







Stress during the covid-19 pandemic: unusual challenges for university professors

Estresse durante a pandemia de covid-19: desafios incomuns para professores universitários

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ABSTRACT

Objective: Investigate the factors related to the stress levels triggered during the COVID-19 pandemic and the quality of life (QOL) of university professors. **Methods:** This is a cross-sectional study with 318 professors from private and public higher education institutions in Maranhão, Brazil. Data collection included a sociodemographic questionnaire, the Brazilian versions of the Perceived Stress Scale (PSS), and the Abbreviated World Health Organization QOL Assessment Instrument (WHOQOL-bref). Statistical analyses were performed with Student's T-test and Analysis of Variance with Duncan's post-hoc. **Results:** according to the results of the professor score assessment, perceived stress levels were classified as normal ($n = 166, 52.2\%$), moderate ($n = 126, 39.6\%$), and high ($n = 26, 8, 2\%$), with an average of $26.6 (\pm 10.5)$. QOL had an overall average of $56.4 (\pm 13.0)$. Among the QOL domains, the physical had the highest mean with $66.1 (\pm 17.7)$, while the lowest mean was in the social domain with $55.8 (\pm 14.8)$. **Conclusion:** The factors that influenced the stress levels were being female with age between 31 and 40 years old, those who had a child, and those who did not perform a frequent religious practice.

Keywords: Mental health, COVID-19, Stress psychological, Quality of life, Faculty.

RESUMO

Objetivo: Investigar os fatores relacionados aos níveis de estresse desencadeados durante a pandemia de COVID-19 e à qualidade de vida (QV) em professores universitários. **Método:** Trata-se de um estudo transversal com 318 docentes de instituições de ensino superior públicas e privadas do Maranhão, Brasil. A coleta de dados incluiu um questionário sociodemográfico, as versões brasileiras da Escala de Estresse Percebido (PSS) e o Instrumento Abreviado de Avaliação da QV da Organização Mundial da Saúde (WHOQOL-bref). As análises estatísticas foram realizadas com testes T de Student e Análise de Variância com post-hoc de Duncan. **Resultados:** de acordo com os resultados da avaliação da pontuação dos professores, os níveis de estresse percebido foram classificados como normal ($n = 166, 52,2\%$), moderado ($n = 126, 39,6\%$) e alto ($n = 26, 8, 2\%$), com uma média de $26,6 (\pm 10,5)$. A QV teve uma média geral de $56,4 (\pm 13,0)$. Entre os domínios da QV, o físico apresentou a maior média com $66,1 (\pm 17,7)$, enquanto a menor média foi no domínio social com $55,8 (\pm 14,8)$. **Conclusão:** Os fatores que influenciaram os níveis de estresse no grupo participante foram o sexo feminino com idade entre 31 e 40 anos, ter filho e não exercer prática religiosa frequente.

Palavras-chave: Saúde mental, COVID-19, Estresse psicológico, Qualidade de vida, Docentes.

INTRODUCTION

Infectious diseases that compromise physical and mental performance are the main threat to public health throughout the world¹. Due to the rapid increase in contamination by 2019-nCoV globally, panic and stress started to lead to mental health disorders². This kind of public

health emergency impacts the population's behavior, as they experience anxiety, anger, fear, and post-traumatic stress disorder because of their experiences³.

Since the first case was reported in Brazil in February 2020, the country has quickly become one of the most affected globally, as Brazil has many states with vulnerable communities, an

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emerging economy, and a relatively weak social protection system. For these reasons, it was difficult for local authorities to persuade people to stay at home. Thus, the lockdowns were only partially implemented⁴.

COVID-19 is significantly changing how people live in society due to the need for physical and social distances imposed by the nature of the infection. For example, social institutions such as schools and universities were closed, and their activities began to be carried out remotely in whole or in part. The pedagogy of learning was changed, and teachers were required to learn how to teach online. Digital structures were the only means of teaching and working. In response to these changes, screen time has become even more significant during COVID-19. As a result, the use of technology by teachers increased dramatically during the COVID-19 pandemic to the point of overuse in daily life. These factors are all deemed to have a negative impact on teacher stress, well-being, and quality of life (QOL)⁵. The QOL is the individuals' general well-being associated with a wide range of contexts that include physical, psychological, social, and environmental aspects⁶.

In crises, teachers can provide psychosocial support to learners, creating a safe and supportive interaction where students may express their emotions and experiences. They can include specific structured psychosocial activities in the teaching-learning process that can powerfully help vulnerable students⁷. Accordingly, teachers' mental health is associated with their students' academic success⁸.

