



Moral injury and mental health outcomes among Israeli health and social care workers during the COVID-19 pandemic: a latent class analysis approach

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ABSTRACT

Background: The COVID-19 pandemic poses unique challenges to health and social care workers (HSCWs) who face morally challenging and life-threatening decisions. Following exposure to events that transgress moral beliefs and expectations, HSCWs might experience psychological, social, and spiritual problems referred to as Moral Injury (MI).

Objective: The objectives of this study were to examine patterns of exposure to potentially morally injurious events (PMIEs) among HSCWs and their associations with MI, mental health outcomes and psychological correlates.

Method: A sample of 296 Israeli HSCWs volunteered to complete a cross-sectional electronic survey with validated self-report questionnaires in February and March 2021. Latent Class Analysis (LCA) was used to identify classes characterized by unique patterns of exposure to PMIEs. Socio-demographic, work and COVID-related variables were used to predict patterns of exposure to PMIEs, and differences in mental-health outcomes and psychological correlates between classes were assessed.

Results: Three subgroups were identified: 'high exposure' (19.5%), 'betrayal-only' (31.3%), and 'minimal exposure' (49.4%). Perceived stress increases the odds for inclusion in the 'high exposure' and 'betrayal-only' classes. Participants in both the High Exposure class and the betrayal-only classes reported higher levels of depressive, anxiety, posttraumatic and more moral injury symptoms as compared to the 'minimal exposure' class. Importantly, both 'high exposure' and 'betrayal-only' classes reported lower levels of self-compassion and higher levels of self-criticism, relative to those in the 'minimal exposure' class.

Conclusions: The study's findings offer an overview of the complex associations between patterns of exposure to PMIEs and associated predictors and outcomes. Clinicians treating HSCWs coping with COVID-19 related stress should be aware of the contribution of exposure to PMIEs to HSCWs' distress and to the unique constellation of high self-criticism and low self-compassion among HSCWs with exposure to PMIEs.

ARTICLE HISTORY

Received 27 April 2021
Revised 2 June 2021
Accepted 9 June 2021

KEYWORDS

Moral injury; betrayal; PTSD; COVID-19; healthcare workers

PALABRAS CLAVE

Daño moral; traición; TEPT; COVID-19; trabajadores de salud

关键词

道德伤害; 背叛; PTSD; COVID-19; 医护人员

HIGHLIGHTS

- We examined moral injury among medical staff during COVID-19 pandemic.
- Three classes were identified: High Exposure (HE), Betrayal-Only (BO), and Minimal Exposure (ME).
- HE and BO classes reported more psychopathology, low self-compassion and high self-criticism.

Daño moral y consecuencias sobre la salud mental en trabajadores sociales y de la salud israelíes durante la pandemia por la COVID-19: Una aproximación mediante análisis de clase latente

Antecedentes: La pandemia por la COVID-19 presenta desafíos únicos para los trabajadores sociales y de la salud (TSSs), quienes atraviesan decisiones moralmente desafiantes y potencialmente mortales. Luego de la exposición a eventos que transgreden las creencias y expectativas morales, los TSSs podrían experimentar problemas psicológicos, sociales y espirituales conocidos como daño moral (DM).

Objetivo: Los objetivos de este estudio fueron el evaluar los patrones de exposición a eventos potencialmente dañinos para la moral (EPDMs) en los TSSs y el evaluar sus asociaciones con el DM, con consecuencias para la salud mental y con correlatos psicológicos.

Métodos: Se constituyó una muestra de 296 TSSs israelíes voluntarios, la cual completó un sondeo electrónico transversal de cuestionarios de autorreporte durante febrero y marzo del 2021. Se empleó el análisis de clase latente (ACL) para identificar clases caracterizadas por patrones únicos de exposición a EPDMs. Se emplearon variantes sociodemográficas, laborales y asociadas a la COVID-19 para predecir patrones de exposición a EPDMs. También se evaluaron las diferencias en las consecuencias sobre la salud mental y correlatos psicológicos entre las clases.

Resultados: Se identificaron tres subgrupos: 'Alta exposición' (19,5%), 'solo traición' (31,3%) y 'exposición mínima' (49,4%). El estrés percibido incrementa el riesgo para ser incluido en las clases de 'alta exposición' y de 'solo traición'. Los participantes tanto de la clase de 'alta exposición' como de 'solo traición' reportaron niveles más altos de síntomas depresivos, de ansiedad, postraumáticos y de daño moral comparado con la clase de 'exposición mínima'. De manera importante, tanto la clase de 'alta exposición' como la de 'solo traición' reportaron niveles más bajos de autocompasión y niveles más altos de autocrítica en comparación con la clase de 'exposición mínima'.

Conclusiones: Los hallazgos del estudio revelan el panorama de las asociaciones complejas entre los patrones de exposición a EPDMs y predictores y consecuencias asociadas. Los clínicos que tratan a los TSSs que afrontan estrés asociado a la COVID-19 deberían estar informados respecto a la contribución que tiene la exposición a EPDMs sobre el estrés de los TSSs y respecto a la singular constelación de una alta autocrítica y baja autocompasión entre los TSSs con exposición a EPDMs.

COVID-19 疫情期间以色列卫生和社会护理工作者的道德伤害和心理健康

结果: 潜在类别分析方法

背景: COVID-19 疫情给面对道德挑战和危及生命决定的卫生和社会护理人员 (HSCW) 带来了独特的挑战。在暴露于违反道德信念和期待的事件之后, HSCW 可能会遇到心理, 社会和精神问题, 称为道德伤害 (MI)。

目的: 本研究旨在考查 HSCW 暴露于潜在道德伤害事件 (PMIE) 的模式及其与 MI, 心理健康结果和心理相关因素的关联。

方法: 一个 296 名以色列 HSCW 的样本在 2021 年 2 月和 2021 年 3 月自愿使用经过验证的自我报告问卷完成了横断面电子调查。潜在类别分析 (LCA) 用于识别以暴露于 PMIE 的独特模式为特征类别。社会人口统计学, 工作和 COVID 相关变量被用来预测暴露于 PMIE 的模式, 并评估了心理健康结果的差异和类别之间的心理相关因素。

结果: 识别出三个亚组: '高暴露' (19.5%), '仅背叛' (31.3%) 和 '最低暴露' (49.4%)。感知压力增加了被归为 '高暴露' 和 '仅背叛' 类别的几率。与 '最低暴露' 类别相比, 高暴露类和仅背叛类的参与者报告的抑郁, 焦虑, 创伤后和道德伤害症状水平更高。重要的是, 与 '最低暴露' 类别相比, '高暴露' 和 '仅背叛' 类别都报告了较低水平的自我同情和较高水平的自我批评。

结论: 本研究的发现概述了 PMIE 暴露模式与相关预测因子和结果之间的复杂关联。治疗应对 COVID-19 相关应激的 HSCW 的临床医生应该意识到暴露于 PMIE 对 HSCW 痛苦的贡献, 以及暴露于 PMIE 的 HSCW 中高自我批评和低自我同情的独特群集。

1. Introduction

The scientific exploration of the phenomenon of *moral injury* (MI; Litz et al., 2009) has rapidly increased over the last decade. While most studies to date focused primarily on military personnel (Griffin et al., 2019), other populations such as health and social care workers (HSCWs) are also known to be a population at risk for heightened exposure to *potentially morally injurious events* (PMIEs) that might trigger the development of MI complex and long-term ramifications (Williamson, Murphy, & Greenberg, 2020). In these unprecedented times of the COVID-19 pandemic, when HSCWs are routinely exposed to highly stressful (Greene et al., 2021) and morally challenging scenarios (Rodríguez, Agüero-Flores, Landa-Blanco, Agurcia, & Santos-Midence, 2021), the identification of frontline HSCWs classes who are more vulnerable to MI is timely. The present study aims to empirically explore patterns of exposure to PMIEs among HSCWs and their associations with socio-demographic, work and COVID-related variables, psychological risk/resiliency factors, MI symptoms, and varied mental health disorders.

