

Original Research

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The relationship between peritraumatic distress, mental health symptoms, and functioning impairment in healthcare workers during the COVID-19 emergency

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Abstract

Objective. Healthcare workers (HCWs) were considered a population at risk for developing psychiatric symptoms during the COVID-19 pandemic, such as anxiety, depression, and post-traumatic stress disorder (PTSD). Peritraumatic distress is associated with post-traumatic psychopathological symptoms; however, little is known about how it may affect functioning. The study aimed at evaluating the level of peritraumatic distress in a sample of HCWs during the first wave of the COVID-19 pandemic and at examining the relationship between peritraumatic distress, mental health symptoms, and functioning impairment.

Methods. A sample of 554 frontline HCWs were consecutively enrolled in major university hospitals and community services in Italy. The PDI, IES-R, PHQ-9, and GAD-7 were used to assess peritraumatic distress, symptoms of PTSD, depression, and anxiety, respectively, and the WSAS to investigate functioning impairment. PDI scores were higher among females, community services, physicians, and nurses. Furthermore, the PDI correlated significantly with the GAD-7, PHQ-9, IES-R, and WSAS.

Results. In a mediation analysis, the direct effect of PDI on WSAS and the indirect effects through the PHQ-9 and IES-R were statistically significant ($P < .001$).

Conclusion. Peritraumatic distress reported by HCWs was associated with symptoms of PTSD, depression, and anxiety, but the association with reduced functioning may be only partially mediated through symptoms of depression and PTSD.

Introduction

The pandemic due to the coronavirus disease-19 (COVID-19) is considered the most serious world sanitary emergency of the last decades. It was related to negative consequences to healthcare, economy, and social life in almost every country in the world.¹ During the first phase, between March and May 2020, Italy was one of the most affected countries in the world, with over 240 000 individuals infected and almost 35 000 died.² Exposure to COVID-19-related events, such as high level of exposure, isolation, infection, and death of a close one, has been shown to be potentially traumatic, possibly leading to post-traumatic stress disorder (PTSD) reactions, as well as to other psychiatric symptoms especially in subjects with recognized vulnerable conditions.^{3–8}

Healthcare workers (HCWs) are at risk with regard to mental health outcomes due to the COVID-19 pandemic because of a critical work-related context, a high contamination risk, and the need for isolation.^{9–14} Specifically, HCWs deployed to the front line during the first wave of the pandemic were found at higher risk for developing psychological distress and mental health problems, including depressive, anxiety, and PTSD symptoms^{15–19} than the general population.^{3,6} A meta-analysis on the impact of the COVID-19 pandemic on the mental health of HCWs, including 53 784 participants, showed a pooled prevalence for PTSD, anxiety, and depression of 49%, 40%, and 37%, respectively.²⁰ In another meta-analysis on HCWs during the pandemic, Allan et al.⁹ reported relevant levels of psychiatric symptoms in 34.1% of the participants during the first wave and in 29.3% of the participants 12 months later.

The identification of factors associated with prolonged psychopathological response to the event “pandemic” is of great importance in order to develop specific intervention and tailored treatment strategies. A recent review has identified several risk and resilience factors for the development of PTSD and post-traumatic stress symptoms in HCWs, including level of

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exposure, job role, years of work experience, and social and work support.¹⁰ Moreover, there is robust evidence on the predicting value of peritraumatic distress for mental health outcomes of a traumatic event.²¹ Peritraumatic distress includes altogether the cognitive, emotional, and physiological reactions that occur during a traumatic event and in the immediate aftermath.^{21,22} An association between peritraumatic distress and the development of PTSD symptoms, depression, anxiety, and other mental health problems has been consistently reported.^{23–26} More recently, peritraumatic distress has been found to be relevant in the context of the COVID-19 pandemic.^{4,27–30} Online surveys, conducted during the first months of the pandemic, reported severe peritraumatic distress ranging from 4.9% to 16.4%,^{27,28,30} while other studies showed a relationship between peritraumatic distress and extensive media use, loneliness, female gender, and older age.^{4,28,31} Higher levels of peritraumatic distress were usually found in studies on HCW samples with respect to the general population.^{32,33} In an online survey on HCWs, Jang *et al.*³⁵ reported rates of clinically significant peritraumatic distress in about 33.7% of the participants, while Wozniak *et al.*³² reported it in 22% of 352 HCWs. Megalakaki *et al.*,²⁹ in a prospective online study, confirmed the predictive value of peritraumatic distress due to the COVID-19 emergency and related national lockdown in France, for developing symptoms of PTSD, depression, and anxiety after four months.

