Mental Health Conditions of Italian Healthcare Professionals during the COVID-19 Disease Outbreak

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Background: The COVID-19 pandemic in Italy represents a unique threat in terms of psychological distress. This cross-sectional study aims to investigate the psychological health of Italian healthcare professionals during the COVID-19 outbreak. We assessed participants' current psychological distress and coping strategies in the midst of the COVID outbreak (March–April 2020), and also asked them to retrospectively report how they remember feeling before the COVID-19 outbreak (December 2019). We examined associations between psychological distress and coping strategies with mental health and infection perceptions. **Methods:** Self-administered questionnaires were distributed online to healthcare professionals ($N = 580$) residing in different Italian regions from 26 March to 9 April 2020. The questionnaire measured changes in psychological states, coping strategies, and demographic variables testing variations in mental health and infection risk perception among Italian healthcare workers. **Results:** Overall, approximately 33.5 per cent of healthcare professionals in our sample meet the threshold for psychiatric morbidity. Participants perceive their current psychological health to be worse during the COVID-19 emergency outbreak as compared to before the outbreak, and this was especially true among women. **Conclusions:** Both immediate and long-

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term monitoring psychological assistance services for healthcare workers should be implemented by national institutions to re-establish the psychological well-being and enhance the self-confidence and resilience of hospital personnel.

Keywords: COVID-19, healthcare workers, Italy, mental health, risk perception

INTRODUCTION

Since its arrival, the coronavirus disease 2019 (COVID-19) has infected around 15,247,848 individuals and claimed 623,863 lives across 188 countries and regions (Johns Hopkins Coronavirus Resource Center, as of 23 July 2020). COVID-19 is unprecedented in terms of the rapidity with which the illness spread across the globe. Shortly after the discovery of the virus in China, Italy experienced an exponential increase in infection cases and deaths, exceeding the Chinese numbers in less than one month. As of 9 April 2020, Italy reported 136,110 confirmed cases, and the highest mortality rate globally with 16,654 deaths. The entire health system was overwhelmed by this unique crisis, especially in the northern regions. From 26 March (beginning of data collection) to 9 April (end of data collection) there were 62,330 new COVID-19 cases in Italy. By 9 April 2020, 14,066 Italian healthcare professionals were infected and had 133 died—record-breaking numbers in modern medical history (Istituto Sanità Superiore, n.d.).[1] Medical professionals working on the frontlines during this crisis faced threats to not only their physical health, but also to their mental health (Lai et al., 2020). The aim of this research is to examine the extent to which the COVID-19 crisis affected the mental health of healthcare providers in Italy during this time.

Previous research on other infectious diseases, including the Severe Acute Respiratory Syndrome (SARS), the Middle East Respiratory Syndrome (MERS), and Ebola virus disease, consistently showed that many healthcare workers reported symptoms of anxiety and depression, both during and after the outbreak, which had a severe impact on their coping abilities and mental health (Chan & Huak, 2004; Chong et al., 2004; Ji et al., 2017; Khalid, Khalid, Qabajah, Barnard, & Qushmaq, 2016; Lee, Kang, Cho, Kim, & Park, 2018; Sim, Chong, Chan, & Soon, 2004; Tam, Pang, Lam, & Chiu, 2004; for a comprehensive review see Brooks, Dunn, Amlôt, Rubin, & Greenberg, 2018). Evidence from China suggests that COVID-19 had a similar negative impact on the mental health of medical personnel. For instance, recent studies have documented signs

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[1] At the time of the revision (23 July 2020), 28,878 Italian healthcare professionals have been infected and 174 have died.

of severe emotional distress among Chinese healthcare workers (Jiang, 2020; Lai et al., 2020).

Little research has focused on Italian healthcare workers. Whereas other countries have experienced previous infectious disease outbreaks (e.g. SARS, MERS), COVID-19 was the first time this type of crisis was experienced in Italy. Despite the effort to increase Intensive Care Unit (ICU) capacity and the implementation of restrictive containment measures, Italy faced a critical situation and risked a severe collapse of the public health system (Armocida, Formenti, Ussai, Palestra, & Missoni, 2020; Grasselli, Pesenti, & Cecconi, 2020). Further, retired doctors and nurses were called back to support hospital colleagues, and the graduation process of nursing schools has been expedited to allow new personnel to start working immediately (Gussoini, 2020). Thus, the COVID-19 outbreak in Italy was markedly severe, and unprecedented.

An important task for psychologists is to understand and quantify the toll that the COVID-19 outbreak had on the mental health of medical professionals in Italy. Two recent cross-sectional studies conducted during the COVID-19 outbreak have revealed (1) high levels of burnout and somatic symptoms among Italian healthcare workers (Barello, Palamenghi, & Graffigna, 2020), and (2) increased sleep disturbances, and heightened stress and anxiety levels among Italian pediatric hospital staff (Di Filippo et al., 2020).

