The Mediating Role of Gender, Age, COVID-19 Symptoms and Changing of Mansion on the Mental Health of Healthcare Workers Operating in Italy during the First Wave of the COVID-19 Pandemic

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Abstract: The COVID19 pandemic tested the performance of hospitals and intensive care units around the world. Health care workers (HCWs) have been used to develop mental symptoms, but this was especially true during the COVID19 pandemic when HCWs must deal with many other sources of stress and anxiety that can usually be avoided, and long-term shifts and unprecedented population restrictions have weakened people's ability to cope with stress. The research aims to observe the dynamic interplay between burnout, depression, distress, and anxiety in HCWs working in various settings, with specific a focus on Emotional exhaustion, depersonalization, and a diminished sense of personal achievement in mediating a worst mental health status during the first wave of the COVID19 pandemic in Italy. To analyze that we performed a mediation analysis, from which resulted a strong correlation among depression, psychological distress, health perception and anxiety, and the impact of job burnout on anxiety, depression, and distress. Gender seemed to have a strong correlation with burnout, anxiety, and distress; the impact of COVID19 pandemic on Quality of Life seemed to affect anxiety and depression; the changing of mansion influenced depression and job burnout. Encouraging supportive and educational strategies would certainly be recommended to policy makers.

Keywords: burnout; healthcare workers; mediation analysis; covid-19 pandemic; mental health

Introduction

The WHO Emergency Committee declared a global health emergency on January 30, 2020, due to COVID-19 (coronavirus disease 2019; previously 2019nCoV) outbreak disease [1]. The cumulative number of cases reported globally is now nearly 216 million and the cumulative number of deaths is just under 4.5 million and with just under 4.4 million new cases reported in the week between 23-29 August, the number of new cases reported globally remains like the previous week after having increased for nearly two months (Figure 1). COVID-19, as an unknown disease, requires in-depth studies and observations on the existence of the virus, posing itself as a new challenge for the scientific community. To contain the disease, develop prevention and treatment strategies, active loco-regional to inter-national cooperation is needed [2].

The pandemic of COVID-19 would force a re-definition of vital support personnel, with acknowledgement of all healthcare workers' (HCW) contributions

and adequate education, defense, and compensation [3]. with more than 5.2 million new cases reported in the last week – surpassing the previous peak in early January 2021.

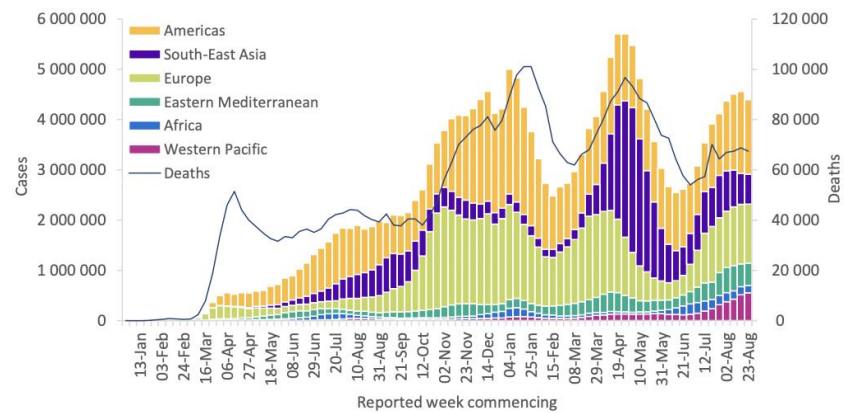



Figure 1. COVID-19 cases reported weekly by WHO Region, and global deaths, as of 29 August 2021 tried by World Health OrganizaTable 2021.

According to the COVID-19 Taskforce of the Department of Infectious Diseases and the IT Service Istituto Superiore di Sanità, there were 459,366 cases in the general population (49.6% males, 50.4 per cent females, with a median age of cases pair to 45 years), 3,860 cases among healthcare workers (HCWs), 9,588 deaths, and 364,749 recovered cases in Italy in the last 30 days (EpiCentro, 2021).

The COVID-19 pandemic has tested and, in many cases, surpassed hospital and intensive care unit (ICU) capability around the world [4]. Despite fatigue, personal risk of infection, fear of transmission to family members, sickness or death of friends and colleagues, and the loss of many patients, HCWs have continued to provide care for patients. Unfortunately, HCWs are a population of workers already used to develop anxiety, depression, burnout, insomnia, moral distress, and post-traumatic stress disorder[5]. In any case, even more so, during COVID-19 pandemic, HCWs have also had to deal with a slew of other, frequently avoidable sources of stress and anxiety, and long shifts coupled with unprecedented population limits, such as personal isolation, have harmed people's ability to cope [6].

Among other risk factors for the development of stress and anxiety, many HCWs travelled to new places of work as the pandemic progressed, to provide patient care in overburdened facilities; those who volunteered in unfamiliar clinical areas were often thrust into the pandemic ICU environment with inadequate skills and training [7]. The task of educating and supervising these volunteers fell to clinicians who were already overworked. As initial shortages of personal protective equipment (PPE) were resolved, hospital-based health professionals worked long hours wearing bulky and uncomfortable PPE. HCWs had to adapt to emerging technology to fulfil their patient care and educational obligations, which included telemedicine [6].

The treatment of COVID-19 patients with chronic comorbidities has been particularly complex due to both the lack of funding and specific COVID-19 therapies. HCWs had to look after sick coworkers, console dying patients who were separated from their loved ones, and educate and support patients' families from afar [8]. Some HCWs were faced with difficult decisions regarding resource

rationing and withholding resuscitation or ICU admission that were emotionally and ethically fraught [9].

Fear of transmitting COVID-19 drove many doctors and nurses to separate themselves from their families for months. Loneliness was exacerbated by working remotely and being shunned by community members [10]. Outpatient appointments and elective treatments were cancelled, resulting in missed earnings for many HCWs. Moreover, because of COVID-19 pandemic, surgeries or other life-saving treatments were cancelled or postponed, determining anguish among recovered COVID-19 patients, emotional experience shared by the attending physicians [11,12].

HCWs' preparation (e.g., medical students, residents, and allied health learners) was also disrupted, resulting in tuition payments being lost, missed learning opportunities, missed tests, and possibly delayed certification [6,13].

Back to the house, HCWs faced additional obstacles that compounded the inequities they face as a marginalized workforce, such as a lack of or insufficient PPE, varying levels of employer support, and the challenging option of operating with the possibility of losing salaries and benefits [14].