A study used the Perceived Stress Scale (PSS) to measure the stress of Brazilian university professors before the pandemic⁹. Another one found some higher scores during the pandemic with professors from a university in Southeastern Brazil¹⁰. The perceived stress can negatively affect physiological and psychological health and lead to a decline in QOL¹¹.

Thus, the number of demands for mental health problems related to COVID-19 due to these changes is emerging exponentially worldwide. Therefore, this study seeks to offer important information about the impact of COVID-19 on perceived stress and QOL and how they are

influenced by personal and work-related characteristics of university professors from Maranhão, the Northeast state that concentrates the lowest per capita Gross Domestic Product (GDP)¹² and the second lowest Human Development Index (HDI) in Brazil¹³.

To date, few studies conducted during the pandemic have measured symptoms of stress, anxiety, and depression among university professors, but studies have suggested that they show psychological symptoms¹⁴. This emphasizes the need for mental health studies with professors during the pandemic, especially in regions with profound social inequality.

Thus, this study aims to investigate the factors related to stress levels during the COVID-19 pandemic and the QOL in university professors by exploring the correlation between the factors found that affect the mental health of this group, negative coping styles, and sociodemographic variables. As a result of the COVID-19 pandemic, we hypothesize that there is a significant inverse correlation between the QOL domain of social relations and perceptions of stress in university professors.

METHODS

This is a cross-sectional study conducted between May and June 2020 with professors from private and public higher education institutions in the state of Maranhão, Brazil. The state of Maranhão is in the Northeast, the most impoverished region of Brazil, with about 7.1 million inhabitants distributed in an area similar to the size of Italy¹⁵. We followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for reporting the survey data.

The target group for this research study was a representative sample of the state of Maranhão population, which has approximately 30 public and private institutions of higher education. The sample was self-selected and composed according to the criterion of participant's accessibility or convenience. The survey was uploaded and shared on the Google online survey platform. A link to the electronic survey was distributed throughout universities in the state of Maranhão

via a range of methods: invitations via e-mails, shared on some faculties' official pages, and other social media platforms such as Facebook and WhatsApp.

The survey was administered in four sections. The first section, prior to accessing the questions, included an introductory page describing the background and the aims of the survey, and ethics information for participants. The other sections included a sociodemographic questionnaire designed for this study, the Brazilian versions of the Perceived Stress Scale (PSS)¹⁶, and the Abbreviated World Health Organization Quality of Life Assessment Instrument (WHOQOL-bref)¹⁷.

Responding to the survey was voluntary. The unique email addresses were used to identify duplicate entries and the first entries were kept for analysis. Only one member of the team had access to the emails to identify duplicate entries. We excluded participants who failed to answer at least 20% of the items in each questionnaire and those who completed the survey in under three minutes.

We conducted a statistical power analysis using G*Power based on the main variable, sex, using the Student's t-test for the average of two independent groups, showing a test power of 97.1%.

We used adaptive questioning (branched). The full survey comprised 82 items, although because of the adaptive nature of the questionnaire, not all respondents answered all items. The first part of the sociodemographic questionnaire included personal questions regarding gender, age, children, religion, city of residence, education level, work (yes/no), and employment situation. The second part, the work-related questions, requested information on job characteristics such as the nature of the work institution, remote work, and overload during the social isolation period (they responded on a 4-point scale, from 1 = completely agree to 2 = completely disagree if they felt more overloaded in remote work during the pandemic period than before social isolation). The third part asked about the participants' health situation with questions about chronic diseases, if the participant or someone close to them was infected with COVID-19, alcohol consumption (yes/no), smoking, and use of psychotropic drugs.

Perceived stress was measured using the PSS proposed by Cohen *et al.*¹⁸, which measures the degree to which individuals perceive situations as stressful, meaning perceived stress. It has 14 questions with answer options ranging from 0 to 4 (0 = never; 1 = almost never; 2 = sometimes; 3 = almost always 4 = always). The questions with a positive connotation (4, 5, 6, 7, 9, 10, and 13) have their added scores inverted, as follows: 0 = 4, 1 = 3, 2 = 2, 3 = 1, and 4 = 0. The remaining questions are negative and should be added directly. The scale total is the sum of these 14 questions' scores, and the scores can vary from zero to 56, with higher scores indicating greater perceived stress. Scores from 0–18 are considered low stress, 19–37 moderate, and 38–56 high stress.

