

Impact of COVID-19 on the mental health in a cohort of Italian rehabilitation healthcare workers

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Abstract

The COVID-19 pandemic has had a strong impact on healthcare workers (HCWs), affecting their physical and mental health. In Italy, HCWs have been among the first exposed to unprecedented pressure, dealing with large numbers of infections during the first pandemic wave. However, the severe psychological consequences on HCWs find little evidence in the literature, especially in terms of comparison to the status quo ante pandemic. The aim of this study was to provide an assessment of the mental health burden in a cohort of Italian HCWs during the COVID-19 pandemic, comparing their condition with that before the emergency, to direct the promotion of mental well-being among HCWs worldwide. In this retrospective study, we included physicians, physical therapists, and nurses working in the Respiratory Intensive Care Unit, Neurology Unit, and Rehabilitation Unit from a Southern Italy University Hospital. All study participants underwent a battery of psychological tests, aimed at verifying their state of mental health during the COVID-19 emergency and before it. Depressive, anxiety, and burnout symptoms were assessed using the following questionnaires: Maslach Burnout Inventory, Patient Health Questionnaire-9 (PHQ-9), and General Anxiety Disorder-7. Depressive, anxiety, and burnout clinical relevance symptoms were present in HCWs during the COVID-19 pandemic more than those before the emergency. Fifty percent of the HCWs obtained a score clinically significant during the emergency. Moreover, a depersonalization factor showed a statistically significant increase in average scores ($p < 0.0001$). The PHQ-9 scale showed that 47.1% of the operators reported depressive state presence. The number of operators scoring above the cut-off for the anxiety scale tripled during the emergency ($p < 0.0001$). The female gender conferred greater risks for depression. Taken together, the findings of this study showed that our sample of Italian HCWs showed a greater risk for depression, anxiety, and stress during the COVID-19 pandemic. These data might be a starting point to plan mental health monitoring and prevention programs for HCWs, thus ensuring patients receive the best possible care performances even during healthcare crises such as the current pandemic.

KEYWORDS

coronavirus, economic reason, epidemiology, social science, virus classification

1 | INTRODUCTION

The COVID-19 pandemic has had a strong impact on people's lives all over the world, affecting their health, minds, and habits.¹⁻³ The disruption of normal life has significantly impacted the mental health of the individuals; in detail, mental health might influence the personal and social functioning of individuals, justifying the importance of intervening upstream to promote mental health before mental illness occurs.⁴

The rapid spread of the infection and the severity of the COVID-19 caused a partial collapse of the sanitary systems in many countries of the world.⁵ One of the main causes of this failure was the lack of specialized workers and structures, particularly intensive care units and in the rehabilitation units overloaded by the recent pandemic due to the growing rehabilitation needs of COVID-19 patients.⁶⁻¹³

Consequently, healthcare workers (HCWs) had to intensify their work shift to cope with this sanitary emergency¹⁴; overwork and the small numbers of adequate personal protective equipment were associated with stress,¹⁵ especially during the initial part of the COVID-19 pandemic.

It has been shown that fatigue, fear of getting sick, fear for one's family, precarious organization, and preventive isolation might also contribute to cause mental illness.¹⁶

HCWs were exposed to several additional stressful events while working under extreme pressure with COVID-19 patients, and this made HCWs a high at-risk population.¹⁴ Lai et al.¹⁷ performed a cross-sectional study on a sample of 1257 HCWs in medical facilities treating COVID-19 patients, observing that symptoms of depression and anxiety reached percentages of 50.3% and 44.6%, respectively.

Another study by Cao et al.¹⁸ found 6.3% of the participating doctors felt nervous after listening to the news on mass media that some doctors were positive for COVID-19, whereas 52.6% of the participating nurses report negative emotion, worrying about family, fear of infection, and stress about a heavy workload.

Some recent studies tried to deepen the possible different psychological impacts of the ongoing pandemic on the different health professionals involved and showed that those who work in the frontline seem more prone to develop psychological distress than those who work in the second line,^{19,20} and even the emotional involvement, physical and mental stress of these first-line HCWs have been observed to respond to a certain "exposure effect".²¹ Nevertheless, also the second line HCWs suffered serious consequences from a mental point of view.^{22,23}

Albeit psychological stress related to healthcare workers is an ever-present problem,^{24,25} there is now more evidence that the pandemic has worsened the global health status of HCWs around the world.²⁶

Despite being the first European country involved in the COVID-19 pandemic,²⁷ in Italy available data about the psychological impact of the COVID-19 spread on HCWs are still poor, and there is still a lack of knowledge about how the mental health of these subjects may have changed due to their work compared to the situation before the pandemic.²⁸

Thus, the aim of this study is to evaluate the impact of COVID-19 on the mental health burden of a cohort of Italian HCWs, comparing their condition with the one before the emergency, to highlight the promotion of mental well-being among HCWs worldwide.

2 | METHODS

2.1 | Participants

This retrospective study assessed medical records from a cohort of HCWs, including physicians, physical therapists, and nurses working in the Respiratory Intensive Care Unit, Neurology Unit, and Rehabilitation Unit from a Southern Italy University Hospital Italian rehabilitation workers commonly involved in the management of patients with postacute COVID-19 in their clinics. All data were obtained during the first wave of the COVID-19 pandemic from March 2020 to May 2020. Inclusion criteria were the following: (a) HCWs employed in their medical operational units at least 1 year before the onset of the pandemic; (b) HCWs who continued to work during the emergency in the first or second line, respectively, with direct or not direct contact with COVID-19 patients. We excluded HCWs with: (a) pre-existence of mental health disorders before the COVID-19 pandemic; (b) staff in drug therapy or psychotherapy for mental health disorders.

