Evolution of Posttraumatic Symptoms and Related Factors in Healthcare Workers During the COVID-19 Pandemic

A Longitudinal Study

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Objective: This study aimed to (1) evaluate the evolution of mental health (posttraumatic stress symptoms [PTSSs], depression, and burnout) of healthcare workers during the second wave of the pandemic (November to December 2020) and compare it with the first wave (March to May 2020), and (2) ascertain the predictors of PTSSs. **Methods:** In March to May 2020 (T1), 269 healthcare professionals working in Spain completed PTSSs, sadness, resilience, and coping questionnaires. In November to December 2020 (T2, N = 58), we assessed PTSSs, sadness, burnout, and depression. **Results:** Among the healthcare professionals, 63.8% displayed severe PTSSs, 51.7% depressive symptoms, and 79.3% emotional exhaustion (T2). Some risk factors were caring for patients who were severely ill or dying and using rumination, thinking avoidance, self-isolation, emotional expression, and self-blaming as coping strategies. **Conclusions:** The pandemic has had a deep and long-lasting impact on the healthcare workers' mental health.

Keywords: COVID-19, pandemic, healthcare workers, psychological impact, sadness, burnout, posttraumatic growth, depression, second wave

The health crisis unleashed by the COVID-19 pandemic led to Spain declaring a State of Emergency between March 14 and June 21, 2020.[1] The first wave of the pandemic peaked in Spain on March 20, 2020,[2] and stayed stable during the months of June and July 2020, and the second wave began in late August. Spain was one of the European nations with the highest rates of infection in September and October 2020.[3] Faced with the difficulty of containing the spread of the virus, along with increased pressure on hospitals, the Spanish Government declared a new State of Emergency on October 25, 2020,[4] limiting mobility and setting a night-time curfew.

Healthcare workers have played a crucial role in this crisis, at the risk of exposing themselves and their families to the virus. As a matter of fact, more than 217,000 healthcare workers have been infected in Spain.[5] They have also been exposed to extremely difficult situations that entailed contact with patients with high levels of suffering, increased pressure of care, taking difficult decisions, and resource shortages.[6] All of this made healthcare workers vulnerable to mental health problems.[7] According to different meta-analyses, healthcare workers all over the world displayed high levels of depression, anxiety, worry, insomnia, and burnout during the COVID-19 pandemic.[8–11] In addition, multiple studies revealed the presence of posttraumatic stress

disorder (PTSD)[10–17] in this population, one of the most common psychological adverse effects in persons exposed to traumatic, unpredictable, uncontrollable, and life-threatening situations such as working in health disasters.[18–20] Posttraumatic stress disorder includes intrusive thoughts about the traumatic event, reexperience, avoidance behaviors, feelings of depersonalization and hopelessness, and symptoms of hyperactivity and hypervigilance. All of which can generate high levels of distress and significant difficulties in functioning that can persist in the long term.[11,21,22]

In Spain, the National Government created the Psychological First Aid Service during the first wave (March to May 2020), a telephone hotline for healthcare workers and the general public.[23] The profiles of the healthcare workers who used this service the most were women and young people with symptoms of anxiety and depression. To comprehend the psychological impact on frontline workers in Spain during the first wave, Rodríguez-Rey et al[24] conducted a study between March and June 2020. According to the results, 49.8% felt depressed and 73.6% displayed posttraumatic stress symptoms [PTSSs]. Different studies that were subsequently conducted confirmed this impact on healthcare workers in Spain, having found that a quarter to almost half of all healthcare workers fulfilled the criteria for PTSD diagnosis.[25–27]

This work is a continuation of the research conducted by Rodríguez-Rey et al[24] and is intended to study the evolution of the mental health status (PTSSs and levels of sadness) of healthcare workers in Spain between the first and second waves of the COVID-19 pandemic. In addition, it studies the work-related and personal variables related to PTSSs in the second wave, to establish possible predictive hypotheses. Finally, it seeks to study the incidence of other possible psychological consequences of the pandemic that emerge after an elevated and continuous exposure to negative events, such as burnout and depression.

Burnout is defined as the inability to deal with emotional stress caused by work, as well as the excessive consumption of energy by a person faced with a work situation that provokes feelings of failure and exhaustion.[28] It has three dimensions: emotional exhaustion, depersonalization, and the lack of personal accomplishment.[29] Numerous studies have found high levels of emotional exhaustion and depersonalization in healthcare workers during the pandemic,[7,8,30,31] with personal accomplishment functioning as a protective factor.[32] In a study conducted in Spain, 57.5% of healthcare workers surveyed stated that they felt more burnout at work since the onset of the pandemic.[33] With regard to the symptoms of depression, different studies have shown that more than 46% of all healthcare workers in Spain have suffered symptoms of depression during the COVID-19 pandemic.[7,24]

The literature on the subject shows different sociodemographic variables linked to PTSSs in the context of the COVID-19 pandemic, especially being a woman and being a young adult.[8,24,27,34,35] Also noteworthy are work-related variables such as working as a nurse,[6,8,16] caring for COVID-19 patients or patients dying from the disease,[8,14,18,24] and working more than usual.[24,34] Other influential variables are isolation due to quarantine,[14] worrying about being infected or infecting a partner,[6,7,24] separation from loved ones and family to avoid putting them at risk,[36] feelings of loneliness,[15,37] and having suffered COVID-19.[24,38] Finally, higher levels of PTSSs have been

