

Psychological Trauma: Theory, Research, Practice, and Policy

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Online First Publication, June 22, 2023. <https://dx.doi.org/10.1037/tra0001519>

CITATION

Greene, T., Harju-Seppänen, J., Billings, J., Brewin, C. R., Murphy, D., & Bloomfield, M. A. P. (2023, June 22). Exposure to Potentially Morally Injurious Events in U.K. Health and Social Care Workers During COVID-19: Associations With PTSD and Complex PTSD. *Psychological Trauma: Theory, Research, Practice, and Policy*. Advance online publication. <https://dx.doi.org/10.1037/tra0001519>

Exposure to Potentially Morally Injurious Events in U.K. Health and Social Care Workers During COVID-19: Associations With PTSD and Complex PTSD

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Objective: Health and social care workers (HSCWs) have been shown to be at risk of exposure to potentially morally injurious events (PMIEs) and mental health problems during the COVID-19 pandemic. This study aimed to examine associations between exposure to PMIEs and meeting threshold criteria for probable posttraumatic stress disorder (PTSD) and probable complex PTSD (CPTSD) in U.K. HSCWs immediately after the peak of the first COVID-19 wave. **Method:** Frontline HSCWs from across the United Kingdom working in diverse roles in hospitals, nursing or care homes, and other community settings were recruited to the Frontline-COVID study via social media. Participants ($n = 1,056$) completed a cross-sectional online survey (May 27, 2020–July 23, 2020) which assessed exposure to PMIEs (nine-item Moral Injury Events Scale), and meeting symptom thresholds for probable PTSD and probable CPTSD (International Trauma Questionnaire). **Results:** PMIEs related to witnessing others' wrongful actions and betrayal events were more commonly endorsed than perceived self-transgressions. The rate of probable International Classification of Diseases, 11th Revision (ICD-11) PTSD was 8.3%, and of probable ICD-11 CPTSD was 14.2%. Betrayal-related PMIEs were a significant predictor of probable PTSD or probable CPTSD, together with having been redeployed during the pandemic. The only variable that differentially predicted probable CPTSD as compared with probable PTSD was not having had reliable access to personal protective equipment; none of the PMIE types were differential predictors for screening positive for probable PTSD versus probable CPTSD. **Conclusions:** Exposure to PMIEs could be important for PTSD and CPTSD development. Interventions for moral injury in HSCWs should be investigated.

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The data reported in this manuscript have been previously published and/or were collected as part of a larger data collection (multiple points in time). Findings from the data collection have been reported in separate manuscripts. Greene et al. (2021) focused on the overall prevalence of PTSD and CPTSD together without splitting these into two separate constructs, and did not examine exposure to PMIEs as predictors. Brewin et al. (2021) examined a novel screening measure for psychological distress and its association with depression and anxiety. The current manuscript focused on exposure to different types of PMIEs and a comparison of probable PTSD and probable CPTSD.

Talya Greene served as lead for conceptualization, methodology, software, supervision, and writing—original draft. Jasmine Harju-Seppänen

served in a supporting role for writing—review and editing. Jo Billings served in a supporting role for conceptualization, methodology, project administration, and writing—review and editing. Chris R. Brewin served in a supporting role for formal analysis and writing—review and editing. Dominic Murphy served in a supporting role for conceptualization and writing—review and editing. Michael Bloomfield served in a supporting role for conceptualization, investigation, and writing—review and editing. Talya Greene and Jasmine Harju-Seppänen contributed equally to data curation, visualization, and formal analysis.

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Clinical Impact Statement

Our study examined the links between exposure to potentially morally injurious events and probable posttraumatic stress disorder (PTSD) or probable complex PTSD (CPTSD) in a sample of health and social care workers (HSCWs) in the United Kingdom following the peak of the first COVID-19 wave. In our sample, 8.3% of participants screened positive for probable PTSD and 14.2% for probable CPTSD. Experiences of feeling betrayed by leaders, coworkers, and one's community, and having been redeployed during the pandemic were associated with probable PTSD or probable CPTSD. We recommend that interventions for moral injury in HSCWs should be investigated.