The World Health Organization (WHO) concept of QOL was adopted as a theoretical framework. As a result of this definition, quality of life is incorporated into a broader context by assuming a transcultural perspective. According to this definition, the concept refers to an individual's perception of his or her position in life. This takes into account the culture and value system in which he or she lives, as well as how they perceive their goals, expectations, standards, and concerns⁶.

The WHOQOL-bref has 26 items; the first 2 assess self-perception of QOL and satisfaction with health, while the others are distributed into 24 facets and 4 domains: Physical (PD), Psychological (PsD), Social relations (SRD), and Environment (ED)⁶. Each item is classified on a 5-point Likert scale, varying in intensity, capacity, frequency, and evaluation. The final scores of each domain consider the answers to each question that compose it, thus resulting in final scores on a scale of 4 (lowest QOL) to 20 (highest QOL), which can be transformed from 0 (lowest QOL) to 100 (highest QOL), measured in a positive direction¹⁷.

The data collected were stored in a specific database created in the Microsoft Excel version 2016 program (Microsoft, Redmond, WA, USA). Relative and absolute frequencies performed a descriptive statistical analysis for sociodemographic, work, and health profile characteristics after checking for errors and inconsistencies.

Missing data were handled by putting the mean value calculated of the existing observations.

We conducted the analyses to evaluate the PSS according to the studied characteristics. The Shapiro-Wilk normality tests and Levene homogeneity tests of variance were performed to verify the possibility of performing Student's t-test and Analysis of Variance (ANOVA) with Duncan's post-hoc; otherwise, corresponding non-parametric tests were performed. All analyses were performed using the IBM SPSS program (IBM Corp., Armonk, NY, USA) with a 5% significance level.

The study was conducted following the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) guidelines and complied with the ethical precepts following the Brazilian Resolution No. 466 of 2012, which deals with research and tests on human beings. The Research Ethics Committee of the Federal University of Maranhão/ Institutional Review Board (IEC/IRB) approved it under protocol No. 4.015.692 with informed consent obtained from each participant. The survey has been reviewed by the IEC/IRB team as a minimal-risk review.

RESULTS

Sociodemographic characteristics and comparison with the PSS and WHOQOL-bref results

After an 8-week recruitment period, there were 779 clicks on the survey link, resulting in 340 eligible participants consenting and ending the survey. Of these 340 participants, 18 duplicated answers, one participant provided consent but did not answer any questions. We excluded three participants who failed to answer at least 20% of the items in each questionnaire. Four participants had missing data in the WHOQOL-bref and one in the PSS. No respondents were removed from the survey for completing the items too quickly. The minimum completed survey was timed at approximately 14 minutes. No straight lines were identified.

The final sample consisted of 318 university professors, the majority were female (n =

168, 52.8%), in the age group of 31 to 40 years (n = 126, 39.6%), racially/ethnically identified as brown (n = 188, 59.1%), living with a partner (n = 215, 67.6%), had children (n = 180, 56.6%), and had 2 to 3 children (n = 101, 56.4%). The majority (n = 191, 60.1%) had a doctorate degree as a higher level of education and worked in a public institution (n = 248, 78.0%) with a public statutory employment situation (n = 226, 71.7%). Religion was practiced for most of the sample (n = 274, 86.7%), practiced regularly by most of the participants (n = 190, 69.3%), and the majority lived in the same city where they worked (n = 282, 88.7%).

The sociodemographic characteristics associated with stress level results were: female gender with higher scores for perceived stress levels (Mean \pm SD = 28.52 \pm 10.94; p = 0.001); age is also associated with stress (p = 0.002), with the age group of 31 to 40 years old being the most stressed (Mean \pm SD = 29.12 \pm 10.15) (Table 1).

Several sociodemographic variables were associated with both stress levels and QOL. The number of children variable was associated with both stress (p = 0.002) and QOL (p = 0.03), with higher stress scores (Mean \pm SD = 29.64 \pm 9.94) and lower for the QOL (Mean \pm SD = 51.63 \pm 12.15) being from professors with one child. Having or not having children affected the perception of QOL (p = 0.03), participants who did not have children had higher scores (Mean \pm SD = 58.20 \pm 12.61). Practicing religion had no influence on the results, but frequently practicing religion affected the stress results (p = 0.01) with lower scores (Mean \pm SD = 25.17 \pm 10.86), and better QOL (p = 0.01) scores (Mean \pm SD = 57.78 \pm 12.22) than non-practitioners.

