



Article

Protective Factors against Emergency Stress and Burnout in Healthcare and Emergency Workers during Second Wave of COVID-19

Monia Vagni * , Tiziana Maiorano , Valeria Giostra and Daniela Pajardi

Department of Humanities, University of Urbino, 61029 Urbino, Italy; tiz.maiorano@gmail.com (T.M.); valeria.giostra@uniurb.it (V.G.); daniela.pajardi@uniurb.it (D.P.)

* Correspondence: monia.vagni@uniurb.it; Tel.: +39-072-230-5814

Abstract: Working as healthcare workers (HCWs) and emergency workers (EWs) during the first wave of COVID-19 has been associated with high levels of stress and burnout, while hardiness, coping strategies and resilience have emerged as protective factors. No studies have so far investigated these psychological factors during the second wave. We aimed to verify the trend of stress levels, burnout, coping strategies and resilience during the pandemic in Italian healthcare and emergency workers by comparing a first sample recruited from the first COVID-19 wave (N = 240) with a second sample relating to the second wave (N = 260). Through an online platform we administered questionnaires to measure stress, burnout, resilience, hardiness and coping strategies. The results showed that in the two waves the total stress levels of HCWs and EWs did not differ, while the physical stress and hardiness scores in the second wave were greater. No differences were found in the coping strategies used. An analysis of burnout levels in the second wave sample found that stress showed a high predictive power in the emotional exhaustion and depersonalization scales. Hardiness and resilience emerged as protective factors in reducing stress. The implications for the need to provide support and to improve hardiness for HCWs and EWs are discussed.

Keywords: healthcare workers; emergency workers; COVID-19; second wave; stress; burnout; resilience; hardiness; coping strategies



Citation: Vagni, Monia, Tiziana Maiorano, Valeria Giostra, and Daniela Pajardi. 2021. Protective Factors against Emergency Stress and Burnout in Healthcare and Emergency Workers during Second Wave of COVID-19. *Social Sciences* 10: 178. <https://doi.org/10.3390/socsci10050178>

Academic Editor: Monica Magadi

Received: 11 April 2021

Accepted: 17 May 2021

Published: 18 May 2021

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

The epidemic COVID-19 scenario in Italy can be summarized in three phases. The period from February to the end of May 2020 (first wave) was characterized by a very rapid spread of cases and deaths in a strongly territorial concentration mainly in the north of Italy. In the summer season, from June to mid-September (transition phase), the spread was initially very limited. As of the end of September 2020 (second wave), the cases again increased rapidly until the first half of November, and then decreased. Compared to the first epidemic wave, the second epidemic wave in Italy changed both in terms of the quantity and geographic distribution. The effects of this wave on mortality continue in 2021. In January there were an estimated 70,538 deaths—2000 more than the average for the same month in the 2015–2019 period and 8500 more than in January 2020 (ISTAT and ISS 2021).

During the first wave the Italian Government declared a hard nationwide lockdown. During the second it adopted new restrictive measures, which were initially quite mild, but became more severe over time, leading to the creation of “colored zones” (yellow, orange, red) based on indexes reflecting the impact of the epidemic on the National Health Service in the various regions of the country (Carletti and Pancrazi 2021).

Several studies have shown that emergency and healthcare workers (Vagni et al. 2020a, 2020b, 2020c, 2020d) (HCWs) who worked during the first wave of the COVID-19 pandemic have suffered many psychological consequences (Pappa et al. 2020; Van Roekel

et al. 2021; Shreffler et al. 2020; Maiorano et al. 2020; Vagni et al. 2020a). The psychological burden and general well-being of these workers have been severely put to the test due to the high levels of stress they experienced (Vagni et al. 2020b; Maiorano et al. 2020; Simione and Gnagnarella 2020; Zhou et al. 2021a; Riguzzi and Gashi 2021; Ali et al. 2020) when working in contact with COVID-19 patients without adequate protection, in the absence of clear protocols, with grueling work shifts, and with the fear of becoming infected (Luan et al. 2020).

High levels of stress, fatigue, and increased workload can lead to the development of burnout in healthcare workers. Burnout is a syndrome caused by chronic workplace stress and is characterized by emotional exhaustion, reduced personal accomplishment and depersonalization (Maslach et al. 1986). Several studies have found a relationship between burnout and stress associated to other characteristics such as gender in healthcare workers during the COVID-19 pandemic (Çelmeçe and Menekay 2020; Pappa et al. 2021; Zhou et al. 2021a; Nishimura et al. 2021). The presence of considerable emotional exhaustion and a sense of reduced accomplishment were also found (Elhadi et al. 2020).

In a study conducted in Greece, 65% of HCWs were found to develop high levels of burnout, reporting high levels of emotional exhaustion and depersonalization, whereas high personal accomplishment reached only 49%. Perceived stress was predictive of these three factors. Furthermore, female gender, medical status, and concern for friends/family members for infection correlated with lower rates of personal accomplishment (Pappa et al. 2021). Several studies showed that during COVID-19 50% of HCWs experienced burnout (Roslan et al. 2021; Chor et al. 2020; Khasne et al. 2020), or even more, as found in a study conducted in the United Kingdom (Ferry et al. 2020).

The literature showed that resilience and hardiness were important protective factors against stress and burnout in HCWs during the COVID-19 pandemic. Resilience can be defined as the ability to bounce back from negative experiences and find flexible solutions to adapt to the changing demands of stressful experiences (Tugade and Fredrickson 2004), while hardiness is defined as a specific personality trait, characterized by the following three related personality dispositions: commitment, control and challenge (Kobasa 1979). In fact, according to Kobasa et al. (1983), persons with a high degree of hardiness involve themselves in what they are doing (commitment), believe that they can influence the course of life events (control), and consider change a positive stimulus to development (challenge).

According to the literature (Taku 2014; Kutluturkan et al. 2016), resilience during the COVID-19 pandemic was found to be a significant protective factor against burnout (O'Connor et al. 2020; Di Monte et al. 2020; Hu et al. 2020), in particular in the personal accomplishment dimension (Di Monte et al. 2020). Jose et al. (2020) found in a sample of emergency nurses that resilience and, in particular, hardiness were negatively correlated with reduced personal accomplishment and emotional exhaustion. Other studies have shown that hardiness is a protective factor against stress in healthcare and emergency workers (Vagni et al. 2020c; Maiorano et al. 2020), and against burnout, in particular reinforcing personal accomplishment, and decreasing depersonalization and emotional exhaustion (Vagni et al. 2020d).

Another protective factor against stress and burnout is coping, which is defined as a series of cognitive and behavioral efforts to manage specific internal or external questions that test or exceed individual resources (Lazarus and Folkman 1984).

A study of Zhang et al. (2020) showed that the most common coping strategies used by HCWs during the COVID-19 pandemic were as follows: taking preventive measures, actively learning about COVID-19, actively acquiring professional knowledge, adjusting attitude and facing the COVID-19 epidemic positively, finding social support and chatting with family and friends. Other studies have found that the primary coping strategy of HCWs to manage work overload and stress levels is seeking out social support and communication from family, friends and colleagues (Xiao et al. 2020; Cai et al. 2020; Özçevik Subaşı et al. 2021).

Many studies have studied the relationship between coping strategies and level of stress in HCWs during COVID-19, but the results are not always consistent. Wang et al. (2020) found that the level of PTSD was negatively correlated with positive coping, which refers to the process of taking active steps to try to remove or circumvent the stressor or to ameliorate its effects, and positively correlated with negative coping, which is marked by avoidance or other maladaptive efforts (e.g., self-blame, venting). In the same way, a study of Si et al. (2020) showed that passive coping strategies were positively correlated with PTSD, depression, anxiety, and stress, while on the contrary, perceived social support and active coping strategies were negatively correlated to these variables. In another study (Özçevik Subaşı et al. 2021), a significant negative relationship was found between the problem-focused approach and anxiety levels, and a positive relationship with the emotion-oriented approach. Finally, Zhou et al. (2021b) found that perceived organizational support had a significant indirect effect on PTSD symptoms, and that self-efficacy and problem-focused coping strategies mediate this association. According to these authors, perceived support from the organization directly enhances coping self-efficacy in frontline healthcare workers and promotes the usage of problem-focused coping strategies.