However, while peritraumatic distress predicts the development of psychiatric symptoms, and psychiatric symptoms negatively affect quality of life and functioning, including during the COVID-19 pandemic,^{34–38} little is known about whether peritraumatic distress is associated with poorer functioning and whether this association is mediated by psychiatric symptoms.

The present study aims at evaluating levels of peritraumatic distress in a sample of HCWs during the first wave of the COVID-19 pandemic; (ii) examine the relationship between peritraumatic distress, mental health symptoms, and functioning impairment; and (iii) examine whether the association between peritraumatic distress and poorer functioning was mediated by PTSD, anxiety, and depressive symptoms. Our specific hypotheses were as follows:

H1) Peritraumatic distress was prevalent in HCWs exposed to the COVID-19 emergency.

H2) Peritraumatic distress was associated with poorer functioning.

H3) Depression, anxiety, and PTSD symptoms mediate the relationship between peritraumatic distress and functioning.

Methods

Study sample and procedures

For the present cross-sectional study, we utilized a convenience sample of 554 subjects recruited from April 1, 2020, to June 30, 2020, among HCWs employed in hospitals or in healthcare services in the community during the acute phase of the COVID-19 outbreak in Italy. Subjects were enrolled in the major hospitals and community services of five different towns located in two regions in Italy: Tuscany and Emilia-Romagna.

All participants were clearly informed about the study and had the opportunity to ask questions before providing a written informed consent. The study was conducted in accordance with the Declaration of Helsinki, and the Ethics Committee of the

Azienda Ospedaliero-Universitaria of Pisa (CEAVNO) approved all recruitment and assessment procedures (ID: 17151/2020).

Instruments and assessments

All participants were asked to complete the following instruments: the Peritraumatic Distress Inventory (PDI)^{22,39}; the Generalized Anxiety Disorder 7-Item (GAD-7),⁴⁰ assessing anxiety symptoms; the Patient Health Questionnaire-9 (PHQ-9),⁴¹ assessing depressive symptoms; the Impact of Event Scale-Revised (IES-R),⁴² assessing PTSD symptoms; and the Work and Social Adjustment Scale (WSAS),⁴³ assessing the global impairment of functioning related to the mental health burden. Sociodemographic characteristics were also gathered through a specific form.

The PDI is aimed at examining the cognitive response, emotional distress, or physical symptoms experienced in the framework of the traumatic event. It is self-reported and includes 13 items. Each item scores from 0 to 4; hence, the total score varies from 0 to 52 and a higher score represents more distress. The Italian version of the PDI demonstrates good psychometric proprieties³⁹; its internal consistency was good with a Cronbach's alpha coefficient of .874 and one-month test-retest reliability was excellent (ICC = .997).

The GAD-7⁴⁰ is a self-assessment questionnaire used as a tool for screening and measuring the severity of anxious symptoms. Particularly, it investigates the frequency of anxious symptoms in the last two weeks using 7 items with a score ranging from 0 (never) to 3 (almost every day).