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detected in individuals who have COVID-19 and in those who feel that they require psychological support but have no time to receive it.[38]

Regarding the personal variables that predict mental health in crisis situations, resilience[7,39] and coping strategies[40] are noteworthy. Resilience, defined as a process of positive adaptation undertaken by the person when faced with significantly adverse experiences, has proven to be a relevant protection factor against PTSSs, burnout, anxiety, and depression in healthcare workers.[7,40] Certain factors such as social support, staying informed, and reducing isolation by maintaining online contact boost resilience against COVID-19.[36] Persons who score high in resilience levels usually display less physical and psychological distress and have improved interpersonal relationships.[7,39] Conversely, coping strategies, defined as cognitive and behavioral changes made by a person to cope with those changes that are beyond their resources,[41] have proven to have significant weight in predicting symptoms of burnout and PTSD in healthcare workers.[40] According to Lazarus and Folkman,[41] there are two types of coping strategies: (a) problem oriented, which seek to take action against the situation and solve the problem, and (b) emotion oriented, whose goal is to reduce the distress caused by the stressful situation. Prior studies have found that the use of the first type is linked to better mental health, whereas greater use of the second type contributes to aggravating PTSSs[15] and burnout.[40]

In this study, we conducted a follow-up during the second wave (November to December 2020) of the same professionals who were surveyed during the first wave (March to June 2020) in the study by Rodríguez-Rey et al.[24] The goal was to study the mental health evolution of healthcare workers, comparing their PTSS levels in both waves. We also sought to study the relationship between PTSSs and different variables including sociodemographic variables, work-related variables, worries, levels of resilience, and coping strategies. In addition, we explored the prevalence of burnout and depression, and the reception of psychological aid.

MATERIALS AND METHODS

Participants

The participants were healthcare workers active in Spain during the COVID-19 pandemic. They were from all over Spain (26 different provinces), most of them from Madrid (48.3%), Barcelona (8%), Badajoz (7.2%), and Valencia (6.1%). All of them completed a questionnaire at two moments: the first (T1) between March and June 2020, and the second (T2) between November and December 2020. A total of 269 healthcare workers (48.70% nursing personnel, 32.39% physicians, and 18.96% other healthcare workers) participated at T1, and the results were compiled and published in Rodríguez-Rey et al.[24] Of these, 58 healthcare workers (average age, 41.10 years; SD, 11.48; 89.7% women; Table 1) participated at T2, of whom 43.1% were nursing personnel and 29.4% were physicians. The remaining participants were pharmacists, technicians, orderlies, and psychosocial professionals.

Procedure

The study was approved by the University Ethics Committee, which coordinated the study. The participants' anonymity and confidentiality were guaranteed. Contact was established with those participants who had explicitly consented at T1 to be surveyed in a second data collection (N = 150), by means of the contact details provided by them (text message to mobile phones or email). They were provided a numeric code, which they had to enter in the survey and was used to match their responses from T2 to those from T1. All the participants gave their informed consent before accessing the questionnaire. The data were collected on the Limesurvey platform between 27 November and 9 December 2020, and 58 responses (38.66%) were received.

Instruments

Instruments of the First Assessment (T1)

Sociodemographic Data

The participants provided information on their age, sex, province of residence, civil status, level of education, and number of children below the age of 16 years or dependents.

Work-Related Data

The professionals were asked about their professional position (physician, nurse, other), their prior experience working in crisis situations, if they were working more than usual, the degree to which they thought they were working as a team, and the availability and access to

TABLE 1. Descriptive Data on Sociodemographic Variables of the Sample (N = 58) and their Association With PTSSs at T2

Variable	n (%)	M (SD) PTSSs	t/F	P	g/η^2
Sex			−2.32	0.02	0.99
Male	6 (10.3)	27.67 (17.51)			
Female	52 (89.7)	47.12 (19.62)			
Civil status			1.19	0.31	0.04
Single	15 (25.9)	42.67 (19.97)			
Married or cohabiting with partner	33 (56.9)	48.39 (18.50)			
Divorced	10 (17.2)	37.90 (25.16)			
Level of education			1.20	0.32	0.10
Primary education	1 (1.7)	75			
High-school education	2 (3.4)	37 (15.56)			
Vocational training	9 (15.5)	48.11 (17.66)			
University education	37 (63.8)	46.70 (20.76)			
Master's degree	8 (13.8)	35.13 (19.12)			
Doctorate	1 (1.7)	25			
Children or dependents			−1.74	0.09	0.50
Yes	16 (27.6)	52.44 (18.22)			
No	42 (72.4)	42.31 (20.39)			
	M (SD)	Pearson r	P		
Age	41.10 (11.48)	0.02	0.88		

Differences in mean level between categories of dichotomous variables were assessed via t test, and Hedges g effect size statistic was obtained (interpretation: negligible < 0.20 < small < 0.50 < medium < 0.80 < large). For multiple-category variables, one-way analyses of variance were used, and the effect size was assessed via η_f^2 (interpretation: negligible < 0.01 < small < 0.06 < medium < 0.14 < large).

personal protective equipment. They were also asked if they had attended to COVID-19 patients (diagnosed, critical, deceased).