However, little research has been conducted on the general mental health condition of Italian healthcare workers. Several studies conducted before the COVID-19 crisis (Conway, Campanini, Sartori, Dotti, & Costa, 2008; Grassi & Magnani, 2000; Klersy et al., 2007; Renzi, Di Pietro, & Tabolli, 2012; Tabolli, Ianni, Renzi, Di Pietro, & Puddu, 2006) assessed Italian healthcare workers' burnout and psychological stress symptoms by investigating the role that shift-work, ward typology, emotional exhaustion, and work-related stress may play in leading to impaired health and job (dis)satisfaction, which ultimately may also influence the quality of care that hospital staff provide to patients. Generally, the prevalence of psychiatric morbidity (through the GHQ-12 questionnaire) was found in 25–30 per cent of health professionals (e.g. Grassi & Magnani, 2000; Renzi, Di Pietro, & Tabolli, 2012; Tabolli, Ianni, Renzi, Di, & Puddu, 2006).

THE PRESENT RESEARCH

At the time of manuscript submission, this work represents one of the first attempts aimed at exploring the impact of the COVID-19 pandemic on the mental health of Italian healthcare professionals working on the frontline of the outbreak in Italy.

The present cross-sectional study was carried out with the aim of examining the status of mental health and other psychological indicators among Italian medical professionals working during the unprecedented threat represented by the COVID-19 outbreak. Because of the highly contagious nature of the disease, we

pay special attention to factors that increase (or decrease) participants' risk of being infected or infecting others, including demographic variables (e.g. living alone; having children), the region where the participant resides (i.e. high vs. low risk areas), and contact with persons infected with COVID-19. We also measure participants' perception of their risk of becoming infected.

For our focal dependent variable, we measured participants' mental health using the 12-item General Health Questionnaire (GHQ-12), which is a commonly used screening measure for psychiatric morbidity (Goldberg & Blackwell, 1970). We also assessed indicators of psychological health that we thought were especially relevant during this pandemic. First, because of the contagion and social distancing concerns during COVID-19, we included a measure of separation distress. The literature suggests that adult separation anxiety symptoms could be exacerbated by the presence of environmental risk factors such as traumatic events related to worries for personal and loved ones' safety, which interferes with everyday functioning (Bögels, Knappe, & Clark, 2013). Moreover, research suggests that separation distress could play a role in the onset of posttraumatic stress disorders (Morina, Schnyder, Schick, Nickerson, & Bryant, 2016; Tay, Rees, Chen, Kareth, & Silove, 2015). Second, because of the threatening and uncertain nature of the COVID-19 outbreak, we also included a measure of emotional symptoms, gauging participants' levels of worry and fear.

We assessed participants' *coping abilities* with two different measures. Specifically, we measured resilience—which is defined as the process of adapting well in the face of adversity, trauma, threats, or stress—using the Brief Resilience Coping scale (Sinclair & Wallston, 2004). We also included a measure of people's self-efficacy in coping abilities in challenging times (using the Coping Self-Efficacy scale; Chesney, Neilands, Chambers, Taylor, & Folkman, 2006), which was designed to measure change in coping self-efficacy due to major threats and challenging situations. Finally, we included a more stable, personality trait-type measure of emotion regulation, which gauges the ability to control one's emotions in response to stressful life events.

While this study was largely exploratory, we did have research questions guiding our analyses. First, we posited that medical professionals who have a greater chance of infecting others (because, for instance, they have a family or live with other people) might have worse mental health during the COVID-19 crisis compared to those who could more easily socially distance (e.g. those who are living alone). We also examined how infection risk factors (such as having contact with an infected person or living in a highly affected area) relate to mental health and other psychological indicators. We expected that those who had high (vs. low) risk of infection would report worse mental health.

Another aspect of this study was that we asked our participants to evaluate themselves on several psychological variables—namely, separation distress, emotional symptoms, resilience, and self-efficacy in coping—both in their current state (which was in the midst of the crisis), and also retrospectively, that is,

how they remember feeling before the COVID-19 pandemic. To this end, we can gauge how much people perceive themselves to be affected over the past few months. We expected that participants would report lower well-being across all measures when rating themselves in the current state compared to their pre-COVID state. We also examined whether this perceived change differed between men and women, and between those who had contact (vs. no contact) with someone infected with COVID-19. Research on healthcare workers in China during the COVID-19 outbreak found that women reported worse mental health than men (Lai et al., 2020). Thus, we predicted that we would find gender differences on our psychological measures, and that the difference between men and women on mental health would be larger when people were giving current (vs. retrospective) reports. In addition, we suspected that those who have had contact with a COVID-infected person would report a bigger change from pre-COVID to their current state compared to those who have not had such contact.

