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Psychopathological burden and coping strategies among frontline and second-line Italian healthcare workers facing the COVID-19 emergency: Findings from the COMET collaborative network

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ABSTRACT

Background: The aim of this study was to explore the psychopathological burden related to COVID-19 together with coping strategies in healthcare workers, focusing on differences between frontline and second-line workers.

Methods: This is a cross-sectional study part of the Covid Mental hEalth Trial (COMET). Participants' socio-demographic and COVID-19-related information was collected through an online survey. Psychiatric symptoms and coping strategies were also investigated. Multivariate analyses, corrected for demographic characteristics, were adopted to assess differences between frontline and second-line workers.

Results: The sample consisted of 20,720 individuals. Healthcare workers (n = 2907) presented with significantly higher risk for mental health disturbances as compared to the rest of the sample (p < 0.001). Healthcare professionals working versus not working on the front line differed in living in severely impacted areas (p < 0.001), precautionary isolation by COVID-19 (p < 0.001), infection by COVID-19 (p < 0.001). Frontline workers also reported significantly increased insomnia (p < 0.001), depression (p = 0.007), anxiety (p < 0.001), obsessive-compulsive symptoms (p < 0.001), non-specific chronic and acute traumatic stress (p < 0.001; p < 0.001), as well as more adaptive coping strategies (p = 0.001).

Limitations: The survey was conducted between March and June 2020, at the peak of the COVID-19 outbreak in Italy. Accordingly, the mental health impact of the COVID-19 pandemic might have changed over time. The survey design involved online invitation and it was not possible to assess the participation rate.

Conclusions: To our knowledge, this is the largest study addressing the psychopathological burden of Italian healthcare professionals during the COVID-19 outbreak and associated coping strategies. Empowering supportive interventions is crucial for the whole healthcare workforce.

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1. Introduction

The COVID-19 illness has presented with high rates of contagion, coupled with deadly virulence. To date, the virus has infected more than 200 million people worldwide and killed more than 5 million. Furthermore, new viral variants are spreading across the world. Even though highly effective vaccines were developed and deployed in record time, many individuals will be at risk for some time to come. We know that the COVID-19 pandemic has produced extraordinary stress in healthcare workers, especially frontline physicians, nurses and healthcare professionals (Greenberg et al., 2020). A large portion of this stress may be attributable to the pressure of new case numbers and to the increased demands of work during a pandemic. The magnitude of mental health outcomes in health workers was assessed at the very beginning of the pandemic in China in a study on 1257 individuals, finding high rates of psychiatric symptoms, in particular in frontline healthcare workers (Lai et al., 2020). Subsequently, these results were further confirmed in an Italian sample of 1379 health workers, reporting a specific association between being at the front line and the onset of Post-Traumatic Stress Disorders (PTSD) symptoms (Rossi et al., 2020). As the months went by, there was an increasing understanding of risk factors for mental health alterations related to COVID-19 (Janiri et al., 2021; Moccia et al., 2020). In parallel, protective factors were specifically assessed, in particular resilience and coping strategies (Miao et al., 2021; Pietrzak et al., 2020; Rathod et al., 2020).

In light of the above, the aim of our study was to further explore the psychopathological burden related to COVID-19 in Italian healthcare professionals, specifically focusing on differences between frontline and second-line workers. Accordingly, we first compared healthcare workers and general population on mental health risk. Second, we evaluated main psychiatric symptoms, as well as positive and negative coping strategies, in front-line and second-line workers. We hypothesized a high psychopathological burden in healthcare workers, particularly in those operating on the front line. The study capitalized on the availability of data from the COMET Italian collaborative network (Fiorillo et al., 2020), which assessed the impact of COVID-19 in over 20,000 individuals, of whom 2907 were healthcare workers.

