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Impact of the COVID-19 pandemic and work-related stress in Umbrian healthcare workers during Phase 1 in Italy

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Abstract

Background: *Depression, anxiety, psychological distress, and poor sleep quality increased in healthcare workers (HCWs) during the COVID-19 pandemic. The aim of the study was to assess levels of psychological distress in Umbrian HCWs during the COVID-19 Phase 1 lockdown along with exploring the relationship between sociodemographic/occupational factors.* **Methods:** *Data on sociodemographic and occupational characteristics, change of job description, economic losses and emergency involvement and SARS-CoV2 infections in the workplace were collected using an anonymous online survey sent by healthcare professional associations. Data concerning psychological healthcare distress, were collected anonymously using BIAS 20 (stress balance) and Depression Anxiety Stress Scales (DASS-21).* **Results:** *One thousand and one healthcare workers responded to the questionnaire. Biological risk at work was perceived by all HCWs, less so from psychologists and more so from those working in hospitals. Stress symptoms (DASS21 >14) were associated with a younger age group (OR 0.98; 95% CI 0.97-0.99) and less work experience (OR 0.98; 95% CI 0.96-0.99). Younger age was also associated with anxiety symptoms (DASS 21 >7) (OR 0.98; 95% CI 0.97-0.99), as well as graduate/post graduate education level (OR 2.04; 95% CI 1.14-3.63). Working as an independent contractor was a risk factor for high stress health impact (OR 2.00; CI 1.40-2.86) and stress (OR 1.87; CI 1.20-2.92), anxiety (OR 1.89; CI 1.22-2.92) and depression (OR 1.57; CI 1.10-2.22) symptoms.* **Conclusions:** *Our study showed a possible relationship between healthcare type of employment and distress symptoms during Covid19 pandemic phase 1. Results of our study should be confirmed in other Italian healthcare settings and could serve as a preliminarily baseline for multidisciplinary Italian collaboration.*

Introduction

The novel Coronavirus outbreak, which appeared in China in December 2019, raised attention around the world. It is referred to as Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) by the International Committee on Taxonomy of Viruses (ICTV) and COVID-19 by the World Health Organization (WHO) (1). The COVID-19 epidemic is more severe than previous coronavirus

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human infections; such data indicate the significant transmission potential of this virus (2). Italy is among the countries where disease prevalence has been reported in most of its regions. To reduce the transmission and spread of the virus, the Italian government declared a complete nationwide lockdown for more than 60 days (Phase 1 of the COVID-19 pandemic) from March 8, 2020, to May 18, 2020, which involved public transport and prohibited the opening of public spaces, affecting the economic, agricultural, industrial as well as the services and public health system sectors.

Infectious disease outbreaks are known to have a psychological impact on healthcare workers (HCWs) as well as on the general population. Psychosocial responses to the spread of the disease may include anxiety, depression, social weaknesses, decreased estimation of survival, an overestimation of risk infection, fostering inappropriate preventive measures, and an increase in demand for healthcare (3, 4). A notable example would be the psychological sequelae observed during the Severe Acute Respiratory Syndrome (SARS) outbreak in 2003 (5). Increased workload, physical exhaustion, inadequate personal equipment, nosocomial transmission, and the necessity to make ethically arduous decisions concerning care rationing may dramatically affect HCWs' physical and mental well-being. Medical Staff resilience can be further compromised by isolation and loss of social support, by family risk infections and unsettling changes in working methodologies (6). Depression/depressive symptoms, anxiety, psychological distress, and poor sleep quality increased in HCWs during the COVID-19 pandemic (7), with a rise seen in women and older professionals. Factors such as being in contact with the virus or fear of contagion in the workplace triggered more significant symptomatology (8). Most studies on HCWs' COVID-19 stress-related symptoms focus on prevalence and risk factors. Moreover, studies analyzing the Italian context are lacking; only one, in Lombardy, has been published (9).