Keywords: frontline workers, pandemics, occupational trauma, moral injury

Supplemental materials: <https://doi.org/10.1037/tra0001519.supp>

Since the COVID-19 pandemic broke out, research across the globe has consistently shown that health and social care workers (HSCWs) are at elevated risk for mental disorders due to the combination of difficult working conditions, potential exposure to the COVID-19 virus, and repeated witnessing of serious injury and death (Li et al., 2021; Marvaldi et al., 2021; Pappa et al., 2020). Moral injury, defined as the psychological distress caused by perpetrating, failing to prevent, or witnessing acts that violate deeply held moral beliefs and expectations (Litz et al., 2009), has been proposed as a key driver of this distress, especially for posttraumatic stress disorder (PTSD) among HSCWs during COVID-19 (Borges et al., 2020; Dean et al., 2020; Greenberg et al., 2020; Roycroft et al., 2020; Williamson et al., 2020).

Events that are perceived by an individual as a moral violation typically cause some psychological distress. Sometimes this distress can develop into something more severe and long-lasting, characterized as moral injury, which can be experienced in a wide variety of negative ways including feelings of guilt, shame, anger, helplessness, loss of trust, lack of empathy, negative self-beliefs, and impaired occupational functioning (Griffin et al., 2019; Williamson et al., 2018). Studies have shown that exposure to potentially morally injurious events (PMIEs) is associated with mental health problems, especially PTSD (Griffin et al., 2019; Levi-Belz et al., 2020; Papazoglou et al., 2020), along with depression, anxiety, substance use, and suicidality (Williamson et al., 2018; Wisco et al., 2017).

Research carried out by Bryan et al. (2016) among combat veterans indicated that PMIEs comprise three distinct types: (a) events in which the individual considers themselves the perpetrator—either carrying out or failing to carry out some action in such a way that violates their personal moral code; (b) witnessing others engaging in actions that one perceives to be morally wrong; and (c) perceived experiences of betrayal by people in positions of authority or responsibility, coworkers or peers, and one's community. There are other conceptualizations, however, this three-factor approach has become common.

Before the COVID-19 pandemic, the majority of the moral injury literature focused on the military context (Koenig et al., 2019). Additionally, some studies conducted among other occupational groups including journalists (Backholm & Idås, 2015), police (Papazoglou & Chopko, 2017), and veterinarians (Crane et al., 2015), similarly showed that these groups were at risk for PMIEs exposure and associated distress (Williamson et al., 2018). In the early stages of the COVID-19 pandemic, there was concern that HSCWs would be at risk of moral injury due to PMIEs exposure

such as being forced to make difficult decisions regarding the rationing of available treatment or due to being obliged to enforce social restrictions preventing family members and friends visiting their loved ones in order to reduce the COVID-19 risk even when it meant that patients died in isolation (Hines et al., 2021; Roycroft et al., 2020; Sheather & Fidler, 2021; Zerach & Levi-Belz, 2021a).

Indeed, a body of research is emerging regarding the associations between PMIEs exposure and mental health among HSCWs during COVID-19, mostly conducted in the United States. For example, a study of U.S. healthcare workers ($n = 109$) in May–July 2020 found that PMIEs exposure was related to the secondary traumatic stress subscale of the professional quality of life questionnaire (Litam & Balkin, 2021). A second study of U.S. healthcare workers ($n = 1,122$) conducted during May–August 2020 found that higher PMIEs exposure was associated with higher PTSD symptoms (Hagerty & Williams, 2022). Another U.S. study collected data between April and June 2020, finding that more intense PMIEs exposure was associated with anxiety and depression symptoms and worse psychosocial functioning among hospital personnel (Ehman et al., 2023), and yet another study of U.S. healthcare workers ($n = 350$) conducted during September–December 2020 found an association between PMIEs exposure and psychiatric symptoms including suicidality, anxiety, depression, and PTSD (Amsalem et al., 2021).