2. Methods

This is a cross-sectional study part of the COVID Mental Health Trial (COMET), a national study coordinated by the University of Campania “Luigi Vanvitelli” (Naples) together with nine Universities: Università Politecnica delle Marche (Ancona), University of Ferrara, University of Milan Bicocca, University of Milan “Statale”, University of Perugia, University of Pisa, Sapienza University of Rome, “Catholic” University of Rome, and University of Trieste. The Center for Behavioral Sciences and Mental Health of the National Institute of Health in Rome has supported the study according to the clinical guidelines by the National Institute of Health for facing the effects of the COVID-19 pandemic. The COMET collaborative network study consists in an online survey carried out during the first phase of the pandemic in the Italian adult population. The survey was implemented through a multistep procedure: (a) email invitation to healthcare professionals; (b) social media channels (Facebook, Twitter, Instagram); (c) mailing lists of universities, national medical associations and associations of stakeholders (e.g., associations of users/carers); and (d) other official websites (e.g., healthcare or welfare authorities websites). Because of the self-selected and non-probabilistic nature of the sample, invitations and response rates could not be quantifiable, as reported by American Association for Public Opinion Research (AAPOR) reporting guideline. The online survey has been set up through EUSurvey, a web platform promoted by the European Commission (2013). The survey was online from March 30 to June 30, 2020, and it took approximately 30 min (range 15–45 min) to be completed. At the end of June 20,720 individuals completed the survey. For the aim of our study, we mainly focused on health care

workers. Further information about the design of the COMET collaborative network study and representativeness of the sample is available elsewhere (Fiorillo et al., 2020; Giallonardo et al., 2020). The study protocol was approved by the Ethical Review Board of the Coordinating Centre (protocol number: 0007593/i).

All participants accepted to participate to the study and signed specific informed consent.

2.1. Assessment

All the participants were administered an online protocol described elsewhere (Fiorillo et al., 2020; Giallonardo et al., 2020). Respondents' sociodemographic (e.g., gender, age, educational level, living with partner, number of house cohabitants), clinical information (e.g., diagnosis of a previous physical and psychiatric disorder, current use of medications) and information on COVID-19 (e.g., having been infected by COVID-19, having been precautionary isolated due to COVID-19) were collected through a dedicated questionnaire. The questionnaire aimed at collecting sociodemographic, anamnestic and clinical characteristics of the participants and was based on the latest evidence available on the impact of the COVID-19 pandemic on mental health. The full description of the questionnaire is reported in the Supplemental Material. Respondents were asked if they were employed in the health care sector or not. Those who were health workers have been categorized as working on the front line or not working on the front line. Frontline healthcare professionals were all doctors, nurses, paramedics, or other healthcare professionals who were directly involved in COVID-19 prevention and control and who have had direct contact with confirmed or suspected cases during patient intake, screening, inspection, testing, transport, treatment, nursing, specimen collection, or pathogen detection (e.g., working in Emergency Departments, Intensive Care Units or Infective Diseases wards). All other health care professionals have been included in the not working on the frontline group. Healthcare workers were also specifically assessed based on their living in severely impacted areas. According to the official data of the Italian Ministry of Health, at the time of the assessment, Lombardy, Piedmont, Veneto and Emilia-Romagna were the regions with the highest rate of new COVID-19 cases and of COVID-related mortality (<http://www.salute.gov.it/portale/nuovocoronavirus>).

For this study, we considered general mental health status, psychiatric symptoms and coping strategies.