This study's main aim was to investigate the psychological impact of the COVID-19 outbreak among all HCWs in Umbria, a region in Central Italy, during the Phase 1 lockdown, not merely among hospital HCWs working directly with infected patients. Firstly, we assessed the levels of psychological distress (i.e., psychological imbalance, anxiety, depressive and stress symptoms) in healthcare professional workers. Secondly, we explored the relationships between sociodemographic/occupational factors and psychological distress in HCWs.

Methods

Study population

Data were collected using an anonymous online survey from April 6, 2020, to May 20, 2020, during the first lockdown period. An online survey was used to minimize face-to-face interactions and facilitate the participation of HCWs working extensively during this emergency period. The survey was conducted online using Google forms. We recruited HCWs within Umbrian (central Italy) healthcare professional associations. Characteristics of the participants and the group comparisons of sociodemographic and occupational variables are presented in Tables 1 and 2.

The healthcare institutions were actively involved in sending the survey link via email or website during the study period. Study participants included doctors, dentists, nurses, midwives, psychologists, pharmacists, physiotherapists, and technicians registered with professional Umbrian associations. Informed consent was obtained from all participants. The different healthcare associations approved the study in accordance with the principles in the Declaration of Helsinki.

One thousand and one healthcare workers responded to the questionnaire sent by healthcare professional associations. The mean age was 44 years ±13 SD (SD, standard deviation), and the mean years of work were 17 ± 13SD. More females (73% vs 27%) and 24% of subjects were smokers, primarily doctors and independent workers. Biological risk in the workplace was perceived by all HCWs, less by psychologists (Table 1) and more by those working in the hospital (Table 2). All the participants were informed, trained, and followed the advice from the Ministry of Health; fear of COVID-19 infection and fear of infecting family affected all subjects in our study; 50% of doctors and less than 50% of

Table 1. Characteristics of the population by professions

