). Moreover, Hines et al. (2021) describe how moral injury severity reported by healthcare workers during the COVID-19 pandemic is comparable to that of military-service members after deployment.

Healthcare workers' experiences in the workplace may have deleterious effects on their well-being, including the use of substances. For example, a study examining healthcare workers' alcohol use behaviours after the 2003 severe acute respiratory syndrome outbreak in China demonstrated that rates of problematic alcohol use among healthcare workers, while typically at similar rates to the general population, increased in the years immediately following the outbreak (Wu et al., 2008). This study suggests substance use may be driven by PMIEs, such as prolonged periods of heightened stress, exposure to infectious diseases, and increased interaction with death and despair (Wu et al., 2008). The effects of these types of exposures might also have prolonged effects on healthcare workers' substance use behaviours. For example, a study of first responders suggests that collectively traumatic events (those events that are shared by a community) may contribute to an increase in alcohol consumption that is sustained for long periods of time (Homish et al., 2012).

There is substantial evidence that work-related stressors affect the mental health and coping mechanisms of healthcare workers (e.g., Medisauskaite & Kamau, 2019; Miller, 2021; Sriharan et al., 2021; Widjaja et al., 2020; Williamson et al., 2018). For example, a study of health effects caused by occupational distress among doctors in the United Kingdom showed high rates of health-related issues, such as substance use and other ill-health complications, were associated with occupational distress (Medisauskaite & Kamau, 2019). While occupational distress in general can lead to heightened ill-health outcomes, it has not been well documented what effect the increase of distress-inducing PMIEs caused by the COVID-19 pandemic has had on substance use and mental health challenges faced by healthcare workers.

It is clear, however, that COVID-19 has increased workplace stress among healthcare workers (Orrù et al., 2021; Sorokin et al., 2020; Spoorthy et al., 2020). Although stress, psychological well-being, and substance use have been well-studied in physicians (e.g., Abdulah & Musa, 2020; Huggard & Unit, 2013; Medisauskaite & Kamau, 2019; Myran et al., 2022; The Lancet, 2019; West et al., 2018; Yates, 2020), little attention has been paid to other types of healthcare workers, particularly those in lower-wage occupations (e.g., dietary aides, custodians, nursing aides, etc.). The pandemic has heightened many pre-existing and distressing elements of working in the healthcare field—including experiencing PMIEs—such as severe human suffering and death, staffing and resource shortages, among others. Not only has distress increased among healthcare workers, but emerging research suggests that healthcare workers have experienced increased moral injury in the context of the COVID-19 pandemic, and it is associated with various internalising and externalising sequelae, such as some mental health symptomatology (Hegarty et al., 2022; Hines et al., 2021; Plouffe et al., 2021; Spilg et al., 2022).

Importantly, there appear to be gender-based differences in the experiences and understandings of moral injury (Maguen

et al., 2020). In a national sample of veterans (serving post-9/11), Maguen and colleagues ran gender-stratified analyses to determine if there are gender-based differences in the prevalence of exposure to PMIEs based on the accepted aforementioned definition of moral injury. Results suggest that there are significant differences in moral injury based on gender: women more frequently reported PMIEs they witnessed or instances when they were betrayed by other servicemembers or leaders, whereas men and women were equally likely to report moral injury relating to *perpetrating* a morally injurious act. Additionally, they found gender-based differences relating to experiencing PMIEs and the associated outcomes: witnessing and betrayal seemed to drive impairment or other potentially self-harming outcomes in women, whereas men had significant distress associated with all three types of PMIEs. Less is known about the gender-specific effects of moral injury in non-military populations.

Moreover, there is a dearth of research regarding the potential mitigating or exacerbating effects of other sociodemographic factors on moral injury, such as race/ethnicity and occupational level (e.g., high wage, high autonomy positions vs. other positions). Data from the National Health and Resilience in Veterans Study, a nationally representative population-based study, suggests that white, higher income, and college-educated veterans experience lower levels of moral injury (Wisco et al., 2017), suggesting that structural racism and classism, which are entangled and prevalent in the workplace (Bailey et al., 2017; Byrd et al., 2018), may exacerbate the effects PMIEs on adverse health outcomes. However, the authors of this study note that there is a lack of research in this area. The role that these characteristics might play in the relation between moral injury and substance use in non-military populations is largely unknown. However, elucidating these possible relations might inform more effective prevention and intervention efforts that protect the health and well-being of healthcare workers.