Finally, we examined participants' mental health and infection perceptions as a function of all these variables. More specifically, first, we tested a model predicting mental health with demographic variables, contextual factors (e.g. region; infection contact), psychological states (i.e. separation distress; emotional symptoms), and coping abilities (resilience; self-efficacy). We expected that contextual factors associated with risk would be associated with worse mental health, and this would be mediated, at least in part, by separation distress, emotional symptoms, and lack of coping abilities (i.e. low resilience and self-efficacy). Second, we tested a model examining predictors of people's perception of infection risk. We expected that those who had more exposure (living in an highly affected area and/or having contact with infected persons) would perceive their infection risk as higher, but that, above and beyond this, poor mental health would increase people's perception of risk of infection.

METHOD

Study Design and Procedure

Data were collected in Italy from 26 March to 9 April 2020 through an online questionnaire. The questionnaire took around 10–12 min to complete. It was organised in four main sections with 109 questions in total. First, participants were asked to answer a set of 33 questions (described below) in a retrospective way, by recalling their psychological state in December 2019 as the time of reference ("pre-COVID condition"). Second, participants were provided with the same set of 33 questions, and were asked to answer based on their current state ("during-COVID condition"). Third, participants were asked to answer a set of 23 items assessing their ability in negative emotion control, general health state, and the risk perception to be infected. The final demographic section asked for

age, gender, geographic area, occupation, ward, work shift, and marital status. We also asked participants to report if they had contact with individuals infected with COVID-19, including patients, relatives, friends, or colleagues, and the condition of these individuals at the time of the survey. The questions relevant to the current research, which were embedded in a larger survey, assessed contextual factors and psychological variables.[2]

Participants

We recruited hospital staff from different regions throughout Italy. All participants voluntarily took part in the survey. The questionnaire was forwarded by the authors to different groups of healthcare professionals through social media networks (e.g. Facebook, WhatsApp, mailing lists), and participants were also encouraged to forward it to others. We obtained an overall sample size of 911 participants. We excluded from the analyses participants who self-reported not to be hospital staff ($n = 14$; e.g. architect, esthetician), and those who failed to complete the entire questionnaire ($n = 317$). Thus, 331 (36%) of the initial participants were excluded overall, resulting in a final sample of 580 participants. Demographic information related to the sample is reported in Table 1. The study was approved by the ethics committee of the authors' university. The entire survey was conducted anonymously.

Measures and Items

We asked participants to fill out four set of items in two different ways—retrospectively (based on how they remember feeling before the COVID outbreak), and currently (based on how they are feeling currently, during the COVID outbreak). This included psychological distress that can be associated with the fear of losing loved ones and the need to keep social distance ("separation distress"), the presence of emotional symptoms, and the ability to successfully cope and manage difficult situations, including resilience and self-efficacy. We also measured participants' emotion regulation ability and their overall mental health.

In order to respect the time of the medical personnel who volunteered to participate in this study during a crisis, we aimed for a very short questionnaire, and we thus included shortened versions of the validated scales. We analysed the internal consistency of the item subsets through a reliability analysis and conducted factor analyses for each measure using SPSS statistical software version 25 (IBM Corp). The translated English version of the original questionnaire can

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[2] In addition to the measures reported here, the larger survey included measures on (1) life satisfaction, (2) happiness, (3) religious and spiritual belief behaviors, (4) alcohol, drug, medicine consumption and (6) changes in social activities.

TABLE 1
Demographics

	N	Percentage	GHQ-12[a] Mean (SD)
Gender			
Male	232	59%	1.62 (0.50)
Female	341	40%	**1.82 (0.54)**
Occupation			
Doctor	413	71%	1.72 (0.52)
Nurse	121	21%	**1.85 (0.53)**
Staff	46	8%	1.59 (0.50)
Marital status			
Married	264	45%	1.77 (0.50)
Relationship	175	31%	1.70 (0.55)
Single	106	18%	1.74 (0.56)
Widowed	5	1%	1.75 (0.21)
Separated/divorced	27	5%	1.56 (0.61)
Kids			
No kids	276	48%	1.71 (0.55)
>1 kids	298	52%	1.75 (0.51)
Living alone			
Yes	116	20%	1.72 (0.53)
No	463	80%	1.74 (0.53)
High vs. low risk area[b]			
High risk area	162	28%	1.74 (0.51)
Low risk area	418	72%	1.73 (0.54)

Note: Bolded terms indicate a statistical significant difference of GHQ-12 between groups ($p < .05$).

[a]GHQ-12 is measured on a 4-point Likert scale from 0 to 3.

