

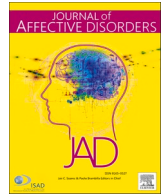


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Journal of Affective Disorders

journal homepage: www.elsevier.com/locate/jad

Potential predictors of depressive symptoms during the initial stage of the COVID-19 outbreak among Brazilian adults

A.A. Schmitt Jr.^{a,b,c,*}, Augusto Mádke Brenner^{a,b,c,d}, Lucas Primo de Carvalho Alves^{a,b,c}, Felipe César de Almeida Claudino^{a,b,c}, Marcelo Pio de Almeida Fleck^{a,b}, Neusa Sica Rocha^{a,b,c}

^a Center of Clinical Research, Center of Experimental Research, and Psychiatric Service Hospital de Clínicas de Porto Alegre (HCPA), Porto Alegre, RS Brazil

^b Post-Graduation Program in Psychiatry and Behavioral Sciences, Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre, Brazil

^c I-QOL Innovations and Interventions for Quality of Life Research Group, Brazil

^d Universidade Federal de Ciências da Saúde de Porto Alegre (UFCSA), Porto Alegre, Brazil

ARTICLE INFO

Keywords:

Depressive symptoms
COVID-19
Quarantine

ABSTRACT

Background: In early 2020, Sars-Cov-2 was identified in China as a new coronavirus. Due to its transmission, Sars-Cov-2 has spread rapidly across the world. In the early stage of the disease outbreak, psychiatric symptoms have been reported, including depressive symptoms. In this study, we assessed the prevalence of depressive symptoms in quarantine and its association with sociodemographic variables and known protective factors for depression, such as spirituality, social support, resilience, and quality of life.

Methods: A cross-sectional web-based questionnaire was distributed via social media. The instruments consisted of the 8-item EUROHIS-QOL, PHQ-9, Social Support Questionnaire, WHOQOL-SRPB, and CD-RISC.

Results: A total of 3,274 participants were included in this study. 23.67% of the participants met the criteria for a depressive episode. Higher age, spirituality, social support, resiliency, and quality of life were associated with less depressive symptoms. Quarantine length; mental health treatment; chronic disease; age; sex; lower levels of spirituality, social support, resilience, quality of life, physical exercise, and education; and unpaid occupation were found to be predictors of depressive symptoms during COVID-19 quarantine.

Limitations: The data are limited to the pandemic initial period, the sample isn't random and the use of self-reported questionnaires are some limitations of our study. **Conclusions:** During the initial phase of the COVID-19 outbreak in Brazil, quarantine time, treatment for mental health, chronic illness, lower levels of education, and unpaid occupation were positively associated with depressive symptoms. Age, sex, spirituality, social support, resilience, quality of life, and physical exercise showed a negative relationship with depressive symptoms.

1. Background

In December 2019, increasing pneumonia cases of unknown etiology were reported in Wuhan, which is the largest city in Central China (Li et al., 2020; The Lancet, 2020). In early January 2020, a new coronavirus (COVID-19) was identified as the cause of bronchoalveolar lavage fluid among patients in China (Roujian Lu*, Xiang Zhao*, Juan Li*, Peihua Niu*, Bo Yang*, Honglong Wu*, Wenling Wang, Hao Song, Baoying Huang, Na Zhu, Yuhai Bi, Xuejun Ma, Faxian Zhan, Liang Wang, Tao Hu, Hong Zhou, Zhenhong Hu, Weimin Zhou, Li Zhao, Jing Chen, Yao Meng, Ji Wang, Yang, Lu* et al., 2020). Due to its person-to-person transmission, COVID-19 has spread rapidly across the world (Rothe

et al., 2020). This situation has become a public health emergency of international interest and has required rapid, high-level, and coordinated effort to control the outbreak (Cucinotta and Vanelli, 2020). A significant number of deaths have been reported on all continents in this pandemic. In Brazil, the first case was confirmed on February 26, 2020, in São Paulo (SP). The first death from COVID-19 was recorded on March 17, 2020 (Brazil, 2020). In view of this scenario, social isolation measures were necessary to decrease the COVID-19 transmission worldwide and Brazil.