All participants were asked to participate in an online questionnaire, after a detailed description of the survey and a previous authorization by the participants to be contacted for survey purposes. The study was approved by the Institutional Review Board and was performed in accordance with the Declaration of Helsinki. All the participants were asked to carefully read and sign an informed consent before collecting the data and privacy protection was guaranteed by the study investigators.

2.2 | Outcome measures

Before starting the administration of the specific rating scales, the following demographic and organizational data were collected: gender; age; professional position (PRM physician, nurse, physical therapist, or other members of medical staff); healthcare unit to which HCWs belong; information on direct or not direct contact with COVID-19 patients.

All study participants were asked to express themselves on their current condition (during the pandemic) and on their condition before the spread of the pandemic in Italy (before March 2020).

Outcome measures were:

1. Maslach Burnout Inventory (MBI), Italian version,²⁹ to assess the burnout level. It is composed of 22 statements to investigate three dimensions of burnout:
 - emotional exhaustion (9 items);
 - depersonalization (5 items);

—personal accomplishment (8 items).

All MBI items are scored using 7-level frequency ratings from “never” (=0) to “daily” (=6). Burnout is confirmed with high scores obtained on a subscale of emotional exhaustion (0–54 points) and depersonalization (0–30 points), and low results on a personal accomplishment subscale (0–48 points).

2. Patient Health Questionnaire-9 (PHQ-9),³⁰ to evaluate depressive disorders; it is a nine-item questionnaire designed to detect depression in primary care and other medical settings.²⁸ The cut-off score is identified as 10 points. Scores 10 or above suggest depressive state presence.
3. General Anxiety Disorder-7 (GAD-7) to assess anxiety. GAD-7 includes seven items measuring anxiety symptoms. Each item is scored on a 4-point Likert scale (0–3) with total scores ranging from 0 to 21 with higher scores reflecting greater anxiety severity. Scores 10 or above are in the clinical range. The GAD-7 has shown good reliability and construct validity.³¹

2.3 | Statistical analysis

Data management and analyses were conducted according to a prespecified statistical analytical plan. Statistical analysis was performed using STATA v.12 (StataCorp LP). Continuous variables are presented as means ± standard deviations, or median and interquartile range. The continuous variables were compared between times by testing Wilcoxon signed-rank test. Comparisons of categorical variables across groups were made by χ^2 tests.

Univariate and multivariate linear regression was used to evaluate the relationship between each outcome difference (value during-COVID-19 vs. value pre-COVID-19) and the determinants sex (males vs. females), age (years), role (physicians vs. other health workers), and healthcare unit (intensive vs. sub-intensive). Pearson correlation coefficients and regression analyses assessed associations and correlations among oral health status of study participants, analyzing a correlation with clinical and demographic features. A *p* value of 0.05 was considered statistically significant.

3 | RESULTS

Out of 74 subjects, 68 HCWs (46 female and 22 male), mean aged 35.8 ± 12.1 years were assessed. Thirty-eight (55.9%) were PRM physicians, 10 nurses (22.0%), and 10 physical therapists (22.0%). Forty-three (63.2%) of them work in subintensive units (no direct contact with COVID-19 patients) and 25 (36.8%) intensive (direct contact with COVID-19 patients). Table 1 describes differences in outcome measures comparing answers by study participants before and during the COVID-19 pandemic.

The MBI Emotional Exhaustion average score was above the cut-off during the pandemic. Fifty percent of the HCWs obtained a score above the cut-off in the MBI Emotional Exhaustion during

TABLE 1 Differences in outcome measures before COVID-19 pandemic versus during COVID-19 pandemic

	Before COVID-19 pandemic	During COVID-19 pandemic	<i>p</i> Value
MBI Emotional Exhaustion	19.4 ± 13.1	25.6 ± 13.5	<0.0001
Low	30 (44.1%)	20 (29.4%)	
Medium	15 (22.1%)	14 (20.6%)	
High	23 (33.8%)	34 (50.0%)	
MBI Depersonalization	6.3 ± 6.2	7.5 ± 7.2	<0.0001
Low	30 (44.1%)	26 (38.2%)	
Medium	16 (23.5%)	15 (23.5%)	
High	22 (32.4%)	26 (38.2%)	
MBI Personal Accomplishment	34.1 ± 9.5	34.0 ± 9.2	<0.0001
Low	32 (47.1%)	34 (50.0%)	
Medium	15 (22.1%)	13 (19.1%)	
High	21 (30.9%)	21 (30.9%)	
PHQ-9	6.8 ± 5.0	9.7 ± 6.0	<0.0001
No relevant depression	53 (77.9%)	36 (52.9%)	
Significant depression	15 (22.1%)	32 (47.1%)	
GAD-7	6.6 ± 4.9	9.5 ± 5.8	<0.0001
Normal anxiety	57 (83.8%)	35 (51.5%)	
Anxiety above cut-off	11 (16.2%)	33 (48.5%)	

Abbreviations: GAD-7, General Anxiety Disorder-7; MBI, Maslach Burnout Inventory; PHQ-9, Patient Health Questionnaire-9.

the COVID-19 emergency. A 17% increase was recorded in this score if compared to 33.8% before the COVID-19 phase ($p < 0.0001$). The second component of the MBI scale, which is referred to as Depersonalization, showed a statistically significant difference in average scores between before and during pandemic scores ($p < 0.0001$). Specifically, it was detected an increase in the number of subjects with a pathological Depersonalization factor (above cut-off), which reached 38.2% during the pandemic ($p < 0.0001$). The third component of the MBI scale, Personal Accomplishment, detects no statistically significant difference on the average score ($p = 0.66$).