MI is a trauma- and stressor-related phenomenon that represents a cause-and-effect process. It begins with exposure to PMIEs, which typically ended tragically, and that transgress deeply held value(s) in high-stake situations or violate one's conscience and integrity. The two main facets of PMIEs are 'self-based' PMIEs and 'others-based' PMIEs (Jordan, Eisen, Bolton, Nash, & Litz, 2017). The 'self-based' PMIEs usually incorporate perpetrating acts of commission

(e.g. violating the rules of engagement) and omission (failing to prevent expected malfeasance). The 'others-based' PMIEs usually incorporate direct and indirect exposure to others' transgressive behaviours (e.g. being a victim of commanders' perceived immoral decisions or experiencing betrayal by leaders) (Currier, Holland, Drescher, & Foy, 2015).

As opposed to traumatic events that might pose a life-threat, exposure to PMIEs has been proposed to trigger a significant moral dissonance. Thus, the individual's moral code and deeply held beliefs of right and wrong might be severely shaken (Litz et al., 2009). In the aftermath of such events, a significant minority who attribute their moral violation to a global, internal, and stable personality deficit, may experience painful moral emotions such as guilt and shame. Moreover, profound changes in cognitions and world assumptions (e.g. 'I am a rotten person'), and dysfunctional strategies such as self-condemnation to self-destruction, aimed to relieve moral pain, may possibly follow. Importantly, if left unresolved, these PMIEs might result in deep psychiatric, social, functional and spiritually aversive consequences (Farnsworth, Drescher, Evans, & Walser, 2017).

It is important to note the similarities and differences between the moral distress and moral injury concepts (Campbell, Ulrich, & Grady, 2018). Moral distress stems from coping with moral stressors, such as when individuals are obliged to act contrary to their beliefs. As a result of these stressors, demanding feelings might arise which are distressing but neither impairing nor incapacitating (Maffoni, Argentero,

Giorgi, Hynes, & Giardini, 2019). For example, to be subjected to an act of infidelity can lead to painful psychological experiences, but not to disabled functioning or a wholistic experience of the self as damaged. In terms of job-related distress, moral distress was mainly studied among nurses, and refers to situations where caregiving professionals fail to pursue the right course of action. MI, in contrast, is located at the extreme end of this continuum with exposure to PMIEs, which are the least frequent, but result with much stronger, harmful and chronic sequelae (Litz & Kerig, 2019).

According to standard psychiatric manuals (e.g. DSM-5; APA, 2013), MI is not considered a psychiatric disorder. Nevertheless, a growing body of empirical studies has pointed to associations between exposure to PMIEs and varied psychiatric symptomatology. The most studied link that has been found is with posttraumatic stress disorder (PTSD; Koenig, Youssef, & Pearce, 2019). Other studies have also documented direct associations with depressive symptoms (Levi-Belz, Greene, & Zerach, 2020), and destructive behaviours such as substance abuse (Currier et al., 2015) and suicidality (Bryan, Bryan, Morrow, Etienne, & Ray-Sannerud, 2014). Indeed, a recent review (Griffin et al., 2019) and a meta-analysis (Williamson, Stevelink, & Greenberg, 2018) found consistent associations between a PMIE and mental health outcomes such as PTSD, depression and suicidality, as well as other negative religious/spiritual sequelae. Preliminary results among military personnel (Currier et al., 2018) and healthcare professionals (Mantri, Lawson, Wang, & Koenig, 2020) have also suggested that exposure to PMIEs is associated with specific MI symptoms such as guilt and shame.

Exposure to PMIEs and its MI-related psychopathology has been examined mainly among veterans (e.g. Griffin et al., 2019). However, these experiences are not exclusive to combatants and might also impact other professions such as public safety personnel (e.g. police officers) and even journalists (Feinstein, Pavisian, & Storm, 2018). Importantly, HSCWs are routinely exposed to profound ethical and moral dilemmas in high-stake situations, and thus are also prone to be exposed to PMIEs and MI's deleterious consequences. For example, HSCWs might be exposed to life-threatening decisions and fatality-related events, in which a mistake might result in the death of a patient. HSCWs might fail to pursue the 'right' course of action when they need to allocate limited resources to equally needy patients, in times of healthcare system inequities and disparities. Indeed, preliminary results indicated that 7.8% of healthcare professional might experience clinically significant MI (Mantri et al., 2020), only to point to the large gap in literature regarding the link between exposure to PMIEs and MI-related mental health outcomes, particularly during the COVID-19 pandemic.

During the unprecedented COVID-19 pandemic (Maffoni et al., 2020), HSCWs are experiencing a complex set of challenges and risks. Beyond the dramatic increase in their workload, HSCWs are now working under difficult physical conditions such as wearing specialized protective clothing with heightened personal risk of being infected (Shanafelt, Ripp, & Trockel, 2020). HSCWs also stand at the frontline of delivering health care in stressful situations filled with uncertainty, while lacking enough supportive contact with their families and sometimes even their managers (Kang et al., 2020). It is come as no surprise that recent reports from China, the US and Europe have indicated high rates of psychopathology such as depression, anxiety and PTSD among HSCWs (e.g. Greene et al., 2021). Both qualitative (Catania et al., 2020) and quantitative studies (Braquehais et al., 2020) have identified unique risk factors such as concerns regarding appropriate personal protective equipment, direct work with confirmed patients or being infected with COVID, which contribute to the increased mental health problems.

Recent commentaries and personal accounts also recognized the unique workplace ethical and moral challenges and risks faced by HSCWs in the COVID-19 era (e.g. Greenberg, Docherty, Gnanapragasam, & Wessely, 2020). For example, concerns of infecting family members or of being exposed to numerous patients in their final moments awaiting death to arrive without any possible remedy. Moreover, HSCWs are exposed to the dissonance between the need to provide the best care while lacking proper knowledge, evidence and resources, or the need to balance personal physical and mental needs with the ethical value of caring for severely ill patients (Williamson et al., 2020). Therefore, a timely and urgent public health task is recognizing MI as a possible outcome of these experiences and its possible link to psychopathology.

Preliminary evidence for MI symptoms among healthcare professionals during the COVID-19 pandemic has recently come from China (Wang et al., 2020), Honduras (Rodríguez et al., 2021), and the US (Hines et al., 2021). The estimated prevalence of MI in China and Honduras was 41.3% and 45.6%, respectively. Greater risk for MI was observed among those who provided medical care to COVID-19 patients. MI was significantly associated with depression, anxiety and clinician burnout. Among the US sample, the sum of exposure to PMIEs was 16.15 (SD = 7.80; range = 9–54) and was significantly associated with sleep disturbance and proportion of inpatient clinical time. Although important, these results are limited by the fact that no study has assessed the link between exposure to PMIEs and MI symptoms, as well as other psychiatric disorders. Moreover, none have pointed to psychological factors that might be associated with

greater MI-related distress. It is now well accepted that one important aim of the healthcare system is to improve the work life of health care professionals in order to reduce burnout, and thus increase patient's satisfaction and health outcomes (e.g. Bodenheimer & Sinsky, 2014). Therefore, identification of classes of individuals with high exposure to PMIEs and MI-related psychopathology should assist clinicians in the field to 'help the helpers' by transferring and applying knowledge to medical teams in real time.