Work profile and comparison with the PSS and WHOQOL-bref results

Regarding the work profile, the majority (n = 191, 60.1%) had a doctorate degree as a higher level of education, worked in a public institution (n = 248, 78.0%) with a public statutory employment situation (n = 226, 71.7%), and were performing remote work during the pandemic period

Table 1

Sociodemographic characteristics of university professors (n = 318), distribution of average scores of perceived stress (PSS) and quality of life (QoL) and comparison of sociodemographic variables with the results of the PSS and WHOQOL-bref – Maranhão, Brazil, 2020.

	n (%)	PSS		WHOQOL-bref	
		Mean ± SD	p	Mean ± SD	P
Gender					
Female	168 (52.8)	28.52 ± 10.94	<0.001*	55.11 ± 14.10	0.06*
Male	150 (47.2)	24.41 ± 9.63		57.82 ± 11.57	
Age					
20 to 30 years	27 (8.5)	28.70 ± 9.33 ^a	<0.001**	58.32 ± 13.74	0.92**
31 to 40 years	126 (39.6)	29.12 ± 10.15 ^a		56.13 ± 13.47	
41 to 50 years	92 (28.9)	26.11 ± 10.42 ^{ab}		56.30 ± 12.69	
51 to 60 years	50 (15.7)	22.42 ± 10.46 ^{bc}		55.68 ± 12.83	
> 60 years	23 (7.2)	21.17 ± 10.10 ^c		57.38 ± 12.16	
Race/color					
Brown	188 (59.1)	26.77 ± 10.64	0.71*	56.31 ± 13.45	0.93*
Not brown	130 (40.9)	26.32 ± 10.40		56.44 ± 12.75	
Do you live with a partner?					
No	103 (32.4)	25.43 ± 10.84	0.18*	54.41 ± 12.30	0.06*
Yes	215 (67.6)	27.14 ± 10.35		57.33 ± 13.27	
Do you have children?					
No	138 (43.4)	26.99 ± 9.87	0.71*	58.20 ± 12.61	0.03*
Yes	180 (56.6)	26.28 ± 11.02		54.99 ± 13.19	
How many children do you have? (n=179)					
1 child	73 (40.8)	29.64 ± 9.94 ^a	0.002**	51.63 ± 12.15 ^c	0.03**
2 to 3 children	101 (56.4)	24.41 ± 11.22 ^{ab}		57.11 ± 13.51 ^b	
≥ 4 children	5 (2.8)	19.20 ± 6.06 ^b		62.92 ± 12.10 ^a	
Are your children living with you? (n=180)					
No	24 (37.3)	25.85 ± 10.39	0.46*	56.55 ± 12.02	0.30*
Yes	156 (86.7)	26.89 ± 11.04		54.78 ± 13.54	
Do you practice a religion?					
No	44 (13.8)	28.55 ± 9.34	0.18*	56.02 ± 11.68	0.84*
Yes	274 (86.2)	26.27 ± 10.69		56.44 ± 13.24	
Do you practice it regularly? (n=274)					
No	84 (30.7)	28.76 ± 9.91	0.01	53.41 ± 14.93	0.01*
Yes	190 (69.3)	25.17 ± 10.86		57.78 ± 12.22	
Do you live and work in the same municipality?					
No	36 (11.3)	29.69 ± 9.79	0.06	58.01 ± 13.50	0.43*
Yes	282 (88.7)	26.19 ± 10.57		56.18 ± 12.97	
Highest education degree					
Post-secondary/ Bachelor's	2 (0.6)	29.50 ± 3.54	0.68**	53.57 ± 15.15	0.95**
Specialization	36 (11.3)	25.67 ± 10.32		56.29 ± 14.81	
Master's	89 (28.0)	27.64 ± 10.83		56.99 ± 13.25	
Doctorate	191 (60.1)	26.24 ± 10.49		56.15 ± 12.63	
Do you work in a public or private institution?					
Public	248 (78.0)	26.12 ± 10.48	0.08**	56.57 ± 12.52	0.23**
Private	56 (17.6)	29.29 ± 10.60		57.01 ± 14.76	
Both	14 (4.4)	24.00 ± 9.82		50.58 ± 13.89	

SD - Standard deviation. * Student's t-test. ** Analysis of Variance (ANOVA) with post hoc Duncan (Means with different letters differ statistically). Source: Authors' own elaboration (2020).

(n = 229, 72.5%). Most professors (n = 119, 51.7%) mentioned not having received training for remote work and said they were using social networks (n = 163, 51.3%) and other technological tools (n = 169, 53.1%) to work. Participants also said they had already used these tools before the pandemic (n = 116, 50.9%).