The aforementioned U.S.-based studies used the DSM-5 formulation of PTSD, which does not differentiate between classic PTSD and complex PTSD (CPTSD) diagnostic constructs. In contrast, the International Classification of Diseases, 11th Revision (ICD-11) distinguishes PTSD from CPTSD (World Health Organization [WHO], 2018), defining them as two mutually exclusive diagnoses. According to the ICD-11 criteria, individuals with CPTSD meet the diagnostic criteria for PTSD along with additional symptoms relating to disturbances in self-organization (DSO), including affective dysregulation, negative self-concept, and disturbances in relationships (World Health Organization [WHO], 2018). CPTSD often occurs in the context of chronic or repeated traumas (Cloitre et al., 2018; Maercker et al., 2013). ICD-11 CPTSD is associated with higher symptom severity and comorbidity compared with ICD-11 PTSD (Brewin, 2020; Karatzias et al., 2019), thus identifying differential predictors is important for both prevention and treatment. There is very limited research regarding PMIEs exposure and CPTSD, however, a study of Israeli HSCWs ($n = 296$) conducted in February–March 2021 found that participants reporting greater PMIEs exposure had higher levels of PTSD symptoms,

CPTSD symptoms, depression symptoms, and anxiety symptoms compared to those with minimal exposure (Zerach & Levi-Belz, 2021a).

The current study aimed to examine the relationship between exposure to PMIEs with probable PTSD and probable CPTSD in HSCWs. Specifically, we investigated the association of different types of PMIEs with both probable PTSD and probable CPTSD in HSCWs in the United Kingdom during the first wave of COVID-19. We hypothesized: (a) that exposure to all types of PMIEs would be associated with increased odds of screening positive for probable PTSD/CPTSD versus not; and (b) that exposure to all types of PMIEs would be associated with increased odds of screening positive for probable CPTSD versus probable PTSD.

Method

Participants and Procedure

Frontline HSCWs across the United Kingdom were invited to participate in the Frontline-COVID study via a social media campaign (Facebook adverts, Twitter and Facebook posts, and emails to well-being leads at a number of U.K. hospitals, with a request to circulate to staff). Individuals were eligible if they were aged at least 18 years old and worked in a health care or social care role in a hospital, nursing or care home, or other community setting across the United Kingdom (for more details, see Brewin et al., 2021; Greene et al., 2021). The questionnaire was administered using online survey methods, via the Qualtrics data collection platform. Data were collected between May 27, 2020 and July 23, 2020. This corresponds to the immediate phase following the peak of the first COVID-19 wave in the United Kingdom. During this period, COVID-19-related deaths in the United Kingdom rose from 27,430 to 41,160 (see <https://coronavirus.data.gov.uk/details/deaths>). Participants gave informed

consent online before proceeding to the questionnaire. Ethical approval for the study was granted by UCL institutional review board (Ethics ID: 18341/001).

Of the 2,447 individuals that opened the link to read the participant information sheet, 1,311 consented to participate and 1,205 provided data. Participants who indicated that they did not work in healthcare ($n = 5$) were excluded. For participants who completed the questionnaire more than once, only their first response was included ($n = 6$). In the current study, participants were excluded from the analyses if they either dropped out of the survey during the early stages of completion or had missing data for any of the variables in that analysis. This resulted in a final sample of 1,056 participants. In the final sample for this study, the majority were female (92.6%), white (91.4%), and married or living with a partner (63.3%). The mean age of the participants was 41.7 years ($SD = 0.2$). Participants worked in hospitals (53.6%), nursing or care homes (14.9%), and community or other settings (31.5%). Missing data analysis indicated that there was no difference between those who completed all of the PTSD/CPTSD items and those that did not regarding age, gender, income, or ethnic minority background (see the online supplemental material).

Measures

The study survey included background questions regarding participants' gender, age, income, ethnicity, job role, and work setting. A series of questions relating to COVID-19 assessed: access to personal protective equipment (PPE; yes, sometimes, no) which we collapsed into two categories (yes [66%] vs. sometimes/no [34%]) due to the small group size of the "no" category (4.3%); whether they had been redeployed during COVID-19 into a new team or to a new role as part of the emergency response to COVID-19 (24%); and whether they had been infected with COVID-19 (32%; for