Given the unique ethical challenges of HSCWs in the midst of the COVID-19 pandemic (e.g. Greenberg et al., 2020), which are reflected in their personal narratives (Catania et al., 2020) and the accounts of mental health professionals who support them (Billings et al., 2021), we proposed that self-criticism and self-compassion are also likely to be associated with MI. Specifically, both high self-criticism and low self-compassion were hypothesized to characterize classes with high levels of exposure to PMIEs. Self-criticism is considered a personality trait which is defined as the inclination to set high and possibly unrealistic self-standards and to adopt a punitive outlook of oneself (Blatt, Quinlan, Chevron, McDonald, & Zuroff, 1982). It has been found to impede interpersonal relationships, and thus as a vulnerability factor of psychiatric disorders such as depression (Høstmælingen, Ulvenes, Nissen-Lie, Eielsen, & Wampold, 2021). As proposed by the MI integrative model (Litz et al., 2009), exposure to COVID-19 related PMIEs might give rise to depressive attributions in which self-criticism plays a pivotal role and might lead to MI-related guilt and shame and a fear of being judged.

In recent years, empirical literature has pointed to self-compassion as an important resilience factor for at-risk populations facing PTEs (e.g., Smith et al., 2011). Neff (2003) defines self-compassion as the ability to hold one's feelings of suffering with a sense of warmth, connection and concern. It has been suggested that self-compassion incorporates three facets: Self kindness (as opposed to self-judgment), common humanity (as opposed to feelings of isolation by one's failures), and mindfulness (as opposed to over-identification with painful thoughts or emotions). Self-compassion was found to be associated with greater psychological flexibility and well-being, and as a buffer in face of depression and PTSD (e.g. Kaurin, Schönfelder, & Wessa, 2018). Despite a dearth of data regarding resiliency, psychological factors and the MI process (Koenig et al., 2019), two studies found that higher self-compassion moderated the link between exposure to PMIEs and current suicidality (Kelley et al., 2019), PTSD, depression, and deliberate self-harm (Forkus, Breines, & Weiss, 2019). Furthermore, clinical reports consistently focused on constructs such as self-compassion and self-

forgiveness as promising targets for intervention following the self-blame and condemnation which characterized subjects coping with MI (e.g. Griffin et al., 2019).

The present study utilized Latent Class Analysis (LCA) to identify patterns of exposure to PMIEs. Socio-demographic, work and COVID-related variables were used to predict patterns of exposure to PMIEs and differences in mental-health outcomes and assessed psychological correlates between classes, in a sample of Israeli HSCWs. Identification of these classes should assist clinicians in the field to create personalized and tailored MI-related interventions in traumatized populations (Hoffman, Liddell, Bryant, & Nickerson, 2019). Following other LCA studies of exposure to PMIEs among veterans (Zerach, Levi-Belz, Griffin, & Maguen, 2021), we hypothesized that LCA would result in distinct classes of general high exposure to PMIEs, high exposure to betrayal transgressions by others, and minimal exposure to PMIEs. We further hypothesized that HSCWs who would report high general exposure to PMIEs would also report higher levels of psychopathological problems, higher self-criticism and lower self-compassion than HSCWs who experienced minimal exposure. Possible patterns of associations between constellations of PMIEs and socio-demographic, work, general stress and COVID-19 related variables remain exploratory.

2. Method

2.1. Participants

Participants in this cross-sectional designed study included 413 Israeli Frontline HSCWs. To be included in this study, participants needed to be at least 20 years of age and to indicate that they worked in a healthcare setting in Israel. Of all participants who consented to participate ($n = 555$), 130 participants (21.7%) did not complete study questionnaires and 12 (0.2%) participants did not meet inclusion criteria. Of the remained 413 participants, 117 (28.3%) participants completed only the sociodemographic, work and COVID-related questionnaires, while 296 participants (71.6%) completed all/most of the questionnaires (75% to 86%). A comparison of these two groups did not reveal any significant differences in most socio-demographic, work-related and COVID-19 variables, except for the variables: age ($t(407) = -2.21, p < .05$), time devoted to treating COVID patients ($t(384) = 2.76, p < .01$), work setting ($\chi^2(2) = 12.36, p < .01$), personal COVID symptoms ($\chi^2(1) = 4.78, p < .05$) and COVID-19 diagnosis of a family member ($\chi^2(1) = 4.95, p < .05$). Participants who completed all/most of the questionnaires were younger. Higher percentages of them work in hospitals and devoted more of their overall time to treating COVID patients. They also reported higher

rates of personal COVID symptoms and family members that were diagnosed with COVID-19, compared to participants in the 'non-completers' group. To summarize, 296 participants (71.6%) completed all/most of the questionnaires and their demographic, work-related and COVID-19 characteristics are reported in Table 1.

2.2. Procedure

Potential participants were recruited between February 1 and 15 March 2021, which represents the post-peak of the third COVID-19 wave in Israel. During this period, deaths related to COVID in Israel rose from 4816 to 6030, while reported weekly deaths fell from 46 to 16, and daily new cases fell from 8926 to 2125 (Israel Ministry of Health, 2021). Volunteers were invited through a social media campaign (e.g. Facebook posts describing the research project). Research assistants also posted a message briefly explaining that they were conducting a research project focusing on 'HSCW coping with COVID-19 mental-health challenges' and asked for possible volunteers. Volunteers who responded positively to advertisements for enrolment in the study were invited to participate. We also emailed few HSCW and heads of units, at a number of Israeli hospitals. We requested that they circulate the electronic link to this study's questionnaire to staff who are known to work regularly with COVID-19 patients. Participants agreeing to participate were required to affirm their willingness to participate by signing an informed consent form, and then completing the questionnaire online (using Qualtrics online data collection platform). Following completion of the survey participants were compensated with a voucher (approximate value of US 5 USD). Approval for this study was given by the XXX internal review board (Number: 2021-76 L/bs).

2.3. Measurements

2.3.1. Perceived stress scale (PSS-10; Cohen, Kamarck, & Mermelstein, 1983)

The level of perceived stress was evaluated by means of the PSS-10 Scale. Each of the 10 items were divided into a five-point frequency scale (0 = never; 1 = almost never; 2 = sometimes; 3 = fairly often; 4 = very often) in relation to the past month. The PSS-10 consisted of six negative items and four positive items (e.g. 'During the past month, how often have you been able to control irritations in your life?'). The positive items were reversely coded when calculating the total sum PSS-10 score (Cohen et al., 1983). Scores for 10 items were summed to obtain a PSS-10 total score, ranging from 0 to 40. Higher scores indicated a higher level of

perceived stress. Cronbach's alpha coefficient for the current study was $\alpha = .88$.

2.3.2. Moral injury event scale (MIES; Nash et al., 2013)

The MIES is a self-report 9-statement questionnaire tapping exposure to perceived transgressions committed, comprising three subscales: (1) MIES-Self--four items assessing exposure to MI resulting from committing acts or making decisions perceived to be morally wrong (e.g. 'I acted in ways that violated my own moral code or values'); (2) MIES-Others--two items that assess exposure resulting from witnessing or learning about others' actions that were perceived to be morally wrong (e.g. 'I am troubled by having witnessed others' immoral acts'); and (3) MIES-Betrayal--three items that assess exposure to MI resulting from perceived deception or betrayal by others (e.g. 'I feel betrayed by fellow colleagues whom I once trusted') and referred to clinical work since the outbreak of the COVID-19 pandemic. We adapted the scale to tap the health environment rather than a military surrounding. The 6-point Likert-type scale ranged from 1 (*strongly disagree*) to 6 (*strongly agree*). This scale has previously been used to assess moral injury in military service members and was adapted for healthcare workers (Hines, Chin, Glick, & Wickwire, 2021). The MIES has demonstrated good preliminary factor structure and reliability, with only small to moderate correlations with other measures of psychopathology, an indication that the MIES is a distinct construct (Bryan et al., 2014). In the current study, good internal consistency characterized the subscales of Self ($\alpha = .86$), Others ($\alpha = .95$), and Betrayal ($\alpha = .70$). To enhance interpretability of results, item-level responses of items 2, 4, 6, 7,8,9 were collapsed into two categories: 0 for those who reported slight, moderate, and strong disagreement and 1 for those who reported slight, moderate and strong agreement. Table 2 shows the distribution of the six items in the entire sample.