The PHQ-9⁴¹ represents one of the most used self-assessment tools for the screening of depressive symptoms. It consists of 9 items that investigate the presence of depressive symptoms in the last two weeks, each evaluated on a scale of 0 (never) to 3 (almost every day);

The IES-R⁴² is a self-report instrument composed of 22 items. It evaluates the level of PTSD symptoms during the last week. The IES-R is divided into three subscales investigating re-experiencing, avoidance, and hyperarousal symptoms. The scale total score is the sum of the scores of each item, while the subscale score is derived from the mean score of the items of each subscale. In the present study, the IES-R referred to the traumatic events that the subjects had experienced in the framework of the COVID-19 pandemic. The questionnaire has an adequate internal consistency and high test-retest reliability.

The WSAS⁴³ is a self-assessment questionnaire used to evaluate the work and social adjustment. It includes five items on the impairment in the ability to perform the activities of everyday life in the week prior to the assessment. Each of the five items is rated on a nine-point scale ranging from 0 (not at all) to 8 (severe interference), so that the total scores are between 0 and 40.

Statistical analyses

All analyses were performed using SPSS version 26.⁴⁴ Continuous variables were described as mean \pm standard deviation (SD). Conversely, categorical variables were described as percentages. For all the analyses, the level of statistical significance was set to 0.05 (two-tailed).

We performed Student's t-test to compare PDI and WSAS scores between males and females. Three-way ANOVA models, followed by the Bonferroni post-hoc tests, were used to compare PDI and WSAS scores across age group, occupation, and workplace.

Spearman's correlation coefficients were used to examine associations among PDI, IES-R, GAD-7, PHQ-9, and WSAS scores. Four multiple linear regression analyses were performed in order to study the association of the PDI score, adjusted by gender, occupation role, and workplace, with the IES-R, GAD-7, PHQ-9, and WSAS scores (dependent variables), respectively. In these models, occupation and workplace variables were dummy coded.

Finally, we performed a multiple mediation analysis providing the PDI total score as predictor; the WSAS total score as dependent variable; and PHQ-9, IES, and GAD-7 total scores as mediators. A nonparametric method was preferred⁴⁵ to bypass assumptions of normality common to traditional tests of mediation. Specifically, we relied on a bootstrapping approach, in which 2000 samples of the original size are taken from the obtained data and mediational effects were calculated in each sample. The bias corrected and accelerated 95% confidence intervals (BCa 95% CI; i.e., with *z* score-based corrections for bias due to the underlying distribution) were then examined, and if not containing zero, indicated a significant point estimate.

Results

The total study sample involved 186 (33.6%) males and 368 (66.4%) females, and the sample consisted of the following age groups: 191 (34.5%) in the 18- to 35-year group, 237 (42.8%) in the 36- to 55-year group, 126 (22.7%) in the ≥ 56 -year group. We divided the HCWs by professional role into physicians (298, 53.8%), nurses (201, 36.3%), and other HCWs (55, 9.9%), such as health and social care workers, technicians, and administrative staff. One hundred fifty-five subjects (28%) were from community services, 259 (46.8%) worked in medical or surgical units, and 139 (25.1%) in intensive care unit (ICUs) or emergency unit. Table 1 summarizes the socio-demographic characteristics of the sample and reports the comparison of the PDI and WSAS scores among groups. Other HCWs

reported significantly lower scores than physicians or nurses on the PDI (7.76 ± 6.24 vs 11.09 ± 8.10 vs 12.67 ± 9.65 ; $P < .001$) and the WSAS (7.55 ± 8.97 vs 11.74 ± 10.11 vs 12.03 ± 10.22 ; $P = .010$). Furthermore, subjects from community services showed higher PDI scores than subjects working in medical or surgical units (12.51 ± 8.97 vs 10.25 ± 7.92 ; $P = .018$).

Significant moderate or strong correlations emerged among variables, as described in Table 2. Particularly, the PDI correlated significantly with the GAD-7 ($r = 0.692$; $P < .001$), PHQ-9 ($r = 0.710$; $P < .001$), IES-R ($r = 0.723$; $P < .001$), and WSAS ($r = 0.597$; $P < .001$).