	Doctors N=297	Psychologists N =178		Nurses N =126	Midwives N =66	Technicians N =148	Physiotherapists N=118	Pharmacists N=5	Others N=25
*Gender (F), n (%)	182 (61)	160 (90)	28 (74)	97(77)	65 (98)	98 (66)	71 (60)	4 (80)	21 (84)
*Age (M ±DS)	50 (13)	41 (12)	43 (12)	42 (11)	38 (10)	41 (12)	41 (11)	49 (5)	43 (10)
*Education, n (%)									
- High school diploma	..	..	1 (3)	23 (18)	1 (2)	11 (7)	10 (8)	..	7 (28)
- Graduate/post graduate	297 (100)	178 (100)	37 (97)	103 (82)	65 (98)	137 (93)	108 (92)	5 (100)	18 (72)
*Family members (>3), n (%)	216 (73)	99 (56)	25 (66)	87 (69)	46 (70)	92 (62)	71 (60)	3 (60)	14 (56)
*Years of work (M ±DS)	21 (14)	12 (11)	17 (12)	17 (11)	13 (11)	16 (13)	16 (11)	21 (8)	15 (12)
*Smoker, n (%)	56 (19)	49 (27)	12 (32)	39 (31)	21 (32)	29 (20)	26 (22)	0(0)	5 (20)
*Smoker in the workplace, n (%)	36 (64)	25 (51)	7 (58)	30 (77)	12(57)	16 (55)	14 (54)	0 (0)	2 (40)
*Biological risk at work, n (%)	246 (83)	58 (33)	37 (97)	116 (92)	65 (98)	114 (77)	92 (78)	3(3)	15 (3)
*Fear of COVID-19 infection, n (%)	208 (70)	88 (49)	32 (84)	106 (84)	51 (77)	108 (73)	80 (68)	4 (80)	15 (60)
*Fear of infecting family, n (%)	247 (83)	122 (68)	33 (86)	105 (83)	57 (86)	131 (88)	93 (79)	5 (100)	24 (96)
*Work protective equipment, n (%)	150 (50)	79 (44)	19(50)	94(75)	47(71)	100 (68)	65 (55)	5 (100)	12 (48)
*Discomfort using PPE, n (%)	193 (65)	103 (58)	26 (68)	99 (79)	54 (82)	102 (69)	62 (52)	5 (100)	14 (56)
- To communicate	46 (15)	35 (20)	10 (26)	30 (24)	20 (30)	48 (32)	24 (20)	3 (60)	5 (20)
*Remoteworking, n (%)	47 (16)	131 (74)	1 (2,6)	9 (7)	6 (9)	36 (24)	18 (15)	0 (0)	13 (52)
Information/training, n (%)	285 (96)	168 (94)	37 (97)	119 (94)	65 (98)	140 (95)	112 (95)	5 (100)	24 (96)
- Media	241 (81)	161 (90)	34 (89)	90 (71)	54 (82)	128 (86)	101 (86)	5 (100)	22 (88)
- Chief/head/employer	99 (33)	42 (24)	5 (13)	81 (64)	40 (61)	60 (40)	40 (34)	2 (40)	7 (28)
- advice from Ministry of Health, n (%)	294 (99)	177 (99)	37 (97)	124 (98)	66 (100)	145 (98)	117 (99)	5 (100)	25 (100)
Job /task changes, n(%)	39 (13)	27 (15)	2(5)	15(12)	3(4)	16 (11)	12 (10)	1(20)	0 (0)
*Economic loss, n (%)	132 (44)	127 (71)	37 (97)	26 (21)	13 (20)	48 (32)	84 (71)	2 (40)	10 (40)
*Involved in emergency management, n (%)	220 (74)	117(66)	5 (13)	108 (86)	46 (68)	86 (58)	20 (17)	3 (60)	11 (44)
* COVID-19 infection at work, n (%)	70 (23)	16 (8)	4 (10)	56 (44)	19 (28)	44 (30)	25 (21)	0 (0)	2 (8)