2.3.3. The patient health questionnaire-9 (PHQ-9; Kroenke, Spitzer, & Williams, 2001)

This scale was used to assess the prevalent symptom comprising the diagnostic criteria for major depressive disorder (e.g. anhedonia). The PHQ-9 is a widely used instrument for recording the frequency of depressive symptoms over the past month. Item (e.g. 'Have little interest or pleasure in doing things') scores ranged from 0 (*not at all*) to 3 (*nearly every day*). Total score comprised the sum of the items of PHQ. In this study, we used the sum of the PHQ-9 as a continuous variable in our analyses, as well as an indication for the presence of a depressive disorder using the validate cut-off of ≥ 10 (Manea, Gilbody, & McMillan, 2012). Cronbach's alpha coefficient for the current study was $\alpha = .90$.

Table 1. Characteristics of the study participants ($N = 296$).

Variables		<i>M (SD)</i>	<i>N (%)</i>
Socio-Demographic			
Age		40.28 (10.83)	
Years of education		18.06 (3.04)	
Length of marriage (years)		13.86 (11.40)	
Gender	Male		(%22.4)66
	Female		(%77.6) 228
Place of birth	Israel		227 (77.2%)
	Europe		49 (16.7%)
	America		(%5.1) 15
	Asia/Africa		3 (1%)
Marital status	Single		54 (18.2%)
	Married		210 (70.9%)
	Divorced		22 (7.4%)
	Other		10 (3.4%)
Religiosity	Secular		188 (63.7%)
	Traditional		44 (14.9%)
	Religious		49 (16.6%)
	Other		14 (4.8%)
Work-related characteristics			
Years of clinical experience		12.67 (11.27)	
Job role	Medical doctor (attending)		(%16.3) 48
	Medical doctor (Intern, Resident)		59 (20%)
	Nurse (including Midwives)		(43.4%) 128
	Clinical Support		10 (3.4%)
	Social and Psychological care		50 (16.9%)
Shifts	Permanent day		(50.7%) 150
	Changing without nights		(11.1%)33
	Changing with nights		109 (36.8%)
	Permanent nights		(1.4%) 4
Workplace setting	Hospital		262 (88.5%)
	Nursing institution		(3.4%) 10
	Public community clinic		(8.1%) 24
COVID-19 characteristics			
Direct work with COVID-19 patients (percentage)		31.75 (34.09)	
Family members became ill	Yes		(36.5%)(108
	No		188 (63.5%)
Family members died of COVID-19 complications	Yes		(3.7%) 11
	No		285 (96.3%)
Experienced personal isolation	Yes		(52.8%)(156
	No		140 (47.2%)
Prior COVID-19 personal diagnosis	Yes		(11.1%)(33
	No		263 (88.9%)
Prior COVID-19 personal symptoms	Yes		37 (12.6%)
	No		259 (87.4%)

Table 2. Item-level responses to the moral injury events scale items.

	Agree	Disagree
I am troubled by having witnessed others' immoral acts (item 2)	108 (36.5%)	188 (63.5%)
I am troubled by having acted in ways that violated my own morals or values (4)	61 (21%)	235 (79%)
I am troubled because I violated my morals by failing to do something that I felt I should have done (6)	71 (24%)	225 (76%)
I feel betrayed by leaders whom I once trusted (7)	164 (55.4%)	132 (44.6%)
I feel betrayed by fellow co-workers whom I once trusted (8)	77 (26%)	219 (74%)
I feel betrayed by others outside the hospital whom I once trusted (9)	94 (31.8%)	202 (68.2%)

2.3.4. The generalized anxiety disorder 7 (GAD-7; Spitzer, Kroenke, Williams, & Löwe, 2006)

The GAD-7 is a seven-item self-report scale to assess the frequency of symptoms of anxiety over the past month, with a 4-point Likert-scale ranging from 0 (*not at all*) to 3 (*nearly every day*). Items (e.g. 'Feeling nervous, anxious or on edge') are summed to yield a total score ranging from 0 to 21, with higher scores indicating more anxiety symptoms. The GAD7 has good sensitivity and specificity for specific anxiety disorders. The GAD7 severity cut point is 10 for moderate and severe anxiety. Cronbach's alpha coefficient for the current study was $\alpha = .92$.

2.3.5. Global mental health – K6 (Kessler et al., 2010)

This measure contains six items concerning the extent to which individuals felt (a) nervous, (b) hopeless, (c) restless or fidgety, (d) so depressed that nothing could cheer them up, (e) that everything was an effort, and (f) felt worthless during the 4 weeks preceding their screening. Each of the items are on a 5-point scale (none of the time = 0 to all of the time = 4). Responses were summed into an overall scale, ranging from 0 to 24. Moreover, as recommended we also used the cut-off score of 13 (Kessler et al., 2010) to distinguish

participants with serious mental difficulties from those without. Cronbach's alpha for the K6 was .91.

2.3.6. Moral injury symptom scale – health professional version (MISS-HP; Mantri et al., 2020)

This scale assesses theoretically grounded dimensions of MI based research (e.g. Litz et al., 2009). Each of the 10 items of the MISS-HP has response options on a Likert scale ranging from 1 ('strongly disagree') to 10 ('strongly agree'), referring to the present moment in participants' experience. After recoding the positively worded items (5, 6, 7, 10), item scores are summed to create a total score ranging from 10 to 100, with higher scores indicating the number and severity of MI symptoms. High MI symptoms reflect maladaptive behaviours and internal experiences associated with the moral challenges involved in delivering clinical care (e.g. 'I feel guilty over failing to save someone from being seriously injured or dying'). Following Mantri et al. (2020), we calculated a total score for this scale. The internal reliability α of the MISS-HP in the current sample was .72.

2.3.7. International Trauma Questionnaire (ITQ) for PTSD and C-PTSD (Cloitre et al., 2018)

The ITQ is a self-report measure and consists of 12 items with a 5-point Likert scale ranging from 0 (not at all) to 4 (extremely), referring to stressful events in the last month related to working with COVID-19 patients. The ITQ consists of three symptom clusters referring to PTSD (re-experiencing, avoidance and sense of threat, e.g. "Being 'super-alert', watchful, or on guard?") and three additional symptom clusters referring to DSO (affective dysregulation, disturbances in relationships, and negative self-concept; e.g. 'I feel like a failure'). Every symptom cluster consists of two symptoms, and only severity scores of 2 or higher are used to indicate a symptom. For both PTSD and CPTSD diagnosis, the endorsement of one of two symptoms from each symptom cluster and an additional functional impairment are required. The CPTSD diagnosis is constructed as a combination of all PTSD symptom clusters and all DSO symptom clusters. The total severity of PTSD and DSO symptom scores is calculated by summing up items 1 to 6 and 7 to 12 respectively, with a total ITQ score ranging between 0 and 48 (PTSD + DSO). The previous versions of the ITQ have been shown to be reliable and valid measures of PTSD and DSO and the currently used 12-item version has recently been demonstrated to be a valid measure to diagnose PTSD and CPTSD based on the ICD-11 (Shevlin et al., 2018).