For all these reasons, COVID-19 was particularly relevant for female HCWs, where COVID-19 has had a disproportionately negative effect. In the event of a pandemic, women make up 70% of the global health and social care workers, placing them at risk of illness and the variety of physical and mental health issues that come with their roles as health practitioners and caregivers [6]. Gender inequities in formal and informal jobs, as well as the distribution of household duties, were intensified by the pandemic, which raised the risk of unemployment and domestic abuse. Women had to balance their professional obligations with their family's needs, which included childcare, homeschooling, elder care, and home care [15,16]. Due to these commitments, women's academic productivity was lower than men's, as shown by the fact that fewer women were part of the cohort that generated new information about the pandemic [17]. As evidenced by the ultra-short deadlines for COVID-19-related grant requests, there was a gap between the demands of parenting and the priorities of the scientific community, further deepening the gender divide [6].

Extreme burnout syndrome affects up to 33% of critical care nurses and up to 45% of critical care physicians under normal working circumstances [18]. The COVID-19 pandemic has exacerbated extrinsic organizational risk factors, such as increased job pressures and little influence over the work environment, as well as the trauma of caring for critically ill patients, both of which are significantly exacerbating factors for poor mental health among HCWs [19].

HCWs recorded persistent stress symptoms for months to years after the outbreak of serious acute respiratory syndrome in 2003 [20]. A Chinese study found high rates of depression (50 per cent), anxiety (45 per cent), insomnia (34 per cent), and pain among HCWs treating COVID-19 patients (72 per cent) [21]. A systematic analysis of 13 studies of over 33 000 participants backed up these conclusions [3]. Depressive symptoms, post-traumatic stress disorder, and burnout were found to be common in Italian and French studies; risk factors for negative psychological results included younger age, female sex, becoming a nurse, and dealing directly with COVID-19 patients [9,22,23].

Burnout is a multi-faceted reaction to physiological, mental, or interpersonal work stressors that can lead to psychological issues, increased suicide, and drug abuse among HCWs [24]. Emotional exhaustion, depersonalization, and a diminished sense of personal achievement are all symptoms of this condition [25]. A variety of factors can affect burnout risk, but encouraging mental health in politics, reducing HCW workload, mitigating job-related stressors, and favoring a healthy work environment can all help to prevent or reduce burnout [26].

In a previous study using an online survey [27], we evaluated the mental health effects of the first wave of the COVID-19 pandemic on HCWs in North-Eastern Piedmont, a high-risk region in Italy. Previous studies concentrated on aspects of mental health, primarily in HCWs who were specifically exposed to COVID-19, while our study analyzed HCWs from various settings (hospital and community healthcare facilities, emergency, and non-emergency services), including also HCWs not directly involved in the treatment of patients affected by the 2019-nCOVID disease. The study aims to observe the dynamic interplay between burnout, depression, distress, and anxiety in HCWs working in various settings, with specific a focus on Emotional exhaustion, depersonalization, and a diminished sense of personal achievement in mediating a worst mental health status. In this study, we hypothesized that job burnout could have a positive effect on perceived stress, anxiety and depression and that socio-demographic characteristics could act as a mediator in the relationship between job burnout and perceived stress, anxiety, and depression. Based on the research findings reported above, the objective of the study was to explore: (1) whether a relationship between job burnout and perceived stress, anxiety and depression exists among HCWs; (2) whether socio-demographic and anamnestic characteristics could act as a mediator in the relationship between job burnout and perceived stress, anxiety, and depression.

Materials and methods

The study protocol was approved by the local Ethical Board (Comitato Etico Interaziendale di Novara, Protocollo 534/CE, Studio n. CE 82/20, approved on May 11th, 2020). The survey was implemented with the REDCap platform and e-mailed at the end of the first wave of the COVID pandemic emergency crisis period (in June 2020) on behalf of the human resources offices in charge of the healthcare institutions detailed below, who have access to the mailing lists including the institutional e-mail contacts of all HCWs employees. The procedure for the implementation and diffusion of the survey have been already described in detail elsewhere [27].

The online survey presented the objectives of the research; HCWs were required to give their informed consent to participate (for the blank informed consent form see supplementary materials).

The first part of the online survey included general information, questions about the professional role and possible changes in job tasks and duties during the peak of the pandemic. Standardized and validated self-administered measures were used for the assessment of burnout (Maslach Burnout Inventory – Human Services Survey for Medical Personnel-MBI-HSS MP), overall health perception (General Health Questionnaire-12 Items-GHQ-12), distress perceived because of stressing life events (Impact of Event Scale-IES), depression (Beck Depression Inventory-BDI-II) and anxiety (Beck Anxiety Inventory-BAI) (for more details see [27])

In our sample of HCWs, four main subgroups could be identified: medical doctors/physicians, residents in training (meaning graduated medical doctors attending specialization schools), nurses and "others" (this group included participants who did not fit any of the previous categories, such as psychologists, social workers, radiology and laboratory technicians, educators).

Statistical Analysis

Data have been synthesized in terms of absolute and relative frequencies for the categorical variables and as second median and third quartiles for the continuous variables.

Mediation analysis has been carried out via Structural Equation Model (SEM) computation. The Pearson correlation matrix has been calculated to assess

the correlation between items. The intercepts in the SEM were set to zero. The SEM can capture the complex relationships between variables by incorporating the path model presented in Figures 2, 3, 4 and 5 through a system of connected equations. The pathway computation uses the bootstraps method to measure uncertainty in estimating the mediation effects.

The root-mean-square errors of approximation (RMSEA) provided information about the model fit within all nested models. The RMSEA values greater than 0.10 indicate poor model fit, values below 0.10 suggest mediocre fit, values below 0.08 indicate suitable fit.

The computations have been conducted with R 3.4.2[28] with the lavaan [29] package.

Results

Description of the sample

The online survey was e-mailed to 2422 HCWs and filled in by 897 (37%) of them. Only 653 out of these 897 (73%) completed all the questionnaires. The 244 incomplete records were thus excluded from the statistical analyses.

210 HCWs were male (32.2 %), 443 HCWs were female (67.8 %). 92 HCWs were aged 18-29 years (14.1%), 189 HCWs were aged 30-39 years (51%), 145 HCWs were aged 40-49 years female (22.2%), 227 HCWs were aged ≥ 50 years (34.8%). 159 HCWs were single/divorced/widow (24.3%), 413 HCWs were married/cohabitant (63.2%), 81 HCWs in a stable relationship (12.4%), 358 HCWs had children (54.8%), 295 HCWs did not have children (45.2%).

286 HCWs were doctors/physicians (43.8 %), 99 HCWs were residents in training (15.2 %), 137 HCWs were nurses (21.0 %), 131 HCWs were other professionals (20.1 %). 89 HCWs resulted positive to COVID-19 swab (13.6%),125 had COVID-19 related symptoms (19.1%). 556 HCWs did not have COVID-19 related health problems (85.1%). 322 HCWs modified their job due to the COVID-19 pandemic (49.3%), 331 HCWs did not modify their job due to the COVID-19 pandemic (50.7%). 454 HCWs had someone dear positive to COVID-19 swab (69.5%), 199 HCWs did not have someone dear positive to COVID-19 swab (30.5%). 43 HCWs modified family habits for fear of infecting loved one dear (6.6%), 525 HCWs did not modify family habits for fear of infecting loved one dear (80.45), 85 HCWs did not answer the question related to modification of family habits for fear of infecting loved one dear (13.0%). All results are shown in Table 1.