In the four linear regression models adjusted for gender, occupational role, and work place, the PDI presented a significant positive association with the GAD-7 [$b = 0.4$ (SE = 0.10), CI 95%: 0.364–0.436; $P < .001$], PHQ-9 [$b = 0.40$ (SE = 0.018), CI 95%: 0.367–0.436; $P < .001$], IES-R [$b = 1.60$ (SE = 0.063), CI 95%: 1.475–1.724; $P < .001$], and WSAS [$b = 0.681$ (SE = 0.042), CI 95%: 0.599–0.763; $P = .001$] scores.

Finally, the multiple mediation analysis model explained 49% of the WSAS total score variance [$R^2 = .4904$, $F(4,549) = 132.0730$, $P < .0001$]. The results (see Figure 1) revealed that the indirect total effect through GAD-7, PHQ-9, and IES-R total scores were significant, [$b = 0.5761$, SE = 0.0531, 95% bootstrapped CI (0.4744–0.6825)], and the indirect effects through the PHQ-9 [$b = 0.2875$, SE = 0.0563, 95% bootstrapped CI (0.1690–0.3943)] and IES-R [$b = 0.2048$, SE = 0.0573, 95% bootstrapped CI (0.0899–0.3173)] were significant, while the indirect effect through the GAD-7 [$b = 0.0837$, SE = 0.0554, 95% bootstrapped CI (–0.0254–0.1996)] was not significant. The completely standardized indirect total effect was $b = 0.4922$, with 95% bootstrapped CI (0.4067–0.5717); the standardized PHQ-9 indirect effect was $B = 0.2457$, with 95% bootstrapped CI (0.1480, 0.3335); the standardized IES indirect effect was $B = 0.1750$, with 95% bootstrapped CI (0.0752, 0.2714); and the standardized GAD-7 indirect effect was $B = 0.0715$, with 95% bootstrapped CI (–0.0215, 0.1704).

Table 1. PDI and WSAS Scores in the Total Sample and Divided by HCWs' Working and Personal Characteristics

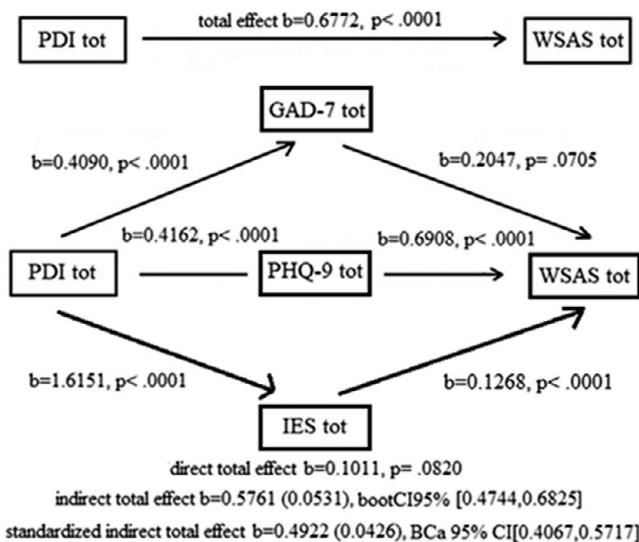
	N (%)	PDI (mean \pm SD)	P	Post-hoc comparison*	WSAS (mean \pm SD)	P	Post-hoc comparison*
Total sample	554 (100.0)	11.34 \pm 8.64	–	–	11.43 \pm 10.11	–	–
Gender							
Male	186 (33.6)	9.74 \pm 8.19	.002	–	10.99 \pm 9.59	.467	–
Female	368 (66.4)	12.14 \pm 8.76			11.65 \pm 10.37		
Age (years)							
18–35	191 (34.5)	11.71 \pm 8.61	.277	–	11.38 \pm 9.81	.510	–
36–55	237 (42.8)	11.61 \pm 9.03			11.90 \pm 10.81		
≥ 56	126 (22.7)	10.25 \pm 7.88			10.61 \pm 9.19		
Occupational role							
Physicians ^a	298 (53.8)	11.09 \pm 8.098	.001	$a > c$, $b > c$	11.74 \pm 10.11	.010	$a > c$, $b > c$
Nurses ^b	201 (36.3)	12.67 \pm 9.648			12.03 \pm 10.22		
Other HCWs ^c	55 (9.9)	7.76 \pm 6.239			7.55 \pm 8.97		
Workplace							
Community services	155 (28.0)	12.51 \pm 8.969	.018	$a > b$	11.12 \pm 9.98	.168	–
Medical or surgical unit	259 (46.8)	10.25 \pm 7.924			10.65 \pm 9.93		
ICU or emergency unit	139 (25.1)	12.10 \pm 9.343			12.72 \pm 10.43		