2.1.1. Psychiatric symptoms

The General Health Questionnaire (GHQ) is a 12-item questionnaire assessing mental health status. Each item is rated on a 4-point Likert-type scale (0–3). Threshold ≥ 4 at GHQ identifies people with a probability $>80\%$ of having a mental health problem (Goldberg et al., 1997). The Depression, Anxiety and Stress scale (DASS-21) evaluates the general distress on a tripartite model of psychopathology (Lovibond and Lovibond, 1995). The DASS consists of 21 items grouped in three subscales: Non-specific chronic stress, Anxiety, and Depression. Each item is rated on a 4-level Likert scale, from 0 (never) to 3 (almost always). The total score is calculated by adding together the response values of each item, with higher scores indicating more severe levels of non-specific chronic stress, anxiety, and depression symptoms. The presence of acute traumatic stress symptoms was evaluated through the Severity of Acute Stress Symptoms - Adult scale (SASS), which consists of 9 items rated on a 5-point scale (from 0 = Not at all to 4 = Extremely). The total score ranges from 0 to 28, with higher scores indicating a greater severity of acute stress disorders (Kilpatrick et al., 2013). Suicidal risk was assessed through the Suicidal Ideation Attributes Scale (SIDAS), which consists of 5 items assessing frequency, controllability, closeness to attempt, level of distress associated with suicidal thoughts and impact on daily functioning. Each item is assessed on a 10-level Likert scale, with the total score ranging from 0 to 50. In case of scoring “0— Never” to the first item, all other items are skipped, and the total score is zero

(Van Spijker et al., 2014). Obsessive-compulsive symptoms were assessed through the Obsessive–Compulsive Inventory—Revised version (OCI-R), which is an 18-items scale rated on a 5-level Likert scale, ranging from 0 to 4. The total score is calculated by adding all single items (Foa et al., 2002). The Insomnia Severity Index (ISI) includes seven items rated on a 5-level Likert scale (from 0 to 4), with a total score ranging from 0 to 28 (Morin et al., 2011).

2.1.2. Coping strategies

Coping strategies have been investigated using the Brief-COPE, which consists of 28 items grouped in 14 subscales (Carver, 1997). Each item is rated on a 4-level Likert scale from 0 = “I have not been doing this at all” to 3 = “I have been doing this a lot.” Coping strategies are divided in maladaptive strategies, including denial, venting, behavioral disengagement, self-blame, self-distraction and substance abuse, and adaptive coping strategies, which include emotional support, use of information, positive reframing, planning and acceptance. Two other subscales include religion and humor. The 14-factor structure of the Brief-COPE has been recently validated specifically in the context of the COVID-19 pandemic (Hanfstingl et al., 2021).

2.2. Statistical analyses

2.2.1. Main analyses

First, we compared healthcare workers with the rest of the sample on mental health, according to the GHQ cutoff, on the basis of the chi-square test. Furthermore, to fit our aims, we only considered the group of the healthcare workers and subdivided our sample in individuals working versus not working on the front line.

We compared healthcare workers working versus not working on the front line as regards socio-demographic and clinical characteristics with the chi-square test for nominal variables and the one-way analyses of variance (ANOVA) for continuous variables. Statistical significance was set at $p < 0.05$.

Subsequently, we conducted two multivariate analyses of covariance (MANCOVA) using psychiatric symptoms (Non-specific chronic stress, Anxiety, Depression, Acute traumatic stress symptoms, Suicidal risk, Obsessive compulsive symptoms, and Insomnia) and coping strategies as dependent variables (using continuous total scores), working on the front line as independent factor, and age, sex and education level as covariates. When the initial model was significant, we conducted a series of ANCOVAs, with the same covariates, to test differences between groups on dependent variables. We used a statistical model corrected for multiple comparisons according to the Bonferroni procedure to further minimize the likelihood of type I (false positive) errors. All statistical analyses were performed using SPSS v. 25 (IBM Corp., USA).

Table 1
Demographic and clinical characteristics of the health workers' sample (n = 2907).