[b]High Affected Areas are areas where confirmed cases are over 10,000 (Piemonte, Lombardia, Veneto, and Emilia Romagna). Low Affected Areas are all the remaining areas in the provinces of the sample (Abruzzo, Alto Adige, Basilicata, Calabria, Campania, Friuli Venezia Giulia, Lazio, Liguria, Marche, Puglia, Sardegna, Sicilia, Toscana, Umbria).

be found in Appendix S2. All the measures were chosen because they are easy to administer, and are widely used in studies to evaluate emotion regulation, general health, and coping strategies, as also shown in previous literature.

Separation Distress.   Retrospective and current separation distress were measured with seven items taken from the Adulthood Separation Anxiety (ASA) questionnaire, which is a 27-item self-report questionnaire measuring separation anxiety (e.g. "Have you felt more secure at home when you are with people that are close to you?"; Manicavasagar, Silove, Wagner, & Drobny, 2003) on a scale from 1 (*never*) to 5 (*always*). A factor analysis on the seven items yielded a single factor and a reliability analysis revealed strong internal consistency for both retrospective and current reports (Cronbach's $\alpha = .73$ and $\alpha = .84$, respectively).

Emotional Symptoms.   To assess the most common psychopathological symptoms that might arise from stressful events, we selected items from the Strengths and Difficulties Questionnaire (SDQ), which is a measure of social, emotional, and behavioral functioning (Goodman, 1997). We chose five of the 25 original items from the "emotional problems" sub-dimension, which assesses the presence of emotional symptoms (e.g. "I have many fears, I'm easily scared") on a scale from 1 (*not at all true*) to 5 (*totally true*). A factor analysis on the five items yielded a single factor, and the reliability analysis revealed strong internal consistency both in retrospective and current reports (Cronbach's α = .82 and α = .89, respectively).

The Brief Resilience Coping Scale (BRCS).   The BRCS is a four-item measure designed to capture tendencies to cope with stress in a highly adaptive manner (e.g. "I believe I can grow in positive ways by dealing with difficult situations"; Sinclair & Wallston, 2004) on a scale from 1 (*does not describe me at all*) to 5 (*describes me very well*). A reliability analysis on the four items revealed low to moderate internal consistency both in retrospective and current reports (Cronbach's α = .65 and α = .75, respectively). Higher scores indicate greater resilience during stressful events.

The Coping Self-Efficacy Scale (CSES).   The CSES-brief (Chesney, Neilands, Chambers, Taylor, & Folkman, 2006) is a 13-item scale and was created to measure individuals' confidence in their coping self-efficacy strategies when it comes to handling challenges and stress factors. Participants are asked to report how confident or certain they are that they might engage in different behaviors when things are not going well for them (e.g. "Think about one part of the problem at a time") on a scale from 0 (*not at all sure*) to 10 (*totally sure*). Reliability analysis revealed strong internal consistency both in retrospective and current conditions (Cronbach's α = .91 and α = .95, respectively). This was coded such that higher scores indicate greater self-efficacy in coping with stressful events.

Emotion Dysregulation.   We selected seven items from the 18-item "Difficulties in Emotion Regulation" scale (DERS-18; e.g. "When I'm upset, I believe that I'll end up feeling very depressed"), with responses indicated on a scale from 1 (*never*) to 5 (*always*). This is a trait-level measure of ability (or lack thereof) to regulate emotions while experiencing negative emotions (Gratz & Roemer, 2004; Victor & Klonsky, 2016). A factor analysis on the seven items yielded a single factor, and the reliability analysis revealed strong internal consistency (Cronbach's α = .91). Because emotion regulation is considered to be a stable personality trait, we included this measure only once to assess the trait-level ability to control negative emotions among Italian medical staffs. This was coded such that higher scores indicate more problems regulating emotions (and thus we refer to it as "emotion dysregulation").

The General Health Questionnaire (GHQ-12).   The GHQ-12 is a self-report questionnaire which consists of 12 items which assess (1) the inability to carry out normal functions and (2) the appearance of distress to assess psychological well-being (Goldberg & Blackwell, 1970). The GHQ is the most common assessment of mental well-being and aims to detect those likely to have or to be at risk of developing psychiatric disorders, as well as any predisposing factors. The questionnaire evaluates personality disorders or adaptation patterns associated with distress by asking respondents to report to what degree both positive ("able to concentrate") and negative ("loss of sleep over worry") instances have occurred recently, on a 4-point scale (where $0 = better\ than\ usual$; $1 = same\ as\ usual$; $2 = less\ than\ usual$; and $3 = much\ less\ than\ usual$). Reliability analysis revealed strong internal consistency (Cronbach's $\alpha = .86$). The GHQ-12 represents our main dependent variable as it assesses the overall mental health of hospital professionals during the COVID-19 emergency phase, and it is widely used as a screening device for psychiatric morbidity in the general population (Goldberg & Blackwell, 1970; Grassi & Magnani, 2000). Previous research recommends a score of 2 (out of 3) as a threshold for psychiatric morbidity (Goldberg, Gater, Sartorius, Ustun, Piccinelli, Gureje, & Rutter, 1997).