*Bonferroni post-hoc test.

Table 2. Pearson Correlations Among the PDI, GAD-7, PHQ-9, IES-R, and WSAS in the Total Sample (N = 554)

	Mean ± SD	PDI	GAD-7	PHQ-9	IES-R	WSAS
PDI	11.34 ± 8.64	1.000	–	–	–	–
GAD-7	5.90 ± 5.06	.692*	1.000	–	–	–
PHQ-9	5.70 ± 5.04	.710*	.814*	1.000	–	–
IES-R	19.02 ± 18.69	.723*	.742*	.753*	1.000	–
WSAS	11.43 ± 10.11	.597*	.609*	.651*	.632*	1.000

*P < .001.

**Figure 1.** Multiple mediation analysis with the PDI total score as predictor, the WSAS total score as dependent variable, and PHQ-9, IES, and GAD-7 total scores as mediators.

Discussion

To the best of our knowledge, this is the first study aimed at evaluating the role of peritraumatic distress on functioning impairment in HCWs during the COVID-19 pandemic. We found levels of peritraumatic distress due to the COVID-19 pandemic vary based on gender, occupational role, and work setting. Peritraumatic distress was associated with symptoms of depression, anxiety, and PTSD. Furthermore, the impact of peritraumatic distress on functioning impairment was partially mediated by symptoms of depression and PTSD, but not by anxiety.

According to our first hypothesis, we found peritraumatic distress was prominent in HCWs exposed to the COVID pandemic. Peritraumatic distress emerged higher in females, as well as in physicians and nurses. The gender difference in peritraumatic distress is in line with prior data.^{21,27,30,46,47} Furthermore, studies on COVID-19 emergency revealed a mental health vulnerability of female gender to the events related to the pandemic.^{3,48,49} Interestingly, Lilly et al.,⁴⁶ suggested how greater peritraumatic distress in females was the cause of the gender differences in PTSD prevalence rates. However, in our study, gender did not affect the relationship between peritraumatic distress and psychiatric symptoms or functioning, in line with previous studies.²⁸ Peritraumatic distress was significantly associated with various mental health outcomes evaluated in the study. It is not surprising that distress related to an event is a risk factor for the development of different

psychiatric symptoms. It is reported, in fact, that mood, anxiety, and PTSD symptoms usually coexist in the aftermath of a traumatic event,^{31,36,38,50,51} especially in recent studies on the COVID-19 pandemic.^{52–54} Vulnerable populations have been shown to often present with clinical presentation composed of manifestations with different psychopathological dimensions, particularly PTSD, depression, and anxiety.^{55–59} Hence, our results were in line with previous findings on the relationship between peritraumatic distress and the development of psychopathological manifestations after a traumatic event.^{21,28,60}

Most importantly, according to our other hypotheses, we observed for the first time a relationship between peritraumatic distress and impairment in functioning levels, both mediated by the symptoms of PTSD and depression. Interestingly, there was also a direct effect of peritraumatic distress on functioning, suggesting there might be other mediators not accounted for in our study such as post-traumatic somatic complaints.^{61,62} In a previous multicenter study by some of us,³⁸ symptoms of PTSD and depression emerged as the greatest predictors of impaired functioning in HCWs during the pandemic. In particular, depression and PTSD were related to impairment in family relationship, social activities, and, in general, private life.⁶³ Further supporting our findings, a recent study conducted in a large sample of the general population a few months after the national lockdown in France found that acute peritraumatic distress was a strong predictor of subsequent psychopathological consequences, including post-traumatic stress, depression, and anxiety.²⁹ From a clinical point of view, the assessment of peritraumatic distress as potentially responsible for direct or indirect impairment of functioning could be useful in stratifying individuals subjected to potentially traumatic contexts, such as healthcare workers during the COVID-19 pandemic, into low- and high-risk groups in order to perform preventive interventions and early treatment measures in the case of psychopathological consequences.