1.1 | Current study

Despite the clear need for evaluating the effects of PMIEs in non-military populations, there have been few studies examining moral injury in healthcare workers, and even less is known about the potential effect of moral injury on substance use among this group. Further, much less is known about how demographic factors (i.e., race/ethnicity, gender, occupational level) might modify the relation between moral injury and its adverse sequelae. Thus, in this pilot study, we surveyed a diverse group of healthcare workers to assess the relations between exposure to PMIEs and several substance-related outcomes (i.e., non-medical use of prescription drugs [NMUPD], cannabis use, illicit drug use, and hazardous drinking). We hypothesised that greater moral injury would be associated with a higher likelihood of substance use. Additionally, we exploratorily examined the potential moderating effects of several demographic characteristics (e.g., gender, occupation level) in an effort to discover any interplay, or lack thereof, between these individual characteristics, moral injury, and subsequent outcomes.

2 | METHODS

2.1 | Participants and procedure

We conducted a pilot study in March of 2022 and recruited a diverse sample of US healthcare workers ($N = 200$) using targeted social media recruitment methods. 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." Participants needed to be at least 18 years old and currently working for wages in the US within at least one of the following healthcare settings: hospital, ambulatory or outpatient clinic, nursing or residential facility, social assistance programme, and/or home healthcare. Additionally, participants also needed to be able to read and understand the English language and indicate their ability and willingness to participate in the current study. We recruited a total of 284 healthcare workers who were eligible for inclusion. Of these 284 healthcare workers, 200 (70.4%) agreed to participate and completed the survey. We conducted sensitivity analyses and did not find any statistically significant differences in age, gender identity, or work setting between participants who were eligible and participated and participants who were eligible but chose not to participate. All eligible participants who agreed to participate provided informed consent and completed a single online survey, which took approximately 1 hour to complete. Upon completion of the survey, participants were compensated in the form of an electronic $50 gift card. The study protocol was approved by the Institutional Review Board of the University of Illinois Urbana-Champaign.

The pilot study sample worked in a variety of healthcare settings, including ambulatory/outpatient clinics, home healthcare, hospitals, social assistance programs, and nursing/residential facilities. These healthcare workers were employed in a broad range of occupations, including healthcare support roles (e.g., nursing assistants, dietary aides, administrative support staff), licenced practical nurses, registered nurses, psychologists, case managers, social workers, physical therapists, mid-level providers (e.g., nurse practitioners, physician assistants), both resident and attending physicians, pharmacists, dentists, as well as healthcare administrators. Overall, the sample represented 28 different US states plus Washington, DC. This sample of healthcare workers ranged in age from 19 to 58 years, included men ($n = 65$), women ($n = 133$), and non-binary/genderqueer people ($n = 2$), and the sample was racially and ethnically diverse. Additional details regarding the study sample are shown in Table 1.

2.2 | Measures

2.2.1 | Moral injury

To assess moral injury, we used a modified version of the Moral Injury Events Scale (Nash et al., 2013). Consistent with other work (Hines et al., 2021), the measure's instructions and item-specific language were modified to reflect healthcare workers (e.g., "…your

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 Native 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)
Occupational level	--
Prescriber/Administrator	24.5% (49)
Other healthcare worker	75.5% (151)

Abbreviation: SD, standard deviation.

experiences as a *healthcare worker*" and "I feel betrayed by others outside the *healthcare industry*"), as the original measure was developed for use in military populations. The Moral Injury Events Scale contains 9 items assessing perceived transgressions of self/others and perceived betrayals by others on a 6-point Likert scale with total scores ranging from 9 to 54. For ease of interpretation, we reverse coded each item (6: strongly agree, 5: agree, 4: somewhat agree, 3: somewhat disagree, 2: disagree, 1: strongly disagree) such that individual item and total scores are indicative of greater moral injury (Supplemental Table S1). This measure showed good internal consistency in our sample ($\alpha = 0.93$).