A few work-related variables were associated with both stress levels and QOL. A significant portion of the respondents responded that they felt more overloaded in remote work during the

pandemic period than before social isolation (n = 109, 34.6%), reflecting both the perception of stress ($p = 0.001$) and the QOL ($p = 0.01$), with high scores for stress levels (Mean \pm SD = 30.09 \pm 11.08) and lower scores for QOL (Mean \pm SD = 54.80 \pm 13.83). On the other hand, professors who completely disagreed with the existence of a more significant overload during social isolation had lower stress levels (Mean \pm SD = 20.59 \pm 10.93) and better perception of the QOL (Mean \pm SD = 61.10 \pm 12.86) (Table 2).

Table 2

Work profile of university professors (318), distribution of mean scores of perceived stress (PSS) and quality of life (QoL), and comparison of work variables with the results of the PSS and WHOQOL-bref – Maranhão, Brazil, 2020.

	n (%)	PSS		WHOQOL-bref	
		Mean \pm SD	p	Mean \pm SD	p
What is your work contract with the Higher Education Institution? n=315)					
Public statutory	226 (71.7)	26.73 \pm 10.32		56.73 \pm 12.67	
CLT formalized status	68 (21.6)	27.24 \pm 11.05	0.46**	56.95 \pm 14.74	0.33**
Temporary	21 (6.7)	23.71 \pm 10.44		52.39 \pm 10.16	
Are you working remotely? (n=316)					
No	87 (27.5)	25.45 \pm 9.50	0.25*	55.79 \pm 12.44	0.62*
Yes	229 (72.5)	26.98 \pm 10.90		56.60 \pm 13.31	
Did you receive training for remote teaching work?					
No	119 (51.7)	27.52 \pm 11.22	0.43*	55.77 \pm 12.31	0.32*
Yes	111 (48.3)	26.37 \pm 10.52		57.50 \pm 14.24	
Do you use Google Meet and/or Classroom?					
No	178 (56.0)	26.93 \pm 10.21	0.51*	56.41 \pm 13.02	0.97*
Yes	140 (44.0)	26.15 \pm 10.93		56.36 \pm 13.07	
E-mail					
No	231 (72.6)	27.07 \pm 10.58	0.18*	55.76 \pm 12.79	0.16*
Yes	87 (27.4)	25.29 \pm 10.32		58.05 \pm 13.53	
Social networks					
No	155 (48.7)	26.94 \pm 9.95	0.56*	56.03 \pm 12.39	0.63*
Yes	163 (51.3)	26.25 \pm 11.07		56.72 \pm 13.62	
Others					
No	149 (46.9)	25.56 \pm 9.87	0.10*	55.03 \pm 12.75	0.08*
Yes	169 (53.1)	27.49 \pm 11.03		57.58 \pm 13.17	
Have you already used these technological tools in your teaching work before the Covid-19 pandemic?					
Yes	116 (50.9)	27.63 \pm 11.34	0.31*	55.65 \pm 14.00	0.27*
No	112 (49.1)	26.18 \pm 10.38		57.58 \pm 12.38	
I feel more overloaded today than before social isolation					
Completely agree	109 (34.6)	30.09 \pm 11.08 ^a		54.80 \pm 13.83 ^b	
Partially agree	80 (25.4)	25.65 \pm 9.24 ^b		54.04 \pm 11.47 ^b	
Partially disagree	80 (25.4)	26.30 \pm 8.89 ^b	<0.001**	58.13 \pm 12.93 ^{ab}	0.01**
Completely disagree	46 (14.6)	20.59 \pm 10.93 ^c		61.10 \pm 12.86 ^a	

SD - Standard deviation; CLT (*Consolidação das Leis do Trabalho*): consolidation of Brazilian labor laws, Labor Code – a very protective set of laws with heavy intervention by the Government in the regulation of contracts. * Student's t-test. ** Analysis of Variance (ANOVA) with post hoc Duncan (Means with different letters differ statistically). Source: Authors' own elaboration (2020).

Health profile and comparison with the PSS and WHOQOL-bref results

The health profile (Table 3) showed that most participants stated that they did not have a chronic illness/disease (n = 213, 67.0%); however, systemic arterial hypertension was the most prevalent (n = 40, 12.6%) among those who had chronic illness/disease. Another large portion of respondents

(n = 229, 72.2%) mentioned that they or someone close to them had contracted COVID-19, and among those who did, the majority (n = 126, 57.0%) were family members.