By contrast, other studies (Vagni et al. 2020a; Maiorano et al. 2020) showed that stopping negative or unpleasant emotions and thoughts reduced the arousal and intrusion levels of trauma during the emergency phase of the pandemic, unlike problem-focused strategies. Based on this finding, the authors hypothesized that problem-focused coping strategies were not found to be effective in protecting HCWs in the first wave of the pandemic, probably due to a lack of scientific knowledge about the therapeutic and treatment procedures effective for COVID-19.

Other studies investigated the relationship between coping and resilience, finding that HCWs show low levels both of coping strategies and resilience with no significant statistical correlation between these two variables (Lukong and Jafaru 2021). Bartone et al. (2017) highlighted a strong association between hardiness and coping avoidance strategies that allow a person to block or stop negative thoughts and emotions, and are effective in guaranteeing greater well-being to people subjected to severe stress conditions. Hardiness and stopping unpleasant emotion/thoughts were found to be effective mediators in reducing the effects of stress on the well-being of the healthcare and rescue workers during COVID-19 (Vagni et al. 2020c).

Finally, a study conducted in Italy (Di Monte et al. 2020) has investigated the relationship between coping, resilience and burnout in a sample of general practitioners. The authors found that the use of an emotion-focused coping style predicts increased levels of emotional exhaustion. A task-oriented and emotion-oriented style were found to be significant predictors (negatively and positively, respectively) of depersonalization, and resilience positively predicted personal accomplishment.

To date, no studies have been carried out on the psychological consequences on HCWs and EWs during the second phase of the pandemic and on the levels of stress, hardiness and coping strategies of the workers involved in the first wave (March–April 2020) compared to the second wave (November–December 2020) of the COVID-19 pandemic.

2. Objectives

Two studies were conducted recruiting healthcare workers (HCWs) and emergency workers (EWs) involved in the care of COVID-19 patients.

In the first study, the main objective was to verify the variations over time in the levels of stress, hardiness and coping strategies of the workers involved by comparing the data obtained during the first phase of the Italian pandemic with those collected in the second phase, in the period November–December 2020.

In the second study, the main objective was to identify the predictive effect of the levels of stress and the resilience capacity on burnout in Italian HCWs and EWs involved during the second wave of the pandemic.

The assumption of the two studies was that stress levels remained stable leading to a reduction in personal well-being, and that if coping strategies remained constant over time, a greater use of resilient resources would protect from burnout.

In the two studies, the main forms of stress experienced by health workers (Walton et al. 2020; Vagni et al. 2020a; Ornell et al. 2020; Du et al. 2020), their hardiness and resilience skills (Bartone 2007), their main coping strategies used in the emergency phases (Vagni et al. 2020a, 2020b, 2020c; Maiorano et al. 2020) and the risk of health burnout were considered (Vagni et al. 2020d).

Objectives of Study 1

To examine the relationships between emergency stress, hardiness, and coping strategies in HCWs and EWs and compare the results of the first and second wave, assuming that when the emergency continues, coping strategies remain stable over time, while stress levels increase requiring greater effort in terms of hardiness.

Objectives of Study 2

1. To verify negative correlations of burnout with hardiness and resilience;
2. To analyze the protective effect of hardiness and resilience on burnout and reduction in the effect of emergency stress.

Other contextual variables, such as gender and age, were considered as control variables.

2.1. Participants

The participants recruited in the second wave of COVID-19 were not the same as those recruited in the first wave. Thus, participation in the two surveys was completely independent from one another. In the first study 240 workers participated, including 100 emergency workers (41.7%), 66 nurses (27.5%), and 74 physicians (30.8%). Of the participants, 141 were female (58.8%) with a mean age of 43.37 (SD = 10.49; min 22–max 65), and the remaining 99 were male (mean age = 42.92, SD 11.86; min 25–max 67). There was no significant difference in the average age between males and females. The results of this first study have already been published (Vagni et al. 2020a, 2020b, 2020c, 2020d) and the results are only used here to make comparisons with the similar sample recruited during the second wave of the pandemic.

The second study is made up of 260 participants, including 81 emergency workers (31.2), 129 nurses (49.6), and 50 physicians (19.2%). In this sample there were 77 males (29.6%; mean age = 37.17; SD = 11.20; min 21–max 65) and 183 females (70.3%; mean age = 36.21; SD = 10.71; min 20–max 65). Of the first and second samples, 63.7% and 72.3%, respectively, worked with COVID-19 patients and were evenly distributed among emergency workers, nurses and physicians. Having treated COVID-19 patients directly was considered to be a “COVID frontline” variable.

The participants of both studies came from all Italian regions.

2.2. Procedure

Both studies used an online transactional survey. The first was conducted during the lockdown of April 2020 while the second study was conducted in the November–December period, during the second pandemic wave. The transactional survey included online informed consent, baseline sociodemographic information and several questionnaires, as described in the next section. Participants’ anonymity was maintained while collecting the data. All the procedures used in both studies were approved by the Ethics Committee of the University of Urbino (Comitato Etico per la Sperimentazione Umana—CESU).

2.3. Materials

In both studies, we administered several questionnaires to evaluate the levels of psychological stress and hardiness. In the first, we also collected data on coping strategies,

while in the second more attention was given to the risk of developing burnout and to resilience resources. We included the following questionnaires.

Emergency stress questionnaire (ESQ, [Vagni et al. 2020a, 2020b, 2020c, 2020d](#); [Maiorano et al. 2020](#)): The ESQ is a self-report instrument, already published and validated in previous research, to assess the level of organizational relational (e.g., “Did you notice any tension within your work team?”), physical (e.g., “Did you ever have stomach ache?”), emotional (e.g., “Did you feel agitated during your work?”), cognitive (e.g., “During the various activities to what you extent did you have the perception that things were going according to your expectations?”) and inefficacy decisional (e.g., “Did you find yourself working in unpredictable circumstances?”) stress in HCWs and EWs during phases 1 and 2 of the pandemic ([Vagni et al. 2020a, 2020b, 2020c, 2020d](#); [Maiorano et al. 2020](#)). The instrument includes items to measure a specific stress with respect to COVID-19 (e.g., “Were you afraid of getting infected because of your job?”). The ESQ consists of 33 items assessed on a five-point Likert scale, with scores ranging from 0 (not at all) to 4 (very much). A new confirmatory factor analysis (CFA) relating to the two samples was conducted, which confirmed the previously obtained factors, confirming the six scales. The CFA showed an adequate measure of the sampling (KMO test = 0.925; sphericity of Bartlett test = 7201.38, $p < 0.001$). The fit model was analyzed referring to model Chi-square ($X^2 = 527.472$; $df = 345$; $p < 0.001$; $X^2/df = 1.53$), non-normed fit index (NNFI = 0.91; [Tucker and Lewis 1973](#)) and the root mean square error of approximation (RMSA = 0.05; [Browne and Cudeck 1993](#)).

The internal consistency was good, and the following were found for each scale: organizational relational stress ($\alpha = 0.71$), physical stress ($\alpha = 0.84$), inefficacy decisional stress ($\alpha = 0.80$), emotional stress ($\alpha = 0.86$), cognitive stress ($\alpha = 0.67$), COVID-19 stress ($\alpha = 0.77$), and total ESQ ($\alpha = 0.93$).

The perceived stress scale (PSS, [Cohen et al. 1983](#); [Cohen and Williamson 1988](#)) is the tool widely used in psychology to measure the perception of stress. It allows you to measure how stressful situations in your life are experienced. The scale also includes a series of direct questions about the current levels of stress experienced. The internal consistency was good ($\alpha = 0.87$).

The dispositional resilience scale-15—Italian version (DRS-15, [Bartone 2007](#); [Picardi et al. 2012](#)) is a self-reported questionnaire with 15 items that measure hardiness, scored on a four-point scale ranging from 0 (not at all true) to 3 (completely true). Higher scores indicate a greater level of hardiness. In addition to the total score, the DRS gives scores for the following three subscales: commitment, control, and challenge. Italian standardization shows low alpha coefficient values, 0.66, 0.61, 0.72 and 0.71, for commitment, control, challenge and total score, respectively. For this reason, in the second study the Connor–Davidson resilience scale ([Connor and Davidson 2003](#)) was also used, with which it shows good concurrent validity, as follows: $r = 0.39$, $r = 0.39$, $r = 0.27$, and $r = 0.47$ all with $p < 0.001$ for commitment, control, challenge and total DRS, respectively.

