

RESEARCH REPORT  
RELATO DE PESQUISA

Health Psychology  
*Psicologia da Saúde*

Editor

João Carlos Caselli Messias

Conflict of interest

The authors declare they have no conflict of interests.

Received

October 2, 2020

Approved

August 15, 2022

# Symptoms of post-traumatic stress disorder and affects in healthcare workers during the COVID-19 pandemic

## *Sintomas de transtorno de estresse pós-traumático e afetos em profissionais da saúde durante a pandemia da COVID-19*

Jefferson Luiz Pereira<sup>1</sup> , Sofia Marques Viana Ulisses<sup>1</sup> , Omar Moreira Del Bianco<sup>1</sup> , Katerina Lukasova<sup>2,3</sup> 

<sup>1</sup> Pontifícia Universidade Católica de São Paulo, Programa de Estudos Pós-Graduados em Psicologia, Departamento de Psicologia Clínica. São Paulo, SP, Brasil.

<sup>2</sup> Universidade Federal do ABC, Departamento Centro de Matemática, Computação e Cognição. São Bernardo do Campo, SP, Brasil.

<sup>3</sup> The National Institute of Science and Technology on Behavior, Cognition, and Teaching (INCT-ECCE). São Paulo, SP, Brasil. Correspondence to: K. LUKASOVA. E-mail: <katerina.lukasova@ufabc.edu.br>.

**How to cite this article:** Pereira, J.L., Ulisses, S.M.V., Del Bianco, O.M., & Lukasova, K. (2023). Symptoms of post-traumatic stress disorder and affects in healthcare workers during the COVID-19 pandemic. *Estudos de Psicologia (Campinas)*, 40, e200213. <https://doi.org/10.1590/1982-0275202340e200213>

### Abstract

#### Objective

This study aimed to evaluate symptoms of post-traumatic stress disorder and affects in health professionals during the COVID-19 pandemic.

#### Method

Three hundred and seventy-four health professionals, among which 235 were front-line and 139 non-front-line workers, answered an online questionnaire consisting of socio-demographic data, identification of past mental disorders, personal experience facing the pandemic, the Impact of Event Scale, and the Positive and Negative Affect Schedule. The sample consisted mainly of physicians and nursing staff aged between 30 and 49 years.

#### Results

The results demonstrate high scores of symptoms related to post-traumatic stress disorder, with greater expressiveness among front-line professionals, especially in the nursing staff, and a strong correlation of these results with negative affects.

#### Conclusion

Psychological assistance and interventions directed to health professionals are urgent to mitigate the impacts caused by the COVID-19 pandemic.

**Keywords:** Affect; COVID-19; Healthcare workers; Post-traumatic stress disorders.

### Resumo

#### Objetivo

Este estudo objetivou avaliar sintomas de transtorno de estresse pós-traumático e afetos em profissionais de saúde durante a pandemia da COVID-19.



**Método**

Trezentos e setenta e quatro profissionais da área da saúde, dentre os quais 235 profissionais que estavam atuando na linha de frente e 139 que não estavam na linha de frente, responderam a um questionário online composto por dados sociodemográficos, identificação de transtornos mentais pregressos, experiência pessoal frente à pandemia e Escala do Impacto do Evento e Escala de Afetos Positivos e Afetos Negativos. A amostra foi composta majoritariamente de médicos e funcionários da equipe de enfermagem com idades entre 30 e 49 anos.

**Resultados**

Os resultados demonstram altas pontuações de sintomas relativos ao transtorno de estresse pós-traumático, com maior expressividade nos profissionais da linha de frente, principalmente na equipe de enfermagem, e forte correlação desses resultados com afetos negativos.

**Conclusão**

O atendimento e intervenções psicológicas direcionadas aos profissionais de saúde são urgentes para mitigar os impactos causados pela pandemia da COVID-19.

**Palavras-chave:** Afeto; COVID-19; Profissionais de saúde; Transtornos de estresse pós-traumáticos.

Considered an international public health emergency, the pandemic caused by the new Coronavirus Disease 2019 (COVID-19) began in December 2019 in the Chinese city of Wuhan and quickly spread across the world. Several psychological impacts have been observed not only due to the risk of contamination but also to the drastic changes in the routine and interpersonal relationships resulting from social isolation measures (Chen et al., 2020; Faro et al., 2020; Holmes et al., 2020; Ornell et al., 2020). Given this critical situation, front-line healthcare workers are among the population at the greatest risk of developing psychological disorders and other psychiatric symptoms (Gallopini et al., 2020; Lai et al., 2020).

High stress rates among healthcare professionals, including symptoms of Post-Traumatic Stress Disorder (PTSD), have been described in previous studies as possible consequences of epidemics (Lee et al., 2018; Wu et al., 2009). Depression, anxiety, insomnia, and distress also have a high prevalence among health professionals who treat patients with COVID-19. Notably, working on the front line is a risk factor that predicts worse mental health outcomes (Gallopini et al., 2020; Lai et al., 2020). Stress conditions to which healthcare professionals are exposed can lead to misconduct, absenteeism, and increased costs for medical institutions, factors that can negatively affect patients' health and treatment (Kim et al., 2018; Ornell et al., 2020). Thus, it is important to recognize this population as a target for immediate and continuous psychological and psychiatric care in infectious diseases outbreaks with high mortality rates (Lee et al., 2018).