Clinical Data

The participants were asked if they had been infected with COVID-19 and if they had taken diagnostic tests for the disease, as well as the result: negative, active infection, or past infection. They were also asked if they knew someone who had died of COVID-19.

Perception of Seriousness and Worries

Their perception of the severity of the pandemic situation was assessed on a Likert scale of 0 to 10. They were also asked about their degree of worry (none or not much, some, much, a great deal) regarding different aspects of their work during the health crisis (fear of infecting themselves or others, fear of not knowing how to handle the situation, etc).

Impact of Event Scale—Revised

The Impact of Events Scale—Revised (IES-R) is a self-administered questionnaire consisting of 22 items that assesses subjective distress during the last 7 days experienced by the person after a traumatic event.[42,43] The response scale is formed by a five-point Likert scale from 0 (none or almost none) to 4 (a lot). This questionnaire measures the three main symptoms that are characteristic of PTSD: avoidance, intrusion, and hypervigilance. The total score is obtained from the sum of the scores. The IES-R has been validated for the Spanish population,[44,45] displaying acceptable psychometric properties. According to the criteria used in previous studies on the Chinese[46] and Spanish[24] general population, the results were divided according to the cutoff points in the questionnaire for normal (0–23), mild (24–32), moderate (33–36), and severe (> 37) psychological impact. Like the first stage of the study,[24] the survey questions were adapted to the circumstances of the COVID-19 health crisis. The internal consistency of the scores was acceptable for the three subscales (avoidance, $\alpha = 0.83$; intrusion, $\alpha = 0.86$; hyperarousal, $\alpha = 0.83$) and for the total scale ($\alpha = 0.92$).

Indicators of Sadness

Two questions were asked: (1) "How did you feel during the last week?", on a scale of 0 (not sad at all) to 10 (very sad), which has displayed an appropriate sensitiveness to detecting emotional distress,[47] and (2) "Do you feel depressed?" (with three response choices: yes, maybe, and no), which has been shown to be of use in detecting depression with a sensitivity of 88% when the responses "yes" and "maybe" are combined.[48]

Brief Resilience Scale

It is a self-administered questionnaire that measures personal capacity to bounce back from stressful events.[49] It consists of six items with a five-point Likert scale ranging from 1 (fully disagree) to 5 (fully agree). The higher the score, the greater the resilience. The scores of the Spanish version of this questionnaire have shown to be reliable, valid, and sensitive.[50] In this study, the internal consistency was $\alpha = 0.91$.

Coping Strategies

It is an ad hoc questionnaire for this study developed from the Situational Coping Questionnaire for Adults[51] with the goal of assessing the degree to which healthcare workers make use of eight coping strategies against life difficulties. The questionnaire includes an item to assess each of these strategies, with a five-point Likert response scale, from 1 (fully disagree) to 5 (fully agree). This instrument had been used previously to assess coping strategies in healthcare workers.[40] The questionnaire used in this study includes four strategies to assess emotion-oriented coping (rumination, emotional expression, self-blaming, and self-isolation) and four to assess problem-oriented

coping (seeking help, thinking avoidance, problem solving, and positive thinking).

Instruments of the Second Assessment (T2)

The following instruments used at T1 were once again used at T2: IES-R, indicators of sadness, perception of seriousness, and clinical variables. In addition, the following data were collected.

Work-Related Data

Participants were asked if they had changed units at any time during the health crisis, if the number of hours worked during the last 7 days had increased, and if they were attending to COVID-19 patients at that time (if yes, then they were asked if these were critical patients or dying from the disease). They were also asked if they had a vacation period of at least 7 consecutive days and for how long.

Isolation

They were asked if they had distanced themselves from their family members and friends for fear of infecting them and if, for the same reason, they had had to isolate themselves or change residences. They were also asked if they felt isolated because of this situation.

Psychological Care

It was assessed if they had received any type of psychological care because of the coronavirus crisis.

Brief Patient Health Questionnaire—Screen for Depression

It is a two-item scale that has been proved to be a useful screening tool to measure depression.[52] By means of two questions, it determines the frequency (0, never; 1, several days; 2, more than half of the days; 3, almost every day), during the last 2 weeks, of (1) a loss of interest in routine activities and (2) being in a depressed state of mind.[53] When the scores exceed a cutoff point higher than or equal to 3, they show a sensitivity of 83% and a specificity of 90% in detecting major depressive disorder. The internal consistency of the scores was acceptable ($\alpha = 0.88$).

Maslach Burnout Inventory—Human Services Survey

It is a 22-item questionnaire that measures burnout as a syndrome of emotional exhaustion, depersonalization, and low personal accomplishment.[54] The responses were collected by means of a seven-point Likert scale, from 0 (never) to 6 (everyday). The cutoff points for the dimension of emotional exhaustion are between 15 and 24 (the score is low if it is below 15 and high if it is above 24); for depersonalization, they are between 4 and 9; and for personal accomplishment, between 33 and 39.[54] These cutoff points have been used by professionals in pediatric intensive care in Spain.[40] The scores of this instrument have shown acceptable validity and internal consistency.[55] In this study, the internal consistency of the scores was acceptable for the subscales of emotional exhaustion, $\alpha = 0.83$, and personal accomplishment, $\alpha = 0.72$, but low/moderate for the subscale of depersonalization ($\alpha = 0.56$). Although other studies have reported low internal consistency of the scores of this dimension,[40,55] it is usually acceptable in most of them.[7,56–58]

Data Analysis

First, the Kolmogorov-Smirnov normality test was conducted on the PTSSs variable measured at T2. This variable displayed a normal distribution, and therefore, parametric analyses were performed to study its relationship with the rest of the assessed variables.