Table 1

Description of Sample, by Probable PTSD and Probable CPTSD Status

Variable	Total ($n = 1,056$)	Probable PTSD ($n = 88$)	Probable CPTSD ($n = 150$)	Neither ($n = 818$)
Demographic				
Age: mean (SD)	41.7 (11.7)	40.6 (12.6)	39.8 (12.2)	42.1 (11.4)
Missing	52 (4.9%)	3 (3.4%)	9 (6.0%)	40 (4.9%)
Gender				
Female	978 (92.6%)	80 (90.9%)	139 (92.7%)	759 (92.8%)
Male	73 (6.91%)	8 (9.1%)	9 (6.0%)	56 (6.9%)
Other	4 (0.4%)	0	1 (0.7%)	3 (0.4%)
Missing	1 (0.1%)	0	1 (0.7%)	0
COVID-related				
Access to PPE				
Yes	697 (66.0%)	73 (48.7%)	63 (71.6%)	561 (68.6%)
Sometimes	313 (29.6%)	63 (42.0%)	24 (27.3%)	226 (27.6%)
No	45 (4.3%)	14 (9.3%)	1 (1.1%)	30 (3.7%)
Missing	1 (0.1%)	0	0	1 (0.1%)
Redeployed during pandemic				
Yes	258 (24.4%)	47 (31.3%)	24 (27.3%)	187 (22.9%)
No	797 (75.5%)	103 (68.7%)	64 (72.7%)	630 (77.0%)
Missing	1 (0.1%)	0	0	1 (0.1%)
Had COVID (confirmed and suspected)				
Yes	334 (31.6%)	52 (34.7%)	31 (35.2%)	251 (30.7%)
No	720 (68.2%)	98 (65.3%)	56 (63.6%)	566 (69.2%)
Missing	2 (0.2%)	0	1 (1.1%)	1 (0.1%)

more details, see Table 1). These covariates were chosen a priori based on input from the COVID trauma response working group expert reference committee, comprising trauma specialist clinicians and academic experts, and the well-being reference group, comprising well-being leads of some National Health Service trusts in London (<https://www.traumagroup.org/>).

Probable PTSD and Probable CPTSD

Probable PTSD and probable CPTSD were assessed using the International Trauma Questionnaire (ITQ; Cloitre et al., 2018). This is a self-report questionnaire, based on the ICD-11 criteria for PTSD and CPTSD, which has demonstrated reliability and validity (Cloitre et al., 2021). We used the recommended diagnostic algorithm for this scale to identify participants meeting the criteria for probable PTSD or probable CPTSD. To assess probable PTSD, individuals report how often they have experienced six core symptoms of PTSD (two from each of three subscales) in the last month and three functional impairment items related to these subscales. To assess probable CPTSD, individuals report six core symptoms of CPTSD (two from each of three DSO subscales and three related functional impairment items, on a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*extremely*). The diagnostic threshold for probable PTSD is met if at least one of two symptoms from each PTSD symptom subscale are endorsed (scored as ≥ 2), there is an endorsement of at least one of the PTSD functional impairment items, and the participants do not meet the criteria for probable CPTSD. The diagnostic threshold for probable CPTSD is met if individuals meet PTSD criteria and in addition endorse at least one of two symptoms from each CPTSD symptom subscale (scored as ≥ 2) and endorsement of at least one of the CPTSD functional impairment items. We used this diagnostic algorithm to create three mutually exclusive groups: (a) participants not meeting criteria for either probable PTSD or probable CPTSD; (b) participants meeting criteria for probable PTSD but not probable CPTSD; and (c) participants meeting criteria for probable CPTSD. Cronbach's α in the current study was 0.88 for the PTSD symptoms subscale in the ITQ and 0.89 for the CPTSD symptoms subscale.

Exposure to PMIEs

Exposure to PMIEs was assessed using the nine-item Moral Injury Events Scale (MIES-9; Nash et al., 2013). We adapted the instructions such that participants were asked to indicate how much they agreed or disagreed with a series of statements based on their experiences as a healthcare worker during COVID-19, on a 6-point Likert scale ranging from 1 (*strongly agree*) to 6 (*strongly disagree*). The MIES-9 comprises three subscales: other-transgressions (two items) which refers to witnessing others engage in actions that one perceives to be a moral violation, self-transgressions (four items) which refers to transgressing one's own morals or values by what one did or failed to do, and betrayal (three items) which refers to feeling betrayed by leaders, colleagues, or people in the community. For the current study, some modifications were made to the betrayal subscale to adapt it for this population, that is, "I feel betrayed by managers or team leaders who I once trusted," "I feel betrayed by coworkers who I once trusted," "I feel betrayed by others outside my organization who I once trusted." In total, 951 individuals completed the MIES-9. Cronbach's α was

.88. The items on the MIES-9 were all reverse scored, such that when transformed, higher scores indicated higher levels of exposure to PMIEs.