The coping self-efficacy scale—short form (CSES-SF, [Chesney et al. 2006](#)) is a 13-item self-report questionnaire that evaluates perceived self-efficacy for coping with challenges and threats. The instrument is composed of the following three sub-scales: problem-focused coping (for example, “Make an action plan and follow it when faced with a problem”), stopping unpleasant emotions and thoughts (“Keep your mind away from negative thoughts”), and support (“Seek moral support from friends and family”). The subject was asked to rate the degree to which they believed they could adopt important behaviors for adaptive coping on an eleven-point Likert scale, with scores ranging from 0 (cannot do at all) to 10 (certain can do). The alpha coefficients relating to the sample of this study were calculated as follows: total score ($\alpha = 0.90$), problem-focused ($\alpha = 0.81$), stopping unpleasant emotions and thoughts ($\alpha = 0.91$), and support ($\alpha = 0.86$). In this study all three scales of the instrument were used in a distinct way.

In consideration of the hypothesis that long-term stress leads to the risk of developing burnout and requires not only hardiness but also real resilience skills, the following tools were also administered in the second study:

Connor–Davidson resilience scale: 10 items (CD-RISC, [Campbell-Sills and Stein 2007](#)) whose theoretical construct is to consider resilience as a measure of coping skills against stress. In the sample of the second study the internal consistency was good ($\alpha = 0.88$);

Maslach burnout inventory—human services survey—Italian version (MBI—HSS, [Maslach and Jackson 1986](#); [Sirigatti and Stefanile 1993](#); [Loera et al. 2014](#)): This is a self-report questionnaire and a specific version to measure the presence of burnout in healthcare workers. The Italian version of MBI—HSS, validated by [Sirigatti and Stefanile \(1993\)](#), has 20 self-scored items on a seven-point frequency scale ranging from 0 (never) to 6 (every day) and has three subscales, as follow: emotional exhaustion, depersonalization, and personal accomplishment. Emotionally exhausted (EE) employees lack adaptive resources and feel that emotional resources are so depleted that they cannot give any more to their jobs. Depersonalization (D) refers to impersonal, negative, and indifferent responses to the care and treatment to be provided to patients. Finally, personal accomplishment (PA) refers to a sense of self-efficacy, a feeling of competence as well as a tendency to evaluate oneself positively, and low scores in this scale correspond to higher degrees of experienced burnout. The PA scale is completely independent of the other two scales ([Maslach and Jackson 1981](#); [Maslach et al. 1996](#)). In the sample of our second study the internal consistency was good in all scales, 0.92, 0.80 and 0.76, respectively.

2.4. Statistical Strategy

Study 1

The correlational analyses and the predictive effects of coping strategies and hardiness on stress levels of the first sample have already been verified. In this study the first sample was used to verify the stability of stress levels, coping strategies and hardiness skills. Other analyses of predictivity and association between the variables have already been verified in previous studies ([Vagni et al. 2020a, 2020b](#)).

Pearson's correlation was conducted to detect the presence of associations among all scales examined in the studies. A mean comparison by *t*-test between the two samples was conducted to detect differences in scores obtained in the first and second COVID-19 waves.

Multivariate analysis of variance (MANOVA) was performed to verify the effects of the sample (first wave vs. second wave of COVID-19), gender, and the workers (emergency workers, nurses and physicians) on stress levels, coping strategies and hardiness scales. Age was assumed as a covariate.

Study 2

A preliminary Pearson's correlation analysis was conducted between stress, resilience scales, and burnout. A hierarchical linear regression was performed to verify the predictive effect of stress levels (step 2), and the protective effects of hardiness and resilience on burnout scales (step 3), controlling the model for age, gender, and workers (step 1).

3. Results

Study 1

A Pearson's correlation was conducted between the variables of interest in this study, which are as follow: ESQ scales, DRS-15 scales, CSES-SF, and PSS (see [Table 1](#)).

The *t*-test was applied between the two samples to compare the averages of the scores obtained in the two phases of COVID-19 ([Table 2](#)).

Table 1. Pearson's correlations between ESQ, DRS-15, CSES-SF and PSS ($n = 500$).

Variables	DRS-15				CSES-SF		
	Total ESQ	Commitment	Control	Challenge	Problem Focused	Stop Unpl E-T	Support
ESQ Scales							
Org-Rel	0.793 ***	−0.216 ***	−0.018	−0.206 ***	−0.037	−0.137 **	−0.013
Physical	0.733 ***	−0.127 **	−0.0225 ***	−0.062	−0.162 ***	−0.184 ***	−0.064
Inefficacy Decisional	0.694 ***	−0.064	0.107 *	−0.112 *	0.093 *	0.007	0.128 **
Emotional	0.821 ***	−0.130 **	−0.0103 *	−0.103 *	−0.177 ***	−0.243 ***	−0.042
Cognitive	0.740 ***	−0.195 ***	−0.068	−0.139 **	−0.124 **	−0.233 ***	−0.047
COVID-19	0.704 ***	−0.032	−0.005	−0.134 **	−0.020	−0.105 *	0.0055
DRS-15							
Total DRS	−0.214 ***	0.782 ***	0.696 ***	0.556 ***	0.314 ***	0.319 ***	0.216 ***
Commitment	−0.180 ***	1	0.416 ***	0.249 ***	0.271 ***	0.235 ***	0.196 ***
Control	−0.085 *	0.416 ***	1	0.104 *	0.305 ***	0.275 ***	0.176 ***
Challenge	−0.172 ***	0.249 ***	0.104 *	1	0.075 *	0.121 **	0.059
CSES-SF							
Problem Focused	−0.104 ***	0.271 ***	0.305 ***	0.075 *	1	0.557 ***	0.353 ***
Stop Unpl E/T	−0.196 ***	0.235 ***	0.275 ***	0.121 **	0.557 ***	1	0.465 ***
Support	−0.002	0.196 ***	0.176 ***	0.059	0.353 ***	0.465 ***	1
PSS	0.072 *	−0.037	−0.010	−0.020	−0.041	−0.048*	0.087 *

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; ESQ = emergency stress questionnaire; DRS-15 = dispositional resilience scale; CSES-SF = coping self-efficacy scale—short form; stop unpl E/T = stop unpleasant emotion/thoughts; org-rel = organizational relational stress; and PSS = perceived stress scale.

Table 2. t -test between two samples.

Variables	First Wave COVID-19 N (= 240)	Second Wave COVID-19 N (= 260)	T
	Mean (SD, Min–Max)	Mean (SD, Min–Max)	
Total ESQ	78.27 (16.55, 37–115)	75.81 (20.68, 22–121)	1.46
Org-Rel	20.85 (4.50, 9–30)	17.96 (5.35, 4–31)	6.51 ***
Physical	9.25 (5.01, 0–20)	11.62 (5.18, 0–20)	−5.18 ***
Inefficacy Decisional	13.89 (2.66, 8–20)	12.28 (4.10, 0–20)	5.15 ***
Emotional	12.48 (4.07, 1–24)	12.97 (4.80, 0–23)	−1.25
Cognitive	7.60 (3.01, 1–16)	7.12 (2.99, 1–14)	1.81
COVID-19	14.20 (3.89, 4–20)	13.86 (3.85, 2–20)	0.99
Total DRS-15	28.46 (4.25, 18–39)	30.26 (4.73, 14–41)	−4.44 ***
Commitment	10.11 (1.84, 6–16)	11.44 (2.69, 3–16)	−6.40 ***
Control	10.46 (2.10, 6–15)	9.58 (2.00, 3–15)	4.81 ***
Challenge	7.94 (2.05, 3–12)	9.24 (1.52, 3–13)	−8.08 ***
Problem Focused	37.09 (6.30, 20–50)	36.43 (7.22, 5–50)	1.09
Stop Unpl E/T	34.28 (9.82, 9–50)	34.02 (10.88, 5–50)	0.28
Support	20.97 (6.03, 6–30)	21.18 (6.34, 2–30)	−0.37
PSS	20.65 (5.44, 5–40)	21.20 (5.82, 6–36)	−1.08

*** $p < 0.001$; ESQ = emergency stress questionnaire; DRS-15 = dispositional resilience scale; CSES-SF = coping self-efficacy scale—short form; stop unpl E/T = stop unpleasant emotion/thoughts; org-rel = organizational relational stress; and PSS = perceived stress scale.