2.3.8. Self-criticism was assessed via the self-criticism factor of the depressive experiences questionnaire (DEQ; Blatt, D'Afflitti, & Quinlan, 1976)

It is a well-known self-report measure composed of 66 items assessing predisposition to depressive states. The self-criticism factor taps preoccupation with achievement and inferiority and guilt in the face of perceived failure to meet standards (Lassri et al., 2018). Individuals are asked to indicate on a 7-point Likert scale the extent to which they agree (0 = completely disagree, 7 = completely agree) with each of the 6 items which comprise the self-criticism factor (e.g. 'It's difficult for me to accept my weaknesses'). In this sample Cronbach's $\alpha = .84$.

2.3.9. Self-compassion scale–short form (SCS-SF; Raes, Pommier, Neff, & Van Gucht, 2011)

This is a 12 items 5-point scale ranging from 1 (almost never) to 7 (almost always) which aimed to assess three main components of self-compassion: *Self-Kindness* (e.g. 'When I'm going through a very hard time, I give myself the caring and tenderness I need'); *Common Humanity* (e.g. 'When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people') and *Mindfulness* ('When something upsets me I try to keep my emotions in balance'). The total self-compassion score was calculated by taking a mean of all items (after reverse scores to the negative items). The SCS-SF has good psychometric properties, with high internal consistency and a high correlation with the long form of the SCS (Raes et al., 2011). Higher scores correspond to higher levels of self-compassion. Internal reliability in the present study was $\alpha = .87$.

3. Sociodemographic, work-related and Covid-19 related measurements

We assessed several demographic characteristics including country of origin, location of residence in Israel, family status, religious orientation, age, gender, income level, birth order, and educational level. We also assessed work-related characteristics of the participants, including years of clinical experience, health-care job role, workplace setting and work shift characteristics. Moreover, personal COVID-19 characteristics were assessed, including the percentage of time working directly with COVID-19 patients, as well as whether participants suffered from personal lockdown, a COVID-19 diagnosis or symptoms, and if any of the participants' family members had become ill or died from COVID-19 complications (yes/no).

3.1. Data analysis

Descriptive statistics and rates of PHQ-9, GAD-7, K6, ITQ's-PTSD and CPTSD, MISS-HP, were conducted with IBM SPSS software (Version 23; 2015). Next, analyses were conducted with *Mplus* (Version 8.4, Muthén & Muthén, 2017). Latent Class Analysis (LCA) identified subgroups within the total sample that reported similar patterns of exposure to PMIEs. Consistent with Wurpts and Geiser (2014) recommendations for LCA in smaller samples (e.g. < 300 cases), we utilized binary indicators of selected MIES items (Items 2, 4, 6, 7, 8, 9), which specifically involve subjective distress as opposed to pure exposure. We specified models with one to four classes and compared the models to determine optimal fit. Models with lower values on the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and sample-size adjusted Bayesian Information Criterion (aBIC) were prioritized. We also examined the bootstrapped likelihood ratio test (BLRT) and Lo-Mendell-Rubin adjusted likelihood ratio test (LMR-LRT), where a significant *p*-value indicates that a model with *k* - 1 classes should be rejected in favour of a model with *k* classes (Asparouhov & Muthén, 2012). Entropy values and average latent class probabilities provided an indication of classification accuracy, such that models with relative entropy values and probabilities of correct class assignment that were closer to 1.00 were preferred (Nylund, Asparouhov, & Muthén, 2007).

Once the model containing the optimal number of classes was determined, sample percentages were assigned to each class and conditional probabilities by class were evaluated. Labels for latent classes were based on patterns of conditional probabilities for endorsing each type of exposure, and were determined by consensus among the authors. Conditional probabilities approaching 1.0 indicated that members of a given latent class were more likely to endorse the corresponding type of exposure by witnessing, perpetrating, and being betrayed. Once the optimal number of classes was determined, two additional models were specified and tested. For both models, class membership was based on the latent class variable rather than 'a most likely class' variable, thereby accounting for classification error. First, the covariates (age, seniority, job role, work setting, percentages of direct work time with COVID-19 patients and perceived stress) were used as predictors of class membership, using a multinomial logistic regression. Second, the psychopathological outcomes and psychological resources variables were specified as continuous distal outcomes in the LCA model. Differences between classes on the psychopathological outcomes and psychological resources were tested with a multivariate analysis of variance (MANOVA). Full information maximum likelihood (FIML) was employed to maximize data available for analysis without biasing parameter estimates (Schafer & Graham, 2002).

4. Results

4.1. Prevalence of PMIEs, PTSS, depressive, anxiety, distress and MI symptoms

In this section, we calculated descriptive statistics and rates of transgression acts, PTSS, depressive, anxiety, distress and MI symptoms. The percentages of participants reporting *slightly agree* or higher for the MIES' items were calculated. The most commonly endorsed items from the MIES were 'I feel betrayed by leaders whom I once trusted' (55.4%), 'I saw things that were morally wrong' (45.5%), 'I am troubled by having witnessed others' immoral acts' (36.5%), and 'I feel betrayal by others outside the hospital whom I once trusted' (31.8%). As hypothesized, 31.8% endorsed at least one of the MIES-Perpetration by oneself items, 49.3% endorsed at least one of the MIES-Perpetration by others items, and 62.2% endorsed at least one of the MIES- Betrayal items, at the *slightly agree* or higher level.

According to the diagnostic criteria of the ITQ, rates for probable PTSD and CPTSD in the sample were 8.9% (*n* = 24) and 4.8% (*n* = 13), respectively. The self-report diagnosis of depression, as defined by the PHQ-9 cut-off point, was set as ≥ 10 (Kroenke et al., 2009). Accordingly, the prevalence of current depression was 33.6% (*n* = 83), with 11.7% (*n* = 29) reporting *very* or *extreme* social or occupational functional difficulties due to these problems. The self-report diagnosis of anxiety, as defined by the GAD-7 cut-off point, was set as ≥ 10 (Kroenke et al., 2007). Accordingly, the prevalence of common anxiety disorders was 21.5% (*n* = 53). The self-report diagnosis of general distress as defined by the K6 cut-off point has been set as ≥ 13 (Kessler et al., 2010). Accordingly, the prevalence of current general distress was 15.4% (*n* = 36). Regarding the MISS-HP, the optimum cut-off score on the MISS-HP for identifying HCSWs with clinically significant MI symptoms was ≥ 36 (Mantri et al., 2020). Accordingly, the prevalence of MI symptoms was 40.7% (*n* = 100).

Furthermore, as can be seen in Table 3, exposure to PMIEs was generally positively related to more perceived stress, psychopathological outcomes and to self-criticism. Moreover, it was negatively related to self-compassion. In the same vein, all psychopathological outcomes were significantly and positively related to self-criticism and negatively related to self-compassion. Finally, while perceived stress was positively related to all psychopathological outcomes, the duration of care for COVID patient was associated with higher levels of depressive, anxiety, distress and posttraumatic symptoms, but not to MI symptoms.

4.2. Latent class analysis

As is displayed in Table 4, the BLRT and LMR-LRT indicated that a model containing three classes fit

Table 3. Descriptive statistics and bivariate associations.