Concerning the PHQ-9 scale, it was observed a statistically significant difference in average scores between those before and during pandemic ($p < 0.0001$). The number of subjects with scores above the cut-off registered a significant increase in data referred to the emergency ($p < 0.0001$): specifically, in the period before the COVID-19 pandemic, 22.1% of the operators showed clinically

significant depression, while the percentage reaches 47.1% during the emergency. Analogous results were obtained by observing the anxiety scale GAD-7. The number of operators scoring above the cut-off for anxiety scale triplicated ($p < 0.0001$) during the COVID-19 pandemic. About half HCWs reported clinically significant anxiety. Moreover, it was found a statistically significant difference between before-pandemic and during-pandemic scores in GAD-7 score ($p < 0.0001$).

Univariate and multivariate linear regression analyses were performed to verify the influence of demographic and organizational parameters (sex, age, position, healthcare unit) on each scale (MBI, PHQ-9, and GAD-7). These analyses showed a statistical difference only for anxiety (PHQ-9) referred to sex; particularly, female HCWs significantly were more exposed to depression ($p = 0.040$), as showed by the multivariate linear regression analysis (see Table 2 for further details).

TABLE 2 Univariate and multivariate linear regression to evaluate the relationship between outcome differences in determinants sex, age, position, healthcare units before COVID-19 pandemic versus during COVID-19 pandemic

Determinant	Univariate			Multivariate		
	Coef.	95% CI	p Value	Coef.	95% CI	p Value
MBI Emotional Exhaustion						
Sex (male vs. female)	-3.4	-8.0 to 1.3	0.153	-3.3	-8.1 to 1.5	0.178
Age	0.1	-0.1 to 0.2	0.575	0.1	-0.1 to 0.2	0.628
Position (physicians vs. other)	-1.7	-6.1 to 2.8	0.454	-2.9	-7.8 to 2.0	0.235
HU (intensive vs. subintensive)	-1.9	-6.4 to 2.7	0.410	-3.8	-8.8 to 1.3	0.143
MBI Depersonalization						
Sex (male vs. female)	-1.0	-2.7 to 0.6	0.198	-1.1	-2.8 to 0.6	0.204
Age	-0.1	-0.1 to 0.1	0.873	-0.1	-0.1 to 0.1	0.711
Position (physicians vs. other)	-0.6	-2.2 to 0.9	0.418	-0.6	-2.4 to 1.1	0.464
HU (intensive vs. subintensive)	0.1	-1.5 to 1.6	0.933	-0.3	-2.1 to 1.5	0.724
MBI Personal Accomplishment						
Sex (male vs. female)	-0.9	-3.1 to 1.2	0.392	-0.8	-3.0 to 1.5	0.483
Age	0.1	-0.1 to 0.1	0.848	0.1	-0.1 to 0.1	0.888
Position (physicians vs. other)	-1.4	-3.4 to 0.6	0.168	-1.6	-3.8 to 0.7	0.174
HU (intensive vs. subintensive)	0.2	-1.9 to 2.3	0.825	-0.6	-2.9 to 1.8	0.624
PHQ-9						
Sex (male vs. female)	-2.0	-4.0 to 0.1	0.045	-2.2	-4.2 to 0.1	0.040
Age	0.1	-0.1 to 0.1	0.624	0.1	-0.1 to 0.1	0.783
Position (physicians vs. other)	-0.1	-1.9 to 1.9	0.984	-0.6	-2.7 to 1.5	0.564
HU (intensive vs. subintensive)	-1.3	-3.3 to 0.6	0.180	-1.9	-4.1 to 0.2	0.081
GAD-7						
Sex (male vs. female)	-1.5	-3.5 to 0.5	0.141	-1.8	-3.9 to 0.3	0.086
Age	-0.1	-0.1 to 0.1	0.924	-0.1	-0.1 to 0.1	0.825
Position (physicians vs. other)	0.4	-1.5 to 2.3	0.691	-0.3	-2.4 to 1.8	0.798
HU (intensive vs. subintensive)	-1.7	-3.7 to 0.2	0.084	-2.0	-4.2 to 0.1	0.066

Abbreviations: CI, confidence interval; GAD-7, General Anxiety Disorder-7; HU, healthcare units; MBI, Maslach Burnout Inventory; PHQ-9, Patient Health Questionnaire-9.

4 | DISCUSSION

COVID-19 pandemic has spread worldwide³² with serious consequences also in Italy.³³⁻³⁵ COVID-19 caused many deaths, and it had a deep psychological impact on the general population.³⁶

Forced closures, job loss, fear of contagion and infecting others, social distancing, and the impossibility to have human contact for a long time have significantly affected people's minds, emotions, and behaviors: as a result, the mental health of the worldwide population had worsened.³⁷ This is even more evident for those who faced and are still facing the pandemic at the frontline, often in precarious work conditions.²⁸ In fact, in many cases HCWs operated without adequate tools, adequate preparation, and adequate support, as seen especially at the beginning of the pandemic.

Estimating the impact of the coronavirus emergency on the population and on the mental health of HCWs is a global need.

In literature, higher levels of stress, anxiety, and depression were found in HCWs who assisted COVID-19 patients.^{25,38} In Italy, a study on the general population reported high-stress levels during the pandemic.³⁹ However, most of the studies available in the scientific literature have not reported the status of mental health before the COVID-19 pandemic.

