Received: 7 May 2021 | Revised: 16 June 2021 | Accepted: 28 June 2021

DOI: 10.1002/cpp.2644

RESEARCH ARTICLE

WILEY

Impact of COVID-19 outbreak on Italian healthcare workers versus general population: Results from an online survey

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Abstract

Objective: COVID-19 pandemic has been a stressful condition. We explored life changes and health-related consequences of COVID-19 outbreak in Italian healthcare workers in comparison to the general population.

Methods: A total of 593 subjects participated to the online CoRonavIruS Health Impact Survey. Life events and changes, physical health and worries were evaluated referring to 2 weeks prior to the survey. Mood states and daily behaviour were retrospectively evaluated referring to 3 months before COVID-19 (T1) and 2 weeks prior to the survey (T2). Student *t* test, Mann–Whitney test and multivariate logistic regression analyses were run.

Results: Five hundred and twenty-one subjects were analysed (healthcare workers: $n = 163$, 31.84%; general population: $n = 349$, 68.16%). Healthcare workers were more likely to report fatigue and have spent more time outside home during the 2 weeks prior to the survey than the general population ($\chi^2_{(df)} = 266.0_{3(17)}$, $p < 0.001$, $R^2 = 0.57$). From T1 to T2, healthcare workers had a significant increase in negative mood, worry, restlessness, loneliness and a decrease in happiness, while subjects from the general population had a statistically significant increase in negative mood, worry, attention, concentration difficulties and a decrease in happiness, pleasure related to daily activities, time spent outdoors and alcohol use.

Conclusion: In the framework of a growing literature on healthcare workers' status during the COVID-19 pandemic, the present study allowed to identify fatigue and loneliness as psychosomatic modifiable variables in need of being monitored and, possibly managed, to ameliorate the health status of healthcare workers.

KEYWORDS
COVID-19, fatigue, healthcare workers, loneliness, worry

1 | INTRODUCTION

The COVID-19 outbreak is a pandemic in which a coronavirus was identified as the cause of a systemic disease having a specific respiratory involvement (World Health Organization, 2019a, 2019b). It was first detected in Wuhan, China (Li et al., 2020), and rapidly became a global health emergency of international concern. By 6 May 2021, there were 153.954.491 confirmed

infections and 3.221.052 deaths worldwide (World Health Organization, 2019c).

The COVID-19 pandemic has changed healthcare workers lives quickly and abruptly (Theorell, 2020; Truog et al., 2020). They have become first-line fighters engaged in treating COVID-19 patients (Theorell, 2020; Zhang, Wang, et al., 2020). They have also been daily exposed to source of distress due to workload (Theorell, 2020), job dissatisfaction (Peng et al., 2021), or conflicts (Peng et al., 2021), difficulties in facing ethical decisions (e.g., how to allocate limited ventilators) (Theorell, 2020; Zhang, Wang, et al., 2020), shortage of individual protective equipment (World Health Organization, 2019d), risk of being infected (Nguyen et al., 2020), fear of being infected and infecting their families (Huang et al., 2020), social disruption of daily life (Shaukat et al., 2020), and exposure to stressful life events such as a bulk of patients dead (Zhang, Wang, et al., 2020). Based on the evidence of adverse effects related to exposure to stressful conditions (Fava et al., 2019; Schneiderman et al., 2005), the health consequences of the COVID-19 epidemic on healthcare workers have been recognized as a priority challenge (Busch et al., 2021; Chirico et al., 2020; Theorell, 2020), and the literature on this topic has proliferated (Busch et al., 2021; Shaukat et al., 2020).

A higher prevalence of psychological distress, insomnia, anxiety, depression, obsessive symptoms, posttraumatic stress symptoms, somatization and abnormal illness has been observed in health workers than in nonmedical staff (Busch et al., 2021; Pappa et al., 2020; Zhang, Wang, et al., 2020). Similarly, burnout and poor well-being were observed (Busch et al., 2021; Xu et al., 2021). As what concerns physical symptoms, fever, cough, weakness and cutaneous manifestations were found as the most common among healthcare workers (Shaukat et al., 2020). Unfortunately, only a minority of studies monitored changes of symptoms using longitudinal designs. In particular, few short-term prospective studies showed a worsening of sleep quality among COVID-19 frontline workers at 1-month follow-up (Zhao et al., 2020) and an improvement of mental state and lower risk of depression, anxiety and posttraumatic stress symptoms at 1- (Cai et al., 2020) and 2-month follow-ups (Chen et al., 2020). No retrospective studies have been conducted, yet.

In this framework, we attempted to extend previous research by retrospectively exploring the impact of COVID-19 in Italian healthcare workers in comparison to the general population examining differences as what concerns: (1) prevalence of stressful life events related to COVID-19; (2) mental and physical health during the COVID-19 outbreak; (3) overtime changes in mood states and behaviour from 3 months before COVID-19 outbreak to the moment of the survey participation.