Table 1. Descriptive data of the sample, including socio-demographic and work-related variables.

VARIABLES		N	%
Gender	Male	210	32.2 %
	Female	443	67.8 %
Age categories	18-29 years	92	14.1 %
	30-39 years	189	28.9 %
	40-49 years	145	22.2 %
	≥ 50 years	227	34.8 %
Marital status	Single/divorced/widow	159	24.3 %
	Married/cohabitant	413	63.2 %
	In a stable relationship	81	12.4 %
Children	Yes	358	54.8 %

		N	%
	No	295	45.2 %
Working categories	Doctors/Physicians	286	43.8 %
	Residents in training	99	15.2 %
	Nurses	137	21.0 %
	Others*	131	20.1 %
Positivity to COVID-19 swab	No	564	86.4 %
	Yes	89	13.6 %
COVID-19 related symptoms	No	528	80.9 %
	Yes	125	19.1 %
Health problems not related to COVID-19	No	556	85.1 %
	Yes	97	14.9 %
Changing of mansion due to the COVID-19 pandemic	No	89	13.6 %
	Yes	564	86.4 %
Job modification due to the COVID-19 pandemic	No	322	49.3 %
	Yes	331	50.7 %
Someone of dear positive to COVID-19 swab	No	454	69.5 %
	Yes	199	30.5 %
Modification of family habits for fear of infecting loved one dear	No	43	6.6 %
	Yes	525	80.4 %
	No answer	85	13.0 %

N = number of participants.
% = percentage of individuals.
* = psychologists, socio-health, psychological, radiological and laboratory technicians, educators.

The statistical significance of the mediating effect was confirmed by the Sobel test. The SEM yielded a good fit to the observed data indicating the direct pathway from job burnout and perceived stress, anxiety or depression and the indirect pathway which was mediated by other characteristics. As shown in **Figure 2 and table 2**, the direct effect of perceived stress on job burnout was estimated in the model (the model fit of the data $\chi 2/df < 5$, $p < 0.05$), which was found to be not statistically significant and positive ($\beta = 0.28$); there existed statistically significant effects of perceived stress on both anxiety ($\beta = 0.61$) and depression ($\beta = 0.61$). Moreover, there seems to exist statistically significant effects of depression on anxiety ($\beta = 0.78$) and of health perception on depression ($\beta = 0.68$) and anxiety ($\beta = 0.56$). The coefficients of perceived stress on job burnout were significantly reduced ($\beta = 0.28$) as also for health perception on perceived stress ($\beta = 0.44$) and job burnout ($\beta = 0.36$).

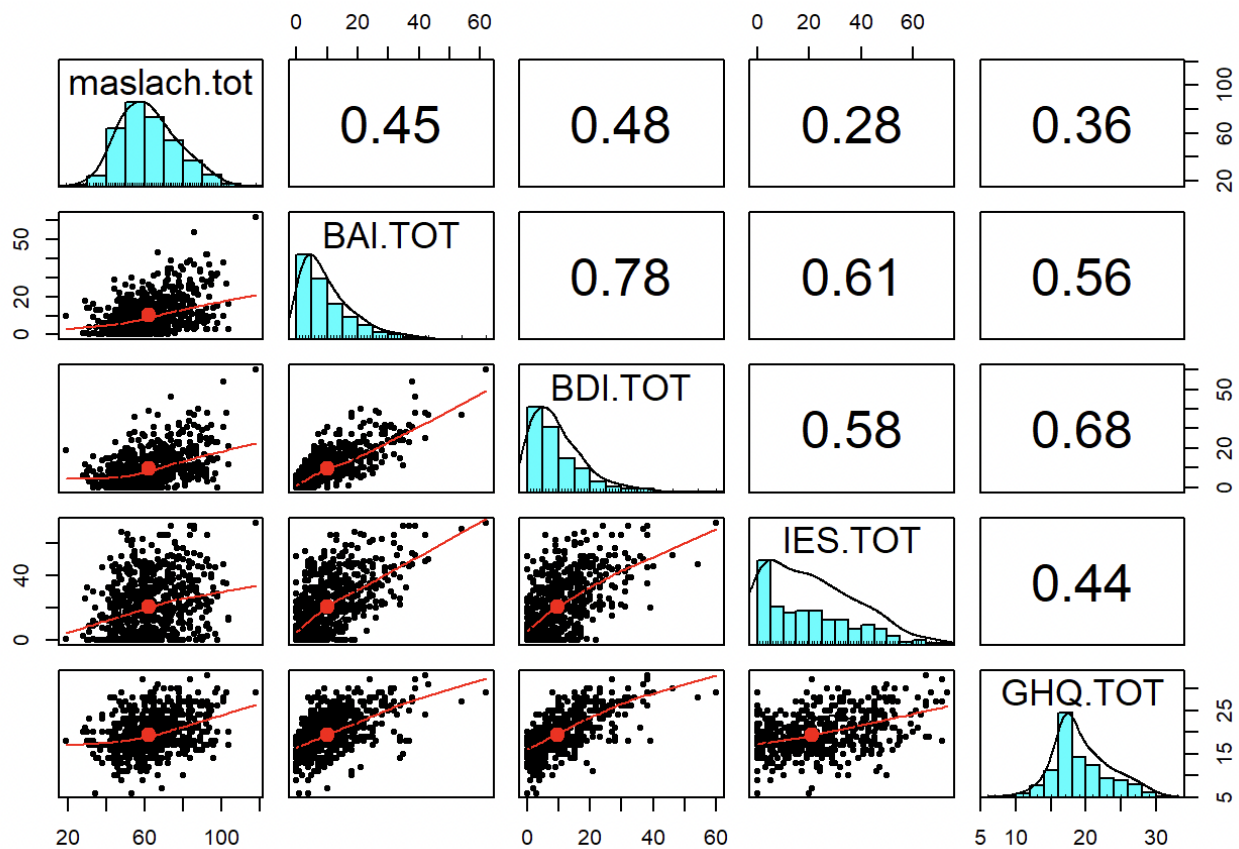



Figure 2. Mediation analysis. Correlations among Medical Personnel (MBI-HSS MP), Beck Depression Inventory (BDI-II), Beck Anxiety Inventory (BAI), Impact of Event Scale (IES) and General Health Questionnaire 12 Items (GHQ-12)

Table 2. provides correlations among Medical Personnel (MBI-HSS MP), Beck Depression Inventory (BDI-II), Beck Anxiety Inventory (BAI), Impact of Event Scale (IES) and General Health Questionnaire 12 Items (GHQ-12), Age categories, Gender, COVID-19 related symptoms, Changing of mansion due to the COVID-19 pandemic, age categories.