Contextual Variables.   To assess the risk of infection of our participants, we categorised them based on how badly their geographical area was affected by COVID. Specifically, we categorised participants living in badly affected areas (i.e. Lombardia, Emilia Romagna, Veneto, and Piemonte) as "high risk" and those living in less affected areas (i.e. Puglia, Sardegna) as "low risk". In addition, we asked participants if they had experienced contact with individuals infected with COVID (i.e. "Did you have direct experience with a COVID19 [patient, friend, family member, colleague]?"). In our analyses, we combined these questions into a single item that indicated contact (vs. no contact) with a person infected with COVID. We also asked participants to rate their own perception of how likely they are to be infected, on a 1 (*extremely unlikely*) to 10 (*extremely likely*) scale.

Finally, we asked participants basic demographic information, including their profession, gender, marital status, etc., as well as the length of their last work shift (in hours).

Statistical Analysis

The results are presented in four sections, namely, (1) comparisons of mental health and infection risk as a function of demographic variables; (2) comparisons between retrospective and current reports of the four psychological variables (separation distress; emotional symptoms; resilience; and self-efficacy); and examinations of the predictors of (3) mental health and (4) infection perception. All the continuous variables in regression models were mean-centered, and all

categorical variables were entered as dummy codes (0 vs. 1). All the statistical analyses were executed using SPSS 25.0 Statistics package.

RESULTS

Demographics, Mental Health, and Risk Infection Perception

Table 1 shows the means and standard deviations of the GHQ-12 for each demographic category. As seen in the table, female healthcare workers reported worse mental health than their male counterparts, $t(570) = -4.40$, $p < .001$, Cohen's $d = 0.38$. There were small differences in mental health as a function of occupation type, $F(2, 576) = 5.14$, $p = .006$, such that nurses reported somewhat worse mental health compared to doctors ($p = .033$, Cohen's $d = 0.25$) and other hospital staff ($p = .010$, Cohen's $d = 0.5$). Mental health did not differ as a function of marital status, $F(4, 571) = 1.24$, $p = .293$; parenthood status (i.e. having children vs. not), $t(571) = .99$, $p = .321$; living situation (i.e. living alone vs. not), $t(576) = .41$, $p = .685$; or risk level of the geographical area of residence, $t(577) = .01$, $p = .996$.

It is worth noting that GHQ-12 scores for each demographic are less than the cut-off point (2) for psychiatric morbidity. In examining the frequencies of scores, we find that 66.5 per cent of the sample scored below 2, and thus 33.5 per cent of the healthcare workers who participated in this study are at risk for psychiatric morbidity.

Table 2 reports the exposure to the COVID-19 (i.e. contact with infected patients or colleagues) as a function of occupation and geographical region. Doctors and nurses had significantly more contact with infected patients, $X^2(2) = 13.40$, $p < .001$, and colleagues, $X^2(2) = 19.71$, $p < .001$, compared to other hospital staff. Infection perception also differed as a function of occupation type, $F(2, 575) = 5.18$, $p = .006$, such that hospital staff reported lower perceived risk than doctors ($p = .005$, Cohen's $d = 0.52$) and nurses ($p = .009$, Cohen's $d = 0.51$). As expected, those living in highly affected Italian regions (i.e. Lombardia, Emilia Romagna, Veneto, and Piemonte) were significantly more likely to have contact with infected colleagues, $X^2(2) = 42.51$, $p < .001$, and patients, $X^2(2) = 81.15$, $p < .001$, compared to those in less affected regions. Furthermore, the risk infection perception was greater in those regions in which the number of confirmed cases is higher as compared to other regions, $t(567) = 3.95$, $p < .001$, Cohen's $d = 0.35$. Details about the correlations between risk factors (including region and contact with people infected with COVID) and the psychological variables are reported in the Online Supplementary Material (see Table S1).

TABLE 2
Contact with COVID Patient/Colleague and Infection Perception by Occupation
and Geographic Area

	Contact with COVID patient N (%)	Contact with COVID colleague N (%)	Infection perception Mean (SD)
Occupation			
Doctor (N = 413)	171 (41%)	255 (62%)	5.13 (1.2)
Nurse (N = 121)	61 (50%)	66 (54%)	5.17 (1.4)
Staff (N = 46)	**9 (20%)**	**12 (26%)**	**4.51 (1.2)**
Geographic areas			
Low affected (N = 418)	126 (30%)	204 (48%)	4.97 (1.3)
High affected (N = 162)	**115 (70%)**	**129 (80%)**	**5.40 (1.2)**

Note: Bolded terms indicate statistically significant differences between groups ($p < .05$).