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. MIES	-									
2. PSS	.39***	-								
3. ITQ-PTSD	.38***	.46***	-							
4. ITQ-DSO	.42***	.63***	.43***	-						
5. PHQ9	.30***	.70***	.55***	.69***	-					
6. GAD-7	.32***	.72***	.52***	.62***	.80***	-				
7. Distress (K6)	.31***	.63***	.43***	.61**	.68***	.67***	-			
8. MISS-HP	.64***	.44**	.40***	.52***	.42***	.41***	.48**	-		
9. Self-Criticism	.45***	.61***	.32***	.64***	.59***	.58***	.52***	.50***	-	
10. Self-Compassion	-.38***	-.52***	-.29***	-.59***	-.48***	-.54***	-.53***	-.45***	-.69***	-
Mean	22.54	19.84	5.22	6.14	7.74	5.65	6.81	33.90	3.61	3.06
Standard Deviation	10.48	5.14	5.02	4.90	6.14	5.00	5.36	12.72	1.42	.76
Range	9–52	6–33	0–22	0–24	0–27	0–21	0–24	0–78	1–7	1–5

** $p < .01$; *** $p < .001$. MIES = Morally Injurious Events; PSS = Perceived Stress Scale; ITQ = International Trauma Questionnaire; PTSD = Posttraumatic Stress Disorder; DSO = Disordered Self Organization; PHQ = Patient Health Questionnaire; GAD = Generalized Anxiety Disorder; MISS-HP = Moral Injury Symptoms Scale-Health Professionals.

Table 4. Fit indices for one to six class latent class models.

	AIC	BIC	aBIC	LRT	BLRT	Entropy	(df) χ^2
1-class	2143.98	2166.12	2147.10				(57) 404.23
2-class	1863.03	1911.00	1869.77	.000	.000	.77	(50) 109.28
3-class	1826.00	1899.81	1836.38	.010	.000	.76	(43) 58.25
4-class	1823.27	1922.91	1837.28	.780	.670	.78	(36) 41.52

Abbreviations include: AIC = Akaike Information Criterion, BIC = Bayesian Information Criterion, aBIC = Sample Size Adjusted, Bayesian Information Criterion; LRT = Lo-Mendel-Rubin Likelihood Ratio Test; BLRT = Bootstrapped Likelihood Ratio Test.

better than the simpler 2- and 1-class models, and models that specified 4-classes were generally no better than simpler solutions with fewer classes. Furthermore, the AIC, BIC and adjusted BIC reduced from 1 to 2-class solution and from 2 to 3-class solution. However, from 3 to 4-class solutions, these values not only stopped to decrease, but they increased. Review of the information criterion indices, particularly the aBIC, concurred that the three-class model was the best fitting model. Relative entropy for the three-class model indicated good classification accuracy, with classification probabilities being no less than .77 for most likely class membership. Theoretical reasoning supported the 3-class solution as inspection of the plotted item-response probabilities further revealed that the 3-class solution contained classes characterized by distinct patterns.

Class-specific conditional probabilities of endorsing each PMIE exposure indicator (CP) are displayed in Figure 1 ($n = 150$, 49.4%), which we labelled the 'minimal exposure' class, that showed little probability of endorsing exposure by witnessing (10.2%), and low probability of experiencing distress for acting in ways that violated their own morals or values (2.2%) and being troubled when violating their morals by failing to do something they should have done (4.6%). This class showed low-medium levels of feelings of betrayal by leaders (19.6%), low probability of betrayal by service members (1.2%) and betrayal by others outside (8.6%). Participants assigned to Class 2 ($n = 92$, 31.1%) were labelled the 'betrayal-only' class and exhibited high probability of

feelings of betrayal by leaders (91.4%), moderate probability of exposure by witness (49%), betrayal by service members (48.1%) and betrayal by others outside (58.2%), and low probability of being troubled by acting in ways that violated morals or values (5.9%) and being troubled when violating morals by failing to do something they should have done (17.1%). Those assigned to Class 3 ($n = 54$, 19.5%) reported high probability of betrayal by leadership (88.6%) and moderate probability of betrayal by outside members (48.3%) and betrayal by fellow service members (53.6%), high probability of witnessing others' moral failings (83%), high probabilities of being troubled by acting in ways that violated morals or values (90.6%) and being troubled when violating morals by failing to do something they should have done (84.1%). We labelled Class 3 as the 'high exposure' class. Table 5 and Figure 1 show the proportion of the different items across the three classes.

4.3. Prediction of class membership by socio-demographic, work, and COVID-related variables

Table 6 shows the results from the multinomial logistic regression. Using the 'minimal exposure' class as a reference, we found that being married (as opposed to being single, divorced, widowed) and experiencing high perceived stress was associated with higher odds of being in the 'betrayal-only' class. Moreover, a job-role of nurse and experiencing high perceived stress was associated with

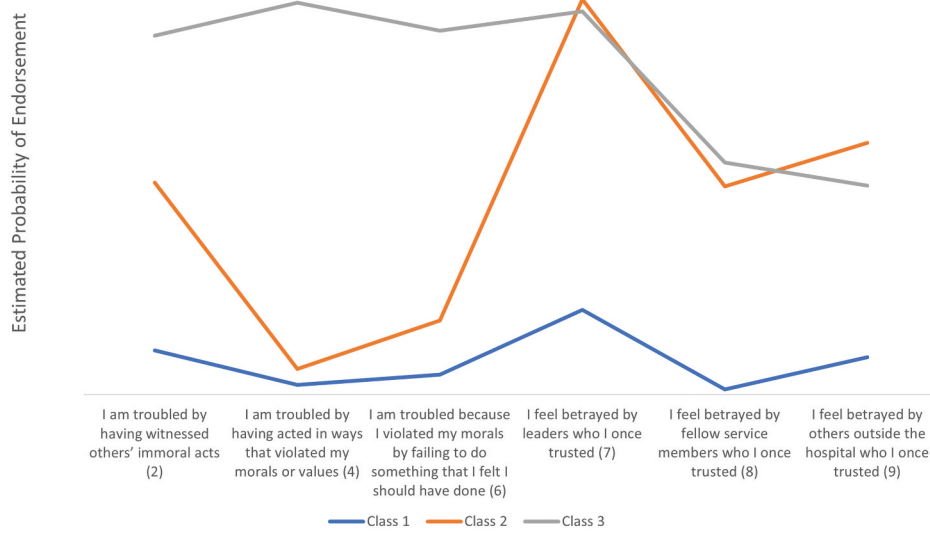


Figure 1. Three-class LCA profile plot.

Table 5. Item-level agreement responses to the moral injury event scale items across classes.

	Class 1	Class 2	Class 3
I am troubled by having witnessed others' immoral acts (item 2)	10.2%	49.0%	83%
I am troubled by having acted in ways that violated my own morals or values (4)	2.2%	5.9%	90.6%
I am troubled because I violated my morals by failing to do something that I felt I should have done (6)	4.6%	17.1%	84.1%
I feel betrayed by leaders whom I once trusted (7)	19.6%	91.4%	88.6%
I feel betrayed by fellow co-workers whom I once trusted (8)	1.2%	48.1%	53.6%
I feel betrayed by others outside the hospital whom I once trusted (9)	8.6%	58.2%	48.3%

Table 6. Results from multinomial logistic regression predicting latent classes of exposure to PMIEs by socio-demographic, work and COVID-19 related variables.

Predictors	Class 2: Betrayal Only OR (95% CI)	Class 3: High Exposure OR (95% CI)
<i>Socio-demographic</i>		
Gender	1.13 (0.51–2.52)	0.42 (0.11–1.56)
Marital Status	2.98 (1.24–7.16) *	1.09 (0.39–3.00)
<i>Work-related</i>		
Job-Role: Medical doctor	1.03 (0.42–2.54)	1.99 (0.44–8.88)
Nurse	1.50 (0.66–3.42)	6.29 (1.59–24.86)
Social/Psychological care	0.89 (0.13–5.97)	**
Seniority	1.02 (0.97–1.03)	0.95 (0.90–0.99)*
<i>COVID-19-related</i>		
Family member ill	1.40 (0.72–2.75)	1.66 (0.69–3.96)
Family member died	0.67 (0.09–4.87)	1.42 (0.19–10.44)
Personal isolation	1.14 (0.60–2.16)	1.07 (0.48–2.40)
COVID verification	3.53 (0.69–18.05)	0.41 (0.02–7.67)
COVID symptoms	0.30 (0.06–1.43)	1.07 (0.48–2.40)
Treating COVID patients	0.99 (0.98–1.00)	0.99 (0.97–1.03)
Perceived Stress	1.11 (1.04–1.18) **	1.14 (1.04–1.25) **

† = $p < 0.07$; * = $p < .005$; ** $p < .01$.

higher odds of being in the 'high exposure' class, while years of seniority decrease the odds of being in the 'high exposure' class.