Next, we checked if there were differences between the characteristics of respondents who had participated at both T1 and T2 (N = 58) and those who had only participated at T1 (N = 211). The two samples were compared using Student t test on the basis of age, PTSSs, and degree of sadness (0–10) at T1. The χ^2 test was used to compare sex and the level of sadness assessed with the question "Do you feel depressed?".

TABLE 2. PTSSs and Levels of Sadness at T1 and T2 (N = 58)

PTSS (IES-R)	T1	T2			
Degrees of severity	n (%)	n (%)			
Severe	192 (73.3)	37 (63.8)			
Normal	24 (9.2)	9 (15.5)			
Moderate	12 (4.6)	3 (5.2)			
Mild	34 (13)	9 (15.5)			
	M (SD)	M (SD)	t	P	g
Total PTSSs	47.81 (15.37)	45.10 (20.18)	1.71	0.09	0.22
Dimensions of PTSSs					
Avoidance	2.08 (0.80)	1.99 (0.98)	1.06	0.29	0.14
Intrusion	2.40 (0.78)	2.22 (1.02)	2.00	0.05	0.26
Hyperarousal	2.05 (0.74)	1.95 (1.06)	1.06	0.29	0.14
	T1	T2			
Levels of Sadness	M (SD)	M (SD)	t	P	g
Sadness (0–10)	6.90 (2.33)	5.86 (2.74)	2.64	0.01	0.34
Feeling depressed	n (%)	n (%)			
No	133 (50.8)	23 (39.7)			
Maybe	93 (35.5)	23 (39.7)			
Yes	36 (13.7)	12 (20.7)			

Differences in mean level between categories of dichotomous variables were assessed via t test and Hedges g effect size statistic was obtained (interpretation: negligible < 0.20 < small < 0.50 < medium < 0.80 < large).

To study the evolution of PTSSs levels and sadness, the T1 and T2 scores of the 58 participants were compared with paired-samples t tests. To study the relationship of the potential protective and risk variables with PTSSs, independent-samples t tests were used for dichotomous predictors, one-way analyses of variance for categorical predictors of three or more categories, and Pearson correlations for quantitative predictors.

Finally, a multiple linear regression model was estimated to detect those variables that can be of the greatest help in the longitudinal prediction of PTSSs. The stepwise regression method was used to estimate the model, which identifies the variables with a significant effect while considering the rest of the covariables and the shared variance between them, thus optimizing the explanatory potential of the model. Variables that had shown to be related to PTSSs in previous analyses were introduced as predictive variables. The possibility of multicollinearity between predictors was explored using tolerance values lower than 20 and variance inflation factor values higher than 10.[59] The values found indicated that there were no problems of multicollinearity. Likewise, the normality, homocedasticity, and outliers of the model's residuals were checked with Cook distance, and no problem was detected.

RESULTS

Homogeneity of Samples (T1 vs T1-T2)

There were no statistically significant differences between those who completed only T1 (N = 211) and those who completed T1 and T2 (N = 58) for the variables age, sex, levels of sadness (yes/maybe/no), and PTSSs at T1 (all $P > 0.05$). However, there were significant differences in the item measuring the level of sadness on a scale of 1 to 10, as the respondents of both assessments had slightly higher scores (M = 6.90; SD, 2.33) than those who only responded to T1 (M = 6.15; SD, 2.45; $t = -2.07$, $P = 0.04$; small effect size of g, 0.31).

Mental Health of Healthcare Workers

Table 2 displays the scores for PTSSs and levels of sadness at T2 and its comparison with T1 scores, showing that 63.8% of the participants had severe levels of PTSSs at T2 and 20.7% stated that they felt depressed. There were no significant differences between the PTSS scores at T1 and T2. There were small effect sizes indicating a possible very small reduction in the scores for the intrusion dimension and the total PTSSs. Regarding levels of sadness, these were significant lower at T2. Table 3 displays the average scores obtained at T2 for the burnout and depression variables—51.7% of healthcare workers had high levels of depression and 79.3% had high scores for emotional exhaustion, 44.8% for depersonalization, and 46.6% for personal accomplishment.

Relationship Between PTSSs at T2 and Predictive Variables of T1 and T2

The variables of age, civil status, level of education, and having children below the age of 16 or other dependents were not significantly related to PTSSs at T2 (all $P > 0.05$; Table 1). However, the effect sizes for civil status, level of education, and having children or dependents were, respectively, small, medium, and medium, indicating the possible association of these variables to PTSSs. Sex was significantly associated with PTSSs—women (M = 47.12) showed higher scores for PTSSs than men (M = 27.67, $P = 0.02$), with a large effect size.