Key Practitioner Message

- Exposure to COVID-19 is a distressing condition.
- In the pandemic, healthcare workers had different response to stress than general population.
- During COVID-19 outbreak, healthcare workers had fatigue.
- During COVID-19 outbreak, healthcare workers had loneliness.
- Fatigue and loneliness are psychosomatic modifiable variables in need of being monitored and, possibly managed, to ameliorate the health status of healthcare workers during the COVID-19 outbreak.

2 | METHOD

2.1 | Participants

From May to September 2020, a total of 593 Italian adults (age ≥ 18 years) participated to the online survey. In order to have a more homogeneous sample in terms of mental health status, subjects were excluded if they had self-reported current or lifetime psychiatry disease. The research was approved by the Institutional Review Board of the University of Florence, Italy. All procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

2.2 | Procedure

A cross-sectional study with a retrospective assessment was conducted. Subjects were recruited via email and social media. Those who agreed to participate provided a digital informed consent of privacy protection disclaimer and completed the CoRonavIruS Health Impact Survey (CRISIS) (Nikolaidis et al., 2021), Italian version. The CRISIS was developed by the National Institute of Mental Health, the New York Child Mind Institute, and the New York State Nathan S. Kline Institute for Psychiatric Research, to provide a comprehensive assessment of the impact of COVID-19 pandemic on daily lives (Nikolaidis et al., 2021). Along with demographic and clinical descriptive variables, CRISIS investigates exposure to COVID-19, concerns, worries, mood states, life changes and daily behaviours (e.g., daily hours of sleep, routine physical activity and media use) related to COVID-19 (Nikolaidis et al., 2021). CRISIS has shown good reliability and construct validity (Nikolaidis et al., 2021).

Socio-demographic (i.e., age, sex, race, ethnicity, urbanicity, working status, education, household size, number of rooms in the house and house size) and clinical data (i.e., physical symptoms during the 2 weeks prior to the survey, current psychotropic medications, past or current psychotherapy, health and emotional status before COVID-19, being exposed to individual with COVID-19 and family member in self-quarantine during the 2 weeks prior to the survey) were also collected via a set of interview-based screening questions as part of the CRISIS background section (Nikolaidis et al., 2021). Stressful life events related to COVID-19 were assessed using a set of CRISIS items evaluating personal infection, impacts of COVID-19 on family

TABLE 1 Risk factors related to healthcare workers versus general population

	OR	95% CI	R^2
Number of cohabitants	0.94	0.75–1.17	0.57
Number of rooms in house	0.85	0.76–0.94	
Living in large city	1.79	0.94–3.41	
Self-perceived mental health status before COVID-19	1.26	0.90–1.77	
Exposure to individuals with COVID-19 during the 2 weeks prior to the survey	12.07	4.59–31.73	
Fatigue during the 2 weeks prior to the survey	3.39	1.20–9.53	
Changes in school or work conditions due to COVID-19 during the 2 weeks prior the survey	0.54	0.32–0.94	
Worry about the risk of being infected by COVID-19 during the 2 weeks prior to the survey[a]	1.12	0.71–1.75	
Worry about the risk that friends or family are infected by the COVID-19 during the 2 weeks prior to the survey[a]	1.11	0.75–1.65	
Worry about the effects of COVID-19 on own physical health during the 2 weeks prior to the survey[a]	0.78	0.52–1.18	
Worry about the effects of COVID-19 on own emotional status during the 2 weeks prior to the survey[a]	0.91	0.65–1.28	
Time spent reading or talking about COVID-19 during the 2 weeks prior to the survey[a]	1.23	0.83–1.81	
Worry on food shortage during the 2 weeks prior to the survey	1.03	0.35–3.01	
Number of people met outside of own family during the 2 weeks prior to the survey	1.01	0.99–1.02	
Time spent outside the home during the 2 weeks prior to the survey	1.51	1.06–2.15	

Note. Multiple logistic regression analysis adjusted for age and education.
[a]COVID-19 Worries Scale.

member (e.g., infection, hospitalization, financial problems and death), changes in school or work conditions/activities due to COVID-19 in the 2 weeks prior to the survey (Nikolaidis et al., 2021).

2.3 | Instruments

The following instruments were administered as part of CRISIS: COVID-19 Worries Scale, Mood states scale, a set of items evaluating life changes, daily behaviours and substance use (Nikolaidis et al., 2021).

The COVID-19 Worries Scale (Nikolaidis et al., 2021) is a 5-item tool assessing worry of being infected, friends and family's infection, effects of COVID-19 on own physical and mental health, and time spent reading or talking about COVID-19 during the previous 2 weeks. The items are rated on a 5-point Likert scale. Higher scores indicate greater worry. In addition, one item assessing the hope that COVID-19 will end soon is rated on a 5-point Likert scale (from 'not all' to 'very much') during the 2 weeks prior to the survey (Nikolaidis et al., 2021).