4.4. Mean difference comparisons in psychopathological outcomes and psychological correlates by classes

Mean difference comparisons by class are tabulated in Table 7. Significant differences emerged for all psychopathological outcomes (Wiks' Lambda = .70; $F(12, 578) = 9.08, p < .00$, partial eta squared = .16). A set of post-hoc 'scheffe' tests revealed that participants assigned to the 'high exposure' class reported more depressive symptoms than those assigned to the 'minimal exposure' class. Moreover, participants assigned to the 'high exposure' and the 'betrayal-only' classes reported more PTSD, DSO and MI symptoms than those assigned to the 'minimal exposure' class. Notably, those assigned to the 'high exposure' class also reported greater MI symptoms than those assigned to the 'betrayal-only' class.

Next, we examined patterns of exposure to potentially morally injurious and psychological correlates of self-criticism and self-compassion. As hypothesized, participants assigned to the 'high exposure' and 'betrayal-only' classes reported higher levels of self-criticism and lower levels of self-compassion, than those assigned to the 'minimal exposure' class.

5. Discussion

The present study aimed to examine associations between constellations of exposure to PMIEs, socio-demographic, work and COVID-related variables, mental-health outcomes and psychological factors in a sample of Israeli HSCWs. We found three classes of unique patterns of exposure to PMIEs: (1) High exposure to PMIEs, (2) mainly experienced betrayal of others, and (3) minimal levels of exposure to PMIEs. Each constellation was associated differently with contributors, mental health outcomes and psychological

Table 7. Psychopathological outcomes and psychological correlates by class.

	Class 1: Minimal exposure Mean (S.D.)	Class 2: Betrayal-only Mean (S.D.)	Class 3: High exposure Mean (S.D.)	F Value	Partial Eta Squared
<i>Psychopathological outcomes</i>					
PHQ-9	6.86 (5.31) ^a	8.36 (5.78)	9.15 (5.76) ^b	4.21**	0.03
GAD-7	4.97 (4.37)	6.29 (4.89)	6.45 (4.23)	3.46*	0.02
Distress (K6)	6.16 (5.21)	7.59 (4.77)	7.32 (4.26)	2.88†	0.02
PTSD (ITQ)	4.04 (4.60) ^a	5.88 (5.15) ^b	7.38 (5.06) ^b	10.61***	0.07
DSO (ITQ)	4.64 (4.10) ^a	7.22 (5.09) ^b	8.46 (5.29) ^b	17.00***	0.10
MISS-HP	29.40 (5.91) ^a	35.24 (10.56) ^b	44.09 (14.17) ^{b,c}	41.64***	0.22
<i>Psychological correlates</i>					
Self-criticism	3.25 (1.24) ^a	3.82 (1.23) ^b	4.25 (1.15) ^b	15.06***	0.09
Self-compassion	3.19 (0.66) ^a	2.95 (0.64) ^b	2.91 (0.61) ^b	5.72**	0.04

† = $p < 0.07$; ** $p < .01$; *** = $p < .001$. ITQ = International Trauma Questionnaire; PTSD = Posttraumatic Stress Disorder; DSO = Disordered Self Organization; PHQ = Patient Health Questionnaire; GAD = Generalized Anxiety Disorder; MISS-HP = Moral Injury Symptoms Scale–Health Professionals.

correlates. Importantly, as compared to the ‘minimal exposure’ class, the ‘high exposure’ and ‘betrayal-only’ classes were associated with more depressive, anxiety, posttraumatic and MI symptoms. Moreover, the ‘high exposure’ and ‘betrayal only’ classes were also associated with a constellation of high self-criticism and low self-compassion, seen commonly among individuals coping with moral injury. These findings shed light on the significance of moral injury experience and possible mental health consequences among HSCWs. Moreover, these results highlight potential psychological vulnerabilities for this group as possible loci for intervention, in the midst of the COVID-19 pandemic.

The COVID-19 pandemic is a phenomenon which continues to be investigated while still spreading progressively. Therefore, before discussing the main results of this study, it is profoundly important to address the mental health condition of HSCWs who stand at the frontline of healthcare of the pandemic patients. Our results support preliminary results for the impact of COVID-19 on HSCWs’ mental health from different parts of the world (e.g., Greene et al., 2021). It is important to note that we do not possess information regarding HSCWs before the onset of the pandemic, and thus causality regarding its direct impact cannot be claimed. Nevertheless, our results indicate high rates of depression, anxiety, distress and MI symptoms. Moreover, both the extent of direct care for COVID-19 patients and perceived stress were associated with higher levels of psychopathology. Therefore, our findings point to the importance of recognition and screening of HSCWs for current mental health distress and future psychiatric morbidity sequela.

The present study focused on the consequences of exposure to PMIEs while providing healthcare to patients of the COVID-19 pandemic. Following commentaries and anecdotal reports (e.g., Greenberg et al., 2020), our results indicated that transgressive acts are

common experiences during these stressful days among Israeli HSCWs. Specifically, at least one-third of the sample reported one PMIEs or more. Importantly, 62% of the HSCWs experienced at least one experience of betrayal, with predominance of experiencing betrayal of trusted leaders and others outside the hospital. These rates are higher than recent reports among helping professionals from the US (Hines et al., 2021), yet quite similar to exposure of military personal around the world (Jordan et al., 2017) and in Israel (Zerach et al., 2021). Thus, these results clearly show that HSCWs are regularly exposed to profound ethical and moral dilemmas in high-stake situations (Mantri et al., 2020) and particularly during the pandemic (Wang et al., 2020). Alternatively, although exposure to PMIEs and its mental health consequences has been studied mainly among veterans (Griffin et al., 2019), HSCWs are experiencing a ‘war-like’ stressors and PMIEs in their civilian duties.

While exposure to PMIEs might be common among various population-at-risk, there is a dearth of literature regarding the associations between constellations of exposure to PMIEs and distinct and overlapping psychopathological problems (Hoffman et al., 2019). In the present study, results of the LCA indicated three distinct classes of exposure to PMIEs among HSCWs: high exposure, betrayal-only, and minimal exposure. These classes are somewhat similar to prior findings among Israeli veterans (Zerach et al., 2021), yet with some unique differences in rates of inclusion in the sub-groups.

Notably, about thirty percent of our sample experienced betrayal of leaders and others outside the hospitals. The experience of betrayal, defined as a fault activity performed by a trusted authority figure (Frankfurt & Frazier, 2016), originally started the empirical and clinical interest in MI (Shay, 1994). Among veterans, betrayal by commanding authorities corrodes the cohesion and effectiveness of military units and may place combatants at risk of other transgressive acts (e.g. committing atrocities) and future

negative mental health consequences such as PTSS and depression. The high rates of HCSWs who report subjective experience of betrayal might represent their pain, anger and rebuke against the representatives of the system who send them to 'combat' COVID-19's devastating effects with only limited resources. Alternatively, in crises or emergencies, battles are carried out mainly by soldiers and not by the commanders. This means that the feeling of betrayal is perhaps inherent in such emergencies, when HCSWs stand at the frontline of a crisis that lacks any clearly responsible leaders. This pattern of results clearly highlights the urgent need for ethical leadership that can provide empathetic and compassionate aid for HCSWs experiencing physical and emotional exhaustion because of COVID-19 (Markey, Ventura, Donnell, & Doody, 2021). Indeed, Maffoni et al. (2020) recently found that managerial support and ethical vision of patient care were associated with lower levels of emotional exhaustion – both directly and through moral distress.