	Maslach Total	BAI Total	BDI Total	IES Total	GHQ Total	Age categories	Gender
Maslach Total	1.000						
BAI Total	0.760	1.000					
BDI Total	0.786	0.912	1.000				
IES Total	0.749	0.872	0.848	1.000			
GHQ Total	0.660	0.734	0.775	0.701	1.000		
Age categories	-0.324	-0.297	-0.233	-0.045	-0.156	1.000	
Gender	0.517	0.656	0.576	0.855	0.458	-0.023	1.000
COVID-19 related symptoms	0.168	0.520	0.495	0.319	0.397	0.025	0.020
Changing of mansion due to the COVID-19 pandemic	0.716	0.466	0.582	0.502	0.538	-0.091	0.147

In the second phase of mediation analysis (**Fig.3 and table 3**), the three variable scales of the MBI-HSS (MP) questionnaire were considered individually, i.e., Emotional Exhaustion (EE), which measures feelings of being emotionally overextended and exhausted by one's work, Depersonalization (D) that measures an unfeeling and impersonal response toward patients, and Personal Accomplishment (PA) that measures feelings of competence and achievement in one's work. From this analysis it emerged that there exist statistically significant effects of EE on D ($\beta = 0.66$), PA ($\beta = 0.14$) anxiety ($\beta = 0.53$) and depression, and less significant ones on psychological distress ($\beta = 0.32$) and health perception ($\beta = 0.53$). As regards D, it showed lower statistically significant effects on anxiety ($\beta = 0.37$), depression ($\beta = 0.40$), psychological distress ($\beta = 0.19$) and health perception ($\beta = 0.27$), but greater statistically significant effects on the reduction of PA, indicative of higher burnout ($\beta = -0.01$).

Finally, effects of a low PA were particularly significant on perceived stress ($\beta = 0.02$), but also on anxiety ($\beta = 0.14$), health perception ($\beta = 0.15$), and depression ($\beta = 0.18$).

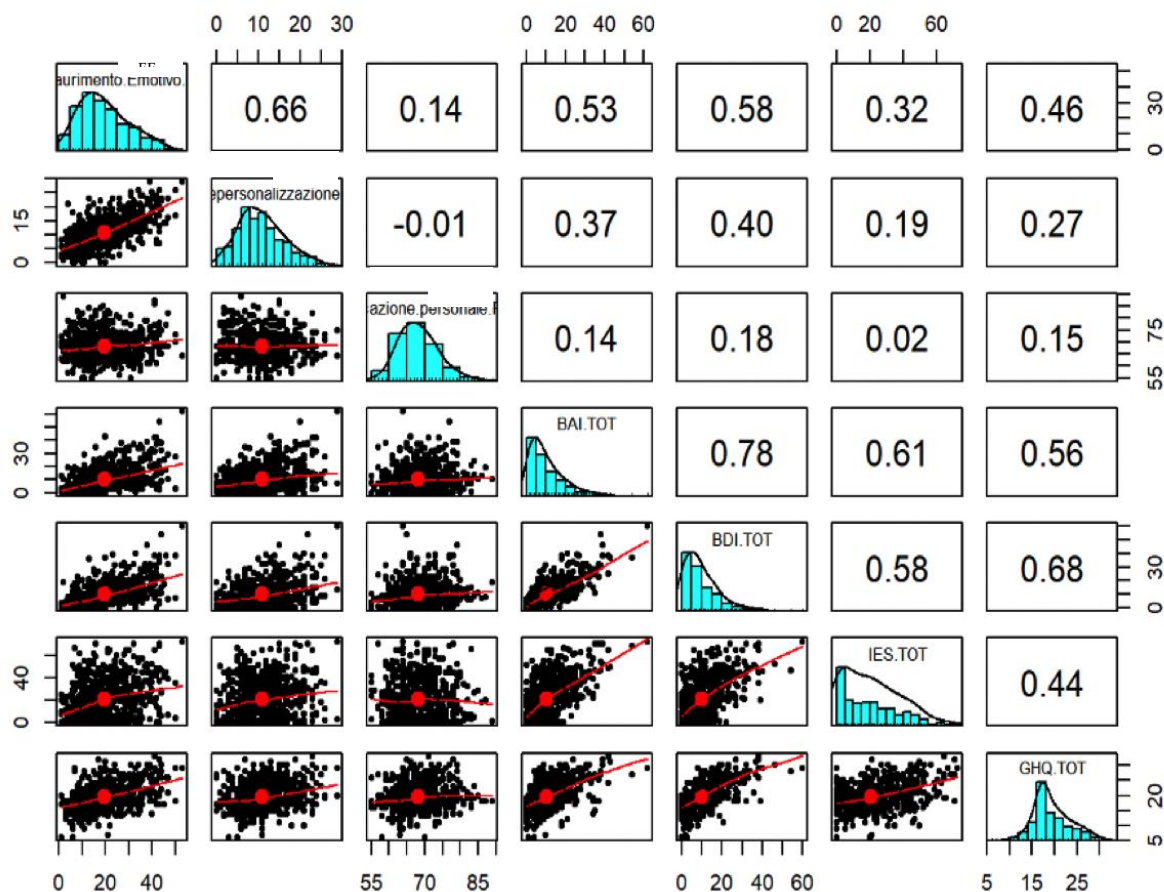



Figure 3. Mediation analysis. *Correlations among Emotional Exhaustion (EE), Depersonalization (DP), Personal Accomplishment (PA), Beck Depression Inventory (BDI-II), Beck Anxiety Inventory (BAI), Impact of Event Scale (IES) and General Health Questionnaire 12 Items (GHQ-12), Age categories, Gender, COVID-19 related symptoms, Changing of mansion due to the COVID-19 pandemic, Beck Depression Inventory (BDI-II), Beck Anxiety Inventory (BAI), Impact of Event Scale (IES) and General Health Questionnaire 12 Items (GHQ-12)*

Table 3. provides correlations among Emotional Exhaustion (EE), Depersonalization (DP), Personal Accomplishment (PA), Beck Depression Inventory (BDI-II), Beck Anxiety Inventory (BAI), Impact of Event Scale (IES) and General Health Questionnaire 12 Items (GHQ-12), Age categories, Gender, COVID-19 related symptoms, Changing of mansion due to the COVID-19 pandemic.