The Mood states scale is a 10-item tool assessing worry, mood (happy vs. sad), pleasure related to daily activities, anxiety, restlessness, fatigue, attention, concentration, irritability, loneliness and negative thoughts (Nikolaidis et al., 2021). The items are rated on a 5-point Likert scale. Higher scores mean higher level of negative mood experienced. The mood states were evaluated retrospectively referring to 3 months prior to the COVID-19 (T1) and 2 weeks prior to the survey (T2) (Nikolaidis et al., 2021).

The CRISIS items evaluating life changes due to COVID-19 are rated on a 5-point Likert scale measuring time spent outside home (from 'not all' to 'very long time'), concerns about housing instability (from 'not at all' to 'very worried'), changes in social contacts (from 'worse social contact' to 'better social contact'), economic difficulties (from 'no difficulties' to 'great difficulties'), stressors related with changes (from 'no stress' to 'higher stress'), and difficulties on keeping social distancing due to COVID-19 (from 'not at all' to 'very difficult'). In addition, one item measures the number of people met outside own family to have in-person conversation, and two items (yes/no) assess food insecurity and positive changes related to COVID-19 (Nikolaidis et al., 2021). Life changes due to COVID-19 were retrospectively evaluated referring to 2 weeks prior to the survey.

Six CRISIS items assess daily behaviours and are rated on a 5-point Likert scale. They measure the number of hours of sleep in the weekdays (from 'less than 6 h' to 'more than 10 h'), the frequency

TABLE 2 Over time changes in mood and behaviours: Healthcare workers versus general population

	Healthcare workers ($n = 163$)				General population ($n = 349$)				Healthcare workers ($n = 163$)	General population ($n = 349$)		
									Delta T2-T1	Delta T2-T1		
	T1 Mean ± *SD*	T2 Mean ± *SD*	*p*	*r*	T1 Mean ± *SD*	T2 Mean ± *SD*	*p*	*r*	Mean ± *SD*	Mean ± *SD*	*p*	*r*
Mood states												
Mood states scale	11.30 ± 4.90	14.36 ± 6.52	**<0.001**	0.246	13.46 ± 5.93	15.94 ± 7.19	**<0.001**	0.176	3.06 ± 6.60	2.49 ± 6.69	0.39	0.038
Worry[a]	0.85 ± 0.81	1.47 ± 0.78	**<0.001**	0.021	0.90 ± 0.85	1.67 ± 0.91	**<0.001**	0.411	0.63 ± 1.005	0.76- ± 1.05	0.14	0.006
Happiness[a]	2.58 ± 0.79	2.09 ± 0.89	**<0.001**	0.283	2.45 ± 0.90	2.00 ± 0.91	**<0.001**	0.233	−0.50 ± 1.08	−0.44 ± 1.16	0.49	0.030
Pleasure related to daily activities[a]	2.42 ± 0.72	2.16 ± 0.87	0.002	0.168	2.19 ± 0.83	1.94 ± 0.86	**<0.001**	0.157	−0.26 ± 1.06	−0.25 ± 1.101	0.69	0.017
Anxiety[a]	1.59 ± 0.94	1.79 ± 1.11	0.099	0.091	1.86 ± 1.04	2.04 ± 1.05	0.040	0.079	0.23 ± 1.17	0.17 ± 1.08	0.41	0.036
Restlessness[a]	0.72 ± 0.82	1.12 ± 0.98	**<0.001**	0.216	1.03 ± 0.93	1.21 ± 1.04	0.038	0.078	0.43 ± 0.94	0.18 ± 1.002	0.005	0.124
Fatigue[a]	1.58 ± 0.98	1.51 ± 1.07	0.54	0.034	1.50 ± 0.93	1.42 ± 1.05	0.11	0.059	−0.18 ± 1.20	−0.09 ± 1.14	0.34	0.041
Attention and concentration difficulties[a]	1.06 ± 0.85	1.31 ± 1.02	0.036	0.116	1.29 ± 0.90	1.71 ± 1.07	**<0.001**	0.187	0.28 ± 0.95	0.41 ± 1.21	0.26	0.050
Irritability[a]	0.93 ± 0.75	1.16 ± 1.01	0.078	0.097	1.27 ± 0.83	1.32 ± 0.97	0.76	0.011	0.25 ± 1.02	0.06 ± 0.97	0.045	0.088
Loneliness[a]	0.47 ± 0.69	0.82 ± 0.96	**<0.001**	0.197	0.84 ± 0.95	1.08 ± 1.09	0.003	0.113	0.35 ± 0.86	0.24 ± 0.94	0.33	0.042
Negative thoughts[a]	1.11 ± 0.86	1.26 ± 1.01	0.22	0.068	1.38 ± 1.03	1.44 ± 1.14	0.68	0.015	0.15 ± 1.08	0.05 ± 0.93	0.25	0.050
Behaviours												
Sleep hours	1.04 ± 0.43	0.93 ± 0.54	0.031	0.119	1.03 ± 0.52	1.02 ± 0.61	0.63	0.018	−0.12 ± 0.57	−0.02 ± 0.63	0.18	0.059
Physical activity	1.21 ± 1.05	1.05 ± 0.98	0.20	0.070	1.14 ± 1.03	1.29 ± 1.15	0.09	0.063	−0.15 ± 1.11	0.15 ± 1.13	0.018	0.105
Time spent outdoors	2.13 ± 1.23	1.75 ± 1.21	0.003	0.163	2.39 ± 1.28	2.08 ± 1.23	**0.001**	0.125	−0.41 ± 1.23	−0.31 ± 1.33	0.45	0.033
TV or internet use	1.66 ± 0.71	1.88 ± 0.85	0.012	0.139	1.77 ± 0.65	1.92 ± 0.79	0.002	0.118	0.23 ± 0.75	0.16 ± 0.82	0.68	0.018
Social media use	1.35 ± 0.88	1.39 ± 0.91	0.71	0.020	1.58 ± 0.82	1.72 ± 0.94	0.043	0.076	0.04 ± 0.53	0.16 ± 0.68	0.027	0.097
Video gaming use	0.29 ± 0.66	0.32 ± 0.68	0.79	0.014	0.27 ± 0.64	0.37 ± 0.73	0.068	0.069	0.06 ± 0.60	0.09 ± 0.61	0.69	0.017
Substance use												
Alcohol	1.05 ± 0.89	1.01 ± 1.01	0.42	0.044	0.97 ± 0.95	0.68 ± 0.85	**<0.001**	0.147	−0.05 ± 0.68	−0.27 ± 0.65	0.004	0.128
Electronic cigarette	0.19 ± 0.76	0.18 ± 0.78	0.83	0.011	0.17 ± 0.72	0.16 ± 0.70	0.65	0.017	−0.12 ± 0.38	−0.01 ± 0.29	0.85	0.008
Tobacco	0.76 ± 1.32	0.74 ± 1.32	0.89	0.007	0.94 ± 1.44	0.86 ± 1.37	0.60	0.019	−0.01 ± 0.66	−0.09 ± 0.60	0.061	0.083
Cannabis/marijuana	0.05 ± 0.34	0.02 ± 0.15	0.71	0.020	0.17 ± 0.63	0.12 ± 0.53	0.16	0.052	−0.03 ± 0.28	−0.05 ± 0.43	0.62	0.022
Heroine/opiates/narcotics	0.02 ± 0.23	0.03 ± 0.17	0.56	0.031	0.04 ± 0.28	0.03 ± 0.20	0.75	0.112	0.00 ± 0.11	−0.014 ± 0.14	0.26	0.049
Sleeping pills/sedatives/hypnotics	0.20 ± 0.72	0.25 ± 0.84	0.68	0.022	0.11 ± 0.43	0.10 ± 0.49	0.39	0.032	0.07 ± 0.41	−0.003 ± 0.31	0.020	0.103