Isolation and quarantine are used to contain or minimize infectious disease outbreaks (Chuanyuan Kanga, Fu Menga, Qiang Fenga, Jing Yuanb, Liang Liuc, LiaXub, Shuran Yanga, Yujun Weib, Xudong Zhaoa,

* Corresponding author at: Federal University of Rio Grande do Sul. Address: Hospital de Clínicas de Porto Alegre, Postgraduate Program in Medical Sciences: Psychiatry, Universidade Federal do Rio Grande do Sul, Avenue Ramiro Barcellos, 2350, Porto Alegre, RS CEP 90035-903, Brazil

E-mail addresses: aschmittjr@gmail.com, asjunior@hcpa.edu.br (A.A. Schmitt).

<https://doi.org/10.1016/j.jad.2020.12.203>

Received 8 September 2020; Received in revised form 26 December 2020; Accepted 31 December 2020

Available online 6 January 2021

0165-0327/© 2021 Published by Elsevier B.V.

Jianzhong Yangb, Kanga et al., 2020). Isolation involves the separation of people who are infected with a contagious disease from those who are not sick. Quarantine involves the separation and restriction of movement of people who have been exposed to a contagious disease during the incubation period to see if they become sick (Giubilini et al., 2018). This restriction involves the confinement of individuals who may not be infected and forces people who have not been infected to be spatially close to those who have actually been infected. Social isolation might be mandated for people who have been exposed to a disease and refuse compulsory medical treatment (Lacey, 2003), as well as when such treatment is not available. Often, these restrictions involve not only physical confinement, but also emotional, spiritual, and cognitive isolation due to limitations in interactions with health workers, relatives, religious leaders, and others (Giubilini et al., 2018). A study using a web-based approach conducted in Vietnam in the second week of April 2020 to examine the influence of national social distance on quality of life and economic well-being showed that most individuals had lost family income, who were female, who had a chronic conditions and who were living in a family with 3 to 5 members were associated with worse quality of life under COVID-19 pandemic (Tran et al., 2020).

In the early stage of the COVID-19 outbreak in China, many psychiatric symptoms were reported, including depressive symptoms. A study conducted in Southeastern China in February 2020 showed that the prevalence of depression was approximately 14.6% among 1,593 participants, and the prevalence in the group affected by quarantine was significantly higher than in the unaffected group (Lei et al., 2020). In Italy, an online survey was administered in March 2020 to 2,766 participants, of which 15.8% scored very high on the DASS-21 depression subscale. This study also showed that lower levels of education, female sex, unemployment, not having a child, having a family member infected with COVID-19, and a history of stressful situations and medical problems were associated with higher levels of depression (Mazza et al., 2020). A systematic review including 19 studies was carried out in order to synthesize the results of the effects of COVID-19 on the psychological health of the population of some countries (China, Spain, Italy, Iran, the United States, Turkey, Nepal and Denmark) and its risk factors associated. In this study, relatively high rates of symptoms of anxiety, depression, post-traumatic stress disorder, psychological distress and stress were found. Female gender, younger age group, presence of chronic and psychiatric diseases, unemployment, student status and frequent exposure to social media and news about COVID-19 are the factors associated with measures of suffering. In Brazil, until now, this situation has not been well studied (Xiong et al., 2020).

The objective of this study was to assess the prevalence of depressive symptoms in quarantine through an online self-reported questionnaire. The study also assesses the association with sociodemographic variables and known protective factors for depression, such as spirituality, social support, resilience, and quality of life. Our hypothesis was that there was an increase in the prevalence of depressive symptoms in the initial stage of the COVID-19 outbreak. These results could help government institutions and health professionals to evaluate the need to protect the psychological wellbeing of communities during and after the COVID-19 outbreak.