Table 4 displays the connections between PTSSs at T2 and work-related, clinical, and social and psychological support variables measured at T1. The only variable that showed a significant relationship with PTSSs at T2 was having attended patients who died of COVID-19 at T1, with a medium effect size. Nursing staff and those professionals who at T1 had no access or insufficient access to protective equipment or felt that they were working as a team much or a great deal showed a tendency to feel worse than the rest of the professionals, in the three cases with a medium effect size. Lastly, with small effect sizes, there was a tendency to show more PTSSs at T2 if the professional (during T1) had no work experience in previous health crises, perceived to be working more than usual, had taken care of COVID-19 patients (especially critically ill patients), or had received a positive COVID-19 test result.

Table 5 shows the correlations between PTSSs at T2 and worries, coping strategies, and resilience assessed at T1. The most prevalent concern was that of "infecting my loved ones with coronavirus." The concerns

TABLE 3. Burnout (MBI-HSS) and Depression (PHQ-2) in Healthcare Workers in T2

Scale	M (SD)	n (%)
Burnout		
Emotional exhaustion	33.86 (10.47)	
High		46 (79.3%)
Medium		9 (15.5%)
Low		3 (5.2%)
Depersonalization	8.26 (5.87)	
High		26 (44.8%)
Medium		15 (25.9%)
Low		17 (29.3%)
Personal accomplishment	36.76 (6.35)	
High		27 (46.6%)
Medium		17 (29.3%)
Low		14 (24.1%)
Depression	2.86 (1.86)	
High		30 (51.7%)
Low		28 (48.3%)

MBI-HSS, Maslach Burnout Inventory—Human Services Survey; PHQ-2, Patient Health Questionnaire—Screen for Depression.

TABLE 4. Descriptive Data on Work-Related Variables and Clinical Variables of T1 and their Relationship With PTSSs at T2

Variables	n (%)	M (SD)	t/F	P	g/η^2
					PTSSs at T2
Profession			1.95	0.15	0.07
Physician	11 (18.96)	37.73 (19.40)			
Nurse/nurse's aide	33 (56.89)	49.51 (16.82)			
Other	14 (24.13)	40.50 (26.10)			
Previous work in other crises			1.18	0.25	0.31
No	31 (53.45)	48.00 (19.19)			
Yes	27 (46.55)	41.78 (21.12)			
Working more than usual			−0.93	0.35	0.24
Yes	30 (51.72)	47.50 (21.16)			
No	28 (48.27)	42.54 (19.11)			
Perception of teamwork*			2.98	0.06	0.10
None or not much	1 (1.72)	66.00			
Some	5 (8.8)	24.60 (20.84)			
Much	21 (36.8)	47.76 (19.04)			
A great deal	31 (54.4)	45.94 (19.59)			
Access to personal protective equipment			1.63	0.21	0.06
No	1 (1.72)	49.00			
Yes, but insufficient	41 (70.69)	48.00 (18.00)			
Yes, all that is necessary	16 (27.59)	37.44 (24.43)			
COVID-19 patient care			−0.49	0.63	0.20
Yes	51 (87.93)	45.59 (20.38)			
No	7 (12.07)	41.57 (19.77)			
Critical COVID-19 patient care			−1.62	0.11	0.42
Yes	33 (56.90)	48.79 (21.12)			
No	25 (43.10)	40.24 (18.14)			
Deceased COVID-19 patient care			−2.37	0.02	0.61
Yes	30 (51.72)	50.93 (20.10)			
No	28 (48.28)	38.86 (18.64)			
COVID-19 test*			0.44	0.65	0.02
No	39 (68.4)	44.38 (18.83)			
Yes, negative result	13 (22.8)	45.92 (23.81)			
Yes, positive result	5 (8.8)	53.40 (22.23)			
No comment	1 (1.72)	21.00			

Differences in mean level between categories of dichotomous variables were assessed via *t* test and Hedges *g* effect size statistic was obtained (interpretation: negligible < 0.20 < small < 0.50 < medium < 0.80 < large). For multiple-category variables, one-way analyses of variance were used, and the effect size was assessed via η^2 (interpretation: negligible < 0.01 < small < 0.06 < medium < 0.14 < large).

*This analysis of variance has been calculated excluding the categories with less than five participants.

that were most related to PTSSs were "the high level of stress and pressure at work," "fear of contracting coronavirus at my workplace," and "the environment of fear of infection at work." Regarding coping, all emotion-oriented strategies were linked to greater PTSSs (especially self-isolation, rumination, and emotional expression). The only problem-oriented strategy linked to lower PTSSs was positive thinking, whereas thinking avoidance was linked to higher PTSSs. Finally, the perception of seriousness of the COVID-19 health crisis and the levels of resilience measured at T1 were not linked to PTSSs at T2.

Finally, Table 6 displays the connections between PTSSs at T2 with work-related, clinical, and social and psychological support variables assessed at T2. There were significantly greater PTSSs in those participants who attended critical patients (medium effect size) and patients who died of COVID-19 (large effect size) during the second wave. The rest of the variables did not show any significant relation to PTSSs. However, inspection of effect sizes points to some possible associations. Displaying mild symptoms of COVID-19 and knowing someone who had died of COVID-19 were linked to more PTSSs with medium effect sizes. Similarly, distancing from family and friends for fear of infecting them and feelings of isolation showed small-medium effect sizes. It is worth pointing out that 89.7% of the participants stated that they felt more isolated from their surroundings because of the pandemic and 93.1% had to distance themselves from their friends and family for fear of infecting them. Finally, with small effect sizes,

working more than usual, changing residence so as not to infect their families, the length of vacation, the results of a COVID-19 test, and receiving in psychological care were linked to more PTSSs. Only 22.4% of the participants received psychological care.