	Emotional Exhaustion (EE)	Depersonalization (DP)	Personal Accomplishment (PA)	BAI Total	BDI Total	IES Total	GHQ Total	Age categories	Gender	COVID-19 related symptoms	Changing of mansion due to the COVID-19 pandemic
Emotional Exhaustion (EE)	1.000										
Depersonalization (DP)	0.360	1.000									
Personal Accomplishment (PA)	0.228	0.079	1.000								
BAI Total	0.803	0.286	0.302	1.000							
BDI Total	0.806	0.316	0.289	0.912	1.000						
IES Total	0.843	0.108	0.219	0.873	0.848	1.000					
GHQ Total	0.667	0.249	0.226	0.733	0.774	0.702	1.000				
Age categories	-0.187	-0.445	-0.217	-0.297	-0.233	-0.045	-0.156	1.000			
Gender	0.698	-0.106	0.164	0.656	0.576	0.855	0.458	-0.023	1.000		
COVID-19 related symptoms	0.210	0.136	0.220	0.520	0.495	0.319	0.397	0.025	0.020	1.000	
Changing of mansion due to the COVID-19 pandemic	0.556	0.372	0.057	0.466	0.582	0.502	0.538	-0.091	0.147	-0.010	1.000

Four covariates were included in the mediation analysis: age, gender, COVID-19 related symptoms and changing of mansion due to the COVID-19 pandemic. As shown in Figures 4, 5, table 4-6 it emerged that the covariates were not very correlated with each other. Moreover, it emerged a statistically significant effect of gender on anxiety (β = 0.656) and psychological distress (β = 0.855), and of changing of mansion due to the COVID-19 pandemic on Maslach total (β = 0.716), health perception (β = 0.538), depression (β = 0.582) and perceived stress (β = 0.502). Finally, it emerged that COVID-19 related symptoms had statistically significant effects on anxiety (β = 0.520), but weaker ones on depression (β = 0.495), perceived stress (β = 0.319) and health perception (β = 0.397).

Considering EE, D, and PA singularly, statistically significant effects were found as follows: Age categories on low PA (β = -0.217); gender on EE (β = 0.698) and on low PA (β = 0.164); Changing of mansion due to the COVID-19 on EE (β = 0.556) and on low PA (0.057), health perception (β = 0.538), depression (β = 0.582), perceived stress (β = 0.502) and health perception (β = 0.538).

The SEM estimated RMSEA fit is equal to 0.075 indicating a suitable model fit.