It is desirable to know the state of mental health of the subjects investigated before the emergency, to provide a realistic estimate of the impact of the health crisis we are experiencing. This allows us to identify objective and subjective risk conditions that can develop during an emergency. In this way, we could be able to modulate the impact of the pandemic for those on the frontline in the short and long term, monitoring them to implement early targeted interventions.

In relation to the health emergency from SARS-CoV-2, due to the peculiarities of the conditions that have arisen, the only way to obtain useful data is to carry out retrospective studies, which allow us to build comparisons with previous data, even if obviously these data are subject to a significant margin of error.

In our study, we considered a sample of HCWs and compared data on their mental health before the onset of the SARS-CoV-2 pandemic, and during the emergency. Our results showed significant mental health worsening in HCWs. All components evaluated were involved except one. No influence of demographic and organizational parameters (age, position, healthcare unit) was found with the exclusion of gender.

The analysis of average results showed a significant difference when comparing the scoring for the Emotional Exhaustion factor before the COVID-19 pandemic versus during the COVID-19 pandemic ($p < 0.0001$). In particular, we noted average scores were above the cut-off during the pandemic.

Half of the HCWs obtained a score above the cut-off during the COVID-19 emergency for Emotional Exhaustion ($p < 0.0001$). These results are consistent with the data reported by Lasalvia et al.⁴⁰ which showed that working during an emergency increases the feeling of being emotionally worn out and drained. In a recent study, published by Conti et al.,⁴¹ more than one-third (39.3%) of enrolled HCWs reported their explicit need for psychological support during the COVID-19 emergency. In general, providing psychological support for health professionals can be useful in reducing the feeling of mental fatigue and mental exhaustion, and improving their working conditions. Above all, it prevents and manages the condition of burnout and the long-term psychological consequences that accompany emergency work situations.⁴²

Depersonalization factor showed an increase in significant average outcomes and number of subjects during the pandemic ($p < 0.0001$).

It has been demonstrated that the complex trauma sequelae might include symptoms of depersonalization and derealization; thus, trauma-related dissociation can disrupt the development of self-regulatory processes in stress response systems, interpersonal relationships, affect and impulses, and self-perception and lead to the development of chronic self-dysregulation.⁴³

Recent research by Martínez-López et al.⁴⁴ reached similar results for a Spanish sample. High depersonalization increases an unemotional and impersonal response to patients, and it may cause negative attitudes and feelings, insensitivity, distancing of patients and colleagues. Psychological support, training in stress management, and conflict resolution increase the tolerance to frustration. In addition, changes in management related to work shifts and service rotation can be of help in downplaying these feelings.

The third component of the MBI scale, Personal Accomplishment, detects no statistically significant difference on the average score ($p = 0.66$). This data is in line with the available literature: Di Trani et al.⁴⁵ found a higher level of MBI Personal Accomplishment in emergency professionals than in chronicity operators. In the same research, the "emergency group" expressed more feelings of competence, productivity, and successful achievement in one's work than the chronicity and service group. Moreover, Dinibutun⁴⁶ detected lower gratification in HCWs far from the frontline. This result is consistent with Karasek's Demand-Control theory model. In this model, HCWs with a higher level of job strain and greater decision-making responsibilities were found to be significantly more empowered, more committed to the organization, and more satisfied with their work, with lower levels of illness.⁴⁷ We hypothesized that the stability of this factor is related to a greater perception of themselves as "useful," despite increased levels of workload and stress.

Indeed, an individual's behavior may be motivated by her own hobbies and interests or by external.⁴⁸ Intrinsically, motivated behaviors are those that are performed out of interest and values, whereas the primary "rewards" are the spontaneous feelings of enjoyment and satisfaction that accompany the behaviors.⁴⁹ Extrinsic motivations are those performed for some separable consequences, such as an external reward or the attainment of a valued outcome; thus, caring for others (social benefit) is associated with intrinsic motivation, and utilitarian benefits are associated with extrinsic motivation.⁵⁰

According to the self-determination theory, intrinsic motivation should be considered as the superior type of motivation, and in line with this claim, research has shown a positive correlation with work outcomes such as increased vitality and well-being, cognitive engagement, effective performance, work effort, and knowledge sharing.⁵¹

Concerning psychological variables measured with PHQ-9 (depression) and GAD-7 (anxiety), the percentages of subjects with clinically significant scores during the COVID-19 pandemic were found to be 47.1% and 48.5%, respectively. Thus, during the emergency, about one of every two operators reported being anxious and/or depressed and/or emotionally exhausted. Our data are consistent with many previous works. Elbay et al.⁵² found a rate of 64.7% symptoms of depression, 51.6% of anxiety, and 41.2% of stress in physicians during the SARS-CoV-2 spread.

A Chinese study¹⁷ showed a prevalence of depression (50.7%), anxiety (44.7%), and stress-related symptoms (73.4%) among HCWs exposed to COVID-19. Many studies during previous diseases outbreaks found similar results: there is a high prevalence of psychological symptoms in HCWs during a sanitary emergency.⁵³⁻⁵⁵

The risk for HCWs to be emotionally exhausted, with depersonalization symptoms, significant anxiety, and depression is high and can have serious personal–psychological consequences. These, in turn, can limit work-related performances and the ability to take care of patients. In a recent review, Ignacio et al.⁴² reported that excessive stress and/or anxiety in the clinical context may affect performance and can compromise patient outcomes.

By analyzing the outcome differences between all factors (i.e., emotional exhaustion, depersonalization, personal accomplishment, anxiety, and depression) over time (i.e., before vs. during COVID-19 pandemic) and the determinants of sex, age, professional role, and healthcare unit, we found no significant difference except for the gender determinant. Women achieved higher scores in depression symptoms evaluated using the PHQ-9 test ($p < 0.05$).