*$p<0.05$

dentists and psychologists indicated not possessing protective work equipment (Table 1).

Independent contractors and workers affiliated with the local health system (general practitioners) reported less possibility of procuring protective devices (Table 2). Twenty-six per cent of subjects disclosed working remotely during the lockdown period, more than 70% of the psychologists and most independent contract workers. In our study, the proportion of subjects with work disadvantages (economic loss and change of job description) was more significant in the independent contractors' group compared to the others (Table 2). Doctors and nurses, particularly those who worked in the public health system, were directly involved in the health emergency. Likewise, hospital nurses more frequently reported symptoms, positive diagnostic tests, and therapy for COVID-19 infection (Tables 1 and 2).

Study questionnaire

The study questionnaire was composed of two main components. The first part recorded, with non-validated *ad hoc* questions, the following information: sociodemographic and occupational characteristics such as age, gender, household composition, education level, smoking status, years of work experience, profession, type of employment (independent contractor, official company-based, Local Health Unit/hospital agency, university education internship,

Table 2. Characteristics of the population by type of employment

	Contractor N=323	Health unit. employee N=323	Agreement with the local health unit N= 96	Hospital employee N=146	University training N=45	Other job contracts N=53	retired/not busy N=15
*Gender (F), n (%)	221 (68)	240 (74)	68 (71)	113 (77)	33 (73)	39 (74)	12 (80)
*Age (M ±DS)	42 (13)	45 (12)	50 (12)	43 (11)	31 (8)	41 (13)	47 (22)
*Education							
- High school diploma	12 (4)	18 (6)	0 (0)	13 (9)	2 (4)	8 (15)	0 (0)
- Graduate/post graduate	311 (96)	305 (94)	96 (100)	133 (91)	43 (96)	45 (85)	15 (100)
*Years of work (M ±DS)	16 (13)	18 (12)	21 (12)	17 (10)	3 (7)	14 (12)	20 (22)
*Smoker, n (%)	82 (25)	68 (21)	22 (23)	43 (29)	10 (22)	12 (23)	0 (0)
*Smoker in the workplace, n (%)	39 (47)	50 (73)	17 (77)	24 (56)	6 (60)	6 (50)	0 (0)
*Biological risk at work, n (%)	207 (64)	262 (81)	79 (82)	131 (90)	19 (42)	39 (74)	9 (60)
*Fear of COVID-19 infection, n (%)	192 (59)	247 (76)	75 (78)	122 (84)	20 (44)	31 (58)	5 (33)
*Fear of infecting family, n (%)	240 (74)	281 (87)	79 (82)	128 (88)	33 (73)	45 (85)	11 (73)
*Work protective equipment, n (%)	136 (42)	218 (67)	42 (44)	111 (76)	17 (38)	41 (77)	6 (40)
*Discomfort using PPE, n (%)	174 (54)	233 (72)	57 (59)	116 (79)	35 (78)	33 (62)	10 (67)
- To communicate	60 (19)	84 (26)	13 (13)	42 (29)	8 (18)	14 (26)	0 (0)
*Remote working, n (%)	140 (43)	47 (15)	30 (31)	3 (2)	21 (47)	18 (34)	2 (13)
Information/training, n (%)	308 (95)	314 (97)	90 (94)	134 (92)	43 (96)	51 (96)	15 (100)
- Media	294 (91)	256 (79)	76 (79)	114 (78)	36 (80)	47 (89)	13 (87)
- Chief/head/employer	50 (15)	183 (57)	27 (28)	85 (58)	11 (24)	19 (36)	1 (7)
- advice from Ministry of Health, n (%)	320 (99)	319 (99)	96 (100)	145 (99)	43 (96)	52 (98)	15 (100)
Job/task changes, n (%)	45 (14)	36 (11)	4 (4)	17 (12)	9 (20)	3 (6)	1 (7)
*Economic loss, n (%)	300 (93)	55 (17)	45 (47)	36 (25)	15 (33)	23 (43)	5 (33)
*Involved in emergency management, n (%)	124 (38)	237(73)	82 (85)	121 (83)	25 (56)	25(47)	2(13)
* COVID-19 infection at work, n (%)	34 (10)	96 (30)	20 (21)	66 (45)	6 (13)	13 (24)	1 (7)

*$p<0.05$

agreement with the National Health System), fear of contracting COVID-19 at work and infecting family, information and training regarding SARS-CoV-2 infection, biological risk perception, use of personal equipment, discomfort in using protective equipment, change of job description, economic losses, emergency involvement, COVID-19 infection at work and remote working. Data concerning psychological healthcare distress were collected using BIAS 20 (10), a non- validated questionnaire suggested by our occupational psychologist author colleague, and the Depression Anxiety Stress Scales (DASS-21), a validated and reliable instrument in assessing depression, anxiety, and stress symptoms (11).

BIAS 20 specifications reported the level of requests and resources, perceived stress, impact of stress on health and functional level of stress ranging from 1–10-point scale. Imbalance was calculated as Request (external request + internal requests) – Resources (internal resources + external resources). Furthermore, BIAS 20 investigated anti-stress initiatives. DASS-21 included three components: stress, anxiety, and depression. Each with 7-point scales, the final score of each part was obtained by summing the scores of the related questions—each item scored from 0 (absolutely disagree) to 3 (absolutely agree). Cut-off scores > 9, >7 and > 14 represent a positive screen of depression, anxiety and stress, respectively (12, 13).