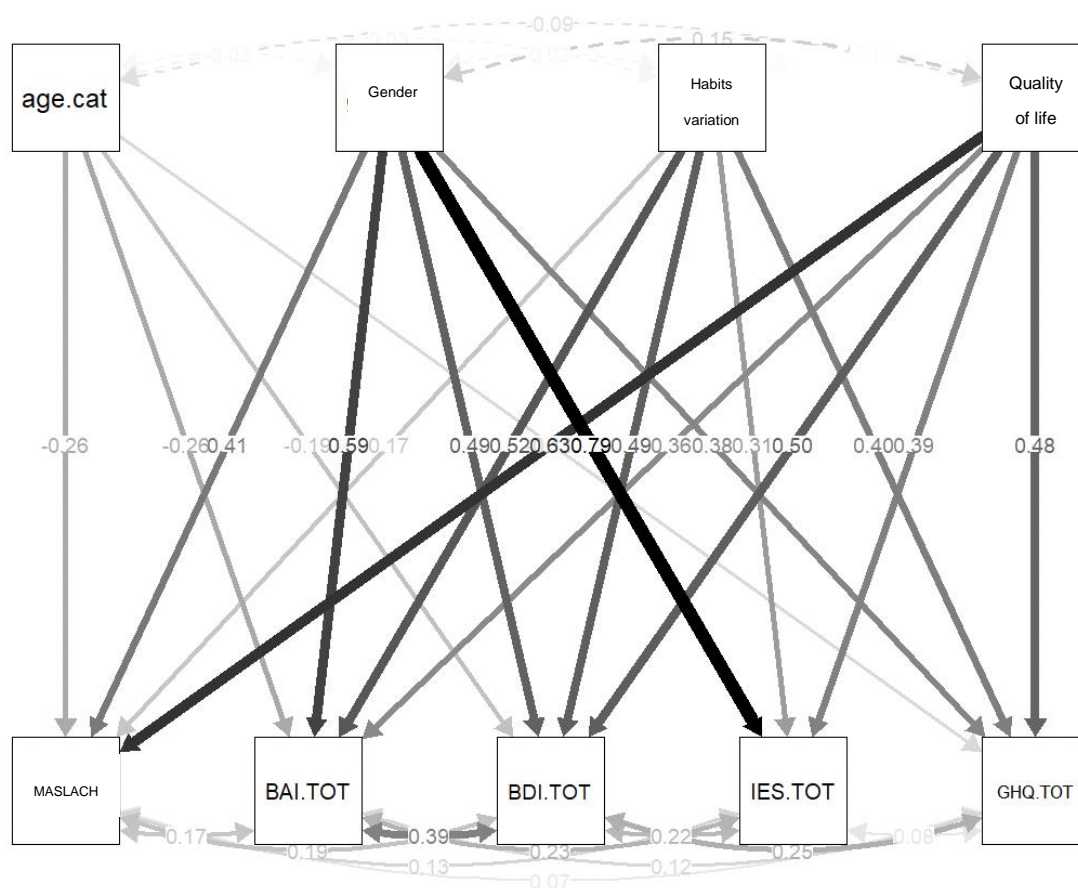



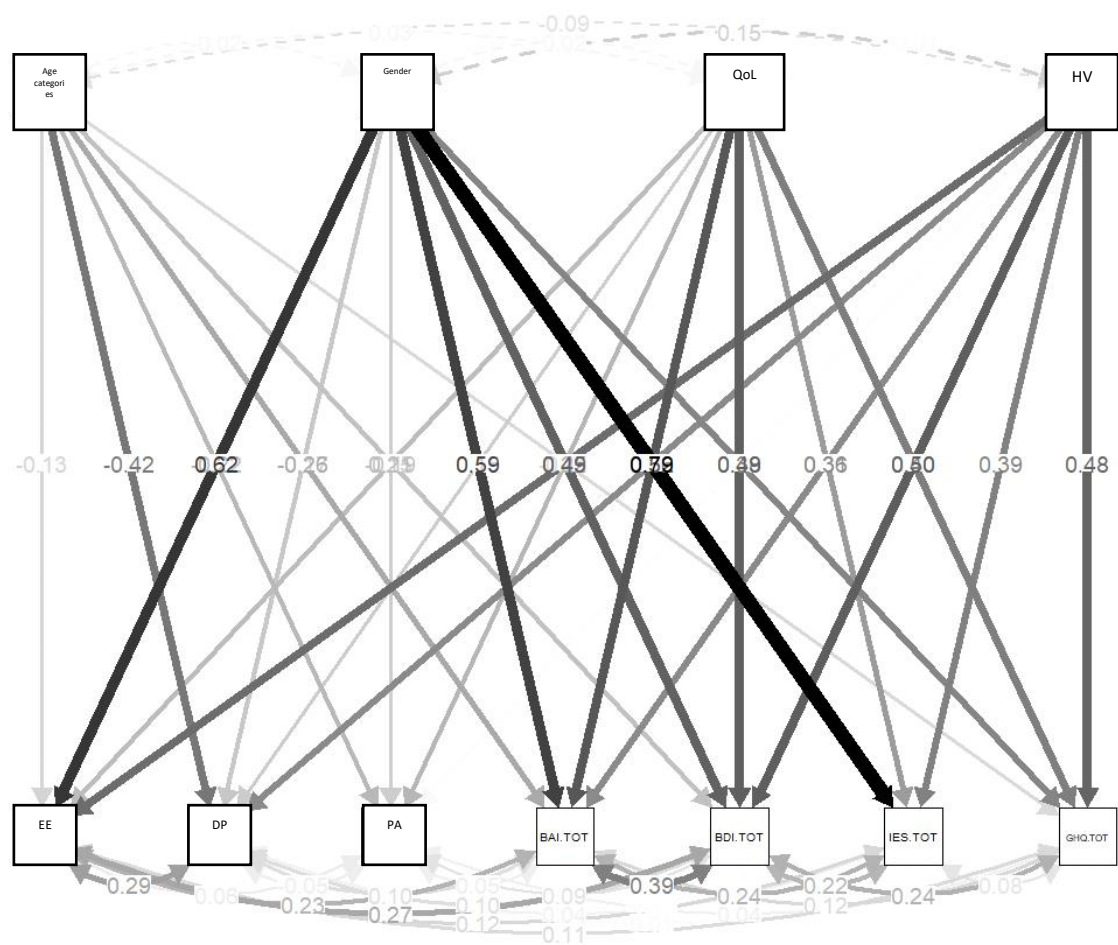
Figure 4. Mediation analysis with covariances (Age categories, Gender, Age categories, Gender, COVID-19 related symptoms, Changing of mansion due to the COVID-19 pandemic). *Correlations among Medical Personnel (MBI-HSS MP), Beck Depression Inventory (BDI-II), Beck Anxiety Inventory (BAI), Impact of Event Scale (IES) and General Health Questionnaire 12 Items (GHQ-12)*

Legend
QoL= Impact of COVID-19 pandemic on Quality of Life (QoL)
HV= Habit's variation due to COVID-19 pandemic

Figure 5. Mediation analysis with covariances (Age categories, Gender, Age categories, Gender, COVID-19 related symptoms, Changing of mansion due to the COVID-19 pandemic). *Correlations among Medical Personnel (MBI-HSS MP), Beck Depression Inventory (BDI-II), Beck Anxiety Inventory (BAI), Impact of Event Scale (IES) and General Health Questionnaire 12 Items (GHQ-12)*

Table 4. provides regression, covariance, intercept, and variance of Maslach Burnout Inventory – Human Services Survey for Medical Personnel (MBI-HSS MP), Beck Depression Inventory (BDI-II), Beck Anxiety Inventory (BAI), Impact of Event Scale (IES) and General Health Questionnaire 12 Items (GHQ-12).

			Estimate	Standard Error	Z-value	P (>|z|)	Std. lv	Std. all
REGRESSION	Maslach Total	Age categories	-0.835	0.059	-14.187	<0.001	-0.835	-0.261
		Gender	1.894	.085	22.357	<0.001	1.894	0.414
		COVID-19 related symptoms	1.038	0.110	9.427	<0.001	1.038	0.173
		Changing of mansion due to the COVID-19 pandemic	3.936	0.116	33.995	<0.001	3.936	0.633
	BAI Total	Age categories	-1.259	0.059	-21.380	<0.001	-1.259	-0.265
		Gender	1.894	0.085	22.357	<0.001	1.894	0.414
		COVID-19 related symptoms	1.038	0.110	9.427	<0.001	1.038	0.173
		Changing of mansion due to the COVID-19 pandemic	3.936	0.116	33.995	<0.001	3.936	0.633
	BDI Total	Age categories	-0.760	0.059	-12.901	<0.001	-0.760	-0.190
		Gender	2.792	0.085	32.957	<0.001	2.792	0.488
		COVID-19 related symptoms	3.716	0.110	33.746	<0.001	3.716	0.495
		Changing of mansion due to the COVID-19 pandemic	3.878	0.116	33.500	<0.001	3.878	0.498
	IES Total	Age categories	-0.001	0.059	-0.018	<0.001	-0.001	-0.000
		Gender	9.650	0.085	113.896	<0.001	9.650	0.791
		COVID-19 related symptoms	4.908	0.110	44.576	<0.001	4.908	0.306
		Changing of mansion due to the COVID-19 pandemic	6.453	0.116	55.741	<0.001	6.453	0.389
	GHQ total	Age categories	-0.273	0.059	-4.636	<0.001	-0.273	-0.115
		Gender	1.283	0.085	15.145	<0.001	1.283	0.377
		COVID-19 related symptoms	1.775	0.110	16.122	<0.001	1.775	0.397
		Changing of mansion due to the COVID-19 pandemic	2.208	0.116	19.074	<0.001	2.208	0.476
COVARIANCE	Maslach Total	BAI Total	0.175	0.037	4.690	<0.001	0.175	0.175
		BDI Total	0.185	0.037	5.001	<0.001	0.185	0.185
		IES Total	0.128	0.038	3.358	0.001	0.128	0.128
		GHQ total	0.067	0.039	1.735	0.083	0.067	0.067
	BAI Total	BDI Total	0.389	0.031	12.552	<0.001	0.389	0.389
		IES Total	0.232	0.036	6.457	<0.001	0.232	0.232
		GHQ total	0.121	0.038	3.191	0.001	0.121	0.121
	BDI Total	IES Total	0.218	0.036	6.013	<0.001	0.218	0.218
		GHQ total	0.245	0.036	6.867	<0.001	0.245	0.245
	IES Total	GHQ total	0.076	0.039	1.957	0.050	0.076	0.076
INTERCEPT	Maslach total		57.394	0.217	264.068	<0.001	57.394	26.887
	BAI Total		2.789	0.217	12.834	<0.001	2.789	0.878
	BDI Total		2.903	0.217	13.355	<0.001	2.903	1.086
	IES total		-1.512	0.217	-6.957	<0.001	-1.512	-0.265
	GHQ Total		15.725	0.217	72.350	<0.001	15.725	9.889
VARIANCE	Maslach total		1.000				1.000	0.219
	BAI Total		1.000				1.000	0.099
	BDI Total		1.000				1.000	0.140
	IES total		1.000				1.000	0.031

	GHQ Total		1.000				1.000	0.395

Legend.
Standardized latent variable coefficient (std.lv), Standardized coefficient (std. all).