Data Analysis

We compared the mean PMIE scores for all three subscales between groups with probable PTSD, probable CPTSD, or no probable PTSD/CPTSD using analysis of variance (ANOVA) and post hoc Tukey's honestly significant difference (HSD) test. We then conducted two separate logistic regressions to investigate the associations between PMIEs and probable CPTSD/PTSD. The first compared screening positive for either probable PTSD or probable CPTSD versus participants that did not screen positive and the second regression compared participants screening positive for probable PTSD compared with screening positive for probable CPTSD. Mean scores on the other-transgressions, self-transgressions, and betrayal subscales from the MIES-9 were included as statistical predictors in all analyses. Additionally, all regression analyses included the following as covariates: whether they had been redeployed during the pandemic, reliable access to PPE, age, gender and whether the individual had ever been infected with COVID-19.

Complete case analysis was performed for each model, and individuals with missing data on any of the covariates included in that model were excluded from that analysis. This resulted in the following sample sizes: 1,056 participants for the ANOVAs comparing PMIEs subscale scores, 904 participants for the logistic regression comparing screening positive for probable PTSD/probable CPTSD versus not screening positive and 204 participants for the probable PTSD versus probable CPTSD analysis (excluding all those not screening positive for probable PTSD/CPTSD). Variance inflation factors were calculated which indicated that there was no evidence of multicollinearity, together with univariate analyses and zero-order correlations (see the online supplemental material). All analyses were conducted in Version 4.1.3 of *R*. The *p* value threshold was set as .05.

Results

We first calculated the percentages of our sample meeting criteria for probable PTSD and probable CPTSD. We found that of the total sample ($n = 1,056$), 88 (8.3%) met the criteria for probable PTSD, and 150 (14.2%) met the criteria for probable CPTSD, while 818 (77.5%), did not meet the criteria for either probable PTSD or probable CPTSD (see Table 1 for the description of the sample).

We first examined PMIEs endorsement by MIES-9 item as shown in Table 2. An item was considered to be endorsed if it was rated as either *slightly agree*, *moderately agree*, or *strongly agree*. We found that witnessing other people carrying out perceived moral transgressions and feeling betrayed by others were events that were more often endorsed than acting in a way that violated one's own morals.

The mean PMIEs sum score across all participants was 22.5 ($SD = 10.7$). Using ANOVAs, we then compared PMIE subscale mean scores between three groups: (a) those with no probable PTSD/CPTSD, (b) those screening positive for probable PTSD, and (c) those screening positive for probable CPTSD (Figure 1). We found that participants that did not screen positive for either probable PTSD or probable CPTSD had the lowest scores for all three subscales, followed by probable PTSD, with the probable

Table 2*Endorsement of Potentially Morally Injurious Events (MIES-9; n = 951)*

MIES-9 item	Endorsed (n/%)
PMIEs other-transgressions	
1. I saw things that were morally wrong	501 (52.7)
2. I am troubled by having witnessed others' immoral acts	383 (40.3)
PMIEs self-transgressions	
3. I acted in ways that violated my own moral code or values	164 (17.2)
4. I am troubled by having acted in ways that violated my own morals or values	169 (17.8)
5. I violated my own morals by failing to do something that I felt I should have done	190 (20.0)
6. I am troubled because I violated my morals by failing to do something that I felt should have been done	191 (20.1)
PMIEs betrayal	
7. I feel betrayed by managers or team leaders who I once trusted	462 (48.6)
8. I feel betrayed by coworkers who I once trusted	316 (33.2)
9. I feel betrayed by others outside my organization who I once trusted	444 (46.7)

Note. MIES-9 = nine-item Moral Injury Events Scale; PMIEs = potentially morally injurious events. PTSD = posttraumatic stress disorder; CPTSD = complex PTSD; PPE = personal protective equipment.

CPTSD group having the highest scores. One-way ANOVAs showed that there were significant group differences, with post hoc Tukey's HSD finding that there were significant differences between the probable PTSD and no probable PTSD/CPTSD groups and between the probable CPTSD and no probable PTSD/CPTSD groups. However, there were no significant differences between the probable PTSD and probable CPTSD groups for any of the three subscales. The distribution of scores and group comparisons are shown in Figure 1.