2. Methods

2.1. Participants and protocols

We conducted a web-based questionnaire quality of life during social isolation due to the COVID-19 pandemic between April 14, 2020, and April 23, 2020. The questionnaire's design targeted the general population Brazil, particularly Southern Brazil, and we distributed it via social media. We used online resources so as not to contribute to the spread of Severe Acute Respiratory Syndrome Coronavirus 2 (Sars-Cov-2).

The inclusion of participants in the study was based on the sharing of the research protocol through a snowball method. The protocol

consisted of a questionnaire with seven sections for demographic data, the 8-item EUROHIS-QOL questionnaire (for quality of life) (Schmidt et al., 2006), the Patient Health Questionnaire (PHQ) (for depression and depressive symptoms), the Social Support questionnaire - MOS study (for social support) (Lopes, 2001), the abbreviated WHOQoL-SRPB (for spirituality), and the Connor-Davidson resilience scale (CD-RISC) (for resilience).

All questions were organized in Google Forms (Google, Mountain View, California, USA) to facilitate access by the participants. The main social media platforms utilized were Facebook and WhatsApp (Facebook Inc., Menlo Park, California, USA). All participants declared that they were older than 18 years, and the use of all data included was authorized by each participant through informed consent. Participation was anonymous and optional, and the participants were allowed to stop at any point. All answers were extracted into an Excel file. We considered that the patients present major depression, if they scored 2 or 3 in five of the 9 questions, with at least one positive question being either question 1 or 2.

2.2. Ethical statement

The present study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Committee of Hospital de Clínicas de Porto Alegre, Porto Alegre, Southern Brazil, as well as the Brazilian National Committee of Research Ethics under CAAE 30487620.7.0000.5327.

2.3. Statistical analyses

The subject's sociodemographic data were described using the means and standard deviations or frequencies. Association between predictors and depressive symptoms (evaluated through PHQ-9) were evaluated through Spearman's correlation and Mann-Whitney U tests or Kruskal-Wallis tests because the continuous variables in our sample had a non-parametric distribution. All predictors with a P-value lower than 0.2 were included in a multivariate analysis.

Quarantine length was considered as a dichotomized variable (higher than 30 days or lower or equal to 30 days). We used multiple linear regressions with the backwards method in a multivariate analysis of predictors of depressive symptoms during COVID-19 (quarantine length, age, sex, spirituality, social support, resilience, quality of life, mental health support, physical exercise, and chronic disease). The regression models were stopped when all predictors had a p-value <0.05 in both the main analysis and the stratified analysis.

We also noticed that a significant part of our sample had post-graduate or graduate education and had paid occupations. Thus, we performed a stratified analysis for these variables in order to evaluate their associations with quarantine and depressive symptoms. All data were considered statistically significant at $P < 0.05$. Statistical analyses were performed using the software SPSS version 24.0 (IBM Corporation, Armonk, NY, USA).

3. Results

A total of 3,274 participants filled out the online questionnaire and provided authorization for data inclusion in this study. Their sociodemographic data are presented in Table 1. The majority of participants were female (79.4%) and white (91.1%). The mean age was 42.39 years with a standard deviation of 13.41 years. Most of the participants were married or had a steady partner (62.7%), had a paid occupation (68.0%), and had post-graduate education (52.6%). Healthcare practitioners represented 31.8% of the sample, and 13 subjects were considered as suspect cases of COVID-19. The average quarantine length was 29.45 days with a standard deviation of 7.34 days.

There were 775 participants (23.67%) who met the criteria for a depressive episode according to the Patient Health Questionnaire. Their

Table 1
Sociodemographic variables of the sample.