The psychological impact of stressful events related to such outbreaks can be mediated by the perceptions regarding these events and the affective states related to them (Wu et al., 2009). Previous studies on PTSD in other circumstances showed that the severity of traumatic stress was accompanied by negative affectivity, which was also associated with aversive memories of traumatic events (Morina & von Collani, 2006; Samuelson et al., 2017).

Several studies have already highlighted that the protection of healthcare professionals, as well as physical and psychological care, are important public health measures to tackle the COVID-19 pandemic (Holmes et al., 2020; Lai et al., 2020; Li et al., 2020). However, despite researchers' growing efforts at international levels, studies regarding the impact on the mental health of these professionals in Brazil are still scarce. Therefore, this study aimed at assessing the symptoms of post-traumatic stress disorder and affects among healthcare workers during the COVID-19 outbreak in Brazil.

## Method

### Design and Participants

This cross-sectional study was carried out during the COVID-19 pandemic from May 17, 2020, to June 9, 2020. The study was approved by the Ethics Committee of the Federal University of ABC, in Santo André (Brazil), CAAE nº 31645220.4.0000.5594, approval nº 4.030.276. Data were collected through a website ([www.pesquisacovid.com.br](http://www.pesquisacovid.com.br)) with a self-reported questionnaire. All respondents provided informed consent.

Study participants included physicians, nursing staff, physiotherapists, occupational therapists, psychotherapists, technicians, pharmacists, dentists, community health agents, nutritionists, and speech therapists. When recruiting participants, it was emphasized that the focus of the study was on front-line healthcare professionals who were working directly with patients with suspected or confirmed contamination by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). However, there was a high number of non-front-line respondents, and thus, two groups were defined: a group of front-line healthcare workers (named FL group) and a group of non-front-line healthcare workers (named NFL group).

### Instrument

Sociodemographic data included information on the age, sex, marital status, city, and state where the participants work, the people in the same household, the specific profession, and whether the institution they work in is private or public. The profession variable was categorized as doctors, nursing staff (nurses, technicians, and assistants), physical therapists, and others.

To control the existence of mental disorders before the pandemic, the participants responded whether they had been previously diagnosed (before March 2020) with any psychiatric disorder (depression, anxiety disorders, phobias, etc.). Those who answered “yes” were asked to specify the disorder diagnosed by a psychiatrist and the treatment pursued (if applicable).

Regarding their personal experience with the COVID-19 pandemic, the participants answered whether they worked directly with the treatment of patients with suspected or confirmed cases of COVID-19; whether they had been infected by the virus; whether the work institution provided or made available any psychological support service to the healthcare staff during the pandemic; and whether they believed that the psychological distress caused by the COVID-19 pandemic affects the performance of the services provided by health professionals. Finally, the self-perception regarding the main psychological impacts during the pandemic was accessed through the question: “In your personal experience, what changes have caused the most discomfort or psychological suffering since the beginning of the COVID-19 pandemic?”. For this question, the participant selected a maximum of two options out of a total of 12 items.

To track the symptoms of PTSD, the instrument used was the reduced version of the Impact of Event Scale - Revised (IES-R) validated for the Brazilian population (Caiuby et al., 2012). The instrument consists of a list of 22 items that describe difficulties that the person may have experienced in the last seven days due to a specific stressful life event. In the case of this study, the event was the occurrence of COVID-19. These items are grouped into 3 subscales (IES-R Avoidance, IES-R Intrusion, and IES-R Hyperarousal) that cover the PTSD assessment criteria published in the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV) (American Psychiatric Association, 1994). Answers are given on a Likert scale ranging from 0 (Not at all) to 4 points

(Extremely). The total score of the scale ranges from 0 to 88 points and the score for each of the three subscales is obtained by calculating the mean score of the questions for each of them.

The negative and positive affects were assessed with the Positive and Negative Affect Schedule (PANAS) validated in Brazil (Carvalho et al., 2013; Otsuka Nunes et al., 2019). This instrument lists ten Positive Affects (PANAS PA) and ten Negative Affects (PANAS NA). For each item, the participant answers how much he or she experienced that state in the last seven days on a Likert scale ranging from 1 (Not at all or very little) to 5 five points (Extremely). The score for each type of affect ranges from 10 to 50 points and is obtained by adding each of the 10 corresponding items.

## Data Analysis

The data were analyzed with the software IBM® SPSS® (version 25). Data were considered statistically significant when  $p$ -value  $< 0.05$ .

The comparison between the groups regarding categorical variables was performed using Fisher's exact test or the chi-square test, in the case of tables with a contingency greater than  $2 \times 2$ . The comparison between the means of the two groups was performed using the t-test and their respective effect size (Cohen's  $d$ ), in the case of  $p$ -value  $< 0.05$ .

Pearson's correlation analysis was performed to examine the relationship between the numerical variables. The effect size interpretation was carried out as proposed by Evans (1996): very weak (from 0.00 to 0.19); weak (from 0.20 to 0.39); moderate (from 0.40 to 0.59); strong (from 0.60 to 0.79); and very strong (from 0.80 to 0.99). Only the correlations with Pearson's  $r$  value greater than or equal to 0.2 were maintained. Possible relationships between categorical variables were verified using the chi-square test; between the numerical and categorical variables, the calculation of the point-biserial correlation coefficient (dichotomous categorical variable) and the ANOVA test (categorical variable with three or more categories) were used, followed by the *post-hoc* analysis with Bonferroni correction. Finally, a multiple linear regression analysis was performed between the variables with the highest correlation values (Pearson's  $r$ ).