Multivariate analysis of variance was performed to verify the main hypothesis of the study, assuming levels of stress, hardiness scales, and coping strategies as dependent variables and “sample” (first vs. second COVID-19 wave), “workers” group (emergency workers = 1, nurses = 2, physicians = 3), and “gender” (male = 1, female = 2) as fixed factors. Age was covariate. The Bonferroni post-hoc was performed.

The model shows significant within-subject effects related to the “sample” (Pillai’s value = 0.358, $F = 20.123$, $df(13, 470)$, $p < 0.001$, $\eta^2 = 0.358$), “workers” (Pillai’s value = 0.153, $F = 2.998$, $df(26, 942)$, $p < 0.001$, $\eta^2 = 0.076$), and gender (Pillai’s value = 0.122, $F = 5.047$, $df(13,470)$, $p < 0.001$, $\eta^2 = 0.122$), age (Pillai’s value = 0.066, $F = 2.563$, $df(13, 470)$, $p < 0.01$, $\eta^2 = 0.066$), and workers*sample (Pillai’s value = 0.096, $F = 1.836$, $df(26, 942)$, $p < 0.05$, $\eta^2 = 0.048$).

The sample’s between-subject effects regarded organizational relational, physical, inefficacy decisional and cognitive stress, and the DRS-15 scales (Table 3). The workers’ between-subject effects regarded all ESQ scales, problem-focused, and stop unpleasant emotion/thought coping strategies and control (Table 3). Gender had only one between-subject effect for physical stress. The between-subject effects referring to age regarded physical and emotional stress, and problem-focused and stop unpleasant emotion/thoughts coping strategies (Table 3). The model showed no between-subject effects related to the workers’ sample.

Table 3. Between-subjects effects of multivariate analysis of variance (MANOVA) for sample, workers, gender and age on stress levels, coping strategies and hardiness scales (n = 500) ¹.

Factor	Dependent Variable	Between Subjects Effect		Estimate Parameter	
		F	η^2	T	
Sample	Org-Rel Stress	46.14 ***	0.09	3.47 **	
	Inefficacy Decisional Stress	35.89 ***	0.07	2.01 *	
	Cognitive Stress	13.51 ***	0.03	2.81 **	
	Commitment	46.78 ***	0.09	−4.14 ***	
	Control	11.98 **	0.03	2.16 *	
	Challenge	56.89 ***	0.11	−2.41 *	
Workers	Org-Rel Stress	13.65 ***	0.05	−2.16 * _(EW-N)	
	Physical Stress	11.35 ***	0.05	−2.45 * _(EW-N)	
	Inefficacy Decisional Stress		4.53 *	0.02	2.47 * _(N-P)
		Emotional Stress	13.25 ***	0.05	−3.25 * _(EW-N)
	Cognitive Stress	13.81 ***	0.05	−2.88 ** _(EW-N) 2.14 * _(N-P)	
	COVID-19 Stress	5.67 **	0.02	−1.57 *** _(EW-N)	
	Control		3.76 *	0.02	1.56 *** _(EW-P)
		Problem Focused	4.11 *	0.02	−2.38 * _(EW-N)
					0.73 ** _(EW-N)
				0.59 * _(P-N)	
				1.86 * _(EW-N)	
Gender	Physical Stress	45.29 ***	0.09	−2.60 ** _(male-female)	
	Age	10.28 **	0.02	−3.21 **	
Age	Emotional Stress	9.25 *	0.02	−3.04 **	
	Problem Focused	9.03 **	0.02	3.01 **	
	Stop Unpleasant Emotion/Thought	6.80 *	0.02	2.61 **	

¹ Only the significant effects are reported. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. EW = emergency workers; N = nurses; P = physicians.

Study 2

Study 1 showed how, during the second wave of the pandemic emergency, stress levels remained high, leading workers to making a greater resilient effort.

In Study 2, Pearson’s correlations of stress with resilience and with the risk of burnout were verified (Table 4).

Table 4. Pearson’s correlations between total ESQ, PSS, DRS-15, CD-RISC-10, and MBI—HSS ($n = 260$).

GSS2	Total ESQ	PSS	Total DRS-15	CD-RISC-10	MBI—HSS		
					EE	D	PA
ESQ	1	0.64	−0.22 ***	−0.17 **	0.68 ***	0.26 ***	−0.17 **
PSS	0.64	1	0.11 *	0.10 *	0.07	0.07	0.09
DRS-15	−0.22 ***	0.11 *	1	0.54 ***	−0.49 ***	−0.35 ***	0.47 ***
CD-RISC-10	−0.17 *	0.10 *	0.54 ***	1	−0.33 ***	−0.23 ***	0.51 ***

ESQ = emergency stress questionnaire; PSS = perceived stress scale; DRS-15 = dispositional resilience scale; CD-RISC-10 = Connor–Davidson resilience scale; MBI—HSS = Maslach burnout inventory—human services survey; EE = emotional exhaustion; D = depersonalization; and PA = personal accomplishment. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

The correlations shown in Table 4 allowed us to proceed with a hierarchical regression model to verify the main hypothesis, excluding PSS for low correlations and assuming the burnout scales as dependent variables, with age, gender and workers as control variables in step 1, and the total ESQ (step 2) and the resilience scales (step 3) as predictors (Table 5). The variables did not show collinearity.

Table 5. Hierarchical linear regression models on MBI—HSS scales ($n = 260$).

Model 1	EE		D		PA	
	B	Exp(B)	B	Exp(B)	B	Exp(B)
Age	−0.08	−0.08	−0.22	−0.35 ***	0.07	0.14 *
Gender ¹	3.74	0.16 *	−3.03	−0.20 **	−0.34	−0.03
Workers ²	1.71	0.11	−0.26	−0.03	−0.56	−0.07
COVID-19 Frontline ³	−0.61	−0.03			−1.37	−0.11
	$R^2 = 0.05$		$R^2 = 0.16$		$R^2 = 0.15$	
	F = 3.19 *		F = 11.50 ***		F = 2.10	
Model 2						
Age	0.01	0.01	−0.20	−0.31 ***	0.06	0.12
Gender ¹	0.51	0.02	−3.81	−0.25 ***	−0.01	−0.01
Workers ²	0.15	0.01	−0.64	−0.06	−0.40	−0.05
COVID-19 Frontline ³	1.09	0.04	0.03	0.01	−1.54	−0.12
Total ESQ	0.36	0.69 ***	0.09	0.25 ***	−0.04	−0.14 *
	$R^2 = 0.48$		$R^2 = 0.22$		$R^2 = 0.05$	
	$\Delta R^2 = 0.43$ ***		$\Delta R^2 = 0.06$ ***		$\Delta R^2 = 0.02$ *	
	F = 43.66 ***		F = 13.39 ***		F = 2.53 *	
Model 3						
Age	0.07	0.07	−0.17	−0.27 ***	0.02	0.04
Gender ¹	0.13	0.01	−4.02	−0.26 ***	−0.07	−0.01
Workers ²	0.28	0.02	−0.56	−0.06	−0.31	−0.04
COVID-19 Frontline ³	1.04	0.04	0.03	0.01	−1.22	−0.10
Total ESQ	0.32	0.62 ***	0.07	0.20 **	−0.01	−0.03
Total DRS	−0.77	−0.34 ***	−0.39	−0.27 ***	0.30	0.26 ***
CD-RISC	−0.05	−0.03	−0.03	−0.02	0.31	0.37 ***
	$R^2 = 0.60$		$R^2 = 0.29$		$R^2 = 0.33$	
	$\Delta R^2 = 0.12$ ***		$\Delta R^2 = 0.07$ ***		$\Delta R^2 = 0.28$ ***	
	F = 50.17 ***		F = 13.63 ***		F = 16.47 ***	

EE = emotional exhaustion; D = depersonalization; PA = personal accomplishment; ESQ = emergency stress questionnaire; DRS-15 = dispositional resilience scale; CD-RISC-10 = Connor–Davidson resilience scale; MBI—HSS = Maslach burnout inventory—human services survey; ¹ gender (1 = male; 2 = female); ² workers (1 = emergency worker; 2 = nurses; 3 = physician); ³ COVID-19 frontline (1 = yes; 2 = no). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 5 showed no effect for the CD-RISC scale. Since the Pearson’s correlations had highlighted significant scores in Table 4, we wanted to verify whether the presence of DRS had completely absorbed its effect. The same models shown in Table 5 are carried out again, excluding the total DRS, and leaving only the Davidson scale in step 3 that has a

high significance for emotional exhaustion (beta -0.323 , $p < 0.001$); depersonalization (beta -0.152 , $p < 0.01$) and for personal accomplishment (beta 0.400 , $p < 0.001$).