To investigate our hypotheses, we conducted two logistic regressions (see Table 3). To test our first hypothesis that all types of PMIEs would be significant predictors for screening positive for probable PTSD/probable CPTSD versus not screening positive, we conducted a logistic regression. The overall model was significant: $\chi^2(9) = 63.88$, $p \leq .001$, Cragg-Uhler $R^2 = 0.10$. Higher scores for PMIEs betrayal-related experiences were associated with odds (1.25) of screening positive for probable PTSD/probable CPTSD. Having been redeployed during the pandemic was also associated with increased odds (1.45) for probable PTSD/probable CPTSD. None of the other variables were significant predictors.

To test our second hypothesis that all types of PMIEs would be significant predictors for screening positive for probable CPTSD versus probable PTSD, we conducted a logistic regression. The overall model was significant: $\chi^2(9) = 16.93$, $p \leq .05$, Cragg-Uhler $R^2 = 0.11$. As shown in Table 3, the only significant variable was not having had reliable access to PPE which was associated with increased odds of probable CPTSD (2.92). None of the PMIEs types were significant predictors for probable CPTSD versus probable PTSD.

Discussion

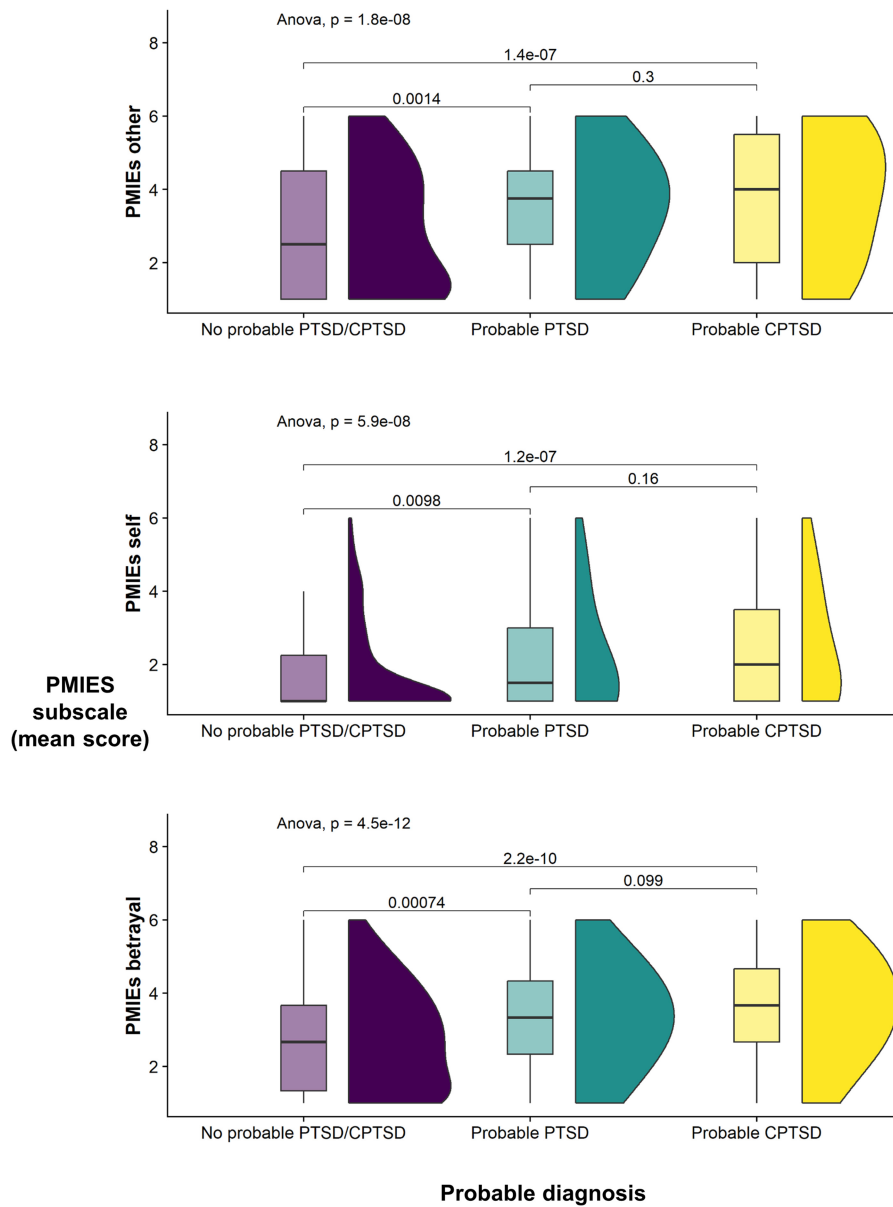
This study aimed to examine whether reporting higher exposure to PMIEs was associated with increased odds of screening positive for probable PTSD, and probable CPTSD in U.K. HSCWs during the first wave of the COVID-19 pandemic. PMIEs related to witnessing others' wrongful actions and betrayal events were more commonly endorsed than perceived self-transgressions of one's own morals. In partial support of our first hypothesis, betrayal-related PMIEs were a significant predictor of screening positive