Likewise, Rossi et al.³⁶ found in their sample no specific working position (i.e., to be physician, nurse, or healthcare assistants) associated with higher odds of mental health problems. This outcome is particularly interesting because allows us to hypothesize that the health system has gone into such a crisis that even operators not in close contact with COVID-19 patients have suffered serious psychological consequences.

The strongest scientific evidence about gender differences in depression comes from larger studies based on representative samples of populations.⁵⁶

Regarding the female condition, our data are consistent with other studies such as Rossi et al.¹⁴ In this study, depressive symptoms were associated with some specific aspects, including being a woman. Cabarkapa et al.,²⁸ in a systematic review, showed evidence that female subjects appeared to have the highest mental health risks^{41,45} and specifically, being a female HCWs conferred greater risks for depression, anxiety, and higher levels of stress.^{57–60}

Our findings inevitably lead us to reflect on the clinical implications of these results.

A psychologist specialist, able to provide support for the staff in the operating units and to the patients admitted in hospital, is often absent worldwide and particularly in Italy. Furthermore, preventive measures to protect the mental health of HCWs are often lacking. As a result of these deficiencies, it is common for HCWs to feel excessively distressed during their normal work activity.⁶¹ This, however, inevitably increased during health crisis emergencies.³⁸ It should be noted that suffering of stress, depression, and anxiety for a person is an undesirable condition, whose consequences can also affect one's personal life. In addition, these factors, especially anxiety, are often associated with worsening work-related performance (i.e., study, work, relationships, etc.).⁶² A health professional plays a central role in the care and management of weak people (such as patients), so that the survival of the patient may depend on the degree of efficiency of the operator. Therefore, having HCWs in poor mental health conditions can have serious consequences for the patients, especially during a pandemic.

Our study suggests a significant psychological impact of the COVID-19 in HCWs. These results underline the benefit of early

intervention in health professionals as vulnerable populations during a sanitary emergency, to protect the workers themselves, as well as the patients they are taking care of. It is advisable to improve the basic condition of health systems, thus improving their response to emergency events such as pandemics or natural disasters. To achieve this, various interventions on several economic-organizational levels are appropriate. Among these it is desirable to implement the mental health care of HCWs by planning training on stress management in normal and exceptional working conditions, reducing exposure to the frontline when not essential, and modifying organizational factors such as shifts and working hours.

Furthermore, it proves important to monitor HCWs mental health outcomes and provide immediate psychological support and treatments if necessary and/or asked.

Early detection and intervention are the most important instruments to prevent the potential middle and long-term adverse psychological impact as we are currently observing during the COVID-19 pandemic.

In this study, we did not investigate the psychological long-term impact on HCWs with COVID-19, known as the “long-COVID effect.” There are few studies in the general population and even fewer in healthcare professionals about this aspect. More in detail, Naidu et al.⁶³ assessed a group of COVID-19 patients, reporting a percentage of 47.0% of adults had persistent physical and psychiatric symptoms. The 13.8% and 10.5% of tested adults were positive for depression and posttraumatic stress disorder at a median of 9 weeks postdischarge from the hospital. Further studies are warranted on wider samples that might deep the long-COVID effect in HCWs mental health to focus on the therapeutic psychological interventions.

This study is not free from limitations. First, the retrospective nature of collected data referred to health HCWs conditions before the COVID-19 pandemic. Moreover, we are aware that the sample size was from the same University Hospital and was too small to have high external generalizability. Finally, in regard to self-report assessments, we only investigated depression, anxiety, and burnout syndrome of HCWs, whereas there would also be many other important psychological aspects buried in this population.

5 | CONCLUSION

Taken together, the findings of this retrospective study showed that HCWs, particularly women, have a high risk for depression, anxiety, and stress during the COVID-19 pandemic. Thus, ensuring a good level of mental health for HCWs is essential for achieving good working standards and increasing the response and efficiency of the health system in case of emergencies such as pandemics.

Further studies on larger samples are warranted to investigate the basic mental health condition of HCWs in Rehabilitation Units, to plan adequate monitoring and psychological prevention for their mental health during the COVID-19 pandemic.

CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

AUTHOR CONTRIBUTIONS

Conceptualization: Giacomo Fari, Alessandro de Sire, Maurizio Ranieri, and Marisa Megna. **Methodology:** Alessandro de Sire. **Formal analysis:** Giacomo Fari. **Investigation:** Giacomo Fari, Vincenzo Giorgio, Laura Rizzo, Antonella Bruni, Francesco P. Bianchi, Alessandra Zonno, and Paola Pierucci. **Resources:** Maurizio Ranieri and Marisa Megna. **Data curation:** Giacomo Fari and Alessandro de Sire. **Writing—original draft preparation:** Giacomo Fari and Alessandro de Sire. **Writing—review and editing:** Maurizio Ranieri and Marisa Megna. **Visualization:** Vincenzo Giorgio, Laura Rizzo, Antonella Bruni, Francesco P. Bianchi, Alessandra Zonno, and Paola Pierucci. **Supervision:** Alessandro de Sire, Maurizio Ranieri, and Marisa Megna. **Submission:** Alessandro de Sire. All authors have read and agreed to the last version of this manuscript.

DATA AVAILABILITY STATEMENT

The dataset is available on request.