Note. T1, 3 months before COVID-19; T2, 2 weeks prior to the survey; Bonferroni post hoc correction ($p \leq 0.05/69$ that is $p \leq 0.0007$). Mann–Whitney test for independent samples.
[a]Mood states scale.

of physical activity and time spent outdoors (from 'not at all' to 'every day'), the length of daily media use (from 'not at all' to 'more than 6 h') (Nikolaidis et al., 2021). Daily behaviours were evaluated retrospectively referring to 3 months prior to COVID-19 (T1) and to 2-week period prior to the survey (T2).

Six CRISIS items assess substance use and are rated on a 5-point Likert scale. They measure the frequency of alcohol, electronic cigarette, tobacco, cannabis, marijuana, heroin, opiates, narcotics, sleeping pills, sedatives and hypnotics use (from 'not at all' to 'regularly') (Nikolaidis et al., 2021). Substance use was retrospectively evaluated referring to 3 months prior to COVID-19 (T1) and 2 weeks prior to the survey (T2).

The COVID-19 Worries Scale and Mood states scale have shown good internal consistency (Omega > 0.80), unidimensional model fit (CFI < 0.95), and test–retest reliability (ICCs between 0.79 and 0.87) (Nikolaidis et al., 2021). CRISIS items evaluating life changes, daily behaviours and substance use have shown good reliability (ICC means between 0.64 and 0.88) (Nikolaidis et al., 2021).

2.4 | Statistical analysis

Healthcare workers and general population were compared. Healthcare workers were those engaged in promotion, protection or improvement of health either as direct care practitioners (e.g., physicians and nurses) or indirectly (e.g., aides, helpers, medical laboratory scientists and social workers) (Dal Poz et al., 2007; World Health Organization, 2010).