## Results

A total of 445 people answered the online questionnaire. Of these, 36 participants were excluded for not being health professionals and 35 for having a psychiatric diagnosis and undergoing drug treatment at the time of the research. The final sample of the study comprised 374 health professionals, of which 235 are front-line healthcare workers (FL group) and 139 are non-front-line workers (NFL group).

As described in Table 1, the groups showed similarities regarding sex, marital status, and household; and differences in the age, region of the country, profession, and type of institution ( $p$ -value:  $\leq 0.003$ ). The FL group had a lower mean age (38.2;  $SD$ : 8.65) than the NFL group (42.4;  $SD$ : 10.50). Most participants are female (FL: 80.4%; NFL: 84.9%) and live in the Southeastern region of Brazil. Most respondents are married (FL: 57.4%; NFL: 65.5%) and live with their partner and/or children (FL: 67.6%; NFL: 66.9%). Physicians and nursing staff made up 83.0% of the participants in the FL group and 69.1% in the NFL group. The category "others", in the FL group, corresponds to psychologists, technicians, health agents, and speech therapists, while in the NFL group this same category corresponds to dentists, psychologists, technicians, pharmacists, nutritionists, and occupational therapists.

**Table 1**  
Sociodemographic characteristics

Variables	FL (n = 235)		NFL (n = 139)		p-value
	n	%	n	%	
Age					
20 - 29	36	15.3	15	10.8	<0.001 <sup>a</sup>
30 - 39	107	45.4	41	29.5	
40 - 49	70	30.0	47	33.8	
50 - 72	22	9.3	36	25.9	
Gender					
Female	189	80.4	118	84.9	0.17 <sup>b</sup>
Male	46	19.6	21	15.1	
Marital status					
Single	74	31.5	34	24.5	0.31 <sup>a</sup>
Married	135	57.4	91	65.4	
Divorced, separated, or widowed	26	11.1	14	10.1	
Brazilian macroregion					
North	19	8.1	3	2.2	0.003 <sup>a</sup>
Northeast	40	17.0	15	10.8	
Midwest	17	7.2	3	2.2	
Southeast	143	60.9	102	73.3	
South	16	6.8	16	11.5	
Household					
Partner and/or children	159	67.6	93	66.9	0.41 <sup>a</sup>
Relatives	43	18.3	33	23.7	
Alone or with friends	33	14.1	13	9.4	
Profession					
Physician	57	24.3	39	28.1	< 0.001 <sup>a</sup>
Nursing staff	138	58.7	57	41.0	
Physiotherapist	17	7.2	7	5.0	
Other	23	9.8	36	25.9	
Type of institution					
Public	135	57.4	69	49.6	0.001 <sup>a</sup>
Private	60	25.6	46	33.1	
Both public and private	40	17.0	24	17.3	

Note: <sup>a</sup>Chi-square test; <sup>b</sup>Fisher's exact test.

FL: Front-Line Healthcare Workers; NFL: Non-Front-Line Healthcare Workers.

Regarding the infection with SARS-CoV-2, most participants did not know if they had been infected (FL: 71.9%; NFL: 74.8%) and a smaller proportion had had a confirmed diagnosis (FL: 11.1%; NFL: 6.5%) or a negative test result (FL: 17.0%; NFL: 18.7%) by laboratory tests (Table 2). Participants reported that their work institutions, in general, did not implement any psychological support system for the employees during the pandemic (FL: 49.8%; NFL: 54.0%). In institutions with psychological support, the reported adherence was low (FL: 50.2%; NFL: 46.0%). Nevertheless, most participants (FL: 87.2%; NFL: 86.3%) recognized that the quality of services provided by healthcare professionals was likely to be affected by the psychological impact of the COVID-19 pandemic.

Regarding the changes that caused discomfort or psychological distress since the beginning of the pandemic, in the FL group, the top-scored items were the concern with transmitting the

virus, the distance from family members, physical/psychosomatic changes, and concerns about contracting the virus. In the NFL group, the same items were more prevalent; however, the concern about contracting the virus appeared first, and the concern about transmitting the virus in fourth place. These two items were the only ones that showed a statistically significant difference between the groups ( $p$ -value: 0.004;  $< 0.001$ , respectively).

**Table 2***Personal experience with the COVID-19 outbreak*

Question	FL (n = 235)		NFL (n = 139)		p-value
	n	%	n	%	
Has been infected with SARS-CoV-2?					
Yes (laboratorial diagnosis)	26	11.1	9	6.5	
No (laboratorial diagnosis)	40	17.0	26	18.7	0.04 <sup>a</sup>
I do not know	169	71.9	104	74.8	
Did your work institution provide or make available any psychological support service to the healthcare staff during the pandemic?					
No	117	49.8	75	54.0	
Yes (low adhesion)	79	33.6	27	19.4	0.01 <sup>a</sup>
Yes (high adhesion)	39	16.6	37	26.6	
Do you believe that the psychological distress caused by the COVID-19 pandemic affects the performance of the services provided by health professionals?					
No	5	2.1	1	0.7	
Yes	205	87.2	120	86.3	0.47 <sup>a</sup>
Maybe	25	10.7	18	12.9	
In your personal experience, what changes have caused the most discomfort or psychological suffering since the beginning of the COVID-19 pandemic?					
Concerns about transmitting the virus	112	47.7	46	33.1	0.004 <sup>b</sup>
Distance from family	70	29.8	39	28.1	0.41 <sup>b</sup>
Physical/psychosomatic changes	67	28.3	28	20.1	0.05 <sup>b</sup>
Concerns about contracting the virus	58	24.5	59	42.4	$< 0.001$ <sup>b</sup>
Concerns about workplace environment	38	16.0	26	18.7	0.31 <sup>b</sup>
COVID-19 deaths	33	14.0	23	16.5	0.30 <sup>b</sup>
Hostility of the population towards health professionals	22	9.3	6	4.3	0.10 <sup>b</sup>
Changes in leisure or entertainment habits	11	4.7	5	3.6	0.42 <sup>b</sup>
Relationship concerns	9	3.8	8	5.8	0.44 <sup>b</sup>
Distance from friends	7	3.0	9	6.5	0.12 <sup>b</sup>
Changes in physical activity	5	2.1	5	3.6	0.51 <sup>b</sup>
Changes in religious activity	4	1.7	1	0.7	0.66 <sup>b</sup>