Regression Analysis

The stepwise multiple linear regression generated a final model with three predictive variables with a significant effect ($F = 12.90$, $P < 0.001$, $R = 0.65$, $R^2 = 0.42$), which accounted for 39% of the variance of the scores for PTSSs at T2 (R^2 adjusted = 0.39). The three variables were worry due to high level of stress and pressure at work ($\beta = 0.31$, $t = 2.68$, $P = 0.01$), fear of getting infected ($\beta = 0.29$, $t = 2.54$, $P = 0.01$), and emotional expression ($\beta = 0.28$, $t = 2.50$, $P = 0.02$).

DISCUSSION

The central goal of this study was to explore the evolution of PTSSs and the levels of sadness in a group of healthcare workers between the first and second COVID-19 waves in Spain, as well as to explore the prevalence of burnout and depression, and the predictive variables of PTSSs. The most important finding was that PTSSs were severe for more than 60% of the participants, and they did not seem to diminish between T1 and T2. These results may be due to the fact that these professionals continued to be exposed to traumatic situations in

TABLE 5. Mean and Pearson Correlation Between Concerns, Resilience, and Coping Strategies (T1) With Symptoms of Posttraumatic Stress (T2) (PTSSs)

	Correlation With PTSSs	*M* (SD)
Concerns		
Not prepared emotionally	0.37*	1.56 (0.86)
Not sufficiently trained	0.30**	1.49 (0.84)
Not "up to it" at work	0.38*	1.50 (0.90)
Getting infected with coronavirus at my workplace	0.49*	2.01 (0.88)
The environment of fear of infection among coworkers	0.48*	1.93 (0.80)
Infecting my loved ones with coronavirus	0.31*	2.72 (0.52)
Not knowing how long this situation will last	0.48**	2.37 (0.70)
How this situation may affect me psychologically	0.43*	1.97 (0.79)
The high level of stress and pressure at work	0.50*	2.00 (0.80)
That my family is worried for me	0.34*	2.27 (0.71)
Having to take difficult decisions	0.42*	1.99 (0.75)
Make a mistake at work that may harm someone	0.32**	2.37 (0.69)
Being unable to attend all the patients	0.29*	2.26 (0.80)
Unable to provide sufficient emotional support	0.23	2.28 (0.75)
Lack of information	0.25	2.11 (0.82)
Receiving protocols that change constantly	0.22	2.37 (0.70)
Coping strategies		
Emotion-oriented coping		
Rumination	0.45*	3.17 (0.78)
Self-isolation	0.47*	2.26 (0.89)
Emotional expression	0.44*	2.13 (0.83)
Self-blame	0.37*	2.16 (0.91)
Problem-oriented coping		
Thinking avoidance	0.32**	2.89 (0.73)
Help seeking	0.00	2.82 (0.75)
Problem solving	0.07	3.02 (0.56)
Positive thinking	−0.33**	3.15 (0.56)
Resilience	−0.21	18.92 (2.82)
Perception of severity	0.26**	45.10 (0.32)

*$p < 0.01$; **$p < 0.05$.

their work environment at T2. However, these participants displayed lower levels of sadness in the second wave, compared with the first wave. Although there may have been a certain degree of adaptation to these new circumstances,[60] it must be pointed out that more than 50% of the participants showed high levels of depression. All of this confirms that the effects of the pandemic on their mental health are long-lasting[16] and highlights the lack of early intervention regarding the mental health status of healthcare workers.

Apart from PTSSs and depression, participants also displayed high levels of burnout, which is concerning, given the impact of these symptoms upon professional performance.[29,61] For this reason, it is important to implement psychological interventions aimed at enabling emotional expression, managing anxiety, sadness, and stress, and learning self-care, to reduce burnout.[62,63] Conversely, it was found that almost half of all participants had high levels of personal accomplishment. Huang et al[64] consistently found that, even in highly complicated working situations during the pandemic, nursing staff had feelings of altruism and professional responsibility. It appears that, despite everything, the feeling of helping has a certain protective effect.[32]

With regard to the factors influencing the appearance of PTSSs, although many of the variables that affected the mental health of healthcare workers at T1[24] have not shown significant a long-term influence at T2 (such as access to Personal Protective Equipment, among others), other variables have demonstrated a long-lasting effect. Our results are consistent with the literature that reports more symptoms in women than in men,[8] in this case with a large effect size. It would

appear to be important to continue to research the variables that are responsible for these sex-based differences to identify areas of intervention.