In any case, the variance explained is greater in the models in which both DRS-15 and CD-RISC are included.

4. Discussion

The first study, which involved HCWs and EWs who treated COVID-19 patients during the first and second waves of the pandemic, found a significant negative correlation between hardiness and coping strategies with the levels of stress, confirming what has already emerged in other studies (Jose et al. 2020; Vagni et al. 2020b; Maiorano et al. 2020).

Comparing the scores obtained in the two waves of the pandemic, the total stress levels did not show any variation, whereas some variations were shown in some individual stressors. In consideration of the continuous and incessant physical effort and fatigue that the pandemic has required from HCWs and EWs, the physical stress in the second wave is significantly higher while the organizational relational and decisional stress is lower, since in the second wave the health structures have managed to develop a better organization and share an operational protocol, helping operators to be able to make more effective decisions (see Table 2).

No differences have been recorded over time with regard to coping strategies. This may indicate that HCWs and EWs have tended to apply the same coping strategies in the second wave, seeming to suggest that any change in their coping styles might require more time and/or specific support interventions. The levels of hardiness and in particular of commitment and challenge in the second wave are higher than in the first wave, and this seems to suggest that workers, being in constant tension and stress due to the incessant number of patients, hospitalizations and deaths, have to make use of their own hardiness. The literature highlights how subjects with higher levels of hardiness have more adaptive coping styles that prompt them to take actions to remove the source of their stress (Eschleman et al. 2010; Bartone et al. 2019) and generally have a greater orientation towards practical solutions (or a problem-focused strategy) to stressful situations, as seems to be confirmed in our study in the correlational analysis (see Table 1).

HCWs and EWs often choose their work out of love for the job and this allows them to be more engaged in achieving their work goals. This seems to lead them to increase their levels of commitment even when they find themselves in disappointing or painful situations. In other words, in situations of persistent work stress, people with hardiness skills will continue to be engaged, to live through experiences as a source of learning and to maintain an honest self-examination to overcome difficulties (Stein and Bartone 2020).

What is supported by Stein and Bartone (2020) seems to be confirmed in the results of Table 2 where it emerges that stress levels have remained almost stable over time, while levels of commitment and challenge have increased. Tables 2 and 3 show a decrease in control scores in the second wave on the hardiness scale.

It may be that in the second wave workers have a better recognition that there are “givens” in the COVID-19 situation, that is to say, factors which are not under the individual’s control. High-level hardy individuals may be better at recognizing when they are dealing with situations that are outside their direct control (Stein and Bartone 2020). The HCWs and EWs employed in the second wave seem to have thus developed a greater self-efficacy in their interventions and greater knowledge about the pandemic virus. However, it must nevertheless be remembered that there are still many factors that are beyond the intervention capacities of doctors and nurses. The increase in self-efficacy and greater knowledge may have helped health workers to use functional coping strategies. This may explain why coping strategies have remained stable over time and why hardiness skills have increased (Labrague 2021).

These results and considerations were confirmed by the multivariate analysis of variance that showed significant effects on stress and on the hardiness components in relation to the second wave. Furthermore, the analysis highlighted different effects on

stress, hardiness and coping strategies among the different categories of workers. In particular, EWs seem to have developed a greater sense of self-efficacy and self-confidence in being able to determine their intervention than nurses. This may be due to the fact that nurses continued to experience a sense of helplessness and lack of confidence in influencing patients' disease outcome. In fact, EWs developed more problem-focused coping strategies than nurses.

Nurses are in fact the ones who have been in constant contact with patients in the frontline, noting that their efforts have not always been rewarding given both the number of deaths recorded in Italy, and the often sudden and unfavorable changes in the patients' clinical conditions. They have experienced even greater levels of organizational, physical and emotional stress because they have had to guarantee safety on the wards in order to contain the contagion, organize protective devices (PPI), provide for all the patients' needs, (even emotional ones as family visits were prohibited) as well as manage the concern of family members by phone, giving updates and sometimes death notifications. It is likely that nurses have also been the loneliest workers and with the least chance of developing a sense of control over the situation, despite their level of commitment and challenge being equal to that of other health workers (see Manova's results in Table 3) (Hystad et al. 2010; Stein and Bartone 2020).

The between-subject effect and the estimate parameters showed how, especially in nurses, the levels of organizational relational, physical, inefficacy decisional, emotional, cognitive and COVID-19 stress increased, while EWs and physicians seem to have developed a sense of effectiveness in managing stress situations by using both problem-focused coping strategies and control as hardiness skills (see Table 3) (Maiorano et al. 2020). Nurses have continued to occupy a frontline role in patient care throughout the patients' hospitalization, taking care of their physical but also emotional needs, trying to encourage patients and supporting family members. The continuous and lengthy care of COVID-19 patients has constantly exposed nurses to the fear of contracting the virus and of infecting their families. The length of time nurses have been in contact with COVID-19 patients and the level of care they are required to give may explain their greater perception of stress in comparison to physicians and emergency workers.

In line with other studies, female workers seem to show a higher level of physical stress than male workers (Lai et al. 2020). Older workers show higher physical and emotional stress, while younger workers seem to adopt more adaptive coping strategies such as problem-focused and stop unpleasant emotion/thoughts, which allow them to remove negative experiences and thoughts from their minds by focusing more on acting and doing things concretely. Older workers may have a greater awareness of the emotional consequences linked to the severity of patients and the suffering of family members, leading them to greater emotional stress. They may also feel a greater sense of fatigue. Older workers may also have a greater awareness of their own resources and a greater sense of self-esteem, allowing them more effective responses and actions in order to cope with emergency situations (Bartone and Bowles 2020). This result is in agreement with Bozdağ and Ergün (2020) who found positive relationship between psychological resilience and age, indicating that older healthcare workers cope better with crises because they have greater experience and skills.

On the basis of these results, in the second study we wanted to verify whether the persistence of high levels of stress and the wearing-out of internal resources could be associated with a greater risk of developing burnout. The PSS scale does not seem to show any significant correlation with burnout. This may be because the tool detects more generic aspects of stress unlike ESQ, which on the contrary shows significant correlations both with resilience skills and with burnout scales (see Table 4). This seems to confirm the need to use a specific tool, especially at this stage and on this specific kind of emergency, to detect the stressors in health and emergency workers.

Emergency stress showed a high predictive effect on emotional exhaustion and the depersonalization scales of burnout, but this effect is significantly reduced on the hardiness

and resilience scales (step 2 and 3 of Table 5). The results of Table 5 seem to demonstrate that during an emergency situation, which is still in progress, it is above all hardiness resources that are most effective in reducing the levels of emotional exhaustion and depersonalization linked to the work context, absorbing the effect of other resilience abilities (Roslan et al. 2021; O'Connor et al. 2020; Pappa et al. 2021). Personal accomplishment, on the other hand, seems to be more closely linked to a sense of self-efficacy, positivity, optimism and therefore more associated with resilience in general as well as with hardiness.

The results of this second study seem to suggest that after months of an intense pandemic, HCWs and EWs present a significant risk of developing burnout. As these workers are constantly engaged in facing the emergency with incessant work paces, they are unable to develop or modify their coping strategies in the absence of a specifically oriented support intervention.

Not being able to change coping strategies and failing to rework their own experiences, the use of hardiness skills is the most used and most functional solution to deal with stress and its consequences (Bartone et al. 2017).

Resilience skills allow workers to maintain or nurture a sense of personal accomplishment, but hardiness seems to be more effective in reducing the loss of personal and workplace well-being. A greater predictive effect of resilience will likely be recorded once the severity of the pandemic is over or reduced.

According to Stein and Bartone (2020), workers who in their jobs take many risks, both physical and emotional, are sensation-seeking in the pleasure or satisfaction that they get from their work. This seems to explain the results of Table 5 where it was found that hardiness has a protective factor with respect to emotional exhaustion and depersonalization, while reinforcing a sense of personal accomplishment. *"Hardiness played a significant role in differentiating those who coped better with their situation from those who continued to suffer over time"* (Stein and Bartone 2020, p. 29). People with high levels of hardiness are able to manage the negative effects of stress precisely through the skills of commitment, control and challenge. The skills of commitment and challenge make it possible to promote new initiatives, to keep motivation in their work high, to commit to finding new strategies and to experience difficulties as professional challenges, reducing the negative effects of stress and the risk of developing burnout. Regarding the risk of burnout, no effects linked to age, gender and worker variables have been recorded. This seems to indicate that all operators are exposed to the risk of developing burnout symptoms.