Note: <sup>a</sup>Chi-square test; <sup>b</sup>Fisher's exact test.

FL: Front-Line Healthcare Workers; NFL: Non-Front-Line Healthcare Workers; SARS-CoV-2: Severe Acute Respiratory Syndrome Coronavirus 2.

Table 3 shows that in the PANAS, the groups had similar results regarding positive affect (mean: 28.6 and 27.6;  $p$ -value: 0.20). The FL group had a higher score on negative affect compared to the NFL group (mean: 28.0 and 25.3;  $p$ -value: 0.004). The self-perceived symptoms of PTSD, accessed by the IES-R, had higher scores in the FL group compared to the NFL group in Total (FL: 39.0; NFL: 32.4;  $p$ -value: 0.001) and in all subscales: Intrusion (FL: 1.89; NFL: 1.56;  $p$ -value: 0.001), Avoidance (FL: 1.60; NFL: 1.38;  $p$ -value: 0.007), and Hyperarousal (FL: 1.84; NFL: 1.49;  $p$ -value: 0.001).

**Table 3**

Comparison of the prevalence of affects and symptoms of Post-Traumatic Stress Disorder between groups

Instrument	FL (n = 235)		NFL (n = 139)		p-value <sup>a</sup>	Effect size	
	M (SD)	95% CI	M (SD)	95% CI		<i>d</i> <sub>Cohen</sub>	95% CI
PANAS							
PA	28.6 (7.87)	27.6, 29.6	27.6 (6.89)	26.4, 28.7	0.20	-	-
NA	28.0 (8.90)	26.9, 29.2	25.3 (8.63)	23.8, 26.7	0.004	0.31	0.10, 0.52
PANAS (highest scores)							
Alert	3.61 (0.97)	3.48, 3.73	3.45 (1.01)	3.28, 3.62	0.14	-	-
Attentive	3.60 (1.03)	3.46, 3.73	3.54 (0.99)	3.37, 3.71	0.61	-	-
Afraid	3.49 (1.25)	3.33, 3.65	3.15 (1.26)	2.94, 3.36	0.01	0.27	0.06, 0.48
Active	3.43 (1.10)	3.29, 3.57	3.32 (1.05)	3.14, 3.49	0.33	-	-
Jittery	3.31 (1.15)	3.16, 3.46	2.88 (1.27)	2.67, 3.10	0.001	0.36	0.15, 0.57
Distressed	3.26 (1.30)	3.10, 3.43	2.96 (1.21)	2.76, 3.17	0.03	0.24	0.03, 0.45
Upset	3.23 (1.28)	3.07, 3.40	2.86 (1.22)	2.66, 3.07	0.006	0.29	0.08, 0.50
Nervous	3.18 (1.25)	3.02, 3.34	2.85 (1.21)	2.65, 3.05	0.01	0.27	0.06, 0.48
Determined	3.16 (1.22)	3.00, 3.31	3.05 (1.14)	2.86, 3.24	0.40	-	-
Irritable	3.06 (1.29)	2.89, 3.22	2.71 (1.25)	2.50, 2.92	0.01	0.27	0.06, 0.48
IES-R							
Intrusion	1.89 (0.93)	1.77, 2.01	1.56 (0.90)	1.40, 1.71	0.001	0.36	0.15, 0.57
Avoidance	1.60 (0.75)	1.51, 1.70	1.38 (0.78)	1.25, 1.51	0.007	0.29	0.08, 0.50
Hyperarousal	1.84 (0.98)	1.71, 1.97	1.49 (0.98)	1.33, 1.66	0.001	0.36	0.15, 0.57
Total	39.0 (17.7)	36.7, 41.2	32.4 (17.6)	29.5, 35.4	0.001	0.37	0.16, 0.59

Note: <sup>a</sup>t test.

CI: Confidence Interval; FL: Front-Line Healthcare Workers; IES-R: Impact of Event Scale - Revised; NFL: Non-Front-Line Healthcare Workers; NA: Negative Affects; PA: Positive Affects; PANAS: Positive and Negative Affect Schedule.

Associations between the sociodemographic characteristics and the scores of the two scales evidenced that the nursing staff of the FL group had a higher IES-R Total score when compared to the other professionals in this group, especially physicians ( $p$ -value < 0.001).

The correlations between the scores of IES-R and PANAS are described in Table 4. The PANAS NA scale had a positive and strong correlation with the IES-R Total, the IES-R Intrusion, and the IES-R Hyperarousal variables. A positive and moderate correlation was found between the IES-R Avoidance and the PANAS NA. Due to the strong correlation between the PANAS NA and the IES-R Total, the correlation between the PANAS NA items and the total PTSD-related symptoms was tested. The highest correlation was found for nervousness, distress, and fear. Conversely, hostility, guilt, and shame indicated weak correlations with the IES-R Total. A negative and weak correlation between the IES-R Hyperarousal and the PANAS PA occurred only in the FL group.