The present study has some limitations to be taken into account when discussing results, including the cross-sectional design and possible recall bias, precluding definitive causality; the use of a convenience sample, which may limit its generalizability to other populations (e.g., non-HCWs and non-Italians); the lack of information about the number of HCWs who declined to complete the questionnaires, which may affect the interpretation of results as most severe post-traumatic cases with high avoidance could be included among these subjects; the lack of information on COVID-19 illness or the loss of a loved one to the disease, which may have affected results as these could have been considered as possible confounding variables; and the assessment of psychiatric symptoms by means of self-report instruments, which could be considered less accurate than a clinician assessment, although self-reports and clinician ratings are often strongly correlated.

Conclusions

Peritraumatic distress reported by HCWs during the first phase of the COVID-19 crisis was associated with symptoms of PTSD, depression, and anxiety; however, the effects on reduced functioning may be only partially mediated through depressive and PTSD symptoms. The identification of peritraumatic distress as a major risk factor for post-traumatic sequelae in the context of the COVID-19 pandemic is critical to develop specific secondary and even primary prevention strategies. Primary intervention strategies include organizational support from the hospital to healthcare professionals' PTSD management, by making clear health policies

and reducing potential stressful work environments. PTSD symptom screening should also be provided for healthcare professionals so that early interventions can be given.⁶⁴ Secondary interventions include a combination of different intervention strategies: trauma-related knowledge, emotion regulation and relaxation skill training, and psychological support from peers and psychologists (particularly cognitive behavioral therapy-based interventions) are the most frequent techniques.⁶⁵ Furthermore, critical incident stress debriefing, originally designed specifically for emergency service personnel and disaster workers, includes several components, including discussion of the traumatic event, sharing of thoughts and emotions about the event, and education about typical stress reactions and stress management strategies.⁶⁴ These interventions should promote protective factors, such as personal resources/resilience, and help healthcare workers reprocessing stressful events and use of the most effective and functional long-term coping strategies to prevent the development of PTSD.⁶⁶ Most recently, specific attention has also been devoted to the evaluation of social media and Internet use by the general population as a first step for developing specific protective and supportive interventions, including practical suggestions on how to safely use Internet and social media.⁷ Search for information, accessing the Internet, and using social media were highlighted as possible coping strategies during the pandemic, despite their use was also associated with, especially in vulnerable populations such as adolescents and young adults, may represent a potential risk factor for related mental disorders.^{67,68} Further studies are warranted on the possible intervention for the management of peritraumatic distress in HCWs in order to promote resilience of this population.

Data availability statement. The data that support the findings of this study are available from the corresponding author, [C.C.], upon reasonable request. The data are not publicly available due to legal and ethical restrictions, related to the study protocol.

Author contribution. Data curation: V.D., C.A.B., S.F., V.P., C.C.; Investigation: V.D., A.-R.A., A.G., C.A.B., M.G.N., V.P., C.C.; Writing – original draft: V.D., C.A.B., S.F., V.P., C.C.; Writing – review & editing: V.D., A.-R.A., A.G., C.A.B., S.F., E.M., M.G.N., V.P., C.C.; Conceptualization: E.B., C.C.; Methodology: E.B., C.A.B., C.C.; Supervision: E.B., L.D., C.C.; Formal analysis: C.A.B., S.F., C.C.; Project administration: C.C.

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Competing interest. The authors report there are no competing interests to declare.

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