Statistical Analyses

Descriptive analyses were run first to investigate the psychological impact of COVID-19 in our health-

Table 3. Means of BIAS 20 and DASS 21 subscale scores

	Mean (±SD)
Imbalance between requests and resources (BIAS 20)	-6 (13)
Level of perceived stress (BIAS 20)	7 (2)
Level of stress impact on health (BIAS 20)	6 (2)
Functional level of stress (BIAS 20)	5 (2)
Stress symptoms (DASS21)	9 (5)
Anxiety symptoms (DASS21)	4 (4)
Depression symptoms (DASS21)	6 (5)

care workers' group. In addition to descriptive statistics, we conducted univariate analyses to explore the associations between psychiatric symptoms and occupational variables using either Student's t-test, ANOVA test or Pearson's correlation test. Multiple regression analyses were used to assess whether sociodemographic or occupational variables were possible predictors of the psychological outcomes in healthcare professional subgroups. The statistical analyses were conducted using Statistical Package for Social Science, version 25.0 (IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp.).

Results

Using our predefined cut-offs for BIAS 20 and DASS-21 scoring systems, we screened imbalance between requests and resources, high perceived stress, high impact of stress on health, functional level of stress and symptoms of depression, anxiety, and stress. Score means ± SD of BIAS 20 and DASS 21 subscale are reported in Table 3. Retirees and subjects with other jobs were excluded from the analysis. Anxiety (DASS 21 >7) was present in 23%, depression (DASS 21 > 9) in 24% and stress (DASS 21 > 14) in 14 % of healthcare workers who participated. There was no difference in the psychological outcomes in study participants among the different professions.

Stress symptoms (DASS21 >14) were associated with young age (OR 0.98; 95% CI 0.97-0.99) and fewer working years (OR 0.98; 95% CI 0.96-0.99). Young age was associated with anxiety symptoms (DASS 21 >7) as well (OR 0.98; 95% CI 0.97-0.99), along with graduate/post graduate education level (OR 2.04; 95% CI 1.14-3.63).

Working as an independent contractor conjointly with remote working during lockdown seem to be associated with increased levels of stress, anxiety, and depression (Table 4). Working in a public health system (hospital, local health unit, university) and biological risk awareness in the workplace seem to be protective factors for psychological distress. At the same time, economic loss during the lockdown period was associated with high perceived stress, high stress health impact, and anxiety symptoms (Table 4). Healthcare workers involved in emergency management and who got infected with COVID-19 at work felt stress [OR 1.61 (1.24-2.09); OR 1.60 (1.18-2.16)] but in the objective measurement of stress and anxiety symptoms with the DASS 21 scale were resilient. Working in the emergency management is not associated with distress symptoms (Table 4).

The multiple logistic regression analysis shows that working as an independent contractor is a risk factor for high stress health impact (OR 2.00; CI 1.40-2.86) and for stress (OR 1.87; CI 1.20-2.92), anxiety (OR 1.89; CI 1.22-2.92), and depression (OR 1.57; CI 1.10-2.22) symptoms. Working remotely, especially for healthcare workers usually working in direct contact with patients, was negatively associated with all psychological outcomes (Table 5).

Discussion

Based on previous studies conducted during pandemic events (14), we hypothesized decreased mental health and emotional distress affecting all Italian HCWs during phase 1 of the COVID-19 pandemic, not merely hospital colleagues working directly with infected patients. Correspondingly to the current study, a high prevalence of psychological symptoms, such as anxiety and depression, has been reported in the literature regarding healthcare workers. Meta-analysis studies found an analogous prevalence of anxiety [26% (18%-34%)] and depression [25% (17%-33%)] (6, 15). Overall, our results show a higher percentage of people with very high levels of distress compared to results of other European epidemiological studies (16). Also in Italy, the latest data (https://www.epicentro.iss.it/mentale/epidemiologia-italia) indicate that only about 6% of adults aged 18–69 report depressive symp-

Table 4. Logistic regression predictors of Imbalance, high perceived stress, high stress health impact, stress, anxiety, and depression symptoms