2.2.2 | Drug use

We assessed healthcare workers' drug use, including NMUPD, cannabis use, and illicit drug use (excluding cannabis) in the past 3 months with the National Institute on Drug Abuse Modified Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST), which has been shown to be valid and reliable across a diverse range of settings and cultures (WHO ASSIST Working Group, 2002). Non-medical use of prescription drugs was defined 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." NMUPD was assessed with the following question: "In the past 3 months, how often have you used [substance]?" Any use in the past 3 months was considered a positive screen for current NMUPD and was dichotomised (no/yes). Given that cannabis has been decriminalised in many US states, we examined cannabis use separately from other 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 following question: "In the past 3 months, how often have you used [substance]?" Any use of the substance in the past 3 months was considered a positive screen for current use. We dichotomised current cannabis use and current illicit drug use (no/yes).

2.2.3 | Hazardous drinking

To assess whether healthcare workers' engaged in hazardous drinking, we used the Alcohol Use Disorders Identification Test (AUDIT), a 10-item measure of the frequency of alcohol use and alcohol-related consequences (Babor & Del Boca, 1992; Saunders et al., 1993). Example items include "How often during the last year have you found that you were not able to stop drinking once you had started?" and "How often during the last year have you been unable to remember what happened the night before because you had been drinking?" Items on the AUDIT are scored 0–4 on a Likert scale with responses ranging from "Never" to "Daily or Almost Daily," and summary scores range from 0–40, with higher scores indicating greater alcohol problems. Scores greater than 8 are indicative of hazardous drinking (Babor & Del Boca, 1992; Saunders et al., 1993). The AUDIT had good internal consistency in our sample ($\alpha = 0.86$). A cut point of 8 was used to dichotomise AUDIT score into hazardous drinking (no/yes).

2.2.4 | Gender

All participants self-reported their gender identity. Response options included (1) man, (2) woman, and (3) non-binary, genderqueer, or other gender. Given the small number of gender minority participants ($n = 2$), these participants were excluded from models in which gender was a focal correlate (i.e., interaction models by gender). We did not exclude these participants from other models.

2.2.5 | Race/ethnicity

Healthcare workers separately reported their race and ethnicity. We then created a composite race/ethnicity variable with the following categories: non-Hispanic white, non-Hispanic Black, non-Hispanic Asian, non-Hispanic Native American Indian or Alaska Native, Hispanic or Latinx, and Other.

2.2.6 | Occupational level

We asked participants to report their type of occupation in the healthcare sector. To capture the potential differences between the high-earning high-autonomy positions from other roles, we first grouped together healthcare administrators and prescribers (e.g., physicians, nurse practitioners, physician assistants) and then grouped other healthcare professionals together (e.g., registered nurses, nursing assistants, dietary aides, administrative support staff), resulting in a dichotomous occupational level variable (healthcare administrator/prescriber vs. other healthcare worker), consistent with prior work (Hoopsick et al., 2023).

2.2.7 | Covariates

There are several factors that might confound the association between moral injury and substance use among healthcare workers. Given the prevalence of different substance use among different demographic groups (SAMHSA, 2020) and differing levels of work-related stress and psychological sequelae among healthcare workers among different healthcare worker subpopulations (Pappa et al., 2020; Shah et al., 2021), we included age (years), years worked in current job (less than 1 year, 1–5 years, 6–10 years, 11–20 years, more than 20 years), education level (high school diploma/GED, some college, associate's or other technical 2-year degree programme, bachelor's degree or other 4-year programme, and graduate or professional programme), annual family income (less than $10,000;

$10,000–$19,999; $20,000–$29,999; $30,000–$39,999; $40,000–$49,999; $50,000–$74,999; $75,000–$99,999; $100,000–$149,999, and $150,000 or more), and work setting (hospital vs. other) in our adjusted models.

2.2.8 | Analytic plan

First, we used descriptive statistics to characterise our sample. Next, we examined the main effects of moral injury on several measures of current drug use (i.e., NMUPD, cannabis use, illicit drug use) using separate logistic regression models. Odds ratios (ORs) and 95% confidence intervals (CIs) are reported. We then added age, years worked in current job, education level, annual family income, and work setting (hospital vs. other) as covariates to each regression model and report adjusted odds ratios (aORs) and 95% CIs. We then added separate interaction terms to each fully adjusted model representing the cross-products of moral injury with gender, race/ethnicity, and occupational level (healthcare administrator/prescriber vs. other healthcare worker) to examine for differences in the relations between moral injury and each substance use outcome on the basis of these three characteristics. Finally, to better understand statistically significant interactions, we examined predictive margins and plotted the predicted probability of the substance use outcome by moral injury and the third factor.