Variable	Participants (n = 3,274)	Non-depressed participants (n = 2,499)	Depressed participants (n = 775)	P- value*
Age, mean (±SD)	42.39 (± 13.41)	44.05 (±13.36)	37.03 (±12.14)	<0.001
Sex, n (%)				<0.001
Male	707 (21.6)	591 (23.7)	116 (15.0)	
Ethnicity, n (%)				<0.001
White	2,962 (91.1)	2,286 (92.2)	676 (87.5)	
Non-white	290 (8.9)	193 (7.8)	97 (12.5)	
Marital status, n (%)				<0.001
Single	828 (25.7)	552 (22.5)	276 (36.0)	
Married or steady partner	2,021 (62.7)	1,586 (64.5)	435 (56.7)	
Separated or divorced	318 (9.9)	267 (10.9)	51 (6.6)	
Widowed	58 (1.8)	53 (2.2)	5 (0.7)	
Occupation, n (%)				<0.001
Retired due to disability	20 (0.6)	13 (0.5)	7 (0.9)	
Retired for length of services	332 (10.2)	301 (12.1)	31 (4.0)	
Paid occupation	2,213 (68.0)	1,727 (69.6)	486 (62.8)	
Housekeeper	119 (3.7)	90 (3.6)	29 (3.7)	
In sickness benefit	21 (0.6)	11 (0.4)	10 (1.3)	
Student	361 (11.1)	217 (8.8)	144 (18.6)	
Without occupation (not retired)	132 (4.1)	81 (3.3)	51 (6.6)	
Education, n (%)				<0.001
Incomplete elementary school	9 (0.3)	6 (0.2)	3 (0.4)	
Complete elementary school	9 (0.3)	7 (0.3)	2 (0.3)	
Incomplete high school	22 (0.7)	13 (0.5)	9 (1.2)	
Complete high school	208 (6.4)	145 (5.8)	63 (8.1)	
Incomplete bachelor's or equivalent	522 (16.0)	334 (13.5)	188 (24.3)	
Complete bachelor's or equivalent	773 (23.5)	586 (23.6)	187 (24.2)	
Post-graduation	1,711 (52.6)	1,389 (56.0)	322 (41.6)	
Healthcare practitioner, n (%)	1,041 (31.8)	794 (31.7)	247 (31.9)	0.948
Suspected case of COVID-19, n (%)	13 (0.4)	8 (0.3)	5 (0.6)	0.208
Presence of chronic disease, n (%)	540 (16.5)	388 (15.5)	152 (19.6)	0.007

Legends: SD = standard deviation.

* analyses between non-depressed and depressed participants.

mean age was 37.03 years, and the majority of them were female (85.0%), white (87.5%), married or had a steady partner (56.7%), had a paid occupation (62.8%), and had post-graduate education (41.6%). Of the depressed participants, 31.9% were healthcare practitioners, five were suspected of having COVID-19, and 19.6% had a chronic disease. In total, 13 participants were suspected of having COVID-19, and 38% of them met the criteria for a depressive episode.

According to the non-parametric correlation analysis, age ($\rho = -0.37$), spirituality ($\rho = -0.36$), social support ($\rho = -0.26$), resilience ($\rho = -0.49$), and quality of life ($\rho = -0.57$) had statistically significant

correlations (p-value <0.001) with depressive symptoms. We found significant differences of median PHQ scores (PHQm) among different groups of sex (male/female), ethnicity (white/non-white), marital status (single/married or steady partner/separated or divorced/widowed), occupation (retired/paid occupation/unpaid occupation), education (lower education/bachelor's and equivalent and post-graduate), mental health support (yes/no), physical exercise (yes/no), suspected cases of COVID-19 (yes/no), healthcare practitioners (yes/no), and chronic disease (yes/no). PHQ scores were higher for those who were female (PHQm = 9), non-white (PHQm = 10), single (PHQm = 10), unpaid (PHQm = 11), had elementary to high school education (PHQm = 11), had mental health support (PHQm = 9), had no physical exercise (PHQm = 10), and had a chronic disease (PHQm = 9) (Table 2).