The Kolmogorov–Smirnov test was run to test normality of data. The Student *t* test was used to compare means of continuous variables normally distributed (i.e., age), and Mann–Whitney test for independent samples was run to compare rank means of continuous variables non-normally distributed (e.g., number of cohabitants, life changes due to COVID-19, worry, number of stressful life events, mood states and daily behaviours). Effect size was calculated via *r*, coefficients between 0.10 and 0.29 represented a small effect, between 0.30 and 0.49 represented a medium effect, equal or above of 0.50 represented a large effect (Cohen, 1988; Coolican, 2009). Chi-square tests and Fisher test when more than 20% of cells had expected frequencies less than 5 (Nisbet et al., 2009) were run to compare rates of categorical variables (e.g., sex and race). Cramer V coefficient was calculated as a measure of the effect size (Cumming, 2012); it may range between 0 (no association) and +1 (perfect association). Because of the high number of comparisons, Bonferroni post hoc correction was applied (Munro, 2005).

Stressful life events were defined a posteriori according to Paykel et al. (1971) list that includes the following: major personal physical illness (i.e., COVID-19 personal infection); hospitalization of family member/serious illness (i.e., COVID-19 family member infection; family member hospitalized due to COVID-19); major financial difficulties (i.e., family financial problems due to COVID-19); death of close family members (i.e., death of a family member due to COVID-19); change in schools/change in work hours/change in work conditions (i.e., changes in school or work conditions/activities due to COVID-19).

A multivariate logistic regression analysis was run. Healthcare workers versus general population was used as reference (healthcare worker group = 1, control group = 0). Socio-demographic data, clinical data, stressful life events and CRISIS items assessing life changes were included in the model as independent variables only if they had reached the statistically significance threshold in the comparisons between groups. As what concerns COVID Worries Scale, all items were included in the model as dependent variables to take into account the different type of worries. The coefficient of determination R^2 was calculated as a goodness-of-fit measure (Cumming, 2012). R^2 uses a convenient 0%–100% scale; the larger the R^2, the better the regression model fits the data observed.

The overtime changes in mood states and behaviours from 3 months before COVID-19 (T1) to 2 weeks prior to the survey (T2) were evaluated calculating delta values (T2 minus T1) for each rating scale score. Positive or negative differences indicated an increase or a decrease in each score, respectively (Griez et al., 2001).

Analyses were performed via SPSS, version 21 (SPSS Inc). Two-sided significance level was set at $p \leq 0.05$.

3 | RESULTS

A total of 593 subjects completed the survey. Among them, 23 (3.88%) were excluded because they did not live in Italy, and 58 (9.78%) because they had at least one self-reported lifetime psychiatry disorder. Data obtained from 512 subjects were analysed: 163 (31.84%) healthcare workers (physicians: $n = 45$, 27.61%; psychologists: $n = 33$, 20.25%; nurses: $n = 30$, 18.40%; psychotherapists: $n = 24$, 14.72%; specialist physicians: $n = 13$, 7.98%; medical assistants: $n = 9$, 5.52%; physiotherapist: $n = 4$, 2.45%; dentists: $n = 4$, 2.45%; medical laboratory scientists: $n = 1$, 0.61%) and 349 (68.16%) subjects from the general population.

Healthcare workers were older, had less cohabitants and rooms in the house and had more frequently lived in large city than subjects from the general population. Healthcare workers were more frequently employed, had post-graduation degrees, were more frequently exposed to individuals with COVID-19, and presented more frequently fatigue during the 2 weeks prior to the survey than subjects from the general population (see Table A1). Healthcare workers self-perceived a better mental health status before COVID-19 (mean ± *SD*: 2.66 ± 0.73 vs. 2.42 ± 0.95; $p = 0.013$; $\eta^2 = 0.010$) than subjects from the general population.

Healthcare workers less frequently reported changes in school or works conditions due to COVID-19 than subjects from general population (see Table A2). No statistically significant differences were found for the number of stressful life events (health workers: 1.18 ± 1.02 vs. subjects from the general population: 1.31 ± 1.02; $p = 0.093$; $\eta^2 = 0.006$).

During the 2 weeks prior to the survey, healthcare workers had statistically significant lower worry about the effects of COVID-19 on own health status as well as on food shortage; they had a higher number of people met outside besides their own family and more time

spent outside home than subjects from the general population (see Tables A3 and A4).

The multiple regression analysis showed that healthcare workers were more likely to have a lower number of rooms in the house, to have been exposed to individuals with COVID-19, to report fatigue, to have less changes in school or work conditions, and have spent more time outside home during the 2 weeks prior to the survey than the general population group ($\chi^2_{(df)} = 266.03_{(17)}$, $p < 0.001$, $R^2 = 0.57$) (Table 1).