Table 5. provides regression and covariance, intercept of Emotional Exhaustion (EE), Depersonalization (DP), Personal Accomplishment (PA), Beck Depression Inventory (BDI-II), Beck Anxiety Inventory (BAI), Impact of Event Scale (IES) and General Health Questionnaire 12 Items (GHQ-12).

			Estimate	Standard Error	Z-value	P (>|z|)
REGRESSION	Emotional Exhaustion (EE)	Age categories	-0.0399	0.059	-6.774	<0.001
		Gender	2.702	0.085	31.888	<0.001
		COVID-19 related symptoms	1.167	0.110	10.596	<0.001
		Changing of mansion due to the COVID-19 pandemic	2.673	0.116	23.092	<0.001
	Depersonalization (DP)	Age categories	-0.785	0.059	-13.337	<0.001
		Gender	-0.459	0.085	-5.413	<0.001
		COVID-19 related symptoms	0.540	0.110	4.904	<0.001
		Changing of mansion due to the COVID-19 pandemic	1.314	0.116	11.353	<0.001
	Personal Accomplishment (PA)	Age categories	-0.349	0.059	-5.925	<0.001
		Gender	0.349	0.085	4.116	<0.001
		COVID-19 related symptoms	0.669	0.110	6.072	<0.001
		Changing of mansion due to the COVID-19 pandemic	0.052	0.116	0.448	0.654
	BAI Total	Age categories	-1.259	0.059	-21.380	<0.001
		Gender	3.987	0.085	47.058	<0.001
		COVID-19 related symptoms	4.630	0.110	42.051	<0.001
		Changing of mansion due to the COVID-19 pandemic	3.336	0.116	28.815	<0.001
	BDI Total	Age categories	-0.769	0.059	-12.901	<0.001
		Gender	2.792	0.085	32.958	<0.001
		COVID-19 related symptoms	3.716	0.110	33.747	<0.001
		Changing of mansion due to the COVID-19 pandemic	3.878	0.116	33.500	<0.001
	IES Total	Age categories	-0.001	0.059	-0.016	0.987
		Gender	9.650	0.085	113.896	<0.001
		COVID-19 related symptoms	4.908	0.110	44.576	<0.001
		Changing of mansion due to the COVID-19 pandemic	6.453	0.116	55.740	<0.001
	GHQ total	Age categories	-0.273	0.059	-4.638	<0.001
		Gender	1.283	0.085	15.145	<0.001
		COVID-19 related symptoms	1.775	0.110	16.122	<0.001
		Changing of mansion due to the COVID-19 pandemic	2.208	0.116	19.072	<0.001
COVARIANCE	Emotional Exhaustion (EE)	Depersonalization (DP)	0.294	0.034	8.560	<0.001
		Personal Accomplishment (PA)	0.055	0.039	1.423	0.155
		BAI Total	0.234	0.036	6.519	<0.001
		BDI Total	0.271	0.035	7.758	<0.001
		IES Total	0.122	0.038	3.197	0.001
		GHQ total	0.111	0.038	2.900	0.004
	Depersonalization (DP)	Personal Accomplishment (PA)	-0.051	0.039	-1.301	0.193
		BAI Total	0.100	0.038	2.616	0.009
		BDI Total	0.102	0.038	2.653	0.008
		IES Total	0.041	0.039	1.042	0.297
		GHQ total	0.012	0.039	0.317	0.751
	Personal Accomplishment (PA)	BAI Total	0.047	0.039	1.198	0.231
		BDI Total	0.088	0.039	2.266	0.023
		IES Total	-0.004	0.039	-0.106	0.916
		GHQ total	0.042	0.039	1.080	0.280

BAI Total	BDI Total	0.390	0.031	12.607	<0.001
	IES Total	0.237	0.036	6.617	<0.001
	GHQ total	0.119	0.038	3.125	0.002
BDI Total	IES Total	0.223	0.036	6.178	<0.001
	GHQ total	0.239	0.036	6.671	<0.001
IES Total	GHQ total	0.077	0.039	2.003	0.045

Table 6. provides intercept and variance of Emotional Exhaustion (EE), Depersonalization (DP), Personal Accomplishment (PA), Beck Depression Inventory (BDI-II), Beck Anxiety Inventory (BAI), Impact of Event Scale (IES) and General Health Questionnaire 12 Items (GHQ-12).

		Estimate	Standard Error	Z-value	P (>|z|)	Std. lv	Std. all
INTERCEPT	Emotional Exhaustion (EE)	13.465	0.217	61.953	<0.001	13.465	6.662
	Depersonalization (DP)	12.200	0.217	56.131	<0.001	12.200	9.761
	Personal Accomplishment (PA)	68.272	0.217	314.117	<0.001	68.272	63.953
	BAI Total	2.789	0.217	12.834	<0.001	2.790	0.878
	BDI Total	2.903	0.217	13.355	<0.001	2.903	1.086
	IES total	-1.512	0.217	-6.957	<0.001	-1.512	-0.265
	GHQ Total	15.725	0.217	72.352	<0.001	15.725	9.890
VARIANCE	Emotional Exhaustion (EE)	1.000				1.000	0.245
	Depersonalization (DP)	1.000				1.000	0.640
	Personal Accomplishment (PA)	1.000				1.000	0.877
	BAI Total	1.000				1.000	0.099
	BDI Total	1.000				1.000	0.140
	IES total	1.000				1.000	0.031
	GHQ Total	1.000				1.000	0.396

Legend.
Standardized latent variable coefficient (std.lv), Standardized coefficient (std. all).

Discussion

The 2019-nCOVID pandemic as a public health emergency has faced healthcare systems with remarkable challenges. The current research expands the findings of a previously published one, with the aim to deepen the understanding of the mental health effects of the 2019-nCOVID pandemic on HCWs from North-eastern Piedmont, Italy. In the first work [27], we evaluated singularly burnout, anxiety, depression, distress, observing higher degrees of burnout (in particular D and PA) in females, in HCWs aged <30 years, in the ones exposed to changes of their working habits and own family behaviour, and in trainees. Moreover, lower ranges of anxiety and depression than those reported in the literature were found.

Based on our knowledge, this study was the first to explore the relationship among job burnout, depression, anxiety, perceived stress, health perception in Italian HCWs, examining the possible role of the following factors as mediators of the aforesaid relationships: gender, age categories, COVID-19 related symptoms, changing of mansion due to the COVID-19 pandemic.