A multivariate analysis on the predictors of depressive symptoms during COVID-19 quarantine was performed through linear regression, and the results are shown in Table 3. Quarantine length, age, sex (female reference), spirituality, social support, resilience, quality of life, mental health support, physical exercise, and chronic disease were associated with significant differences in PHQ scores. Quarantine length ($\beta = 0.03$), mental health treatment ($\beta = 0.07$), and chronic disease ($\beta = 0.03$) were considered as risk factors for depressive symptoms. Age ($\beta = -0.2$), male sex ($\beta = -0.12$), spirituality ($\beta = -0.09$), social support ($\beta = -0.07$), resilience ($\beta = -0.19$), quality of life ($\beta = -0.38$), and physical exercise ($\beta = -0.07$) were considered as protective factors against depressive symptoms.

The variables of education and occupation were stratified to analyze

Table 2
Non-parametric correlations and tests considering PHQ scores.

Variables	ρ^1	PHQ Median (IIQ) ²	P
Age	-0.37	-	<0.001
Spirituality	-0.36	-	<0.001
Social support	-0.26	-	<0.001
Resiliency	-0.49	-	<0.001
Quality of life	-0.57	-	<0.001
Gender	-		
Male		6 (3 – 11)	<0.001
Female		9(5 – 14)	
Ethnicity	-		
White		8 (5 – 13)	<0.001
Not-white		10 (6 – 16)	
Marital status	-		
Single		10 (6 – 16)	<0.001
Married or steady partner		8 (4 – 13)	
Separated or divorced		7 (3 – 11.25)	
Widowed		5.5 (2 – 9)	
Occupation	-		
Retired		5 (2 – 9)	<0.001
Paid occupation		8 (5 – 13)	
Unpaid occupation		11 (7 – 16)	
Education	-		
Lower than higher education		11 (6 – 16)	<0.001
Bachelor's or equivalent and post-graduation		8 (4 – 12)	
Mental health support	-		
No		7 (3 – 12)	<0.001
Yes		9 (5 – 15)	
Physical exercise	-		
No		10 (6 – 16)	<0.001
Yes		7 (4 – 11)	
Suspect case of COVID-19	-		
No		8 (5 – 13)	0.319
Yes		9 (5.5 – 20)	
Healthcare practitioner	-		
No		8 (4.5 – 13)	0.727
Yes		8 (5 – 13)	
Presence of chronic disease	-		
No		8 (4 – 13)	0.020
Yes		9 (5 – 14)	

Legends:¹Spearman's Rho; ²Evaluated through Mann-Whitney-U or Kruskal-Wallis test; PHQ = Patient Health Questionnaire; IIQ = Interquartile Range.

Table 3
Multivariate analysis of predictors of depressive symptoms during COVID-19 quarantine.

Predictor	B (CI 95%)	Standardized β	P
Quarantine length > 30 days	0.44 (0.06 – 0.82)	0.03	0.02
Age	-0.09 (-0.1 – -0.08)	- 0.2	<0.001
Sex (ref. = female)	-1.88 (-2.30 – -1.46)	- 0.12	<0.001
Spirituality ¹	-0.03 (-0.04 – -0.02)	- 0.09	<0.001
Social support ²	-0.56 (-0.78 – -0.35)	- 0.07	<0.001
Resilience ³	-0.18 (-0.21 – -0.15)	- 0.19	<0.001
Quality of life ⁴	-3.98 (-4.32 – -3.63)	- 0.38	<0.001
Mental health support ⁵	0.93 (0.58 – 1.27)	0.07	<0.001
Physical exercise ⁵	-0.94 (-1.28 – -0.59)	- 0.07	<0.001
Presence of chronic disease ⁵	0.53 (0.08 – 0.97)	0.03	0.02

Legends: CI = confidence interval.