Over time changes from 3 months before COVID-19 to 2 weeks prior to the survey were observed in healthcare workers in terms of increase in negative mood, worry, restlessness, loneliness and a decrease in happiness. On the other hand, subjects from the general population had a statistically significant increase in negative mood, worry, attention and concentration difficulties, and a decrease in happiness, pleasure related to daily activities, time spent outdoors and alcohol use (Table 2). When over time changes between 3 months and 2 weeks prior to the survey were compared between healthcare workers and general population, no statistically significant differences were found (Table 2).

4 | CONCLUSION

The overtime changes documented are the innovative findings of the study. In particular, healthcare workers had an increase of restlessness and loneliness, which was not found in the general population.

As expected, during the COVID-19 outbreak, the exposure to subjects infected by COVID-19 was more common among healthcare workers than the general population (Bielicki et al., 2020; De Brier et al., 2020). Healthcare workers also had changed working conditions related to an increase in working load (Cao et al., 2020; Theorell, 2020; Zhang, Wang, et al., 2020), while the changes observed in the general population were due to the restrictions to limit the spread of the coronavirus (Barouki et al., 2021; Viner et al., 2020), which imposed the closure of school, shifting to on-line learning, the closure of nonessential businesses and working from home.

Healthcare workers had more fatigue than the general population; fatigue prevalence was described between 35% and 56% according to the studies (Hou et al., 2020; Salazar de Pablo et al., 2020; Zhan et al., 2020).

Healthcare workers had lower levels of worry about the effects of COVID-19 on own physical health and on food shortage than subjects form the general population. The lower levels of worry about the effects of COVID-19 among healthcare workers seem related to the fact that healthcare workers had a professional and academic knowledge on COVID-19 while the general population was informed via media, friends, acquaintances and similar. Academic knowledge and information reduce both worry and anticipated worry, which are, on the contrary, increased by information acquired via other sources (Ho et al., 2020). Healthcare workers were also less worried on food shortage. This can be explained by the fact that they were not at risk of losing their work, while subjects from the general population had often to stop working, being employed in nonessential businesses, and had economic problems more commonly than healthcare workers (Peng et al., 2021). However, different manifestations of worry, e.g., persistent worry about COVID-19 and its negative consequences (Busch et al., 2021; Labrague & De Los Santos, 2021; Sahashi et al., 2021; Wahlund et al., 2021), dysfunctional and a transient, generic worry about COVID-19 infection and bodily preoccupations (Cosci & Guidi, 2021; Nardi & Cosci, 2021), have been documented during the pandemic and differently observed among healthcare workers and in the general population (Asmundson & Taylor, 2020; Busch et al., 2021; Sahashi et al., 2021; Wahlund et al., 2021).

In terms of multivariate regression analysis results, the variables more likely related to healthcare workers than to the general population condition were less rooms in house (which can be explained by the fact that healthcare workers more frequently live in cities rather than in the countryside); more exposure to individuals with COVID-19, more time spent outside home, and less changes in work conditions (which is expected considering the central role of healthcare workers' in fighting against COVID-19); and more fatigue. Fatigue is a well-known psychosomatic manifestation (Fava et al., 2017), subsumed under the rubric of somatization (Fava et al., 2017), which has been already found more common among medical health workers than nonmedical health workers (Zhan et al., 2020).

We observed an increase of restlessness (AlAteeq et al., 2020; Sakib et al., 2021) and loneliness (Kotera et al., 2021; Shechter et al., 2020; Walton et al., 2020) among healthcare workers, which can be both related to the working overload in a condition in which individual protective devices prevent socialization at work and in which the fear of infecting own families is often the cause of a self-isolation in private life. On the other side, subjects from general population spent less time outdoor (possibly related to restrictions), had less pleasure in daily activities (which can be explained by the psychological burden caused by COVID-19) (Brailovskaia et al., 2021) and had a decrease of concentration and attention which confirms data from a previous study (Fiorenzato et al., 2021). Subjects from the general population also decreased alcohol use. This finding is not consistent with the literature (Jacob et al., 2021; Schmits & Glowacz, 2021) but can be related to a decreased availability of alcohol due to closing of bars, pubs and restaurants (Rehm et al., 2020).

The research has some limitations. Subjects were recruited via email and social media, which limit generalizability of results. However, this method of recruitment is common and was commonly used especially during the pandemic, being safe in terms of physical distancing (Li et al., 2020). In addition, due to the sample size, it was not possible to stratify the analyses according to different healthcare professions. Finally, we used a retrospective design although the gold standard in longitudinal studies is a prospective one. Future research should be conducted in larger samples and using a prospective approach. A strength of the study is the evaluation of overtime changes in mood states and behaviours while the large majority of the literature does not measure changes being cross sectional.