All studies conducted during the first wave showed a significant effect of the frontline role with COVID-19 patients in increasing stress levels (Lai et al. 2020; Rossi et al. 2020; Wang et al. 2020). The results of the present study relating to the second wave show that this effect no longer seems to exist in risk of developing burnout (see Table 5). This may be explained by the fact that because of the spread of infection in this second wave, HCWs and EWs in all hospital wards, even no-COVID ones, had to adopt the same precautions and protocols as COVID frontline workers.

In other words, both HCWs and EWs COVID frontline and not, have been exposed to similar risk factors for contagion and work stress, and this does not seem to lead to significant changes in the risks of burnout in the long term.

5. Limitations

The study has several limitations, primarily due to the fact that the participants recruited in the second wave of COVID-19 were not the same as those in the first wave, preventing a longitudinal design. Although the first-wave participants were invited to participate in the second-wave study they declined, stating that they had already participated in several studies, often without any publication of the results or concrete effects for them, and that they consequently felt demotivated. Moreover, many of the participants previously involved stated that they were no longer operating in the health sector and/or in the emergency, and declined the invitation. Therefore, healthcare and emergency workers other than those originally recruited were involved in the second sample.

A second limitation is given by the fact that only self-report tools were used in the studies. Finally, the limited sample size calls for a further study.

6. Conclusions

The study aimed to verify the trend of stress levels, resilience and coping strategies in healthcare and emergency workers in the first and second waves of the pandemic. The results show how the knowledge and presence of intervention protocols made it possible to reduce organizational and decision-making stress. The constant number of COVID-19 patients and deaths has led to higher levels of emotional stress, requiring workers to continuously use their hardiness skills. It is precisely hardiness that represents an important protective factor for the health of workers during a condition of prolonged emergency. The above results showed that in this prolonged condition of emergency the workers have had to resort to a greater use of their resilience skills to contain the harmful effects of stress on health and to reduce the burnout risk. On the other hand, coping strategies remained unchanged.

Those who are constantly engaged in a long-lasting emergency situation have no time to reflect on their experiences and their suffering. Therefore, they resort to hardiness that allows them to live through the situation with commitment and be able to face the challenge. They resort to more structured resilience skills at a later time when the commitment to the emergency is reduced and a process of reworking or re-elaboration of the experience can begin.

This study thus suggests the appropriateness during a pandemic or health emergency of providing support interventions (Banerjee et al. 2021; Buselli et al. 2021; Pallavicini et al. 2021) for healthcare and emergency workers, and in particular in order to improve hardiness in these workers and in consideration of the fact that more complex resilience capacities tend to intervene only at a later stage when acute stress levels are reduced.

Author Contributions: Conceptualization all authors; methodology, M.V., T.M. and V.G.; software, M.V.; validation, M.V., T.M. and V.G.; formal analysis, M.V.; investigation, all authors; data curation, M.V. and T.M.; writing—original draft preparation, all authors; writing—review and editing, all authors; visualization, M.V. and T.M. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki, and All the procedures used in the studies were approved by the Ethics Committee of the University of Urbino (Comitato Etico per la Sperimentazione Umana—CESU).

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

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

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

References

- Ali, Haneen, Abdulaziz Ahmed Astin Cole, and Gabriella Panos Sa'd Hamasha. 2020. Major Stressors and Coping Strategies of Frontline Nursing Staff During the Outbreak of Coronavirus Disease 2020 (COVID-19) in Alabama. *Journal of Multidisciplinary Healthcare* 13: 2057. [CrossRef]
- Banerjee, Debanjan, T. S. Sathyanarayana Rao, Roy Abraham Kallivayalil, and Afzal Javed. 2021. Psychosocial Framework of Resilience: Navigating Needs and Adversities During the Pandemic, A Qualitative Exploration in the Indian Frontline Physicians. *Frontiers in Psychology* 12: 775. [CrossRef]
- Bartone, Paul T. 2007. Test-retest reliability of the Dispositional Resilience Scale-15, a brief hardiness scale. *Psychological Reports* 101: 943–44. [CrossRef]
- Bartone, Paul T., and Stephen V. Bowles. 2020. Coping with recruiter stress: Hardiness, performance and well-being in US Army recruiters. *Military Psychology* 32: 390–97. [CrossRef]

- Bartone, Paul T., Bjorn H. Johnsen, Jarle Eid, Sigurd W. Hystad, and Jon C. Laberg. 2017. Hardiness, avoidance coping, and alcohol consumption in war veterans: A moderated-mediation study. *Stress and Health* 33: 498–507. [CrossRef]
- Bartone, Paul T., Kelly McDonald, Jonathan Stermac, Manolo Escobar, Justin McNeil, and Steven Stein. 2019. Development and Validation of an Improved Hardiness Tool: The Hardiness Resilience Gauge. Paper presented at the International Applied Military Psychology Symposium, Sarajevo, Bosnia and Herzegovina, May 6–10; Available online: http://www.iamps.org/papers/2019_BARTONE_paper.pdf (accessed on 29 April 2021).
- Bozdağ, Faruk, and Naif Ergün. 2020. Psychological Resilience of Healthcare Professionals During COVID-19 Pandemic. *Psychological Reports* 2020: 0033294120965477. [CrossRef] [PubMed]
- Browne, Michael W., and Robert Cudeck. 1993. Alternative ways of assessing model fit. In *Testing Structural Equation Models*. Edited by Kenneth A. Bollen and Scott Long. Newbury Park: Sage, pp. 136–62.
- Buselli, Rodolfo, Martina Corsi, Antonello Veltri, Sigrid Baldanzi, Martina Chiumiento, Elena Del Lupo, Riccardo Marino, Gabriele Necciari, Fabrizio Caldi, Rudy Foddis, and et al. 2021. Mental health of Health Care Workers (HCWs): A review of organizational interventions put in place by local institutions to cope with new psychosocial challenges resulting from COVID-19. *Psychiatry Research* 299: 113847. [CrossRef] [PubMed]
- Cai, Haozheng, Baoren Tu, Jing Ma, Limin Chen, Lei Fu, Yongfang Jiang, and Quan Zhuang. 2020. Psychological impact and coping strategies of frontline medical staff in Hunan between January and March 2020 during the outbreak of Coronavirus Disease 2019 (COVID-19) in Hubei, China. *Medical Science Monitor: International Medical Journal of Experimental and Clinical Research* 26: e924171.
- Campbell-Sills, Laura, and Murray B. Stein. 2007. Psychometric analysis and refinement of the Connor-Davidson Resilience Scale (CD-RISC): Validation of a 10-item measure of resilience. *Journal of Traumatic Stress* 20: 1019–28. [CrossRef] [PubMed]
- Carletti, Margherita, and Roberto Pancrazi. 2021. Geographic Negative Correlation of Estimated Incidence between First and Second Waves of Coronavirus Disease 2019 (COVID-19) in Italy. *Mathematics* 9: 133. [CrossRef]
- Çelmeçe, Nuriye, and Mustafa Menekay. 2020. The effect of stress, anxiety and burnout levels of healthcare professionals caring for covid-19 patients on their quality of life. *Frontiers in Psychology* 11: 597624. [CrossRef] [PubMed]
- Chesney, Margaret A., Torsten B. Neilands, Donald B. Chambers, Jonelle M. Taylor, and Susan Folkman. 2006. A validity and reliability study of the coping self-efficacy scale. *British Journal of Health Psychology* 11: 421–37. [CrossRef] [PubMed]
- Chor, Wei P. D., Wei M. Ng, Lenard Cheng, Wangmin Situ, Jun W. Chong, Ling Ng, Pek L. Mok, Ying W. Yau, and Ziwei Lin. 2020. Burnout amongst emergency healthcare workers during the COVID-19 pandemic: A multi-center study. *The American Journal of Emergency Medicine*, S0735-6757(20)30936-0. [CrossRef]
- Cohen, Sheldon, and Gail Williamson. 1988. Perceived stress in a probability sample of the United States. In *The Social Psychology of Health*. Edited by Shirlynn Spacapan and Stuart Oskamp. Newbury Park: Sage, pp. 31–67.
- Cohen, Sheldon, Tom Kamarck, and Robin Mermelstein. 1983. Perceived stress scale (PSS). *Journal of Health and Social Behavior* 24: 385–96. [CrossRef] [PubMed]
- Connor, Kathryn M., and Jonathan RT Davidson. 2003. Development of a new resilience scale: The Connor-Davidson resilience scale (CD-RISC). *Depression and Anxiety* 18: 76–82. [CrossRef]
- Di Monte, Cinzia, Silvia Monaco, Rachele Mariani, and Michela Di Trani. 2020. From resilience to burnout: Psychological features of Italian general practitioners during COVID-19 emergency. *Frontiers in Psychology* 11: 2476. [CrossRef] [PubMed]
- Du, Jiang, Lu Dong, Tao Wang, Chenxin Yuan, Rao Fu, Lei Zhang, Bo Liu, Mingmin Zhang, Yuanyuan Yin, Jiawen Qin, and et al. 2020. Psychological symptoms among frontline healthcare workers during COVID-19 outbreak in Wuhan. *General Hospital Psychiatry* 67: 144–45. [CrossRef] [PubMed]
- Elhadi, Muhammed, Ahmed Msherghi, Moutaz Elgzairi, Ayiman Alhashimi, Ahmed Bouhuwaish, Marwa Biala, Seraj Abuelmeda, Samer Khel, Ala Khaled, Ahmed Alsoufi, and et al. 2020. Burnout syndrome among hospital healthcare workers during the covid-19 pandemic and civil war: A cross-sectional study. *Frontiers Psychiatry* 11: 579563. [CrossRef]
- Eschleman, Kevin J., Nathan A. Bowling, and Gene M. Alarcon. 2010. A meta-analytic examination of hardiness. *International Journal of Stress Management* 17: 277. [CrossRef]
- Ferry, Amy V., Ryan Wereski, Fiona E. Strachan, and Nicholas L. Mills. 2020. Predictors of healthcare worker burnout during the COVID-19 pandemic. *medRxiv*. [CrossRef]
- Hu, Deying, Yue Kong, Wengang Li, Qiuying Han, Xin Zhang, Li X. Zhu, Su W. Wan, Zuofeng Liu, Qu Shen, Jingqiu Yang, and et al. 2020. Frontline nurses' burnout, anxiety, depression, and fear statuses and their associated factors during the COVID-19 outbreak in Wuhan, China: A large-scale cross-sectional study. *EClinicalMedicine* 24: 100424. [CrossRef]
- Hystad, Sigurd William, Jarle Eid, Bjørn Helge Johnsen, Jon Christian Laberg, and Paul T. Bartone. 2010. Psychometric properties of the revised Norwegian dispositional resilience (hardiness) scale. *Scandinavian Journal of Psychology* 51: 237–45. [CrossRef]
- ISTAT, and ISS. 2021. Impatto dell'epidemia covid-19 sulla mortalità totale della popolazione residente anno 2020. Available online: <https://www.istat.it/it/archivio/254507> (accessed on 21 April 2021).
- Jose, Sinu, Manju Dhandapani, and Maneesha C. Cyriac. 2020. Burnout and Resilience among Frontline Nurses during COVID-19 Pandemic: A Cross-sectional Study in the Emergency Department of a Tertiary Care Center, North India. *Indian Journal of Critical Care Medicine: Peer-Reviewed, Official Publication of Indian Society of Critical Care Medicine* 24: 1081–88.
- Khasne, Ruchira W., Bhagyashree S. Dhakulkar, Hitendra C. Mahajan, and Atul P. Kulkarni. 2020. Burnout among Healthcare Workers during COVID-19 Pandemic in India: Results of a Questionnaire-based Survey. *Indian Journal of Critical Care Medicine: Peer-Reviewed, Official Publication of Indian Society of Critical Care Medicine* 24: 664–71. [CrossRef] [PubMed]