for probable PTSD or probable CPTSD, together with having been redeployed during the pandemic. The only variable that differentially predicted probable CPTSD as compared with probable PTSD was not having had reliable access to PPE. Our second hypothesis was not supported as none of the PMIEs types were differential predictors for screening positive for probable PTSD versus probable CPTSD.

Nearly half the sample reported feeling betrayed by managers or team leaders that they once trusted. Taken together with the finding that betrayal experiences were associated with increased odds of screening positive for probable PTSD or probable CPTSD, the results of this study suggest that betrayal may have played a key role in HSCWs' distress during COVID-19. The importance of betrayal experiences has similarly been highlighted by other studies conducted during COVID-19. For example, a study among health-care workers in Israel found that betrayal experiences were related to higher levels of depression, anxiety, and PTSD symptoms (Zerach & Levi-Belz, 2021a). A U.K.-based qualitative study conducted during the COVID-19 pandemic among healthcare workers who self-identified as having experienced work-related stress or burnout highlighted the importance of feelings of being abandoned or betrayed by others and that this made them feel that they were considered disposable and devalued (French et al., 2022). Another U.K.-based qualitative study also showed that HSCWs described feeling let down and not valued during the pandemic (Billings et al., 2021).

In addition, we found that redeployment during the pandemic was associated with increased odds of screening positive for probable PTSD/CPTSD, and that lack of reliable access to PPE was associated with increased odds of screening positive for probable CPTSD versus probable PTSD. These predictors, together with high rates of endorsement of witnessing others carrying out perceived wrongful acts and betrayal experiences as compared with the lower endorsement rates of self-transgression items, suggest that the factors that drove distress among HSCWs point toward wider organizational or systemic factors and the actions of others, rather than actions (or inactions) carried out by the workers themselves. This relatively low rate of endorsement of exposure to self-transgression experiences and the lack of association between these experiences and probable PTSD/CPTSD contrasts with the early discourse around

Figure 1
Exposure to Different Types of PMIEs by Probable Diagnosis



Note. Figure shows the distribution of PMIE subscales mean scores by diagnostic group as box and whisker plots (with median score indicated by the line inside the box) and as density plots. The pairwise comparisons indicate differences between the groups (using ANOVA and post hoc Tukey's HSD test). PMIEs = potentially morally injurious events; ANOVA = analysis of variance; HSD = honestly significant difference; PTSD = posttraumatic stress disorder; CPTSD = complex PTSD. See the online article for the color version of this figure.

potential risks associated with moral injury during COVID-19, indicating that HSCWs largely were not distressed by perceived personal violations of their own moral code, but rather by the actions of others. It may be that exposure to PMIEs in the nonmilitary context is different from the military context, a question which needs further exploration.