In brief, loneliness and fatigue seem to be the only variables which can be modulated to ameliorate healthcare workers' quality of life. Unfortunately, while some proposal aimed at facilitating healthcare workers' relaxation have been made (Zhang, Li

et al., 2020), no attention has been devoted to strategies able to manage fatigue and loneliness. The psychosomatic approach, which gives rooms to psychological as well as social factors that can influence positively or negatively the individual's overall health, seems to be an ideal frame (Cosci & Guidi, 2021) for helping healthcare workers in the era of COVID-19.

FUNDING INFORMATION

This research received no specific grant from any funding agency, commercial or not-for-profit sectors.

CONFLICT INTEREST

The authors have no conflict of interest to declare.

DATA AVAILABILITY STATEMENT

The data of this study are available from the corresponding author, upon request.

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How to cite this article: Mansueto, G., Lopes, F. L., Grassi, L., & Cosci, F. (2021). Impact of COVID-19 outbreak on Italian healthcare workers versus general population: Results from an online survey. *Clinical Psychology & Psychotherapy*, *28*(6), 1334–1345. https://doi.org/10.1002/cpp.2644

APPENDIX A

TABLE A1 Continuous and categorical descriptive variables: Healthcare workers versus general population

	Healthcare workers ($n = 163$)	General population ($n = 349$)		
	Mean ± *SD*	Mean ± *SD*	*p*	*r*
Age	40.18 ± 13.14	34.20 ± 13.38	<0.001	0.310
Number of cohabitants	1.85 ± 1.20	2.56 ± 1.65	<0.001	0.223
Number of rooms in house	5.24 ± 2.76	6.46 ± 2.73	<0.001	0.226
	n (%)	*n* (%)	*p*	Cramer's *V*
Sex				
Female	113 (69.33%)	261 (74.79%)	0.19	0.057
Male	50 (30.67%)	88 (25.21%)		
Race and ethnicity				
Caucasian	160 (98.16%)	341 (97.70%)	0.84	0.025
Latin American	2 (1.23%)	4 (1.15%)		
Black African	1 (0.61%)	4 (1.15%)		
Living in large city				
Yes	138 (84.66%)	201 (57.59%)	<0.001	0.267
No	25 (15.34%)	148 (42.41%)		
Working status				
Employed	138 (84.66%)	201 (57.59%)	<0.001	0.275
Student	13 (7.97%)	107 (30.66%)		
Other (retired, housewife, unemployed)	12 (7.36%)	41 (11.75%)		
Education				
Primary school	0 (0.00%)	2 (0.57%)	<0.001	0.552
Secondary school	1 (0.61%)	26 (7.45%)		
High school	14 (8.59%)	155 (44.41%)		
Graduation	68 (41.70%)	144 (41.26%)		
Post-graduation	80 (49.10%)	22 (6.30%)		
Physical symptoms during the 2 weeks prior to the survey				
None	138 (84.66%)	296 (84.80%)	0.020	0.180
Fatigue	16 (9.81%)	11 (3.16%)		
Fever	0 (0.00%)	3 (0.86%)		
Sore throat	5 (3.07%)	19 (5.44%)		
Stomach ache	0 (0.00%)	1 (0.29%)		
Cold	1 (0.61%)	1 (0.29%)		
Wheezing	0 (0.00%)	6 (1.72%)		
Cough	3 (1.84%)	12 (3.44%)		
Currently under psychotropic medications				
Yes	6 (3.68%)	10 (2.87%)	0.62	0.022
No	157 (96.32%)	339 (97.13%)		
Past or current psychotherapy				
Yes	21 (12.88%)	21 (6.02%)	0.009	
No	142 (87.12%)	328 (93.98%)		
Exposure to individuals with COVID-19 during the 2 weeks prior to the survey				
Yes	37 (22.70%)	10 (2.87%)	<0.001	0.320
No	126 (77.30%)	339 (97.13%)		

(Continues)

TABLE A1 (Continued)

	n (%)	*n* (%)	*p*	Cramer's *V*
Family member in self-quarantine due to COVID-19 during the 2 weeks prior to the survey				
Yes	4 (2.45%)	12 (3.44%)	0.55	0.026
No	159 (97.55%)	337 (96.56%)		

Note. Bonferroni post hoc correction ($p \leq 0.05/28$ that is $p \leq 0.002$). *t* test for independent samples, Mann–Whitney test for independent samples, chi-square test.