¹ Evaluated through WHO-QoL SRPB.

² Evaluated through Social Support Questionnaire – MOS study.

³ Evaluated through CD-RISC.

⁴ Evaluated through EUROHIS-QOL.

⁵ self-reported. R²: 0.5.

their association with quarantine and depressive symptoms (Table 4). The education variable was dichotomized into lower education (from elementary to high school) and higher education or post-graduation (bachelor’s or equivalent and post-graduation). The quarantine’s effect on depressive symptoms among the education subgroup of those with lower education was $\beta = 0.06$ ($P = 0.04$). In contrast, no effect was present in the education subgroup of higher education or post-graduation ($\beta = 0.02$; $P = 0.17$).

The variable of occupation was stratified into “retired” (due to disability or length of service), “paid occupation,” and “unpaid occupation” (students, housekeepers, or no occupation – not retired). The quarantine’s effect on depressive symptoms was significant only among the subgroup of unpaid occupation ($\beta = 0.06$; $P = 0.04$).

4. Discussion

Our study showed that quarantine length longer than 30 days, female sex, young age, and chronic diseases were associated with depressive symptoms. Spirituality, support social, resilience, quality of life, and physical exercise were protective against depressive symptoms during the COVID-19 quarantine. In addition, we found that quarantine among people with a lower level of education had a greater association with depressive symptoms when compared to those with a higher level of education. Also, quarantine among people with an unpaid occupation (students, domestic workers, and unemployed - not retired) had a greater association with depressive symptoms.

We examined a period that we considered to be the pandemic’s initial stage. There were 3,320 deaths from coronavirus in the Brazil when we finished the data collection. The data were collected approximately 2 months after the first registered case of COVID-19 and a month after the first death was registered in the country (Brazil, 2020).

In this study, most participants were female, mainly white, married or had a steady partner, had a paid occupation, and had a post-graduate education. An Italian online survey with 2,766 participants showed that female sex, negative affect, and detachment were associated with higher levels of depression during the COVID-19 pandemic (Mazza et al., 2020). In a cross-sectional study on China’s general population, females were found to suffer a greater psychological impact from the pandemic outbreak, as well as higher levels of depression (Wang et al., 2020).

The average age of individuals in this study was 42 years, and the average age of depressed individuals was 37 years. Older age had a positive impact on depressive symptoms, as younger individuals had higher levels of depression. Online studies from Turkey, Spain, and China showed similar results but with smaller sample sizes (Lei et al., 2020; Ozamiz-etxebarria et al., 2021; Özdin and Bayrak Özdin, 2020). Marital status also had a significant role in our results. We found that

Table 4
Stratified analysis of the association between quarantine and depressive symptoms by education and occupation.

Association between quarantine and depressive symptoms on subgroups	n	B (CI 95%)	Standardized β	Covariates	P
Education					
Lower education	655	0.84 (0.03 – 1.65)	0.06	Age, sex, spirituality, social support, resilience, quality of life, mental health support, physical exercise	0.04
Higher education or post-graduation	2,120	0.31 (-0.13 – -0.74)	0.02	Age, sex, spirituality, social support, resilience, quality of life, mental health support, physical exercise, chronic disease, ethnicity	0.17
Occupation					
Retired ¹	318	0.55 (-0.61 – -1.71)	0.04	Age, sex, spirituality, resilience, quality of life, mental health support, ethnicity	0.35
Paid occupation	1,860	0.26 (-0.18 – -0,7)	0.02	Age, sex, spirituality, social support, resilience, quality of life, mental health support, physical exercise, chronic disease	0.25
Unpaid occupation ²	597	1.06 (0.06 – 2.07)	0.06	Age, sex, spirituality, social support, resilience, quality of life, mental health support, physical exercise	0.04

Legends: CI = confidence interval.

¹ Due to disability or length of services.