Characteristics	Health workers overall sample (n = 2907)	Working on the frontline (N = 760)	Not working on the frontline (N = 2147)	F/ X^2	df	p
Age, years, mean \pm SD	41.9 \pm 12.1	41.6 \pm 11.1	41.9 \pm 12.4	0.47	1	0.49
Gender, F, % (N)	73.7 (2143)	70.7 (537)	74.8 (1606)	4.98	1	0.02
Living with partner, yes, % (N)	62.3 (1812)	65.0 (494)	61.4 (1318)	3.11	1	0.07
University degree, yes, % (N)	86.1 (2504)	83.3 (633)	87.1 (1871)	6.98	1	0.008
Number of house cohabitants, mean \pm SD	2.52 \pm 1.31	2.44 \pm 1.29	2.55 \pm 1.32	4.21	1	0.04
Living with at least three house cohabitants % (N)	46.5 (1351)	42.4 (322)	47.9 (1029)	6.97	1	0.008
Any comorbid physical condition(s), yes, % (N)	16.3 (473)	15.4 (117)	16.6 (356)	0.58	1	0.44
Using medications, yes, % (N)	13.3 (387)	12.5 (95)	13.6 (292)	0.60	1	0.43
Life time psychiatric disorders, yes, % (N)	3.9 (114)	3.7 (28)	4.0 (86)	0.15	1	0.69
Severely impacted area, yes, % (N)	35.1 (1019)	44.5 (338)	31.7 (681)	40.1	1	<0.001
Have you been infected by COVID-19, yes, % (N)	3.9 (114)	8.2 (62)	2.4 (52)	49.0	1	<0.001
Have you been precautionary isolated due to COVID-19 infection, yes, % (N)	3.9 (114)	7.8 (59)	2.6 (55)	40.3	1	<0.001

Legend: Significant results in bold characters. Abbreviations: M, mean; SD, standard deviation; df, degrees of freedom; p, statistical significance; F, value of variance of the group means; X^2 , chi-squared test. Significant p are in bold.

2.2.2. Additional analyses (performed after the main analyses)

Given that healthcare workers working or not working on the front line significantly differed for gender, university degree, number of cohabitants, living in severely impacted areas, infection by COVID-19, and precautionary isolation by COVID-19, main analyses were repeated setting these variables as covariates of interest, to determine reliability of the results. Additional analyses are described in the companion article in Data in Brief.

3. Results

3.1. Main analyses

In the total sample of 20,720 individuals (Age: mean = 40.4 years, SD = 14.3; Female sex: n = 14,720, 71.0%), the sample of healthcare workers consisted of 2907 individuals; 73.7% women (N = 2143), with a mean age of 41.9 (SD = 12.1). Sociodemographic and clinical characteristics of participating healthcare workers are reported in Table 1. Healthcare workers showed a significant ($X^2 = 33.4$; df = 1; $p < 0.001$) higher risk for mental health problems (2805 individuals at risk, 96.5%) than the rest of the sample (16,705 individuals at risk; 93.8%). The sociodemographic and clinical characteristics of the entire sample have been reported elsewhere [8].

In the sample of healthcare workers, 760 individuals (26.1%) were working on the front line. Regarding socio-demographic and clinical characteristics, healthcare workers working or not working on the front line differed in gender, university degree, number of house cohabitants, living in severely impacted areas, infection by COVID-19, precautionary isolation by COVID-19 (See Table 1). Specifically, healthcare workers working on the front line were less female, reported less university degrees and less house cohabitants than those working on the second line. Furthermore, in the frontline group more participants worked in severely impacted areas, had been infected by COVID-19, and had been precautionary isolated to COVID-19 (See Table 1). Healthcare workers working or not working on the front line did not differ for any other sociodemographic and clinical characteristics ($p > 0.05$) (See Table 1).

The MANCOVA on psychiatric symptoms indicated that the healthcare workers working versus not working on the front line globally differed for the considered variables (Wilks' Lambda = 0.97; $F = 10.89$; df = 7; $p < 0.001$). In particular, a series of ANCOVAs clarified that the healthcare workers working on the front line reported significantly more depression, non-specific chronic stress, anxiety, acute traumatic stress symptoms, obsessive-compulsive symptoms, and insomnia (See Table 2). The two groups did not differ for suicidal risk.