Comparisons between Retrospective (Pre-Outbreak) and Current (During Outbreak) Reports

We first conducted paired *t*-tests to compare people's retrospective and current reports of the four focal variables. As can be seen in Table 3, participants' retrospective reports of their pre-COVID states showed lower levels of separation distress (Cohen's d = 1.2) and emotional symptoms (Cohen's d = 1.1), and higher levels of resilience (Cohen's d = 0.35) and self-efficacy (Cohen's d = 0.51), compared to their current ("during-COVID") state.

We also examined whether the change in retrospective versus current states differed as a function of participant gender and/or whether or not the participant had contact with someone (friend, family member, colleague, or patient) infected with COVID for all four variables by conducting four repeated-measures ANOVAs, with the retrospective and current reports for each of the four focal variables as the within-subjects factor, and COVID contact and gender as between-subjects factors. The details of these analyses can be found in Appendix S1. For all four dependent measures, there was a significant interaction with gender, such that women reported a greater deterioration of psychological health compared to men (see Figure S1). Knowing someone infected with COVID-19 did not moderate the reported change in separation distress or self-efficacy, but it did moderate change in emotional symptoms and resilience (see Figure S2). Specifically, people who had contact with someone infected with COVID (vs. those who did not) did not differ on emotional symptoms in retrospective reports, but indicated higher levels of emotional symptoms in reports of their current state. For resilience, results showed that people who had (vs. did not have) contact with someone infected with COVID reported *higher* levels of resilience in retrospective reports, but similar levels in current reports. Thus, this interaction appears to be

TABLE 3

Paired *t*-tests Comparing the Differences between the Retrospective (pre-COVID) and Current (during-COVID) Conditions

Measures (Likert scales)	Condition				
	Retrospective		Current		
	Mean	SD	Mean	SD	DIFF (t-test) p
Separation distress (5 points)	2.10	0.6	3.02	0.9	<.001
Emotional symptoms (SDQ, 5 points)	1.71	0.7	2.73	1.1	<.001
Resilience (BRCS, 5 points)	3.63	0.6	3.40	0.7	<.001
Self-efficacy (CSES, 11 points)	6.43	1.8	5.41	2.2	<.001

driven by a heightened perception of resilience in retrospective reports of those who knew someone who was affected.

Mental Health as a Function of Exposure to COVID-19 and Psychological States

To predict respondents' overall mental health (i.e. GHQ-12), we conducted a hierarchical linear regression model in four steps (see Table S2). In Step 1, we included only demographic variables. Results revealed that mental health is worse among women (vs. men), among coupled (vs. non-coupled) people, and it shows a quadratic relationship with age (such that younger and older people are higher compared to those who are middle aged). In Step 2, we added contextual variables related to COVID-exposure, such as the geographic area (high vs. low affected area) and the direct exposure to COVID (i.e. whether the participants have been in contact with at least one COVID-infected individual among patients, friends, family members, or colleagues). Results revealed a significant association between having direct exposure to COVID-19 in terms of contact with infected individuals and worse mental health. There was no association between risk level of the geographic area and healthcare workers' mental health.

In Step 3, we included our focal variables relating to the psychological states of participants assessed during the COVID-emergency, namely, separation distress, emotional symptoms, and perceived resilience and self-efficacy in coping with challenging situations. As seen in Table S2, results showed positive associations between separation distress and emotional symptoms with poor mental health. In addition, we found a negative association between coping strategies—including resilience and self-efficacy—and poor mental health. Further, once our focal variables were included in the model, there was no longer an association between direct exposure to COVID-infected individuals and mental health, and

the association between gender and mental health, while still statistically significant, was reduced by more than half. We tested whether the four variables mediated the association of contact with an affected person and gender with mental health using a bootstrapping procedure with 1,000 bootstraps (Preacher & Hayes, 2004). Results showed that the indirect effect of having contact with a person infected with COVID on mental health was significantly explained by emotional symptoms, $b = .08$, $SE = .03$, bias-corrected 95%CI [0.03, 0.14], and, to a lesser extent, self-efficacy, $b = .02$, $SE = .01$, bias-corrected 95% CI [0.00, 0.05], but not by separation distress, $b = .00$, $SE = .01$, bias-corrected 95%CI [-0.01, 0.02], or resilience, $b = .00$, $SE = .01$, bias-corrected 95%CI [-0.02, 0.02]. The indirect effect of gender on mental health was significantly reduced by all four variables, including separation distress, $b = .29$, $SE = .04$, bias-corrected 95%CI [0.01, 0.08]; emotional symptoms, $b = .19$, $SE = .03$, bias-corrected 95%CI [0.13, 0.25]; resilience, $b = .02$, $SE = .01$, bias-corrected 95% CI [0.01, 0.05]; and self-efficacy, $b = .04$, $SE = .01$, bias-corrected 95%CI [0.02, 0.07].