	Imbalance*	High perceived stress [α]	High stress health impact[β]	Stress symptoms[@] (DASS21 > 14)	Anxiety symptoms[@] (DASS21> 7)	Depression symptoms[@] (DASS21 >9)
Gender	0.76 (0.58-1.01)	0.95 (0.72-1.26)	0.90 (0.68-1.20)	0.74 (0.49-1.13)	0.81 (0.58-1.14)	0.86 (0.62-1.21)
Age	1.00 (0.99-1.01)	0.99 (0.98-1.00)	0.99 (0.98-1.00)	0.98 (0.97-0.99)	0.98 (0.97-0.99)	0.99 (0.98-1.00)
Years of work	1.00 (0.99-1.01)	0.99 (0.98-1.00)	0.99 (0.98-1.00)	0.98 (0.96-0.99)	0.99 (0.97-1.00)	0.99 (0.98-1.00)
Smoker	0.95 (0.71-1.27)	0.82 (0.61-1.11)	1.15 (0.86-1.54)	0.68 (0.46-1.00)	0.89 (0.63-1.24)	0.93 (0.66-1.30)
Graduate/post graduate	0.87 (0.50-1.52)	0.75 (0.43-1.31)	1.13 (0.64-1.97)	0.87 (0.38-1.98)	2.04 (1.14-3.63)	1.27 (0.68-2.36)
[¥]Contract worker	0.79 (0.60-1.03)	2.00 (1.53-2.63)	2.15 (1.63-2.82)	2.10 (1.37-3.25)	2.25 (1.57-3.20)	1.73 (1.24-2.43)
[¥]Health Unit employee	1.16 (0.89-1.52)	0.74 (0.56-0.97)	0.79 (0.60-1.03)	0.90 (0.62-1.31)	0.79 (0.58-1.08)	1.14 (0.82-1.56)
[¥]Agreement with HS	0.88 (0.57-1.36)	0.77 (0.50-1.19)	0.84 (0.55-1.30)	0.71 (0.40-1.26)	0.84 (0.51-1.39)	0.90 (0.55-1.49)
[¥]Hospital employee	1.20 (0.84-1.72)	0.44 (0.33-0.71)	0.37 (0.25-0.55)	0.54 (0.35-0.85)	0.51 (0.35-0.75)	0.46 (0.31-0.67)
[¥] University training	1.14 (0.61-2.12)	1.11 (0.59-2.05)	1.26 (0.68-2.35)	0.71 (0.33-1.51)	0.84 (0.42-1.67)	0.42 (0.22-0.80)
[¥]Task changes	0.96 (0.65-1.42)	0.83 (0.56-1.23)	1.03 (0.69-1.53)	0.75 (0.45-1.25)	0.80 (0.51-1.26)	0.84 (0.54-1.32)
[¥]Economic loss	0.78 (0.60-1.00)	1.67 (1.30-2.16)	1.50 (1.17-1.93)	1.34 (0.94-1.91)	1.67 (1.24-2.26)	1.31 (0.97-1.76)
[¥]PPE	1.15 (0.89-1.49)	1.03 (0.80-1.33)	0.98 (0.76-1.26)	1.04 (0.72-1.48)	0.96 (0.76-1.30)	1.24 (0.92-1.67)
[¥]Biological risk at work	1.25 (0.94-1.67)	0.50 (0.37-0.67)	0.49 (0.37-0.66)	0.50 (0.31-0.80)	0.42 (0.28-0.63)	0.71 (0.49-1.01)
[¥]Emergency management	1.02 (0.78-1.32)	1.61 (1.24-2.09)	0.68 (0.52-0.88)	0.62 (0.42-0.92)	0.57 (0.42-0.79)	0.88 (0.65-1.19)
[¥] COVID-19 infection at work	0.93 (0.69-1.25)	1.60 (1.18-2.16)	0.61 (0.45-0.82)	0.52 (0.35-0.76)	0.50 (0.36-0.69)	0.74 (0.53-1.04)
[¥]Remote working	0.78 (0.59-1.05)	2.04 (1.53-2.72)	2.17 (1.62-2.90)	1.88 (1.19-2.95)	2.15 (1.47-3.15)	1.71 (1.19-2.47)