- Kobasa, Suzanne C. 1979. Stressful life events, personality, and health: An inquiry into hardiness. *Journal of Personality and Social Psychology* 37: 1–11. [[CrossRef](#)] [[PubMed](#)]
- Kobasa, Suzanne C., Salvatore R. Maddi, and Marc A. Zola. 1983. Type-A and hardiness. *Journal of Behavioral Medicine* 6: 41–51. [[CrossRef](#)] [[PubMed](#)]
- Kutluturkan, Sevinc, Elif Sozeri, Nese Uysal, and Figen Bay. 2016. Resilience and burnout status among nurses working in oncology. *Annals of General Psychiatry* 15: 33. [[CrossRef](#)]
- Labrague, Leodoro J. 2021. Psychological resilience, coping behaviours and social support among health care workers during the COVID-19 pandemic: A systematic review of quantitative studies. *Journal of Nursing Management*. 10.1111/jonm.13336. [[CrossRef](#)]
- Lai, Jianbo, Simeng Ma, Ying Wang, Zhongxiang Cai, Jianbo Hu, Ning Wei, Jiang Wu, Hui Du, Tingting Chen, Ruiting Li, and et al. 2020. Factors Associated with Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019. *JAMA Network Open* 3: e203976. [[CrossRef](#)]
- Lazarus, Richard S., and Susan Folkman. 1984. *Stress, Appraisal, and Coping*. New York: Springer.
- Loera, Barbara, Daniela Converso, and Sara Viotti. 2014. Evaluating the psychometric properties of the Maslach Burnout Inventory-Human Service Survey (MBI-HSS) among Italian nurses: How many factors must a research consider? *PLoS ONE* 9: e114987. [[CrossRef](#)] [[PubMed](#)]
- Luan, Rongrong, Weidan Pu, Lilei Dai, Rui Yang, and Peng Wang. 2020. Comparison of Psychological Stress Levels and Associated Factors Among Healthcare Workers, Frontline Workers, and the General Public During the Novel Coronavirus Pandemic. *Frontiers in Psychiatry* 11: 583971. [[CrossRef](#)] [[PubMed](#)]
- Lukong, Anita Mfuh Y., and Yahaya Jafaru. 2021. Covid-19 pandemic challenges, coping strategies and resilience among healthcare workers: A multiple linear regression analysis. *African Journal of Health, Nursing and Midwifery* 4: 16–27.
- Maiorano, Tiziana, Monia Vagni, Valeria Giostra, and Daniela Pajardi. 2020. COVID-19: Risk Factors and Protective Role of Resilience and Coping Strategies for Emergency Stress and Secondary Trauma in Medical Staff and Emergency Workers—An Online-Based Inquiry. *Sustainability* 12: 9004. [[CrossRef](#)]
- Maslach, Christina, and Susan E. Jackson. 1981. The measurement of experienced burnout. *Journal of Organizational Behavior* 2: 99–113. [[CrossRef](#)]
- Maslach, Christina, and Susan E. Jackson. 1986. *Maslach Burnout Inventory*, 2nd ed. Palo Alto: Consulting Psychologists Press.
- Maslach, Christina, Susan E. Jackson, and Michael P. Leiter. 1996. *MBI: Maslach Burnout Inventory*, 3rd ed. Sunnyvale: Consulting Psychologists Press.
- Maslach, Christina, Susan E. Jackson, Michael P. Leiter, Wilmar B. Schaufeli, and Richard L. Schwab. 1986. *Maslach Burnout Inventory Manual*. Palo Alto: Consulting Psychologists Press.
- Nishimura, Yoshito, Tomoko Miyoshi, Hideharu Hagiya, Kosaki Yoshinori, and Fumio Otsuka. 2021. Burnout of Healthcare Workers amid the COVID-19 Pandemic: A Japanese Cross-Sectional Survey. *International Journal of Environmental Research and Public Health* 18: 2434. [[CrossRef](#)] [[PubMed](#)]
- O'Connor, Paul, Sinéad Lydon, Emily O'Dowd, and Dara Byrne. 2020. The relationship between psychological resilience and burnout in Irish doctors. *Irish Journal of Medical Science*, 1–6. [[CrossRef](#)]
- Ornell, Felipe, Silvia Chwartzmann Halpern, Felix Henrique Paim Kessler, and Joana Corrêa de Magalhães Narvaez. 2020. The impact of the COVID-19 pandemic on the mental health of healthcare professionals. *Cadernos de Saude Publica* 36: e00063520. [[CrossRef](#)] [[PubMed](#)]
- Özçevik Subaşı, Damla, Aylin Akça Sümengen, Enes Şimşek, and Ayşe Ferda Ocakçı. 2021. Healthcare workers' anxieties and coping strategies during the COVID-19 pandemic in Turkey. *Perspectives in Psychiatric Care*. [[CrossRef](#)]
- Pallavicini, Federica, Eleonora Orena, Simona di Santo, Luca Greci, Chiara Caragnano, Paolo Ranieri, Costanza Vuolato, Alessandro Pepe, Guido Veronese, Antonio Dakanalis, and et al. 2021. MIND-VR: Design and Evaluation Protocol of a Virtual Reality Psychoeducational Experience on Stress and Anxiety for the Psychological Support of Healthcare Workers Involved in the COVID-19 Pandemic. *Frontiers in Virtual Reality* 2: 620225. [[CrossRef](#)]
- Pappa, Sofia, Nikolaos Athanasiou, Nikolaos Sakkas, Stavros Patrinos, Elpitha Sakka, Barmpareassou Zalfeira, Stamatoula Tsikrika, Andreas Adraktas, Athanasia Pataka, Ilias Migdalis, and et al. 2021. From Recession to Depression? Prevalence and Correlates of Depression, Anxiety, Traumatic Stress and Burnout in Healthcare Workers during the COVID-19 Pandemic in Greece: A Multi-Center, Cross-Sectional Study. *International Journal of Environmental Research and Public Health* 18: 2390. [[CrossRef](#)] [[PubMed](#)]
- Pappa, Sofia, Vasiliki Ntella, Timoleon Giannakas, Vassilis G. Giannakoulis, Eleni Papoutsis, and Paraskevi Katsaounou. 2020. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. *Brain, Behavior, and Immunity* 88: 901–7. [[CrossRef](#)]
- Picardi, Angelo, Paul T. Bartone, Raffaella Querci, Daniela Bitetti, Lorenzo Tarsitani, Valentina Roselli, Annalisa Maraone, Elisa Fabi, Francesco De Michele, Ilaria Gaviano, and et al. 2012. Development and validation of the Italian version of the 15-item dispositional resilience scale. *Rivista di Psichiatria* 47: 231–37.
- Riguzzi, Marco, and Shkumbin Gashi. 2021. Lessons from the First Wave of COVID-19: Work-Related Consequences, Clinical Knowledge, Emotional Distress, and Safety-Conscious Behavior in Healthcare Workers in Switzerland. *Frontiers in Psychology* 12: 44. [[CrossRef](#)]