Based on the results of the strongest correlations only in the FL group, statistical models were verified to determine which offered the best fit for the total IES-R score. Linear regression analysis showed a better explanatory model only with the PANAS NA as an explanatory variable ( $\beta = 0.73$ ;  $t = 16.326$ ;  $p < 0.001$ ). This analysis resulted in a statistically significant model ( $F_{1,233} = 145.9$ ;  $p$ -value < 0.001). Negative affects were responsible for 53.2% of the variance of the IES-R Total (adjusted  $R^2$ ). The regression coefficient was 1.449 (95% CI: 1.274 to 1.624), showing that for each point of variation on the PANAS NA scale, there is a variation of 1.449 points on the IES-R Total scale.

**Table 4**Correlations between numerical variables ( $p$ -value  $< 0.05$ ;  $r \geq 0.2$ )

Variable 1	Variable 2	FL (n = 235)		NFL (n = 139)	
		r*	95% CI	r*	95% CI
IES-R Total	PANAS NA	0.73	0.63, 0.76	0.70	0.60, 0.77
IES-R Intrusion	PANAS NA	0.70	0.61, 0.74	0.65	0.54, 0.73
IES-R Avoidance	PANAS NA	0.52	0.40, 0.59	0.55	0.42, 0.65
IES-R Hyperarousal	PANAS NA	0.77	0.69, 0.80	0.71	0.62, 0.78
IES-R Hyperarousal	PANAS PA	-0.25	-0.35, -0.11	-	-
IES-R Total	PANAS NA - Nervous	0.67	0.59, 0.73	0.58	0.49, 0.66
IES-R Total	PANAS NA - Distressed	0.62	0.54, 0.70	0.65	0.57, 0.72
IES-R Total	PANAS NA - Afraid	0.61	0.52, 0.68	0.64	0.56, 0.71
IES-R Total	PANAS NA - Scared	0.60	0.51, 0.68	0.57	0.47, 0.65
IES-R Total	PANAS NA - Jittery	0.60	0.51, 0.68	0.67	0.59, 0.73
IES-R Total	PANAS NA - Upset	0.54	0.44, 0.63	0.50	0.40, 0.59
IES-R Total	PANAS NA - Irritable	0.50	0.40, 0.59	0.42	0.31, 0.52
IES-R Total	PANAS NA - Hostile	0.38	0.27, 0.49	0.34	0.23, 0.45
IES-R Total	PANAS NA - Guilty	0.37	0.26, 0.48	0.37	0.25, 0.47
IES-R Total	PANAS NA - Ashamed	0.35	0.24, 0.46	0.27	0.14, 0.38

Note: \*Correlation is significant at the 0.01 level (two-tailed).

CI: Confidence Interval; FL: front-line healthcare workers; IES-R: Impact of Event Scale - Revised; NFL: non-front-line healthcare workers; NA: Negative Affects; PA: Positive Affects; PANAS: Positive and Negative Affect Schedule; r: Pearson coefficient.

## Discussion

This is the first observational study to address PTSD-related symptoms in healthcare workers, associating them with affects, during the COVID-19 pandemic in Brazil. In general, the investigated population had a high rate of PTSD-related symptoms, with the average score on the IES-R being significantly higher than those obtained in studies with healthcare workers from other locations during the COVID-19 pandemic (Chew et al., 2020; Lai et al., 2020). Among the different health professionals in the FL group, the nursing staff was the most vulnerable, which is understandable considering the timeline and the context of the data collection, when there was an exponential growth of the accumulated cases of COVID-19 in Brazil, with the imminent threat of the hospital care system collapse. These factors may have contributed to the results of this study (Damas et al., 2020). The specific characteristics of the healthcare context in Brazil and the different levels of complexity in which health professionals operate also stand out in the face of the crisis, revealing weaknesses in the country's healthcare system (Ornell et al., 2020). Brazil offers a universal health system that aims to provide equal access to all its citizens. Despite that, the country is characterized by strong socioeconomic disparities which impose different working conditions and require different levels of attention in healthcare support.

Health professionals' display of stress symptoms derived from work has already been pointed out in different contexts (Hetzl-Riggin et al., 2019; Leonelli et al., 2017), however, the pandemic situation stands out as a risk factor for the emergence or intensification of these symptoms (Lee et al., 2018; Wu et al., 2009), with a greater impact on front-line workers (Lai et al., 2020; Schmidt et al., 2020). The present study reinforces these findings with the results that showed the highest IES-R scores in the FL group when compared to the NFL group, with most professionals from the former group demonstrating the presence of PTSD-related symptoms at an intensity level of possible suppression of the immune system (Asukai et al., 2002; Kawamura et al., 2001). These symptoms tend to persist even after the pandemic (Lee et al., 2018; Wu et al., 2009).

The presence of PTSD-related symptoms in healthcare workers highlights the need for implementing psychological care for these professionals to prevent negative outcomes such as increasing medical errors, caused by neurocognitive deficits (Scott et al., 2015), and a rise in the number of sick leaves due to possible mental disorders. Additionally, high levels of PTSD symptoms can increase the vulnerability to contagion due to a possible change in the immune system (Olf & van Zuiden, 2017; Ryder et al., 2018). The psychological impact caused by pandemic-imposed stress may be associated with an increase in physiological symptoms in these professionals (Chew et al., 2020). Physical or psychosomatic symptoms were mentioned by 28.3% of the professionals in the FL group as a source of psychological distress since the beginning of the pandemic.