[¥]Adjusted for gender, age, work years, family members, education; *Imbalance = Request (external request + internal requests) – Resources (internal resources + external resources): > 2 and < -14; [α] : stress level ≥ 7; [β]: stress health impact ≥ 7; @ stress, anxiety, depression symptoms (DASS 21, Lazzari D. Psychomarkers 2013)

Table 5. Predictors of high perceived stress, high stress health impact, stress, anxiety, and depression symptoms

	High perceived stress[α]	High stress health impact[β]	Stress symptoms[@] (DASS21 > 14)	Anxiety symptoms[@] (DASS21> 7)	Depression symptoms[@] (DASS21 >9)
Contract worker	1.43 (1.00-2.05)	**2.00 (1.40-2.86)**	**1.87 (1.20-2.92)**	**1.89 (1.22-2.92)**	**1.57 (1.10-2.22)**
Smart working	**1.77 (1.30-2.41)**	**1.82 (1.34-2.47)**	**1.63 (1.01-2.61)**	**1.84 (1.23-2.64)**	**1.56 (1.07-2.28)**

Adjusted for gender, age, education, work years, family members; α : stress level ≥ 7; β: stress health impact ≥ 7; @ stress, anxiety, depression symptoms (DASS 21, Lazzari D. Psychomarkers 2013)

toms, compared to the higher percentages of distress found in our study. In line with other reviews (17), the increased frequency of distress found in the current sample could be interpreted as COVID-19-related, although further studies are needed to confirm this association.

Some authors point out that women present more symptoms than men do (18). The data regarding no gender differences obtained in our study may be due to the high number of women in all the professions and the type of employment. Nevertheless, studies conducted during this pandemic have shown that males and females experience stressors in similar ways (19).

Younger healthcare workers show more outstanding post-traumatic stress and anxiety levels, maybe due to a lack of work experience in similar stressful situations (20). An additional plausible interpretation is that, during the current pandemic, the lack of healthcare staff obligated employees with less work experience to deal with the demands of COVID-19 patients. Some authors have suggested that more significant anxiety amongst the younger population may be due to their greater access to information through social media, which could easily trigger stress (21).

During the COVID-19 pandemic, people with higher levels of education had greater levels of anxi-

ety, depression, and stress. According to recent studies, during the COVID-19 pandemic, there was an association between educational attainment and anxiety and depression levels (22, 23). According to a study conducted in China, the higher prevalence of mental symptoms among people with higher levels of education is probably due to a high degree of self-awareness concerning their health (24).

The present study attempted to examine the consequences of unemployment and changes in work performance due to the COVID-19 pandemic lockdown on healthcare workers' income and remittances. Present findings show that days of unemployment during lockdown were directly associated with income loss, especially among independent contract workers and correlated with perceived stress and anxiety symptoms. Variables related to jobs showed that healthcare workers with independent contract jobs have more stress, anxiety, and depression symptoms. In literature, it is acknowledged that psychosocial job characteristics have a negative impact on the well-being of employees (25). Isolation, possibly due to contagion, and remote working, are risk factors for higher levels of psychological stress, anxiety, and depression. Other studies have also divulged social isolation as a cause of epidemic COVID-19 distress (26, 27). A recent review by Li Y et al. showed a relevant prevalence of depression, anxiety, and post-traumatic stress disorders significantly higher in healthcare workers, comparable to our results (28). The relevance of loneliness as a contributor to negative mental health is confirmed by previous studies showing its predictive role in the development and maintenance of depressive and anxiety symptoms (29, 30); the relationship with patients and colleagues, for most professionals, is a source of gratification and support and represents a vital resource factor (31). The negative mental impact of remote working does not depend on the composition of the family unit; this result does not adhere to prior findings (32), which indicated that having children is related to more negative psychological outcomes than having no children.