In the final two steps, we added emotion dysregulation (Step 4) and its interaction with the four psychological and coping measures (Step 5) to test whether this stable measure of emotion regulation ability relates to mental health, and whether it moderates the associations between the other measures and mental health. As seen in Table S2, emotion dysregulation was not significantly associated with mental health, and none of the interactions with the other psychological variables were significant. After including emotion dysregulation in the model, the associations between the focal variables and our dependent variable, mental health (GHQ), were unchanged.

Risk Infection Perception as a Function of Exposure to COVID-19 and Psychological States

To predict respondents' risk infection perception, we conducted a linear regression model in three steps (see Table S3). In Step 1, we included only demographic variables. Results revealed that the risk perception of being infected is higher among younger (vs. older) individuals, and among those who worked longer shifts. In Step 2, we added the risk level of the geographic area (high vs. low) and the direct exposure to COVID (i.e. whether the participants have been in contact with at least one COVID-infected individual). Results revealed a significant association with both variables, such that those in highly affected areas and those who had contact with COVID-infected individuals reported significantly higher risk infection perception. In Step 3, we included all of the psychological variables, including mental health (GHQ-12), separation distress, emotional symptoms, resilience, self-efficacy, and emotion dysregulation. As seen in Table S3, none of these variables had significant associations with

people's perceived risk of infection above and beyond the demographic and contextual variables.

GENERAL DISCUSSION

Consistent with previous findings on the psychological impact of infectious diseases (Lee et al., 2018; Nickell et al., 2004), results from our assessment of the mental health (via the GHQ-12) of medical professionals working during the COVID-19 outbreak in Italy indicate high rates of mental health issues. Specifically, 33.5 per cent of respondents scored higher than what is considered the threshold for psychiatric morbidity. Further, the mean GHQ-12 scores in our sample ranged from 1.56 to 1.85, depending on demographic group, which is far higher than means from the general population, which tend to be less than 1 (e.g. Sanchez-Lopez & Dresch, 2008). Although we do not have pre-COVID measures of mental health, these high numbers suggests that the COVID-19 pandemic has left a significant emotional and psychological scar on Italian healthcare professionals. Interestingly, we found no association between the risk of the hospital workers' region and their mental health, suggesting that the extent of the immediate surrounding crisis did not directly affect people's mental health. It is possible that the severe health emergency in a country as small as Italy might be enough to negatively affect the mental health of professionals working on the frontline, regardless of the condition of their particular region.

We also found marked gender differences among medical professions, such that female (vs. male) personnel reported worse mental health, overall. In general, women do report worse mental health compared to men (Salk, Hyde, & Abramson, 2017), and similar gender differences emerged in other studies of COVID healthcare workers (i.e. Lai et al., 2020). It is worth noting, however, that some of previous studies on Italian healthcare professionals did not report any difference in general health between male and female participants (e.g. Grassi, Magnani, 2000; Renzi, Di Pietro, & Tabolli, 2012).

In comparing retrospective versus current states, our results showed that women indicated more change (for the worse) compared to men on all measures, including increased separation distress and emotional symptoms, and decreased resilience and self-efficacy. Because this study was cross-sectional, we of course cannot say whether the change that people reported was an actual or perceived experience. Nevertheless, given that the gender difference is especially stark in current (vs. retrospective) reports, it suggests that women have fared worse than men during the crisis, at least based on their own perception. It is possible that these differences are, at least in part, due to differences in reporting (Sigmon et al., 2005; Sigmon et al., 1997). For instance, research has shown that people perceive depressive symptoms as less masculine, which in turn makes men more reluctant to report such symptoms (Brody & Hall, 2000; Conway, 2000). It is

conceivable that crises, like the COVID-19 emergency, may exacerbate men's reluctance to report mental health issues.

Importantly, and in line with our prediction, we found that self-reported measures assessing psychological states were worse when people were evaluating their current state as compared to their retrospective evaluations of their state before the outbreak. Given that the "pre-COVID" measures are retrospective, we cannot say whether people actually experienced a change in mental health, but the data clearly show that medical professionals perceive themselves to be worse off now—in terms of mental health, psychological states, and coping abilities—compared to before the COVID outbreak.