Another noteworthy result, consistent with previous research,[65,66] is the association between PTSSs and having attended critical patients at T2 or patients who died of COVID-19 at T1 or T2. The exceptional circumstances that characterize this pandemic have been responsible for families being unable to accompany their loved ones who are gravely ill, and many persons have died alone.[67] This circumstance has been especially difficult for healthcare workers who have witnessed this reality,[68] and it has made their role in end-of-life care more important than ever before. Given that they often do not feel prepared to undertake this role,[69] it is essential to impart training regarding end of life, grief, and communication skills, so they may establish a sincere, continuous, and effective communication with the patient and their families.[70] In addition, to do so at the least possible emotional cost, it is important to promote their self-care.[71]

With regard to the social and family aspect, most participants (93.1%) had distanced themselves from their friends and family for fear of infection and almost 90% felt isolated. These variables showed small-medium effect sizes but were not significantly related to PTSSs, possibly because of the low number of participants who responded that they had not distanced themselves ($n = 4$) nor did they feel isolated ($n = 6$). However, worries such as fear of infecting loved ones were indeed related to PTSSs, in line with previous research.[64] The fear of contagion reduces the possibility of accessing social support, which is relevant considering that prior studies have established a significant relationship between isolation and PTSSs[65] and have underlined the importance of social support for maintaining good mental health.[68,72] Thus, further research on these effects in larger samples is required, hypothesizing that prolonged isolation or a feeling of continued isolation may indeed exacerbate the impact of the working conditions of these healthcare workers on their mental health.

Other worries that have been linked to greater levels of PTSSs are the fear of not knowing how to deal with the situation and the environment of tension and uncertainty at work. These worries were also foremost among healthcare workers in previous studies,[64] apart from others such as fear of lack of preparation[72] and working in extremely tense situations.[65] Having an elevated perception of seriousness regarding the health crisis has also been shown to be linked to greater PTSD symptomatology, which may contribute to a greater awareness of the lethal nature of the virus and therefore cause greater fear.[64] The fears expressed by healthcare workers are important variables to be considered when developing programs that can help to manage them effectively, increasing their perception of control.[65]

With regard to the impact of resilience, it showed a nonsignificant relation with PTSSs, contrary to previous literature,[7,40] which may be due to the small sample size in this study. Concerning coping, this study is in line with previous studies,[40,60,64] as it demonstrates that participants with more PTSSs were those who used emotion-oriented strategies, specifically rumination, self-isolation, emotional expression, and self-blaming. With reference to problem-oriented strategies, participants who used positive thinking showed less PTSSs. This result is consistent with prior research,[8,60,73] which highlights positive appraisal as one of the most adaptive strategies and a protective factor against stress.[74] It is important to be aware of the usefulness of this coping strategy in the context of COVID-19 to develop interventions focused on helping healthcare workers to positively reappraise the situation.[8,75] This may be achieved by means of cognitive-behavioral therapy, which has techniques that are specially geared toward a cognitive restructuring that may be useful in helping healthcare workers to implement more effective coping strategies.[60]

However, positive thinking was the exception in this study regarding the usefulness of problem-oriented coping. Although research shows them as more adaptive in healthcare workers,[40] the rest of the strategies have not contributed to reducing PTSSs in this study. According to previous research,[60] the effectiveness of different strategies

TABLE 6. Descriptive Data on Work-Related Variables, Clinical Variables, and Social and Psychological Support Variables Assessed in T2 and Their Relationship With PTSSs at T2

Work-Related Variables	PTSSs at T2				
	n (%)	M (SD)	t/F	P	g/h²
Change of unit because of the crisis			−0.34	0.74	0.12
Same unit as usual	49 (84.5)	44.71 (18.82)			
It has changed	9 (15.5)	47.22 (27.75)			
Working more hours than usual last week			0.83	0.41	0.22
Yes	25 (43.1)	47.64 (20.56)			
No	33 (56.9)	43.18 (19.98)			
COVID-19 patient care			−0.45	0.66	0.13
Yes	40 (69)	44.30 (21.41)			
No	18 (31)	46.89 (17.57)			
Critical COVID-19 patient care			2.14	0.04	0.67
Yes	17 (42.5)	52.35 (19.83)			
No	23 (57.5)	38.35 (20.96)			
Deceased COVID-19 patient care			3.26	0.002	1.02
Yes	18 (45)	55.22 (16.96)			
No	22 (55)	35.36 (20.80)			
No. vacation days (n = 56)*			0.50	0.69	0.03
1 wk	11 (19.6)	42.09 (25.86)			
1–2 wk	16 (28.6)	49.75 (19.46)			
2–3 wk	11 (19.6)	41.45 (16.81)			
More than 3 wk	18 (31.2)	44.83 (17.97)			
Clinical variables					
COVID-19 test result (n = 56)†			1.00	0.38	0.04
Active virus	5 (9.1)	48.20 (21.76)			
Had the virus in the past, but not anymore	12 (21.8)	38.08 (18.97)			
Negative	38 (69.1)	46.79 (19.17)			
No comment‡	1 (1.8)				
Displayed COVID-19 symptoms			2.22	0.12	0.08
No	28 (49.1)	41.46 (20.77)			
Yes, but mild ones	21 (36.8)	51.43 (17.67)			
Ill with COVID, but not hospitalized	8 (14)	37.25 (19.27)			
No comment[3]	1 (1.7)				
Know someone personally who died of COVID-19			1.60	0.21	0.06
No	13 (22.4)	36.46 (18.46)			
Yes, someone close to me	15 (25.9)	46.60 (21.65)			
Yes, an acquaintance, but not a very close one	30 (51.7)	48.10 (19.72)			
Social and psychological support					
Distancing from family members and friends for fear of infecting them			1.14	0.26	0.59
Yes	54 (93.1)	45.93 (18.55)			
No	4 (6.9)	34 (38.51)			
Changing residence for fear of infection			0.88	0.39	0.29
Yes	11 (19)	49.91 (17.13)			
No	47 (81)	43.98 (20.83)			
Feeling of isolation			1.15	0.26	0.49
Yes	52 (89.7)	46.13 (19.31)			
No	6 (10.3)	36.17 (27.07)			
Psychological care due to the crisis			0.73	0.49	0.03
No	45 (77.6)	43.56 (19.54)			
Yes, but I was already undergoing treatment before the crisis	5 (8.6)	46.60 (20.98)			
Yes, I have received psychological care due to the crisis	8 (13.8)	52.88 (24.06)			