Concerns about transmitting or contracting the virus were mentioned by the participants as the main aspects causing discomfort or psychological distress since the beginning of the COVID-19 pandemic. High rates of morbidity and mortality and the sense of losing control increase the perception of vulnerability (Lai et al., 2020; Neto et al., 2020). The fear of transmitting the virus is based on the possibility of asymptomatic transmission (Chew et al., 2020) and the high rates of transmission among healthcare professionals (Adams & Walls, 2020). The present research showed that, for professionals in the FL group, the concern about transmitting the virus overrides any other triggering factor of psychological suffering, even the concern regarding contracting the virus.

As in other studies (Lai et al., 2020; Maunder et al., 2004; Tham et al., 2017), the present research demonstrated that the nursing staff in the FL group is more vulnerable to PTSD-related symptoms compared to the medical staff. In addition to long shifts, close and continuous contact with infected patients exposes nursing professionals to a greater risk of infection.

Another finding of the present study is an important correlation between negative affects and PTSD symptoms in both groups. A positive and strong correlation was verified between the IES-R Total and the negative affects. The same finding was demonstrated in a survey that investigated the impacts of trauma on survivors of the Kosovo civil war (Morina & von Collani, 2006). The psychological impacts on healthcare professionals during the COVID-19 pandemic exceed those that result from the stressors in healthcare work. It should also be noted that in the FL group, the linear regression analysis showed an explanatory model according to which negative affects, notably fear, distress, and nervousness, were responsible for more than 50% of the variance of the IES-R Total, highlighting that negative affects are mediators of self-perceived PTSD-related symptomatology. Self-assessments of a traumatic event and the way to deal with it directly influence the course and prognosis of PTSD (Samuelson et al., 2017), so it is important to prioritize strategies focused not only on information but mainly on those that assist in the management of affects.

Most participants reported that the psychological consequences of the COVID-19 pandemic might harm the performance of services provided by healthcare professionals. They also indicated that psychological support services to employees was not offered by the institutions where they work, not even in the face of an emergent pandemic situation, and in institutions with support systems, attendance by employees was low. It is, therefore, evident that Brazilian hospitals have not reacted adequately to design and implement the psychological support system to cope with this unprecedented situation imposed by the coronavirus outbreak.

This study showed that most participants were uncertain about whether they had been infected by the new coronavirus, which is yet another factor of insecurity and distress, especially for those on the front lines. General testing for COVID-19 has been low in Brazil, although it is evident that planning testing policy for healthcare workers can reduce the stress and insecurity of these professionals working close to the virus, thus attenuating PTSD symptoms.

The limitations of this study include the use of web surveys and the number of participants in each sample, hindering the generalization of our findings. Despite this, this study was based on the recommendations of good practices in conducting online questionnaires (Eysenbach, 2004). For future studies, it is recommended to use recruitment procedures and a larger sample that allows generalizations of the results (Boni, 2020). Finally, the need for longitudinal studies to monitor the evolution of PTSD symptoms in front-line health professionals during the current public health emergency is emphasized. Currently, a longitudinal follow-up is being carried out to assess the evolution of the reported PTSD symptoms in front-line health professionals in the persisting public health emergency.

## Conclusion

In summary, this study showed the urgent need for the implementation of mental health support measures, especially in times of public epidemics, to mitigate the impact of psychological distress and protect healthcare professionals. The absence of adequate support tends to aggravate the impact on mental health and the services provided by these professionals. The findings can support and guide actions promoted by health institutions, as well as government policies that prioritize the promotion of mental health care for workers who are on the front line, fighting the new coronavirus pandemic, as in other emergencies.

## References

- Adams, J.G., & Walls, R.M. (2020). Supporting the Health Care Workforce During the COVID-19 Global Epidemic. *JAMA*, 323(15), 1439-1440. <https://doi.org/10.1001/jama.2020.3972>
- American Psychiatric Association. (1994). *Diagnostic and Statistical Manual of Mental Disorders* (4th ed).
- Asukai, N., Kato, H., Kawamura, N., Kim, Y., Yamamoto, K., Kishimoto, J., Miyake, Y., & Nishizono-Maher, A. (2002). Reliability and validity of the Japanese-language version of the impact of event scale-revised (IES-R-J): Four studies of different traumatic events. *The Journal of Nervous and Mental Disease*, 190(3), 175-182. <https://doi.org/10.1097/00005053-200203000-00006>
- Boni, R.B.D. (2020). Web surveys in the time of COVID-19. *Cadernos de Saúde Pública*, 36(7), 1-4. <https://doi.org/10.1590/0102-311x00155820>
- Caiuby, A.V.S., Lacerda, S.S., Quintana, M.I., Torii, T.S., & Andreoli, S.B. (2012). Cross-cultural adaptation of the Brazilian version of the Impact of Events Scale-Revised (IES-R). *Cadernos de Saúde Pública*, 28, 597-603. <https://doi.org/10.1590/S0102-311X2012000300019>
- Carvalho, H.W., Andreoli, S.B., Lara, D.R., Patrick, C.J., Quintana, M.I., Bressan, R.A., Mari, J.J., & Jorge, M.R. (2013). Structural validity and reliability of the Positive and Negative Affect Schedule (PANAS): evidence from a large Brazilian community sample. *Brazilian Journal of Psychiatry*, 35(2), 169-172. <https://doi.org/10.1590/1516-4446-2012-0957>
- Chen, R., Liang, S., Peng, Y., Li, X., Chen, J., Tang, S., & Zhao, J. (2020). Mental health status and change in living rhythms among college students in China during the COVID-19 pandemic: a large-scale survey. *Journal of Psychosomatic Research*, 137, e110219. <https://doi.org/10.1016/j.jpsychores.2020.110219>
- Chew, N.W.S., Lee, G.K.H., Tan, B.Y.Q., Jing, M., Goh, Y., Ngiam, N.J.H., Yeo, L.L.L., Ahmad, A., Khan, F.A., Shanmugam, G.N., Sharma, A.K., Komalkumar, R.N., Meenakshi, P.V., Shah, K., Patel, B., Chan, B. P.L., Sunny, S., Chandra, B., Ong, J.J.Y., ...Sharma, V.K. (2020). A multinational, multicentre study on the psychological outcomes and associated physical symptoms amongst healthcare workers during COVID-19 outbreak. *Brain, Behavior, and Immunity*, 88, 559-565. <https://doi.org/10.1016/j.bbi.2020.04.049>