REFERENCES

- de Sire A, Andrenelli E, Negrini F, et al. Rehabilitation and COVID-19: a rapid living systematic review by Cochrane Rehabilitation Field updated as of December 31st, 2020 and synthesis of the scientific literature of 2020. *Eur J Phys Rehabil Med.* 2021; 57(2):181-188. <https://doi.org/10.23736/S1973-9087.21.06870-2>
- Menculini G, Bernardini F, Attademo L, et al. The influence of the urban environment on mental health during the COVID-19 pandemic: focus on air pollution and migration—a narrative review. *Int J Environ Res Public Health.* 2021;18(8):3920. <https://doi.org/10.3390/ijerph18083920>
- Fari G, Di Paolo S, Ungaro D, Luperto G, Fari E, Latino F. The impact of COVID-19 on sport and daily activities in an Italian cohort of football school children. *Int J Athl Ther Train.* 2021. 1:1–5. <https://doi.org/10.1123/ijatt.2020-0066>
- Pfefferbaum B, North CS. Mental health and the Covid-19 pandemic. *N Engl J Med.* 2020;383(6):510-512. <https://doi.org/10.1056/NEJMp2008017>
- OECD/European Union How resilient have European health systems been to the COVID-19 crisis? *Health at a Glance: Europe 2020: State of Health in the EU Cycle.* OECD Publishing; 2020.
- Felice C, Di Tanna GL, Zanus G, Grossi U. Impact of COVID-19 outbreak on healthcare workers in Italy: results from a national E-survey. *J Community Health.* 2020;45(4):675-683. <https://doi.org/10.1007/s10900-020-00845-5>
- Cieza A, Causey K, Kamenov K, Hanson SW, Chatterji S, Vos T. Global estimates of the need for rehabilitation based on the Global Burden of Disease study 2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet.* 2021;396(10267):2006-2017. [https://doi.org/10.1016/S0140-6736\(20\)32340-0](https://doi.org/10.1016/S0140-6736(20)32340-0)
- de Sire A, Giray E, Ozyemisci Taskiran O. Chelsea physical assessment tool for evaluating functioning in post-intensive care unit COVID-19 patients. *J Med Virol.* 2021;93(5):2620-2622. <https://doi.org/10.1002/jmv.26867>
- Curci C, Negrini F, Ferrillo M, et al. Functional outcome after inpatient rehabilitation in post-intensive care unit COVID-19 patients: findings and clinical implications from a real-practice retrospective study. *Eur J Phys Rehabil Med.* 2021;57:443-450. <https://doi.org/10.23736/S1973-9087.20.06660-5>
- de Sire A, Andrenelli E, Negrini F, et al. Rehabilitation and COVID-19: the Cochrane Rehabilitation 2020 rapid living systematic review. Update as of August 31st, 2020. *Eur J Phys Rehabil Med.* 2020;56(6):839-845. <https://doi.org/10.23736/S1973-9087.20.06614-9>
- Bai AV, Rabasco J, Ceccatelli V, et al. Suggestions for changes in professional procedures and adaptation to COVID-19: new models of care in the rehabilitation setting. *Ann Ig.* 2021;33(3):299-304. <https://doi.org/10.7416/ai.2021.2434>
- Agostini F, Mangone M, Ruiu P, Paolucci T, Santilli V, Bernetti A. Rehabilitation setting during and after Covid-19: an overview on recommendations. *J Rehabil Med.* 2021;53(1):jrm00141. <https://doi.org/10.2340/16501977-2776>
- Masiero S, Maccarone MC, Agostini F. Health resort medicine can be a suitable setting to recover disabilities in patients tested negative for COVID-19 discharged from hospital? A challenge for the future. *Int J Biometeorol.* 2020;64(10):1807-1809. <https://doi.org/10.1007/s00484-020-01947-4>
- Rossi R, Soggi V, Pacitti F, et al. Mental health outcomes among frontline and second-line health care workers during the coronavirus disease 2019 (COVID-19) pandemic in Italy. *JAMA Netw Open.* 2020; 3(5):e2010185. <https://doi.org/10.1001/jamanetworkopen.2020.10185>
- Mehta S, Machado F, Kwizera A, et al. COVID-19: a heavy toll on health-care workers. *Lancet Respir Med.* 2021;9(3):226-228. [https://doi.org/10.1016/S2213-2600\(21\)00068-0](https://doi.org/10.1016/S2213-2600(21)00068-0)
- Walton M, Murray E, Christian MD. Mental health care for medical staff and affiliated healthcare workers during the COVID-19 pandemic. *Eur Heart J Acute Cardiovasc Care.* 2020;9(3):241-247. <https://doi.org/10.1177/2048872620922795>
- Lai J, Ma S, Wang Y, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Netw Open.* 2020;3(3):e203976. <https://doi.org/10.1001/jamanetworkopen.2020.3976>
- Cao J, Wei J, Zhu H, et al. A study of basic needs and psychological wellbeing of medical workers in the fever clinic of a Tertiary General Hospital in Beijing during the COVID-19 outbreak. *Psychother Psychosom.* 2020;89(4):252-254. <https://doi.org/10.1159/000507453>
- Moitra M, Rahman M, Collins PY, et al. Mental health consequences for healthcare workers during the COVID-19 pandemic: a scoping review to draw lessons for LMICs. *Front Psychiatry.* 2021;12:602614. <https://doi.org/10.3389/fpsy.2021.602614>
- Batra K, Singh TP, Sharma M, Batra R, Schvaneveldt N. Investigating the psychological impact of COVID-19 among healthcare workers: a meta-analysis. *Int J Environ Res Public Health.* 2020;17(23):9096. <https://doi.org/10.3390/ijerph17239096>
- Wu W, Zhang Y, Wang P, et al. Psychological stress of medical staffs during outbreak of COVID-19 and adjustment strategy. *J Med Virol.* 2020;92(10):1962-1970. <https://doi.org/10.1002/jmv.25914>
- Tsamakis K, Rizos E, Manolis AJ, et al. COVID-19 pandemic and its impact on mental health of healthcare professionals. *Exp Ther Med.* 2020;19(6):3451-3453. <https://doi.org/10.3892/etm.2020.8646>
- Waszkiewicz N. Possible special needs for mental online support in female and male health care workers during the COVID-19. *J Med Virol.* 2021;93(1):174-175. <https://doi.org/10.1002/jmv.26273>
- Yang S, Kwak SG, Ko EJ, Chang MC. The mental health burden of the COVID-19 pandemic on physical therapists. *Int J Environ Res Public Health.* 2020;17(10):3723. <https://doi.org/10.3390/ijerph17103723>
- Gray P, Senabe S, Naicker N, Kgalamono S, Yassi A, Spiegel JM. Workplace-based organizational interventions promoting mental health and happiness among healthcare workers: a realist review. *Int J Environ Res Public Health.* 2019;16(22):4396. <https://doi.org/10.3390/ijerph16224396>
- Giorgi G, Lecca LI, Alessio F, et al. COVID-19-related mental health effects in the workplace: a narrative review. *Int J Environ Res Public Health.* 2020;17(21):7857. <https://doi.org/10.3390/ijerph17217857>