Given the previous literature on occupational distress and moral injury, it is likely that our current findings are not specific to the

COVID-19 context. A study examining PTSD in frontline U.K. healthcare workers during the pandemic found that while 44% met the criteria for PTSD (assessed using structured clinical interview), only 24% reported COVID as their index trauma, with the majority of staff reporting trauma that predated the pandemic (Wild et al., 2022). In the case of the current study, we do not have data regarding exposure to PMIEs prior to the COVID-19 pandemic, and so we cannot assess the role of previous PMIEs exposure or trauma history for

Table 3

Logistic Regression Analyses Predicting Probable PTSD and Probable CPTSD

Variable	Probable PTSD/CPTSD versus not screening positive (<i>n</i> = 904) <i>OR</i> [95% CI]	Probable CPTSD versus PTSD (<i>n</i> = 204) <i>OR</i> [95% CI]
Age	0.99 [0.97, 1.00]	1.00 [0.98, 1.03]
Gender		
Man (vs. woman)	0.79 [0.39, 1.49]	0.72 [0.21, 2.62]
Redeployed during COVID		
Yes	1.45 [1.00, 2.07]*	1.15 [0.61, 2.2]
Reliable access to PPE		
No	1.10 [0.77, 1.57]	2.92 [1.52, 5.82]**
Had COVID		
Yes	1.20 [0.85, 1.69]	0.83 [0.44, 1.56]
PMIEs other	1.10 [0.97, 1.24]	0.95 [0.76, 1.19]
PMIEs self	1.10 [0.96, 1.25]	1.19 [0.95, 1.50]
PMIEs betrayal	1.29 [1.12, 1.48]**	1.04 [0.81, 1.33]

Note. We were not able to estimate gender-other, due to small category size. PTSD = posttraumatic stress disorder; CPTSD = complex PTSD; CI = confidence interval; PPE = personal protective equipment; PMIEs = potentially morally injurious events.

* $p < .05$. ** $p < .005$.

current distress, but it is likely that HSCWs had previously been exposed to PMIEs through their work.

Clinical Implications

These findings have important clinical implications. These results indicate that exposure to PMIEs was associated with screening positive for probable PTSD and probable CPTSD in HSCWs in the context of the pandemic, although PMIE exposure was not differential predictor of these two outcomes. Furthermore, there was a relatively low endorsement of PMIE self-transgressions among our sample, as compared with witnessing perceived wrongful actions or experiencing betrayal events. These findings suggest that prevention of moral injury in HSCWs should focus on systemic factors rather than focusing on individuals' own actions, and that organizations should consider how to increase HSCW physical safety, specifically seeking to prevent betrayal, as well as consider what can be done to make address this sense of betrayal if it arises.

Strengths and Limitations

This study had many strengths, including the assessment of probable PTSD and probable CPTSD across a diverse group of HSCWs from across the United Kingdom. There are also some limitations to this study. The data were from an online volunteer sample recruited via social media, and therefore not representative of the whole HSCW population, so prevalence estimates should not be derived from this study. The majority of the sample was female, and although this mostly reflects the HSCW population in general, it could be a potential source of bias given that the sample was mostly female. The questionnaires were self-report rather than clinician-administered diagnostic interviews, so we can only refer to probable PTSD or probable CPTSD rather than examine actual clinical disorders. The data were cross-sectional and collected during a particular phase in the

pandemic, and so only give a snapshot of the state of the participants at that point in time, and it may be that different results would have been obtained at other stages of the pandemic. Furthermore, there are significant limitations in using cross-sectional data to test models of prediction, and it is crucial that longitudinal data are examined to test these questions. It is also important to note that the MIES-9 which was used in this study tells us about exposure to PMIEs rather than about the symptoms of psychological distress that may be central to a moral injury. Finally, it is important to consider the ongoing debate regarding the extent to which the moral injury construct is distinct from PTSD (Litz & Kerig, 2019; Zerach & Levi-Belz, 2021b), as well as considering the relevance of the CPTSD construct for occupational groups, when interpreting these findings.

Conclusions

The findings of the current study indicate that rates of probable PTSD and particularly probable CPTSD were high among the participants. Exposure to PMIE betrayal experiences was associated with increased odds of screening positive for both probable PTSD and probable CPTSD, however, none of the PMIEs exposure types were differential predictors for probable CPTSD versus probable PTSD. An unanswered question is whether these findings will continue to be valid at other stages of the COVID-19 pandemic and beyond. Given that HSCWs continue to work through the ongoing pandemic along with their likely routine exposure to PMIEs that are not related to COVID-19, future research should continue to investigate PMIEs exposure and moral injury in frontline worker groups which may be a significant contributor to occupational trauma.

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Received October 11, 2022

Revision received March 7, 2023

Accepted March 16, 2023 ■