- Daumas, R.P., Silva, G.A., Tasca, R., Leite, I.C., Brasil, P., Greco, D.B., Grabois, V., & Campos, G.W.S. (2020). The role of primary care in the Brazilian healthcare system: Limits and possibilities for fighting COVID-19. *Cadernos de Saúde Pública*, 36(6), e00104120. <https://doi.org/10.1590/0102-311x00104120>
- Evans, J.D. (1996). *Straightforward statistics for the behavioral sciences*. Brooks/Cole Publishing Company.
- Eysenbach, G. (2004). Improving the quality of web surveys: the Checklist for Reporting Results of Internet E-Surveys (CHERRIES). *Journal of Medical Internet Research*, 6(3), e34. <https://doi.org/10.2196/jmir.6.3.e34>
- Faro, A., Bahiano, M.A., Nakano, T.C., Reis, C., Silva, B.F.P., & Vitti, L.S. (2020). COVID-19 and mental health: the emergence of care. *Estudos de Psicologia (Campinas)*, 37, e200074. <https://doi.org/10.1590/1982-0275202037e200074>
- Gallopeni, F., Bajraktari, I., Selmani, E., Tahirbegolli, I.A., Sahiti, G., Muastafa, A., Bojaj, G., Muharremi, V.B., & Tahirbegolli, B. (2020). Anxiety and depressive symptoms among healthcare professionals during the Covid-19 pandemic in Kosovo: a cross sectional study. *Journal of Psychosomatic Research*, 137, e110212. <https://doi.org/10.1016/j.jpsychores.2020.110212>
- Hetzel-Riggin, M.D., Swords, B.A., Tuang, H.L., Deck, J.M., & Spurgeon, N.S. (2019). Work Engagement and Resiliency Impact the Relationship Between Nursing Stress and Burnout. *Psychological Reports*, 123(5), 1835-1853. <https://doi.org/10.1177/0033294119876076>
- Holmes, E.A., O'Connor, R.C., Perry, V.H., Tracey, I., Wessely, S., Arseneault, L., Ballard, C., Christensen, H., Silver, R.C., Everall, I., Ford, T., John, A., Kabir, T., King, K., Madan, I., Michie, S., Przybylski, A.K., Shafran, R., Sweeney, A., ... Bullmore, E. (2020). Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science. *The Lancet Psychiatry*, 7(6), 547-560. [https://doi.org/10.1016/S2215-0366\(20\)30168-1](https://doi.org/10.1016/S2215-0366(20)30168-1)
- Kawamura, N., Kim, Y., & Asukai, N. (2001). Suppression of cellular immunity in men with a past history of posttraumatic stress disorder. *The American Journal of Psychiatry*, 158(3), 484-486. <https://doi.org/10.1176/appi.ajp.158.3.484>
- Kim, M.S., Kim, T., Lee, D., Yook, J.H., Hong, Y.C., Lee, S.Y., Yoon, J.H., & Kang, M.Y. (2018). Mental disorders among workers in the healthcare industry: 2014 national health insurance data. *Annals of Occupational and Environmental Medicine*, 30(1), e31. <https://doi.org/10.1186/s40557-018-0244-x>
- Lai, J., Ma, S., Wang, Y., Cai, Z., Hu, J., Wei, N., Wu, J., Du, H., Chen, T., Li, R., Tan, H., Kang, L., Yao, L., Huang, M., Wang, H., Wang, G., Liu, Z., & Hu, S. (2020). Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Network Open*, 3(3), e203976-e203976. <https://doi.org/10.1001/jamanetworkopen.2020.3976>
- Lee, S.M., Kang, W.S., Cho, A.-R., Kim, T., & Park, J.K. (2018). Psychological impact of the 2015 MERS outbreak on hospital workers and quarantined hemodialysis patients. *Comprehensive Psychiatry*, 87, 123-127. <https://doi.org/10.1016/j.comppsy.2018.10.003>
- Leonelli, L.B., Andreoni, S., Martins, P., Kozasa, E.H., Salvo, V.L., Sopezki, D., Montero-Marin, J., Garcia-Campayo, J., & Demarzo, M.M.P. (2017). Perceived stress among Primary Health Care Professionals in Brazil. *Revista Brasileira de Epidemiologia*, 20, 286-298. <https://doi.org/10.1590/1980-5497201700020009>
- Li, Z., Ge, J., Yang, M., Feng, J., Qiao, M., Jiang, R., Bi, J., Zhan, G., Xu, X., Wang, L., Zhou, Q., Zhou, C., Pan, Y., Liu, S., Zhang, H., Yang, J., Zhu, B., Hu, Y., Hashimoto, K., ... Yang, C. (2020). Vicarious traumatization in the general public, members, and non-members of medical teams aiding in COVID-19 control. *Brain, Behavior, and Immunity*, 88, 916-919. <https://doi.org/10.1016/j.bbi.2020.03.007>
- Maunder, R.G., Lancee, W.J., Rourke, S., Hunter, J.J., Goldbloom, D., Balderson, K., Petryshen, P., Steinberg, R., Wasylenki, D., Koh, D., & Fones, C.S.L. (2004). Factors Associated with the psychological impact of Severe Acute Respiratory Syndrome on nurses and other hospital workers in Toronto. *Psychosomatic Medicine*, 66(6), 938-942. <https://doi.org/10.1097/01.psy.0000145673.84698.18>
- Morina, N., & von Collani, G. (2006). Impact of War-Related Traumatic Events on Self-Evaluation and Subjective Well-Being. *Traumatology*, 12(2), 130-138. <https://doi.org/10.1177/1534765606294560>