The MANCOVA on coping strategies indicated that healthcare workers working versus not working on the front line globally differed for the considered variables (Wilks' Lambda = 0.99; $F = 1.88$; df = 14; p

Table 2

Differences between health workers working or not working on the frontline in main psychiatric symptoms (n = 2907).

Main psychiatric symptoms	Health workers overall sample (n = 2907)	Working on the frontline (N = 760)	Not working on the frontline (N = 2147)	ANCOVAs		
		Mean (SD)	Mean (SD)	F	df	p
Non-specific Chronic stress (DASS)	16.39 (6.87)	17.46 (6.11)	16.02 (7.08)	30.09	4	<0.001
Anxiety (DASS)	7.15 (6.84)	7.97 (6.87)	6.86 (6.80)	31.19	4	<0.001
Depression (DASS)	10.91 (7.65)	11.56 (7.43)	10.69 (7.72)	16.55	4	<0.001
Acute traumatic stress symptoms (SASS)	5.44 (4.65)	6.25 (4.81)	5.15 (4.56)	53.72	4	<0.001
Suicidal risk (SIDAS)	5.05 (7.03)	4.96 (7.13)	5.08 (7.03)	0.04	4	0.84
Obsessive compulsive symptoms (OCI)	9.34 (7.47)	10.16 (8.03)	9.05 (7.24)	15.88	4	<0.001
Insomnia (ISI)	6.64 (4.97)	7.48 (5.38)	6.34 (4.79)	18.99	4	<0.001

Legend: Significant results in bold characters. Abbreviations: M, mean; SD, standard deviation; df, degrees of freedom; p, statistical significance; F, value of variance of the group means; DASS, Depression, Anxiety, Stress Scale; SASS, Severity-of-Acute-Stress-Symptoms-Adult scale; SIDAS, Suicidal Ideation Attributes Scale; OCI, Obsessive–Compulsive Inventory; ISI, Insomnia Severity Index. Significant p after Bonferroni correction are in bold.

= 0.02). In particular, a series of ANCOVAs clarified that the healthcare workers working on the front line reported significantly more positive coping strategies, specifically emotional support (See Table 3). The two groups did not differ in terms of negative coping strategies.

3.2. Supplemental analyses (performed after the main analyses)

Additional analyses confirmed reliability of the results (see the companion article in Data in Brief).

4. Discussion

Our data highlight that healthcare workers presented with significantly higher risk for mental health disturbances as compared to the rest of the sample. This result is in line with previous studies (Pappa et al., 2020; Serrano-Ripoll et al., 2020; Sheraton et al., 2020) and may be due to the fact that COVID-19 outbreak forced healthcare workers of every country in the world to deal with an unprecedented situation. They had to work under extremely stressful circumstances and take dramatic decisions, including how to provide care to several seriously ill patients with constrained resources and how to balance their own physical and mental healthcare needs with those of patients. This may ultimately lead some of them to experience severe mental burden (Fiorillo and Greenwood, 2020; Greenberg et al., 2020). The high percentage of healthcare workers at risk for mental health we found may also be explained by the

fact that the survey was carried out between March and May 2020. This was a period in which COVID-19 active cases and deaths in Italy were among the highest in the world, possibly increasing the levels of fears and uncertainty in the most vulnerable population groups and triggering mental health problems (Fiorillo et al., 2020).

Consistently with recent meta-analytic findings (Busch et al., 2021), healthcare professionals working versus not working on the front line reported significantly increased mental burden, including depression, anxiety, traumatic and non-traumatic stress symptoms, and insomnia. A number of factors may contribute to mental distress of healthcare workers providing direct frontline care to patients with COVID-19. A few of them may include emotional and physical exhaustion when dealing with growing numbers of infectious patients with life-threatening conditions, shortage of personal protective equipment that may exacerbate fears of virus exposure and contagion as well as worries about transmitting SARS-COV-2 on family members from workplace exposure (Ayanian, 2020). More in details, working in a high-risk environment, which entails being in direct contact with infected patients, along with social isolation, have been recognized as strong risk factors for depression, anxiety, insomnia, and traumatic stress symptoms among healthcare workers during viral epidemics, including the COVID-19 outbreak (Bassi et al., 2021; Serrano-Ripoll et al., 2020). Consistently with these findings, our results indicated that frontline healthcare workers were more likely to living in severely impacted areas, to be infected by COVID-19 or to be precautionary isolated, and to report fewer house

Table 3

Differences between health workers working or not working on the frontline in coping strategies (n = 2907).