3 | RESULTS

3.1 | Descriptive results

Substance use was prevalent among this sample of healthcare workers. More than 1 in 5 participants (21.0%) reported current NMUPD. Among the healthcare workers who endorsed NMUPD ($n = 42$), 78.6% reported non-medical use of prescription sedatives and sleeping medications (e.g., Valium, Serepax, Ativan, Xanax), 26.2% reported non-medical use of prescription stimulants (e.g., Ritalin, Concerta, Dexedrine, Adderall), and 7.1% reported non-medical use of other psychotropic medications (e.g., Zoloft, Trazodone, Lamictal, Seroquel). Additionally, 29.0% of the sample reported current use of cannabis and 7.0% reported currently using illicit drugs (excluding cannabis). Moreover, the mean (± standard deviation [SD]) AUDIT score was 4.7 (±5.7) and 17.0% of the sample had an AUDIT score greater than 8, indicative of hazardous drinking (Babor & Del Boca, 1992; Saunders et al., 1993). The mean (±SD) Moral Injury Events Scale score was 23.8 (±12.1). Mean moral injury scores were significantly higher among those reporting NMUPD ($p < 0.001$; Figure 1), cannabis use ($p < 0.01$), illicit drug use ($p < 0.001$), and hazardous drinking ($p < 0.001$).

3.2 | Main effects of moral injury on substance use

Greater moral injury was associated with higher odds of current NMUPD (OR = 1.08, 95% CI: 1.04, 1.11; Table 2), cannabis use (OR = 1.04, 95% CI: 1.01, 1.06), illicit drug use (OR = 1.09, 95% CI: 1.04, 1.14), and hazardous drinking (OR = 1.08, 95% CI: 1.04, 1.11). After controlling for age, years in job, education level, family income, and hospital work setting (yes/no), higher moral injury scores remained significantly associated with greater odds of current NMUPD (aOR = 1.07, 95% CI: 1.04, 1.11; Table 2), illicit drug use (aOR = 1.09, 95% CI: 1.01, 1.17), and hazardous drinking (aOR = 1.07, 95% CI: 1.03, 1.11), but not cannabis use (aOR = 1.02, 95% CI: 0.99, 1.06).

3.3 | Interaction effects of moral injury and sociodemographic factors on substance use

There was a statistically significant interaction between moral injury and gender on NMUPD (aOR = 1.05, 95% CI: 1.01, 1.09), such that there was a stronger positive relation between moral injury and odds of NMUPD among men than among women (Figure 2). Similarly, there was a significant interaction between moral injury and gender on hazardous drinking (aOR = 1.04, 95% CI: 1.01, 1.09), with increasing moral injury score being strongly associated with

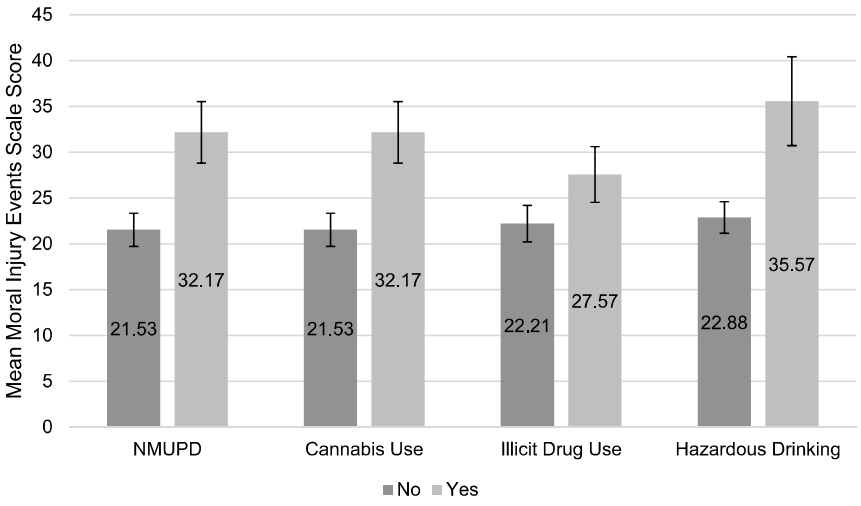

FIGURE 1 Mean Moral Injury Events Scale score by substance use status.

TABLE 2 Main effects of moral injury on substance use.