27. Distante C, Piscitelli P, Miani A. Covid-19 outbreak progression in Italian regions: approaching the peak by the end of March in Northern Italy and first week of April in Southern Italy. *Int J Environ Res Public Health*. 2020;17(9):3025. <https://doi.org/10.3390/ijerph17093025>
28. Cabarkapa S, Nadjidai SE, Murgier J, Ng CH. The psychological impact of COVID-19 and other viral epidemics on frontline healthcare workers and ways to address it: a rapid systematic review. *Brain Behav Immun Health*. 2020;8:100144. <https://doi.org/10.1016/j.bbih.2020.100144>
29. Portoghese I, Leiter MP, Maslach C, et al. Measuring burnout among university students: factorial validity, invariance, and latent profiles of the Italian version of the Maslach Burnout Inventory Student Survey (MBI-SS). *Front Psychol*. 2018;9:2105. <https://doi.org/10.3389/fpsyg.2018.02105>
30. Spitzer RL, Kroenke K, Williams JB. Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. Primary Care Evaluation of Mental Disorders. Patient Health Questionnaire. *JAMA*. 1999;282(18):1737-1744. <https://doi.org/10.1001/jama.282.18.1737>
31. Spitzer RL, Kroenke K, Williams JB, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med*. 2006;166(10):1092-1097. <https://doi.org/10.1001/archinte.166.10.1092>
32. Novelli G, Biancolella M, Mehriani-Shai R, et al. COVID-19 update: the first 6 months of the pandemic. *Hum Genomics*. 2020;14(1):48. <https://doi.org/10.1186/s40246-020-00298-w>
33. Penati R, Begenisic T, Zeni F, et al. Impact of COVID-19 pandemic on physical medicine and rehabilitation residency: an Italian nationwide epidemiologic survey. *Eur J Phys Rehabil Med*. 2021. 57: 1-4. <https://doi.org/10.23736/S1973-9087.21.06844-1>
34. Goumenou M, Sarigiannis D, Tsatsakis A, et al. COVID 19 in Northern Italy: an integrative overview of factors possibly influencing the sharp increase of the outbreak (review). *Mol Med Rep*. 2020; 22(1):20-32. <https://doi.org/10.3892/mmr.2020.11079>
35. Ferraro F, Calafiore D, Dambrosio F, Guidarini S, de Sire A. COVID-19 related fatigue: which role for rehabilitation in post-COVID-19 patients? A case series. *J Med Virol*. 2021;93(4): 1896-1899. <https://doi.org/10.1002/jmv.26717>
36. Rossi R, Succi V, Pacitti F, et al. Mental health outcomes among healthcare workers and the general population during the COVID-19 in Italy. *Front Psychol*. 2020;11:608986. <https://doi.org/10.3389/fpsyg.2020.608986>
37. Sheek-Hussein M, Abu-Zidan FM, Stip E. Disaster management of the psychological impact of the COVID-19 pandemic. *Int J Emerg Med*. 2021;14(1):19. <https://doi.org/10.1186/s12245-021-00342-z>
38. Cai H, Tu B, Ma J, et al. Psychological Impact and coping strategies of frontline medical staff in Hunan between January and March 2020 during the outbreak of coronavirus disease 2019 (COVID-19) in Hubei, China. *Med Sci Monit*. 2020;26:e924171. <https://doi.org/10.12659/MSM.924171>
39. Flesia L, Monaro M, Mazza C, et al. Predicting perceived stress related to the Covid-19 outbreak through stable psychological traits and machine learning models. *J Clin Med*. 2020;9(10):3350. <https://doi.org/10.3390/jcm9103350>
40. Lasalvia A, Amaddeo F, Porru S, et al. Levels of burn-out among healthcare workers during the COVID-19 pandemic and their associated factors: a cross-sectional study in a tertiary hospital of a highly burdened area of north-east Italy. *BMJ Open*. 2021;11: e045127. <https://doi.org/10.1136/bmjopen-2020-045127>
41. Conti C, Fontanesi L, Lanzara R, Rosa I, Porcelli P. Fragile heroes. The psychological impact of the COVID-19 pandemic on health-care workers in Italy. *PLoS One*. 2020;15(11):e0242538. <https://doi.org/10.1371/journal.pone.0242538>
42. Ignacio J, Dolmans D, Scherpbier A, Rethans JJ, Chan S, Liaw SY. Stress and anxiety management strategies in health professions' simulation training: a review of the literature. *BMJ Simul Technol Enhanc Learn*. 2016;2:42-46. <https://doi.org/10.1136/bmjstel-2015-000097>
43. Courtois CA, Ford JD, eds. *Treating Complex Traumatic Stress Disorders: An Evidence-Based Guide*. Guilford Press; 2009.