TABLE A2 Occurrence of stressful life events during the 2 weeks prior to the survey: Healthcare workers versus general population

	Healthcare workers ($n = 163$) *n* (%)	General population ($n = 349$) *n* (%)	*p*	Cramer's *V*
At least one stressful life event				
Yes	115 (70.55%)	249 (71.35%)	0.85	0.008
No	48 (29.45%)	100 (28.65%)		
COVID-19 personal infection				
Yes	4 (2.45%)	5 (1.43%)	0.41	0.036
No	159 (97.55%)	344 (98.57%)		
COVID-19 family member infection				
Yes	7 (4.29%)	9 (2.58%)	0.29	0.046
No	156 (95.71%)	340 (97.42%)		
Family member hospitalized due to COVID-19				
Yes	5 (3.07%)	5 (1.43%)	0.30[a]	0.055
No	158 (96.93%)	344 (98.57%)		
Family financial problems due to COVID-19				
Yes	29 (17.79%)	71 (20.34%)	0.49	0.030
No	134 (82.21%)	278 (79.66%)		
Death of a family member due to COVID-19				
Yes	2 (1.23%)	0 (0.00%)	0.10[a]	0.092
No	161 (98.77%)	349 (100.00%)		
Changes in school or work conditions due to COVID-19				
Yes	47 (28.83%)	171 (49.00%)	<0.001	0.190
No	116 (71.17%)	178 (51.00%)		
Changes in school or work activities due to COVID-19				
Yes	99 (60.74%)	199 (57.02%)	0.42	0.035
No	64 (39.26%)	150 (42.98%)		

Note. Bonferroni post hoc correction ($p \leq 0.05/8$ that is $p \leq 0.006$). Chi-square and Fisher's test.
[a]Fisher's test.

TABLE A3 Consequences of COVID-19 during the 2 weeks prior to the survey: Healthcare workers versus general population

	Healthcare workers ($n = 163$) Mean ± *SD*	General population ($n = 349$) Mean ± *SD*	*p*	*r*
COVID-19 Worries Scale	7.95 ± 3.04	8.74 ± 3.17	0.013	0.109
Worry about the risk of being infected by COVID-19.[a]	1.33 ± 0.88	1.60 ± 0.84	0.003	0.133
Worry about the risk that friends or family are infected by the COVID-19.[a]	1.58 ± 0.89	1.73 ± 0.92	0.10	0.071
Worry about the effects of COVID-19 on own physical health.[a]	1.15 ± 0.93	1.39 ± 0.98	0.002	0.135
Worry about the effects of COVID-19 on own emotional status.[a]	1.23 ± 0.95	1.49 ± 0.99	0.011	0.113
Time spent reading or talking about COVID-19.[a]	2.65 ± 0.64	2.52 ± 0.69	0.033	0.094
Level of hope that COVID-19 will end soon.	1.05 ± 0.81	1.01 ± 0.65	0.97	0.001
Number of people met outside of own family.	23.13 ± 32.21	13.07 ± 20.70	<0.001	0.213
Time spent outside the home.	1.78 ± 0.87	1.48 ± 0.73	<0.001	0.173
Concern about housing instability.	1.23 ± 0.91	1.43 ± 0.95	0.028	0.097
Changing in the interpersonal relationships.	0.84 ± 0.77	1.03 ± 0.92	0.069	0.080
Improvement of family relationships.	2.01 ± 0.93	2.11 ± 0.89	0.25	0.050
Improvement of interpersonal relationships (outside family).	1.73 ± 0.83	1.84 ± 0.85	0.087	0.076
Stress related to changes in relationships with family members.	0.89 ± 0.89	0.90 ± 0.97	0.76	0.013
Stress related to changes in interpersonal relationships (outside family).	1.14 ± 1.02	1.06 ± 0.91	0.65	0.020
Difficulties related to event cancellations due to the COVID-19.	1.42 ± 1.09	1.41 ± 1.03	0.95	0.003
Economic difficulties as a consequence of COVID-19.	0.97 ± 0.96	1.06 ± 0.051	0.33	0.043
Stress related to restrictions on public gatherings due to COVID-19.	1.37 ± 0.97	1.36 ± 0.94	0.70	0.017
Difficulties on keeping social distancing due to COVID-19.	0.93 ± 0.85	1.01 ± 0.87	0.27	0.049
Number of negative consequences related to COVID-19.	5.81 ± 2.07	5.86 ± 2.03	0.81	0.010

Note. Bonferroni post-hoc correction ($p \leq 0.05/20$ that is $p \leq 0.0025$). Mann–Whitney test for independent samples.
[a]COVID-19 Worries Scale.

TABLE A4 Consequences of COVID-19 during the 2 weeks prior to the survey: Healthcare workers versus general population

	Healthcare workers ($n = 163$) *n* (%)	General population ($n = 349$) *n* (%)	p	Cramer's *V*
Occurrence of negative consequences related to COVID-19				
Yes	163 (100.00%)	347 (99.43%)	0.33	0.043
No	0 (0.00%)	2 (0.57%)		
Time spent in pleasure activities				
Yes	23 (14.11%)	58 (16.62%)	0.46	0.032
No	140 (85.89%)	291 (83.38%)		
Worry on food shortage				
Yes	6 (3.68%)	36 (10.32%)	0.011	0.113
No	157 (96.32%)	313 (89.68%)		

Note. Bonferroni post-hoc correction ($p \leq 0.05/3$ that is $p \leq 0.017$). Chi-square for categorical variables.