We suspected that mental health and self-reported change in psychological states and coping abilities would be exacerbated among those who have had direct contact with people infected with COVID. Our results, however, showed that this was less relevant than we expected. Specifically, we found that those who had contact with people infected with COVID (vs. those who did not) did not differ in separation distress, resilience, or self-efficacy, but they did report worse emotional symptoms and mental health. Reported changes in separation distress and self-efficacy did not differ between those who had contact with someone affected with COVID versus those who did not. We found that those who had contact (vs. no contact) with someone infected with COVID did not differ in their retrospective reports of emotional symptoms, but those who had contact (vs. no contact) reported higher emotional symptoms in their current state. We also found that contact with COVID-infected persons moderated the change in resilience, but not in the way that we expected. Specifically, we found that people who had contact with a COVID-infected person reported higher resilience in the retrospective reports compared to those who had no contact, but resilience between the two groups was similar in current reports. Thus, it appears that people who had contact with someone infected with COVID perceive a change in their resilience, but are perhaps overestimating their levels of resilience in the pre-COVID period.

In our examination of predictors of mental health, we found that separation distress and emotional symptoms were positively related to poorer mental health and coping abilities (i.e. resilience and self-efficacy) were negatively related. Further, we found that individuals who had contact (vs. no contact) with COVID-infected persons reported worse mental health, but this was accounted for by emotional symptoms and self-efficacy (but not by separation distress or resilience). A trait-type measure of emotion regulation was unrelated to mental health, above and beyond the other psychological states, and did not moderate the associations between psychological status and mental health.

Finally, we examined predictors of people's perceptions of infection risk. Infection risk perception was higher among people who had recently worked longer shifts, among those who lived in highly affected areas, and among those who have had contact with infected persons. We thought that psychological states may increase the perception of infection risk, but this suspicion was not

supported by the data. That is, mental health, separation distress, emotional symptoms, resilience, and self-efficacy were all unrelated to infection perceptions. Moreover, when all of these variables were included in the model, shift length, region, and contact remained significant predictors of infection risk perception. Thus, it seems as though healthcare professionals' perception of their risk of infection is quite rational in so far as it is related to contextual variables that indicate increased exposure, and is unrelated to psychological states.

Limitations of the Research

Although our research presents several strong points (e.g. large sample of medical professionals in different geographical areas, and data collection during a medical crisis), there are several major limitations. First, our study is limited by the cross-sectional design, which does not allow us to draw conclusions about either causality or the possible change of psychological work-related problems over time. Second, although retrospective measurement represents a common way to investigate past experiences and psychological states, it remains a self-reported measure that can be potentially biased and influenced by several factors. Third, mental health was assessed by the GHQ-12 questionnaire, which is considered a useful and validated screening instrument. However, a formal evaluation by a psychiatrist is needed before establishing a diagnosis. Finally, even though our sample of healthcare professionals is large and has a good national geographic representation, any attempt to generalise with respect to other national or cultural contexts must be approached with great caution.

CONCLUSION

The current research is one of the first attempts to assess the mental health of healthcare professionals during the COVID-19 outbreak in Italy. Our results show that the mental health of Italian healthcare professionals appears to be at risk, especially among women. Along with other recent research, which found high levels of emotional burnout and somatic symptoms in Italian healthcare workers during the peak of the COVID-19 outbreak (Barello, Palamenghi, & Graffigna, 2020), it suggests that the crisis of COVID-19 may be followed by a mental health crisis. This work suggests that COVID-19 is associated with (negative) changes in contextual and situational psychological states, which, in turn, may lead to severe future consequences for healthcare workers if they are not provided with an effective psychosocial support program. Although further research is necessary to gain a more comprehensive understanding of the consequences of the COVID-19 outbreak on healthcare workers' mental health, these data support the notion that the mental health of medical professionals is something that communities ought to be concerned about, and there is a need to put effort into interventions to promote better subjective well-being during these times of crisis.

In conclusion, our findings suggest that local and national institutions should invest in mental health support for hospital personnel during this pandemic. Furthermore, special attention should be paid to women's mental health. On 15 April, the National Board of Italian Psychologists announced the implementation of psychological support services targeting healthcare workers (Consiglio Nazionale Psicologi, April, 2020), and we hope that our results can help inform these support programs in their aims to develop more specific interventions to re-establish psychological well-being and enhance the self-confidence and resilience of hospital and community personnel.

CONFLICTS OF INTERESTS

None.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Figure S1. Changes in retrospective versus current psychological states as a function of participant gender.

Figure S2. Changes in retrospective versus current psychological states as a function of whether or not participants had contact with someone affected with COVID.

Table S1. Correlations between psychological variables and risk factors (i.e., regional risk and contact with infected persons)

Table S2. Unstandardized slope estimates (and standard errors) from hierarchical linear regression model predicting mental health (GHQ-12)

Table S3. Unstandardized slope estimates (and standard errors) from a hierarchical linear regression model predicting risk infection perception

Appendix S1. Comparisons between Retrospective (Pre-Outbreak) and Current (During Outbreak) Reports on the four psychological variables as a function of participant gender and contact with persons affected with COVID.

Appendix S2. English Version of the entire questionnaire. (The original version is in Italian.) We have reported only select example items of the original scales. The full questionnaire can be obtained from the first author upon request.