² Housekeepers, students, and no occupation (not retired).

single individuals had higher levels of depression, followed by those who were separated or divorced, and those who were married or had a steady partner (Lei et al., 2020).

Health professionals comprised a significant percentage of the sample (nearly 30%) in both the depressed and non-depressed group. Studies on Chinese health professionals have also shown that depressive symptoms and other emotional symptoms occurred among the first health professionals who had contact with COVID-19 patients (Kang et al., 2020). The length of experience in a health profession also seems to have an influence. A study that tested resilience among Chinese health professionals showed lower levels among new staff compared to experienced ones (Cai et al., 2020). An online survey was carried out with 2,182 Chinese health professionals and compared non-medical

health professionals with medical health professionals. Medical health professionals had a higher prevalence of insomnia, anxiety, and depression. However, the scale that evaluated depression consisted of only 2 items (PHQ-2) (Zhang et al., 2020).

Chronic disease history was also associated with depressive symptoms in our study, which was also found in a Spanish study (Ozamiz-etxebarria et al., 2021). Our data showed that higher age had a negative impact on depressive symptoms, as younger individuals showed higher levels of depression. This finding supports previous studies (Huang and Zhao, 2020; Lei et al., 2020; Ozamiz-etxebarria et al., 2021). Marital status also had a significant role in our results. We found that single individuals had higher levels of depression, followed by separated or divorced individuals and those who were married or had a steady partner (Lei et al., 2020).

Quarantine length greater than 30 days had a positive association with depressive symptoms. A longer quarantine could potentially be associated with depression in a number of ways. As a developing country, many workers in Brazil have informal jobs or jobs with incomes that depend on daily work. Also, lasting social isolation and changes in social roles and daily activities could also mediate this association.

We found that the quarantine's impact on depressive symptoms was higher among individuals with lower levels of education, thus supporting the hypothesis of economic mediation of this association. Also, we hypothesize that a higher-educated person could have more opportunities and more resources to deal with a longer quarantine period. The quarantine's effect on depressive symptoms was also higher among individuals with unpaid occupations, but this association was not observed among those who had a paid occupation or were retired (due to disability or length of service). An Italian study showed that unemployment was associated with higher levels of depression, and young age and the need to leave for work were associated with higher levels of stress (Mazza et al., 2020).

Our study contributes new data that has not been previously described in the literature to our knowledge. Ethnicity had statistically significant associations in our study. We found that non-white individuals had higher levels of depressive symptoms than white individuals. In addition, people who practiced physical exercise had lower levels of depression than those who did not. Cognitive behavioral therapy (CBT) techniques can be implemented to meet the demands of the population, especially in patients who exaggerate the risk of contracting and dying from the virus. Relaxation and meditation techniques can be incorporated into physical exercise to combat anxiety and depression. Online platforms can be useful for applying these methods, and can also provide a support network for people to share their challenges and resolutions during the outbreak (Ho et al., 2020).

Individuals receiving support for mental health had higher levels of depressive symptoms than those who were not, which was probably due to reverse causality. Greater spirituality, social support, and quality of life were negatively associated with depressive symptoms. This is congruent with current literature since systematic reviews report associations of lower levels of depression with higher levels of spirituality (Braam and Koenig, 2019), social support (Wang et al., 2018), and quality of life (Johnston et al., 2019).

There are some limitations in this study. This is a cross-sectional study that examined the initial period of the pandemic, so our data are limited to that period. Furthermore, as a cross-sectional study, it is susceptible to reverse causality bias, and causal relationships cannot be inferred in regard to whether the factors are protective or are only associated. Due to limited resources and the time sensitivity of the COVID-19 outbreak, we adopted a snowball sampling strategy. This strategy was not based on random sample selection, and the study population did not reflect the actual pattern of the general population. In addition, there are other protective factors that were not included in this study. The face mask use during a pandemic, for example, can be both a risk factor and a protective factor for mental health depending on culture (Wang et al., 2020). Adequate health information and confidence in

doctors' skills have been associated with less psychological impact of the pandemic and lower levels of stress, anxiety and depression as shown in a Philippine study (Tee et al., 2020).