	Non-medical use of prescription drugs		Cannabis use		Illicit drug use		Hazardous drinking	
	OR (95% CI)	aOR (95% CI)	OR (95% CI)	aOR (95% CI)	OR (95% CI)	aOR (95% CI)	OR (95% CI)	aOR (95% CI)
Moral injury	1.08*** (1.04, 1.11)	1.07*** (1.04, 1.11)	1.04** (1.01, 1.06)	1.02 (0.99, 1.06)	1.09** (1.04, 1.14)	1.09** (1.01, 1.17)	1.08*** (1.04, 1.11)	1.07** (1.03, 1.11)

Note: Adjusted models control for age, years in job, education level, family income, hospital work setting (yes/no).
Abbreviations: aOR, adjusted odds ratio; CI, confidence interval; OR, odds ratio.
*$p < 0.05$; **$p < 0.01$; ***$p < 0.01$.

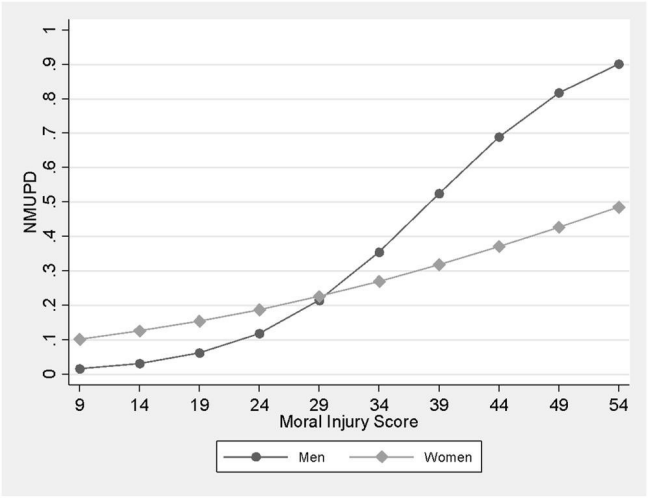

FIGURE 2 Predicted probability of non-medical use of prescription drugs (NMUPD) by Moral Injury Events Scale score and gender.

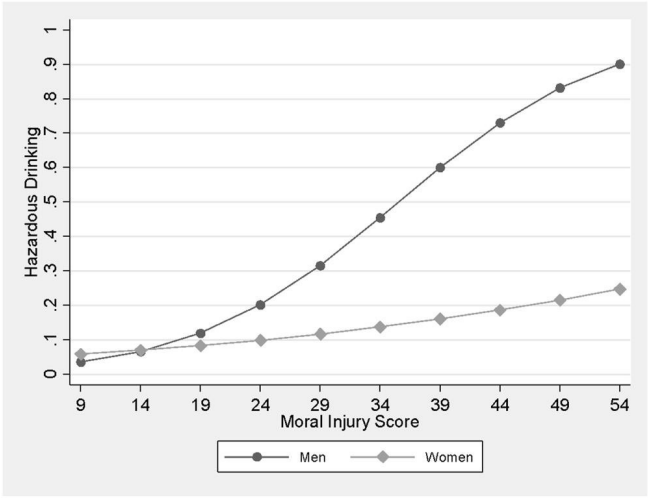

FIGURE 3 Predicted probability of cannabis use by Moral Injury Events Scale score and gender.

hazardous drinking among men and more modestly among women (Figure 3). However, there were no statistically significant interactions between moral injury and gender on cannabis use or illicit drug use (*ps* > 0.05). There were no interactions between moral injury and race/ethnicity or moral injury and occupational level on any of the substance use outcomes (*ps* > 0.05).