With the mediation analysis, we want to investigate whether a variable (i.e., mediator) adjustments regarding an impartial variable, in turn, affecting a structured variable. Moderation evaluation, however, investigates whether the statistical interplay between impartial variables expects an established variable, with a specific interest in the role of the three scales of job burnout.

The results of this study highlighted statistically significant effects of perceived stress and health perception on both anxiety and depression, and effects of depression on anxiety. As for job burnout, we found statistically significant effects of EE on D, PA, anxiety, depression, and health perception ($\beta = 0.53$). About D, it was highlighted its great statistical correlation with a low PA, indicative of higher burnout ($\beta = -0.01$). Finally, effects of a low PA were significantly correlated with perceived stress, anxiety, health perception and depression.

Four covariates were included in the mediation analysis: age, gender, COVID-19 related symptoms, changing of mansion due to the COVID-19 pandemic.

Findings suggested the following: age categories impact on low PA; gender impacts on anxiety and psychological distress; changing of mansion due to the COVID-19 pandemic impacts on health perception, depression, perceived stress, EE, and low PA; COVID-19 related symptoms have statistically significant effects on anxiety.

Using structural equation modeling (SEM), Song et al. [30] described that both tension and poor rest showed associations with job burnout among Chinese nurses. The SEM analysis confirmed the direct pathway from perceived stress to burnout ($\beta = 0.69$, $p < 0.05$) and the indirect pathway mediated by sleep quality ($\beta = 0.56$). There existed statistically significant effects of sleep quality on both perceived stress ($\beta = 0.48$) and job burnout ($\beta = 0.29$). Nonetheless, in our study we did not analyze the quality of the sleep-wake rhythm and our sample included different groups of HCWs, therefore the possibility to compare our results to those by Song and coworkers is limited. Notwithstanding these limitations, it is certainly true that a correlation between perceived stress and job burnout has been found in both works, even though in ours it was shown particularly the effect of low PA (high burnout) on perceived stress.

A Turkish study (Yıldırım et al., 2021) aimed to examine the mediating role of optimism and social relationships on the development of burnout among HCWs during the COVID-19 pandemic. Women reported greater strain from the COVID-19, greater emotional exhaustion, and fewer social relationships. HCWs with COVID-19 disease reported less optimism. The findings suggested that stress and anxiety not only had a direct effect on increasing COVID-19 burnout,

but also had an indirect effect on it through a decrease in positive outlook and social connections. Even if our work did not specifically investigate social relationships, it was observed that changing of mansion due to the COVID-19 pandemic had an impact on health perception, depression, perceived stress, and burnout (high EE and low PA); moreover, in our sample, HCWs with COVID-19 related symptoms reported higher levels of anxious symptoms.

A national cross-sectional survey conducted in U.S. analyzed the prevalence and correlates of stress and burnout among HCWs during the COVID-19 pandemic [31]. Higher Summary Stress Score (SSS) which included stress, fear of exposure, anxiety / depression, and workload were highlighted among nursing assistants, medical assistants, social workers, inpatients, women, and black individuals; moreover, the results appeared to be related to workload and mental health, and the SSS score was lower when health professionals felt valued. The workload in our study was objectified through the change of mansion due to the COVID-19 pandemic which led to a worsening of perceived health, an increase in distress, depression, job burnout (high EE, low PA). Gender also appears to impact anxiety symptoms and psychological distress as found in previously cited study.

In a Portuguese study analyzing the mediating role of psychological resilience of   HCWs   during the COVID-19 Pandemic on burnout and depression [32], the outcomes revealed that clinical depression had a direct guided effect on individual, job- and also patient-related burnout, as in our study where it was shown the correlation between depression and EE, in addition to the strong correlation with anxiety. Moreover, Serrão et al. also observed a small indirect impact of depression on burnout, mediated by resilience; resilience played a partial mediating role between anxiety as well as all job burnout measurements.

One study conducted during the First COVID-19 Pandemic Peak Period to analyze the burnout status of Italian HCWs [33] showed that a substantial part of the sample scored over the clinical levels of depression (57.9%), anxiety (65.2%), post-traumatic symptoms (55%), and also burnout (25.61%). The burnout variation highlighted in the study by Conti et al. seemed to be independently affected by working on the front line, being doctors, experiencing reductions in mental health, as well as higher levels of Post-Traumatic Stress Disorder Symptoms, in line with the results of our work. In fact, we found that the EE and PA scales of MBI-HSS MP, had a correlation with anxiety and depression, while D showed a lower impact on them. Moreover, the EE and PA scales seemed to have an impact on HCWs' health perception.

It should also be underlined that our study is the first that analyzes the correlation among the scales of MBI-HSS MP one with the other. More specifically, it was highlighted a high correlation among EE and D ($\beta = 0.66$), and that D had a great statistically significant effects on the reduction of PA ($\beta = -0.01$).

Conclusion

The COVID-19 pandemic has exposed the general population to challenges never seen before, including restriction of social relationships and changes in individual and family habits. While supported by institutional and government leadership, the spirit of collaboration, the celebration of saved lives and the public recognition of their relevance, the HCWs showed high levels of distress, anxiety, emotional exhaustion, which contributed to increasing feelings of loneliness and the deterioration in their mental health [6].

Our study showed a particularly strong correlation among depression, psychological distress, health perception and anxiety, and the impact of job burnout (high EE) on anxiety, depression, and distress. Gender seemed to have a strong correlation with burnout (High EE), anxiety and distress, while the impact of COVID-19 pandemic on Quality of Life (QoL) seemed to affect anxiety and

depression, while changing of mansion due to the COVID-19 pandemic influenced depression and job burnout (high EE).

The long-term influence on the well-being of health care workers has yet to be established. During the COVID-19 pandemic, HCWs experience increased emotional stress and anxiety and, in many cases, depression and mental illness.

Encouraging supportive, motivational, protective, and educational strategies would certainly be recommended to policy makers and managers (Vizheh et al., 2020).

Identifying the common mental distress related to the care of people with COVID-19, through the analysis of mediating factors that contribute to increasing psychological distress and job burnout, would allow to destigmatize mental illness among HCWs, finalizing prevention and treatment strategies for this population.

Supplementary Materials

The Supplementary Material for this article can be found in the file word attached.

Author Contributions: PZ, CGr and EG designed the study. DM, MP, MR, and EG contributed to disseminating the survey. DA performed the statistical analyses. PZ, CGr, and EG drafted the manuscript. All authors revised the manuscript and contributed with relevant intellectual content.

Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics Statement: The studies involving human participants were reviewed and approved by Comitato Etico Interaziendale di Novara, Protocollo 534/CE, Studio n. CE 82/20, approved on May 11th, 2020. The patients/participants provided their written informed consent to participate in this study.

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Conflicts of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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