Our study did not allow us to collect contact details and personal information from respondents due to ethical requirements of anonymity and confidentiality. Therefore, it was not possible to conduct a prospective study with the same participants and schedule an intervention focused on public mental health. There was an over-sampling of health professionals and post-graduates, leading to selection bias. As a result, the conclusions are less generalizable to the entire population, especially for the less educated. Another limitation is that self-reported levels of psychological impact cannot always be aligned with assessments by mental health professionals. Likewise, respondents may have provided socially desirable responses in terms of satisfaction with the health information received and precautionary measures. Furthermore, several publications from around the world (Wang et al., 2020) recommend that governments provide clear and impartial information with the aim of lessening the impact on the population's mental health during the period of social isolation. However, Brazil is experiencing a political crisis in addition to the health crisis created by pandemic. Hence, other non-measured variables related to quarantine, such as local policy, could have contributed to worse effects on mental health, in addition to the effects of the pandemic. Future studies could better elucidate this issue.

Despite these limitations, this study provides valuable information on depressive symptoms during the early stage of the COVID-19 outbreak in Brazil. Our results could be used as a historical reference since the pandemic will last much longer than initially presumed, and mental health problems probably will persist even after its complete control. Most importantly, our findings could directly inform the development of psychological interventions that could minimize depressive symptoms during the COVID-19 outbreak and provide a baseline for assessing prevention, control, and treatment efforts during the remainder of the epidemic, which was still in progress at the time of preparing this article.

In conclusion, our study showed that there was a high prevalence of depression during the initial phase of the COVID-19 outbreak in Brazil. Quarantine longer than 30 days, female sex, young age, and chronic diseases were associated with depressive symptoms. Spirituality, social support, resilience, quality of life, and physical exercise were protective against depressive symptoms during this period. In addition, we found that quarantine had a major impact on depressive symptoms among people with a lower level of education and on individuals with an unpaid occupation. Our findings could be used to formulate psychological interventions to improve mental health during the COVID-19 epidemic.

5. Contributors

All authors (Antonio Augusto Schmitt Júnior, Augusto Madke Brenner, Lucas Primo de Carvalho Alves, Felipe César de Almeida Claudino, Marcelo Pio de Almeida Fleck and Neusa Sica da Rocha) materially participated in the research and approved the final article.

6. Role of the funding source

This work was supported by Hospital de Clínicas de Porto Alegre Research Incentive Fund (FIPE), Fundação de Amparo à Pesquisa do RS (19/251-0001930-0) and Conselho Nacional de Desenvolvimento Científico e Tecnológico (303652/2019-5).

Funding information: This work was supported by Hospital de Clínicas de Porto Alegre Research Incentive Fund (FIPE) FIPE/HCPA (Fundo de Incentivo à Pesquisa e Eventos do Hospital de Clínicas de Porto Alegre), Fundação de Amparo à Pesquisa do RS (19/251-0001930-0) and Conselho Nacional de Desenvolvimento Científico e Tecnológico (303652/2019-5).

CRedit authorship contribution statement

A.A. Schmitt: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing - review & editing, Writing - original draft. **Augusto Mádke Brenner:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Software, Validation, Visualization, Writing - review & editing. **Lucas Primo de Carvalho Alves:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Software, Validation, Visualization, Writing - review & editing. **Felipe César de Almeida Claudino:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Software, Validation, Visualization, Writing - review & editing. **Marcelo Pio de Almeida Fleck:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Software, Validation, Visualization, Writing - review & editing. **Neusa Sica Rocha:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing - review & editing, Writing - original draft.

Declaration of Competing Interest

All authors has no conflict to declare.

Acknowledgements

No acknowledgements.

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