4 | DISCUSSION

Results of the current study suggest that healthcare workers across a wide range of occupations experience moral injury and that greater moral injury among these healthcare workers is associated with higher odds of NMUPD, illicit drug use, and hazardous drinking. While much work surrounding moral injury in the past has focused on military populations, our results join the chorus of research that suggests that PMIEs are prevalent among healthcare workers and may have deleterious effects on their health and well-being. Taken together with findings from other non-military samples (Hegarty et al., 2022; Hines et al., 2021; Plouffe et al., 2021; Spilg et al., 2022), our findings suggest that PMIEs need not arise in wartime, but instead appear to be related to a transgression of one's personal sense of right/wrong, regardless of setting. Moreover, Litz et al. (2009) note that "chronic collateral manifestations of moral injury may include: *self-harming behaviours*, such as poor self-care, *alcohol and drug abuse*, severe recklessness, and parasuicidal behaviours." It is possible that the healthcare workers in the current study engaged in the use of substances to cope with moral injury experienced in the workplace. A growing body of research (Hegarty et al., 2022; Hines et al., 2021; Plouffe et al., 2021; Spilg et al., 2022) suggests that there are relationships between moral injury and various *internalising* sequelae, such as certain mental health symptomatology. To our knowledge, this is the first study to explore *externalising* sequelae (i.e., substance use behaviours) of moral injury among healthcare workers, focusing on the potential self-coping behaviours associated with moral injury. Indeed, in their systematic review, Hall, et al. (2022), noted studies detailing externalising sequelae exist mainly within military populations. However, our study of healthcare workers shows similar results to those described in Hall's review. While there is notable variability, positive associations between moral injury concepts and greater alcohol use persisted in all of the germane studies (Hall, et al., included), and our results similarly show significant relations between moral injury and greater hazardous alcohol use. Additionally, we found associations between moral injury and sedative use, matching results by Feingold, et al. (2019).

Importantly, our results suggest that there are differential effects of moral injury on some substance use outcomes based on gender. Specifically, we found that men working in healthcare settings are more likely to report current NMUPD and hazardous drinking as moral injury increases, but this effect was not present or was diminished among women. These findings are in line with previous studies of gender differences in experiences of moral injury in military-connected populations (Maguen et al., 2020). As additional research has shown, women are more likely to engage in internalising behaviours than men (Maguen et al., 2010, 2020; Rosenfield, 1999, 2000). Our results underscore the need for further study into the differences in experiences of PMIEs and related ill-health outcomes, which would be beneficial to creating and sustaining supports for healthcare workers. We did not observe any statistically significant interactions between moral injury and occupational level on substance use, suggesting that greater moral injury may increase the likelihood of substance use among healthcare workers, regardless of race/ethnicity and occupational level. While limited research suggests that there may be differences in the severity of experienced PMIEs according to race/ethnicity and other sociodemographic factors, there are no other studies examining these differential effects on substance use. While we found no statistically significant interactions between moral injury and race/ethnicity or occupational level, more research is needed on this subject.

Our results, detailed above, show the ability of moral injury theory to be useful in determining various mental health sequelae outside of military-connected populations. Our data shows that PMIEs indeed also impact healthcare workers, which may lead to adverse health outcomes, including substance use and hazardous drinking. Our work also confirms much in existing moral injury theory, extends the theory into non-military connected populations, and suggests that an expanded understanding of moral injury theory may help with the creation of supports to help alleviate externalising sequelae among healthcare workers. With a deepened and expanded understanding of moral injury in civilian populations, research can be conducted to help define the boundaries of moral injury, its precursors, and its related sequelae.

4.1 | Limitations

As with all research, there are limitations associated with our study. First, the use of cross-sectional data makes it difficult to draw causal relationships between factors. It is possible that other factors may explain the relationships observed here. Additionally, the use of self-reported information may lead to self-report bias. However, we used validated measures of substance use and confidential computer-assisted interviewing, which has been shown to produce accurate estimates of substance use 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 over face-to-face interview methods (Perlis et al., 2004; Waruru et al., 2005). Our pilot data also rely on a convenience sample of healthcare workers who saw our ad requesting participation in a study relating to stress in healthcare workers. While this could have led to adverse selection issues and limited the generalisability of our findings to healthcare workers more broadly, our sample was quite diverse, even across geography. Approximately 60% of the sample were women; however, this is in line with current healthcare worker populations, where women are in the majority (U. S. Census Bureau, 2021), which is important in the context of our findings regarding the potential moderating effect of gender. Lastly, we used a modified moral injury scale that was previously only validated in military populations, but studies among other healthcare workers lend confidence to the use of this adapted measure.

4.2 | Conclusions and future directions

Results from the current study suggest that many healthcare workers experience moral injury and that greater moral injury is associated with higher odds of the use of a range of substances, particularly among men. Because much is yet to be learnt about the relationship between moral injury and substance use, studies with larger sample sizes and those examining the longitudinal effects of moral injury on substance use are warranted. Moreover, qualitative studies that might be able to elucidate the underlying drivers and mechanisms of moral injury in healthcare settings are also needed.

CONFLICT OF INTEREST STATEMENT

On behalf of all authors, the corresponding author states that there is no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study will be made available upon request from the senior author, RAH.

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SUPPORTING INFORMATION

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