44. Martínez-López JÁ, Lázaro-Pérez C, Gómez-Galán J, Fernández-Martínez M. Psychological Impact of COVID-19 emergency on health professionals: burnout incidence at the most critical period in Spain. *J Clin Med*. 2020;9:3029. <https://doi.org/10.3390/jcm9093029>
45. Di Trani M, Mariani R, Ferri R, De Berardinis D, Frigo MG. From resilience to burnout in healthcare workers during the COVID-19 emergency: the role of the ability to tolerate uncertainty. *Front Psychol*. 2021;12:646435. <https://doi.org/10.3389/fpsyg.2021.646435>
46. Dinibutun SR. Factors associated with burnout among physicians: an evaluation during a period of COVID-19 pandemic. *J Healthc Leadersh*. 2020;12:85-94. <https://doi.org/10.2147/JHL.S270440>
47. Theorell T, Karasek RA. Current issues relating to psychosocial job strain and cardiovascular disease research. *J Occup Health Psychol*. 1996;1(1):9-26. <https://doi.org/10.1037//1076-8998.1.1.9>
48. Folbre N. Should women care less? *Br J Ind Relat*. 2012;50:597-619. <https://doi.org/10.1111/bjir.12000>
49. Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *Am Psychol*. 2000;55(1):68-78. <https://doi.org/10.1037//0003-066x.55.1.68>
50. Ryan RM, Deci EL. *Self-Determination Theory: Basic Psychological Needs in Motivation, Development, and Wellness*. The Guilford Press; 2017.
51. Gagné M, Deci EL. Self-determination theory and work motivation. *J Organ Behav*. 2005;26:331-362. <https://doi.org/10.1002/job.322>
52. Elbay RY, Kurtulmuş A, Arpacioğlu S, Karadere E. Depression, anxiety, stress levels of physicians and associated factors in Covid-19 pandemics. *Psychiatry Res*. 2020;290:113130. <https://doi.org/10.1016/j.psychres.2020.113130>
53. Lu YC, Shu BC, Chang YY, Lung FW. The mental health of hospital workers dealing with severe acute respiratory syndrome. *Psychother Psychosom*. 2006;75(6):370-375. <https://doi.org/10.1159/000095443>
54. Maunder R, Hunter J, Vincent L, et al. The immediate psychological and occupational impact of the 2003 SARS outbreak in a teaching hospital. *CMAJ*. 2003;168(10):1245-1251.
55. Pouralizadeh M, Bostani Z, Maroufizadeh S, et al. Anxiety and depression and the related factors in nurses of Guilan University of Medical Sciences hospitals during COVID-19: a web-based cross-sectional study. *Int J Afr Nurs Sci*. 2020;13:100233. <https://doi.org/10.1016/j.ijans.2020.100233>
56. Salk RH, Hyde JS, Abramson IY. Gender differences in depression in representative national samples: meta-analyses of diagnoses and symptoms. *Psychol Bull*. 2017;143(8):783-822. <https://doi.org/10.1037/bul0000102>
57. Xiaoming X, Ming A, Su H, et al. The psychological status of 8817 hospital workers during COVID-19 epidemic: a cross-sectional study in Chongqing. *J Affect Disord*. 2020;276:555-561. <https://doi.org/10.1016/j.jad.2020.07.092>
58. Di Tella M, Romeo A, Benfante A, Castelli L. Mental health of healthcare workers during the COVID-19 pandemic in Italy. *J Eval Clin Pract*. 2020;26(6):1583-1587. <https://doi.org/10.1111/jep.13444>
59. Paolucci T, Bernetti A, Paoloni M, et al. Therapeutic alliance in a single versus group rehabilitative setting after breast cancer surgery: psychological profile and performance rehabilitation. *Biores*

- Open Access. 2019;8(1):101-110. <https://doi.org/10.1089/biores.2019.0011>
60. Notarnicola A, Fari G, Maccagnano G, et al. Teenagers' perceptions of their scoliotic curves. An observational study of comparison between sports people and non-sports people. *Muscles Ligaments Tendons J.* 2019;9(2):225-235.
61. Mateen FJ, Dorji C. Health-care worker burnout and the mental health imperative. *Lancet.* 2009;374(9690):595-597. [https://doi.org/10.1016/S0140-6736\(09\)61483-5](https://doi.org/10.1016/S0140-6736(09)61483-5)
62. Wetherell JL, Reynolds CA, Gatz M, Pedersen NL. Anxiety, cognitive performance, and cognitive decline in normal aging. *J Gerontol B Psychol Sci Soc Sci.* 2002;57(3):P246-P255. <https://doi.org/10.1093/geronb/57.3.p246>
63. Naidu SB, Shah AJ, Saigal A, et al. The high mental health burden of "long COVID" and its association with on-going physical and respiratory symptoms in all adults discharged from hospital. *Eur Respir J.* 2021;57(6):2004364. <https://doi.org/10.1183/13993003.04364-2020>

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