- Neto, M.L.R., Almeida, H.G., Esmeraldo, J.D., Nobre, C.B., Pinheiro, W.R., de Oliveira, C.R.T., Sousa, I.C., Lima, O.M.M.L., Lima, N.N.R., Moreira, M.M., Lima, C.K.T., Gonçalves-Júnior, J., & da Silva, C.G.L. (2020). When health professionals look death in the eye: The mental health of professionals who deal daily with the 2019 coronavirus outbreak. *Psychiatry Research*, 288, 112972. <https://doi.org/10.1016/j.psychres.2020.112972>
- Olf, M., & van Zuiden, M. (2017). Neuroendocrine and neuroimmune markers in PTSD: Pre-, peri- and post-trauma glucocorticoid and inflammatory dysregulation. *Current Opinion in Psychology*, 14, 132-137. <https://doi.org/10.1016/j.copsyc.2017.01.001>
- Ornell, F., Halpern, S.C., Kessler, F.H.P., & Narvaez, J.C.M. (2020). The impact of the COVID-19 pandemic on the mental health of healthcare professionals. *Cadernos de Saúde Pública*, 36(4), e00063520. <https://doi.org/10.1590/0102-311x00063520>
- Otsuka Nunes, L.Y., Lemos, D.C.L., Ribas Júnior, R.C., Behar, C.B., & Santos, P.P.P. (2019). Psychometric analysis of PANAS in Brazil. *Ciências Psicológicas*, 13(1), 45-55. <https://doi.org/10.22235/cp.v13i1.1808>
- Ryder, A.L., Azcarate, P.M., & Cohen, B.E. (2018). PTSD and Physical Health. *Current Psychiatry Reports*, 20(12), 116. <https://doi.org/10.1007/s11920-018-0977-9>
- Samuelson, K.W., Bartel, A., Valadez, R., & Jordan, J.T. (2017). PTSD symptoms and perception of cognitive problems: The roles of posttraumatic cognitions and trauma coping self-efficacy. *Psychological Trauma: Theory, Research, Practice, and Policy*, 9(5), 537-544. <https://doi.org/10.1037/tra0000210>
- Schmidt, B., Crepaldi, M.A., Bolze, S.D.A., Neiva-Silva, L., & Demenech, L.M. (2020). Mental health and psychological interventions during the new coronavirus pandemic. *Estudos de Psicologia (Campinas)*, 37, e200063. <https://doi.org/10.1590/1982-0275202037e200063>
- Scott, J.C., Matt, G.E., Wrocklage, K.M., Crnich, C., Jordan, J., Southwick, S.M., Krystal, J.H., & Schweinsburg, B.C. (2015). A quantitative meta-analysis of neurocognitive functioning in posttraumatic stress disorder. *Psychological Bulletin*, 141(1), 105-140. <https://doi.org/10.1037/a0038039>
- Tham, K.Y., Tan, Y.H., Loh, O.H., Tan, W.L., Ong, M.K., & Tang, H.K. (2017). Psychological Morbidity among Emergency Department Doctors and Nurses after the SARS Outbreak. *Hong Kong Journal of Emergency Medicine*, 12(4). <https://doi.org/10.1177/102490790501200404>
- Wu, P., Fang, Y., Guan, Z., Fan, B., Kong, J., Yao, Z., Liu, X., Fuller, C.J., Susser, E., Lu, J., & Hoven, C.W. (2009). The psychological impact of the SARS epidemic on hospital employees in China: exposure, risk perception, and altruistic acceptance of risk. *Canadian Journal of Psychiatry. Revue Canadienne De Psychiatrie*, 54(5), 302-311. <https://doi.org/10.1177/070674370905400504>

## Contributors

J.L. PEREIRA, S.M.V. ULISSES, K. LUKASOVA, and O.P. DEL BIANCO were responsible for study conceptualization, data collection, and analysis. J.L. PEREIRA, S.M.V. ULISSES, and K. LUKASOVA were responsible for writing this paper. J.L. PEREIRA was responsible for data management and statistical analysis. J.L. PEREIRA and S.M.V. ULISSES reviewed the final version of this article.