Brief COPE subscales	Health workers overall sample (n = 2907)	Working on the frontline (N = 760)	Not working on the frontline (N = 2147)	ANCOVAs		
	Mean (SD)	Mean (SD)	Mean (SD)	F	df	p
Coping negative strategies						
Denial	2.89 (1.32)	2.87 (1.31)	2.89 (1.32)	0.72	4	0.57
Venting	4.58 (1.45)	4.61 (1.42)	4.57 (1.46)	3.29	4	0.01
Behavioral disengagement	3.13 (1.29)	3.07 (1.26)	3.15 (1.30)	0.93	4	0.44
Self-blame	4.84 (1.51)	4.86 (1.51)	4.83 (1.50)	2.52	4	0.03
Self-distraction	5.36 (1.64)	5.31 (1.63)	5.38 (1.65)	2.05	4	0.08
Substance abuse	2.40 (1.03)	2.40 (1.03)	2.40 (1.04)	0.42	4	0.79
Coping positive strategies						
Active coping	5.87 (1.62)	5.87 (1.62)	5.86 (1.62)	0.32	4	0.86
Emotional support	4.76 (1.72)	4.71 (1.72)	4.77 (1.71)	4.97	4	0.001
Use of information	4.88 (1.68)	4.88 (1.63)	4.88 (1.69)	3.63	4	0.006
Positive reframing	5.48 (1.71)	5.65 (1.61)	5.42 (1.74)	3.43	4	0.008
Planning	6.02 (1.61)	6.10 (1.55)	6.00 (1.62)	0.79	4	0.52
Acceptance	6.26 (1.46)	6.34 (1.40)	6.23 (1.49)	2.17	4	0.06
Religion	3.69 (1.95)	3.85 (2.03)	3.63 (1.92)	2.39	4	0.04
Humor	4.12 (1.50)	4.25 (1.51)	4.08 (1.49)	2.41	4	0.04

Legend: Significant results in bold characters. Abbreviations: M, mean; SD, standard deviation; df, degrees of freedom; p, statistical significance; F, value of variance of the group means; Significant p after Bonferroni correction are in bold.

cohabitants as compared to those working on second line. In particular as regards the last result, previous investigations showed a negative association between number of cohabitants and the risk of presenting with psychiatric symptoms (Langenkamp et al., 2022; Tsang et al., 2022). Specifically, a recent study on a large cohort of twins found that cohabiting individuals were more satisfied with life and less depressed than the rest of the sample (Tsang et al., 2022). Due to social distancing measures implemented for the pandemic, individuals have spent more time isolated and with limited social interactions. Close relationships may mitigate negative consequences of the social isolation and be a potential source of support, as individuals may rely on their intimate relationship when faced with the uncertainty related to the pandemic.

In our sample, we also found more obsessive-compulsive symptoms in healthcare professionals working on the frontline compared to those on the second line. A single previous study (Zhang et al., 2020) found that obsessive-compulsive symptoms were more prevalent in healthcare workers who were at risk of contact with COVID-19 patients, as compared to those who were not. On the one hand, certain repetitive and ritualized patterns of behavior, such as frequent disinfecting and/or handwashing, in addition to being advocated during a pandemic, may also foster a psychological sense of competence when facing an extremely stressful situation (Freud, 1907). On the other hand, fears of contamination that are real and well founded, such as those related to contracting COVID-19, may become intrusive and lead to extreme distress especially in those who are at risk of direct contact with COVID-19 individuals.