Our study shows that psychological distress was higher among HCWs not working in the hospital or public health systems (33), and this assumption is understandable if we consider work organization, confidence in protective measures, training, and organizational support related to less severe psychological outcomes (34, 35). In a recent study where protective factors against greater psychological distress, including having up-to-date and accurate health information, were reported (36), even in our study, the awareness of contracting infectious diseases in the workplace, possibly for work information and training, was a protective factor. A recent study showed that an intrinsic/ethical motivation, a flexible representation of one's professional role (personal level), a good interpersonal relationship, the perception of supportive leadership and a sustainable and shared work purpose (organizational level) represented important protective factors (9).

In accordance with the literature, what emerges from our samples is that frontline HCWs adopted numerous and diversified defence mechanisms during the first phase of the outbreak that helped them manage the enormous emotional impact and suffering brought about by this situation (9).

In contrast with our research, recent studies demonstrated that among healthcare workers, frontline nurses (37) working in direct contact with COVID-19 patients and who operated in the hardest-hit areas had higher psychological distress (34, 38). Our results offer a general picture of the psychological impact of COVID-19 on Umbrian (Italian) HCWs and provide a baseline for future research. Few studies have suggested that the psychological impact of COVID-19 may be different among HCWs; our study compares diverse HCWs both working in hospital and elsewhere and includes professions other than nurses and doctors. Amid this critical situation, professionals who are not in the frontline are directly exposed to risks and stressors. The identification of the different healthcare professionals who are at greater risk of suffering from psychological distress, which may have psychopathological consequences, offers them psychological help to reduce the emotional impact of COVID-19, and thus, ensures the mental health of our health professionals as well as the adequate socio-economic care they provide. Few countries have published specific psychological support intervention protocols for HCWs, and this study could serve as a baseline for a multidisciplinary Italian collaboration (39).

Our study investigated the psychosocial issues in diverse healthcare personnel and work disadvantages as a predictive factor of work-related stress. The questionnaire evaluated the impact of lockdown (how lockdown affected emotions and feelings). We used a validated and standardized tool with appropriate cut-off points to classify stress variables, anxiety, and depression. Our research adopted a random sampling method recruiting HCWs from the healthcare professional associations of Umbria, an essential factor in improving the precision of estimates as reported by a recent systematic review and meta-analysis (28).

The research presents some limitations. The sample only consists of Italian HCWs in Umbria, making the results not comprehensive of different possible findings for other nationalities and for some areas of Italy that were more impacted by the COVID-19 pandemic.

A further limitation is the absence of a DASS-21 baseline of pre-pandemic data; accurate pre-post analyses cannot be conducted. Hence, we cannot be certain of any increase in distress levels nor whether any increase (if validated) was COVID-19 related. Furthermore, even if DASS-21 has been validated for use in a recent Chinese study (23), after collecting COVID-19 data, specific stress scales were validated to measure COVID-19 related stress (40).

A deficiency in our investigation is the relatively low percentage of questionnaire responses which could result in study bias. The low response rate is a consequence of the survey not being administered, data collection was limited to a short period, and most hospital workers worked extraordinarily long shifts. Thus, opening an electronic message and replying to a questionnaire may not have been a top priority. Concern and a word of caution when interpreting results has recently been expressed about psychosocial studies based on self-administered questionnaires, especially web-surveys involving working populations, because of inherent selection bias giving rise to unexpected results (41).

Conclusion

Our study showed a possible relationship between healthcare type of employment and distress symptoms during Covid19 pandemic phase 1. Only a few countries have published specific psychological support intervention protocols for HCWs such as our study, which however should be confirmed in other Italian healthcare settings.

Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Ethics Committee of University of Perugia, Department of Medicine

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

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Declaration of Interest: The authors declare no conflict of interest.

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