- Roslan, Nurhanis S., Muhamad S. B. Yusoff, Ab R. Asrenee, and Karen Morgan. 2021. Burnout Prevalence and Its Associated Factors among Malaysian Healthcare Workers during COVID-19 Pandemic: An Embedded Mixed-Method Study. *Healthcare* 9: 90. [CrossRef]
- Rossi, Rodolfo, Valentina Socci, Francesca Pacitti, Giorgio Di Lorenzo, Antinisca Di Marco, Alberto Siracusano, and Alessandro Rossi. 2020. Mental health outcomes among frontline and second-line health care workers during the coronavirus disease 2019 (COVID-19) pandemic in Italy. *JAMA Network Open* 3: e2010185. [CrossRef]
- Shreffler, Jacob, Jessica Petrey, and Martin Huecker. 2020. The Impact of COVID-19 on Healthcare Worker Wellness: A Scoping Review. *The Western Journal of Emergency Medicine* 21: 1059–66. [CrossRef]
- Si, Ming-Yu, Xiaoyou Su, Yu Jiang, Wenjun Wang, Xiao-fen Gu, Li Ma, Jing Li, Shaokai Zhang, Ze-Fang Ren, Ran Ren, and et al. 2020. Psychological impact of COVID-19 on medical care workers in China. *Infectious Diseases of Poverty* 9: 1–13. [CrossRef] [PubMed]
- Simione, Luca, and Camilla Gnagnarella. 2020. Differences between health workers and general population in risk perception, behaviors, and psychological distress related to COVID-19 spread in Italy. *Frontiers in Psychology* 11: 2166. [CrossRef]
- Sirigatti, Saulo, and Cristina Stefanile. 1993. *Adattamento Italiano del MBI-Maslach Burnout Inventory*. Firenze: Giunti Organizzazioni Speciali.
- Stein, Steven J., and Paul T. Bartone. 2020. *Hardiness: Making Stress Work for You to Achieve Your Life Goals*. Hoboken: Wiley.
- Taku, Kanako. 2014. Relationships among perceived psychological growth, resilience and burnout in physicians. *Personality Individual Differences* 59: 120–23. [CrossRef]
- Tucker, Ledyard R., and Charles Lewis. 1973. A reliability coefficient for maximum likelihood factor analysis. *Psychometrika* 38: 1–10. [CrossRef]
- Tugade, Michele M., and Barbara L. Fredrickson. 2004. Resilient individuals use positive emotions to bounce back from negative emotional experiences. *Journal of Personality and Social Psychology* 86: 320–23. [CrossRef]
- Vagni, Monia, Tiziana Maiorano, Valeria Giostra, and Daniela Pajardi. 2020a. Coping With COVID-19: Emergency Stress, Secondary Trauma and Self-Efficacy in Healthcare and Emergency Workers in Italy. *Frontiers in Psychology* 11: 566912. [CrossRef] [PubMed]
- Vagni, Monia, Tiziana Maiorano, Valeria Giostra, and Daniela Pajardi. 2020b. Hardiness and Coping Strategies as Mediators of Stress and Secondary Trauma in Emergency Workers during the COVID-19 Pandemic. *Sustainability* 12: 7561. [CrossRef]
- Vagni, Monia, Tiziana Maiorano, Valeria Giostra, and Daniela Pajardi. 2020c. Hardiness, stress and secondary trauma in Italian healthcare and emergency workers during the COVID-19 pandemic. *Sustainability* 12: 5592. [CrossRef]
- Vagni, Monia, Valeria Giostra, Tiziana Maiorano, Giuliano Santaniello, and Daniela Pajardi. 2020d. Personal Accomplishment and Hardiness in Reducing Emergency Stress and Burnout among COVID-19 Emergency Workers. *Sustainability* 12: 9071. [CrossRef]
- Van Roekel, Henrico, Irene van der Fels, Arnold B. Bakker, and Lars G. Tummers. 2021. Healthcare Workers Who Work With COVID-19 Patients Are More Physically Exhausted and Have More Sleep Problems. *Frontiers in Psychology* 11: 625626. [CrossRef] [PubMed]
- Walton, Matthew, Esther Murray, and Michael D. Christian. 2020. Mental healthcare for medical staff and affiliated healthcare workers during the COVID-19 pandemic. *European Heart Journal: Acute Cardiovascular Care* 9: 241–47. [CrossRef] [PubMed]
- Wang, Ya-Xi, Hong-Tao Guo, Xue-Wei Du, Wen Song, Chang Lu, and Wen-Nv Hao. 2020. Factors associated with post-traumatic stress disorder of nurses exposed to corona virus disease 2019 in China. *Medicine* 99: e20965. [CrossRef] [PubMed]
- Xiao, Han, Yan Zhang, Desheng Kong, Shiyue Li, and Ningxi Yang. 2020. The effects of social support on sleep quality of medical staff treating patients with Coronavirus Disease 2019 (COVID-19) in January and February 2020 in China. *Medical Science Monitor* 26: e923549.
- Zhang, Yuxia, Chunling Wang, Wenyan Pan, Jili Zheng, Jian Gao, Xiao Huang, Shining Cai, Yue Zhai, Jos M. Latour, and Chouwen Zhu. 2020. Stress, burnout, and coping strategies of frontline nurses during the COVID-19 epidemic in Wuhan and Shanghai, China. *Frontiers in Psychiatry* 11: 1154. [CrossRef]
- Zhou, Qian, Xiaoquan Lai, Zhaoyang Wan, Xiping Zhang, and Li Tan. 2021a. Impact of burnout, secondary traumatic stress and compassion satisfaction on hand hygiene of healthcare workers during the COVID-19 pandemic. *Nursing Open*. [CrossRef]
- Zhou, Ting, Ruiyuan Guan, and Liqun Sun. 2021b. Perceived organizational support and PTSD symptoms of frontline healthcare workers in the outbreak of COVID-19 in Wuhan: The mediating effects of self-efficacy and coping strategies. *Applied Psychology: Health and Well-Being*. [CrossRef]