In our study, frontline healthcare professionals also reported more functional coping strategies, specifically emotional support. Functional coping strategies allow individuals to positively reinterpret negative and stressful situations, and have been linked with increased self-efficacy (Vagni et al., 2020) and resilience (Lin et al., 2020) among frontline medical workers during the COVID-19 outbreak. In particular, emotional support consists of seeking assistance, or advice, to solve a stressful issue on the basis of an appropriate reality assessment. It can be considered the opposite of using negative coping strategy, in particular denial, which means avoiding confronting the reality of the situation (Carver, 1997). High scores in emotional support indicate coping strategies that are aiming to regulate emotions associated with stressful situations. Conversely, abnormalities in emotion regulations are implicated in maladaptive response to stress and have been linked to many psychiatric disorders (Sheppes et al., 2015). Interestingly, very recent data showed that emotional dysregulation is also specifically associated with the psychopathological burden related to COVID-19 (Janiri et al., 2021; Moccia et al., 2020). In particular, previous studies found that emotional dysregulation predicted depressive symptoms and psychological distress in the general population during the COVID-19 outbreak (Janiri et al., 2021; Moccia et al., 2020). No data are available on the impact of emotional dysregulation on healthcare workers during the pandemic. Taken together, these observations suggest that emotional support may be considered a specific coping strategy to face the distress related to working in contact with COVID-19 patients. It is interesting to note that although healthcare professionals working versus not working on the front line reported significantly increased psychiatric symptoms, they did not present with negative but conversely positive emotional strategies. This could be potentially linked to specific resilience mechanisms, in particular to a positive attitude in facing the psychopathological burden related to COVID-19 (Janiri et al., 2020). Further longitudinal studies are needed to map psychiatric symptoms in healthcare worker during the different stages of the pandemic and to confirm this initial speculation.

Before summarizing study conclusions, we must acknowledge some potential limitations that might mitigate the generalizability of our findings. First, the survey was conducted between March and June 2020, at the peak of the “first wave” of the COVID-19 pandemic in Italy. Because of the evolving situation, leading to additional waves of cases, the mental health impact of the COVID-19 outbreak on Italian

healthcare workers might change over time (Caroppo et al., 2021). Therefore, long-term psychological implications of this vulnerable population warrant further investigation. Second, the use on an online tool might introduce a selection bias, as the condition of healthcare workers who do not use network devices is left unexplored. However, this was necessary in order to reach a large percentage of the population in a period when face-to-face contacts were forbidden. Third, we cannot determine the participation rate since it is unclear how many subjects received the survey. Finally, the reliability of self-reported questionnaires may be partially biased.

To the very best of our knowledge, this is the largest study addressing the psychopathological burden together with coping strategies in Italian healthcare professionals during the COVID-19 outbreak, by focusing on differences between frontline and second-line workers. In line with previous findings (Lai et al., 2020; Rossi et al., 2020), our results suggest that frontline healthcare workers are disproportionately affected compared to non-frontline healthcare professionals and tend to adopt specific coping strategies. Future intervention strategies should be oriented to empower emotional support in healthcare professionals working with COVID-19 positive cases. These data provide additional support for societal concerns of stressful impact of the COVID-19 pandemic on the mental health of healthcare workers. As the pandemic continues, building supportive interventions or policies (Giordano et al., 2021; Kua et al., 2021) is crucial for the whole healthcare workforce.

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CRediT authorship contribution statement

Conceptualization, GS, AF; Methodology, GS, UA, GC, MP, UV, AF; Formal analysis, LM, DJ; writing/original draft preparation, GS, LM, DJ; writing/review and editing, UA, CC, FC, BDO, GM, MGN, MP, UV, AF. All authors have approved the final version of the manuscript.

Conflicts of interest

All authors declare that they have no conflicts of interest.

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None.

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