Differences in mean level between categories of dichotomous variables were assessed via *t* test, and Hedges *g* effect size statistic was obtained (interpretation: negligible < 0.20 < small <0.50 < medium < 0.80 < large). For multiple-category variables, one-way analyses of variance were used, and the effect size was assessed via *h²* (interpretation: negligible < 0.01 < small < 0.06 < medium < 0.14 < large).

*Only the 56 persons who mentioned having a vacation period were included, excluding 2 who did not.

†Only the 56 persons who mentioned having taken a COVID-19 test were included, excluding 2 who did not.

‡This analysis of variance has been calculated excluding the categories with less than five participants.

depends on the characteristics of the traumatic situation. It is possible that the uncertainty and uncontrollability that characterize this health crisis is affecting the active search for solutions. Furthermore, thinking avoidance was in fact linked to more PTSSs. This may be because thinking avoidance as a coping strategy may overlap with the avoidance symptoms that are characteristic of PTSD.

A noteworthy point is that, despite the significant impact of the health crisis on the mental health of healthcare workers, most of them had not received psychological aid. This may be due to the scarcity of resources for psychological support or the lack of demand by the healthcare workers. Some barriers that prevent them from asking for help are fear of being judged, finding it difficult to recognize their own vulnerabilities,[76] or lacking the time to access this service.[38] It is important for healthcare workers to have access to resources for psychological support, as well as information on the signs that permit them to recognize that they need help.[77] It is also necessary to normalize the

need for psychological aid when faced with the extreme difficulty of the situations experienced during the pandemic, to reduce the attached stigma and to motivate them to seek help without feeling less professional for doing so.

Although the difference was not significant, possibly because of the small subsample size, the average PTSS scores seem to indicate that nursing staff are especially vulnerable, which is consistent with some prior research.[8,64] Spending more time with patients, directly witnessing their suffering, may explain why these professionals are more affected.[73] There were also other nonsignificant mean differences with small or medium effect sizes, indicating possible relationships between PTSSs at T2 and some variables at T1 or T2 that may have not emerged because of the small sample size of this study. These variables were civil status, level of education, having children or other dependents, insufficient access to protective equipment, intense teamwork, not having work experience in previous health crises, working more hours than usual, taking care of COVID-19 patients (especially critical patients), the results of a COVID-19 test, displaying mild symptoms of COVID-19, knowing someone who had died of COVID-19, distancing from family and friends, feelings of isolation, changing residence to protect their families, the length of vacation, and receiving in psychological care. Future research should elucidate their role in PTSSs prediction with larger samples.

Finally, given that only three variables were detected in this study (worry due to the high level of stress and pressure at work, fear of infection, and emotional expression as coping strategy) that can predict 39% of the variance of PTSSs, these questions must be used for screenings to detect especially vulnerable staff and to offer them specialized aid. Performing mass screenings of healthcare workers and providing feedback on their psychological health could help them to be aware of their own vulnerability. This could be easily implemented by means of apps or websites, either at the national, regional, or institutional level and professionals with greater vulnerability may be recommended to seek help, along with accessible resources and a message that normalizes what is happening to them and ensures confidentiality.

The main limitation of this study was that the T2 sample was of a reduced size. In this sense, working with participants who were highly affected at that time by the effects of the pandemic may have played a role in the low rate of participation in the T2 assessment. Considering the small and medium effect sizes that emerged but were nonsignificant, it is very likely that the small sample size impacted the ability of the analyses to detect significant associations between variables. Therefore, future research should conduct longitudinal studies with larger samples and longer follow-up times, to explore the long-term impact of working during the COVID-19 pandemic. Another caveat was that participants were mostly women, although this did not impact the sample representativeness of the population given the predominance of women in healthcare professions.[8] Nevertheless, it would be interesting to overrepresent male professionals in future research to study possible differences and to ensure the general applicability of the results to the male group. Another pending task for future studies is the study of those variables that predict burnout and depression, as well as assessing if the coping strategies used change over time. Also, as a population highly affected by the COVID-19 in the psychological area, healthcare workers may display posttraumatic growth, which should be addressed in future research.

To conclude, the results show that the mental health of healthcare workers has been greatly affected. Therefore, it is important to pay special importance to how this impact may be alleviated and prevented, by developing screening and psychological support programs and initiatives that focus on emotional management, managing worries, equipping them with coping strategies such as the positive reassessment of the situation, training in related topics (eg, end of life, grief) that give them greater confidence and security, and the search for ways to ensure family and social support. These resources must be accessible to palliate symptoms and to promote the psychological well-being of those who have cared for people's health during the COVID-19 crisis.

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