In the present study, we found that the most notable predictor of inclusion in the 'betrayal only' class was high subjective perception of stress. Indeed, a number of scholars (e.g. Williamson et al., 2020) have pointed out the risk for MI among professional staff who may be unable to provide reasonable healthcare, and at the same time feel responsible for the suffering or loss of life. Moreover, lacking supportive contact with their managers (Kang et al., 2020), clear guidance, training and even knowledge, might profoundly contribute to the experiences of being neglected, lonely and not feeling safe enough. HCSWs also stand at the frontline of delivering health care in stressful, uncertain situations, filled with heightened personal risk of being infected (Shanafelt et al., 2020). It comes as no surprise that being married, serving the dual obligation of fear of infecting loved ones while continuing commitment to internal and professional ethics of providing the best care, increase HCSWs' dissonance. Thus, a stressful environment and unique challenges of the pandemic might possibly have increased the odds of subjective experience of betrayal.

With regard to the mental health consequences of exposure to PMIEs, our results indicate that HCSWs in both the 'high exposure' and the 'betrayal-only' classes reported higher levels of depressive, anxiety and posttraumatic symptoms. Importantly, in the absence of a gold-standard measure of MI as an outcome, our results are among the first to focus on the close link between high exposure to transgressive acts and MI symptoms (Mantri et al., 2020). Specifically, our general rates of MI results are quite similar to the estimated prevalence of MI in China (Wang et al., 2020) and Honduras (Rodríguez et al., 2021). Thus, although the link between exposure to PMIEs and varied psychiatric symptomatology such as PTSD,

depression and suicidality (e.g. Bryan et al., 2018), has been documented previously, this study points to a varied spectrum of general distress as well as specific MI symptoms that are closely associated with HCSWs' high exposure to transgressive acts during the pandemic. Moreover, while moral distress and MI share exposure to PMIEs and related cognitions and emotions (Maffoni et al., 2019), our results point to the high rates of psychopathology and functional impairment, which clearly characterize MI.

Interestingly, although the levels of all psychopathological outcomes were the highest among participants with 'high exposure' to PMIEs, the only psychopathological outcome that significantly differed between the 'high exposure' and the 'betrayal-only' classes was MI-symptoms. This result concurs with most studies that found a linear association between exposure to a varied spectrum of PMIEs and MI (e.g., Atuel et al., 2020). According to Litz et al. (2009), exposure to PMIEs sometimes happens in multiple and complex fashions. Although the empirical study of PMIEs supported the three-factor solution (self, other, and betrayal; Bryan et al., 2014), the experience of the traumatized individual helping professional might involve accumulation of different types of PMIEs.

In terms of clinical content of MI-symptoms, our results call for closer examination of symptoms such as guilt, shame and self-condemnation, that go beyond other psychopathological outcomes, and even post-traumatic symptoms. Therefore, these results indicated more pervasive and widespread challenges that tap painful moral emotions which might give rise to self-harming behaviours such as substance abuse and even suicidality (Schwartz, Halperin, & Levi-Belz, 2021). This has important implications for screening and treating HCSWs exposed to an array of highly stressful healthcare-related events, including PMIEs that have not been the main focus of usual care, despite multiple articles finding strong evidence linking perpetration of moral transgressions to guilt (Frankfurt, Frazier, & Engdahl, 2017). Of special target for recognition and possible interventions should be nurses, that were found to have higher odds for high exposure to PMIEs. Indeed, our results support recent testimonial reports from Italian nurses, documenting the heavy burden of COVID-19 on the nursing workforce, especially in terms of the high personal risks and unique ethical dilemmas, and highlighting the importance of effective and sensitive management of nurses' challenges (Catania et al., 2020).

Our findings also indicated that membership in the 'high exposure' and 'betrayal-only' classes were associated with higher levels of self-criticism and lower levels of self-compassion, as compared to the 'minimal exposure' class. In the context of COVID-19 ethical challenges and given the high levels of

MI symptoms of guilt, shame and self-condemnation, it is suggested that the combination of these two psychological resources might put HCSWs at risk (or, alternatively, resiliency) for moral injury. Self-criticism plays an important role in entering into a punitive stance and a depressive generalization of doubted acts during work shifts (Høstmælingen et al., 2021). When one fears being judged, self-compassion might provide a more kind, containing, less cognitively diffused and more psychologically flexible outlook on one's acts and the integrity of oneself in general. Indeed, higher self-compassion has been found to moderate the link between exposure to PMIEs and PTSD, depression, and deliberate self-harm (Forkus et al., 2019). Moreover, the association between self-criticism and heightened depression has been found to be buffered by high levels of self-compassion (Kaurin et al., 2018).

While constructs such as self-compassion and self-forgiveness are seen as a key component of recovery and healing following exposure to PMIEs, difficulties in forgiving oneself may elicit the generalized and prolonged distress that characterizes moral injury (Griffin et al., 2021). Thus, HCSWs who condemn themselves for their actions during the COVID period may appraise themselves as blameworthy, might experience self-blame and self-harming behaviours. Our results contain promising potential for intervention by counsellors who work with HCSWs teams, by focusing particularly on mitigating self-criticism and promotion of self-compassion and self-forgiveness, specifically in the face of experiencing betrayal by those who had to stand alone in morally challenging situations. This fits models of group intervention such as those reported in the military work arena (e.g. Cenkner, Yeomans, Antal, & Scott, 2020).

Several limitations of this study warrant mention. First, because the data gathered in this study were cross-sectional, the directionality of the associations found among the variables remains undetermined. Second, this is an Israeli healthcare professionals' sample so that cultural differences should be considered rather than generalizing these findings to professionals from different nations and cultures. A third limitation is that classes were based on exposure to subjective accounts of PMIEs and not objective identification of transgressive acts. Fourth, we employed a non-representative, volunteer sample that may not reflect accurate rates of PMIEs among HCSWs. Special attention should be given to under representation of subgroups of HCSWs such as interns. Fifth, the period referred to in the questionnaires varied from the 'present moment' to 'the past month'. The time-frame might have an impact on mental health as reported by participants. The

time-frame also does not allow us to fully understand whether participants who faced several waves of COVID-19 were affected, or still being affected, by the pandemic. Finally, we note the use of a large number of questionnaires which could produce fatigue, and possibly distort the results.

Notwithstanding these limitations, this study yielded several important findings. Overall, our results indicated that HCSWs are exposed to both perceived stress and exposure to PMIEs that are associated with higher-than-normal psychological problems. We found that in an HCSWs sample, there were three classes of exposure to PMIEs, with 'high exposure' and 'betrayal-only' classes associated with varied psychopathology. Thus, we validated the theoretical links between transgressive acts and their consequences, in a relatively unexplored population and on times of unprecedented pandemic challenges. We highlighted the special concerns of Israeli HCSWs to betrayal by leadership, which might represent the subjective experience of resentment against systems that were not prepared for these challenges. Last, we suggested a combination of high self-criticism and low self-compassion as a possible target for a 'psychoeducation' module and other healing and reparative psychological interventions among these brave workers facing challenging times.

Note: The data that support the findings of this study are available from the corresponding author, upon reasonable request.

Data availability statement

The data that support the findings of this study cannot be made publicly available due to privacy reasons and are available from the corresponding author upon reasonable request.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This study received no funding.

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