The consumption of alcoholic beverages was reported by half of the professors. However, the absolute majority answered that they were not smokers (n = 312, 98.4%). Of those who claimed to use psychotropic medication (n =

Table 3

Health profile of university professors (318), distribution of mean scores of perceived stress (PSS) and quality of life (QOL) and the comparison of health variables with the results of the PSS and WHOQOL-bref – Maranhão, Brazil, 2020.

	n (%)	PSS		WHOQOL-bref	
		Mean ± SD	p	Mean ± SD	p
Do you have a chronic illness/disease?					
No	213 (67.0)	27.24 ± 9.94	0.11	56.57 ± 12.98	0.72
Yes	105 (33.0)	25.25 ± 11.56		56.01 ± 13.15	
Asthma					
No	301 (94.7)	26.54 ± 10.57	0.76	56.58 ± 12.98	0.25
Yes	17 (5.3)	27.35 ± 9.98		52.86 ± 13.57	
Diabetes					
No	309 (97.2)	26.88 ± 10.42	0.003	56.29 ± 13.14	0.43
Yes	9 (2.8)	16.44 ± 9.66		59.78 ± 7.15	
Obesity					
No	297 (93.4)	26.40 ± 10.62	0.25	56.51 ± 13.04	0.52
Yes	21 (6.6)	29.14 ± 8.91		54.60 ± 12.82	
Hypertension					
No	278 (87.4)	27.30 ± 10.14	0.001	56.01 ± 13.00	0.17
Yes	40 (12.6)	21.63 ± 11.89		59.02 ± 12.99	
Do you live with someone who has a chronic illness/disease? (n=313)					
No	228 (72.8)	26.40 ± 10.32	0.70	56.45 ± 12.85	0.98
Yes	85 (27.2)	26.93 ± 11.35		56.49 ± 13.60	
Did you or someone close to you (relative, friend, or neighbor) contract Covid-19?					
No	88 (27.8)	23.76 ± 10.83	0.003	57.90 ± 13.39	0.21
Yes	229 (72.2)	27.64 ± 10.24		55.86 ± 12.86	
If someone close to you contracted Covid-19, who was it?					
Family member	126 (57.0)	27.90 ± 10.36	0.47	55.41 ± 12.90	0.44
Friends	95 (43.0)	26.89 ± 10.18		56.76 ± 12.84	
Do you consume alcohol?					
No	159 (50.0)	25.84 ± 10.63	0.21	57.25 ± 13.48	0.24
Yes	159 (50.0)	27.33 ± 10.41		55.52 ± 12.53	
Are you a current smoker?					
No	312 (98.4)	26.51 ± 10.51	0.16	56.47 ± 13.04	0.28
Yes	5 (1.6)	33.20 ± 10.57		50.07 ± 12.32	
Do you use any psychotropic medication?					
No	279 (89.1)	25.92 ± 10.47	0.007	56.80 ± 12.79	0.25
Yes	34 (10.9)	31.12 ± 10.46		54.07 ± 14.18	

SD - Standard deviation. * Student's t-test. ** Analysis of Variance (ANOVA) with post hoc Duncan (Means with different letters differ statistically). Source: Authors' own elaboration (2020).

34, 10.9%), antidepressants were predominant (n = 21, 61.7%), followed by anxiolytics (n = 12, 35.2%).

Certain health-related variables were associated with only perceived stress levels. Chronic diseases such as hypertension and diabetes affected stress levels ($p = 0.001$; $p = 0.003$) in comparison of health profile variables with perceived stress and QOL. Having contracted COVID-19 or having someone close to them who fell ill from it correlates to stress ($p = 0.003$). The fact of using some psychotropic medication also had an impact on stress levels ($p = 0.007$), which presented higher stress levels (Mean \pm SD = 31.12 ± 10.46) (Table 3).

Overall result of the PSS and WHOQOL-bref domains

The results of perceived stress and the QOL of professors showed that the stress levels of the majority (n = 166, 52.2%) were normal, followed by moderate (n = 126, 39.6%) and high (n = 26, 8.2%), with an average score of $26.6 (\pm 10.5)$. QOL had an overall average score of $56.4 (\pm 13.0)$. Among the QOL domains, the physical domain had the highest mean score with $66.1 (\pm 17.7)$, while the lowest mean was in the social domain with $55.8 (\pm 14.8)$. Despite the difference, both means indicate a positive perception of these domains (Table 4).

Table 4

Distribution of mean scores for general quality of life (QoL) in each domain of the WHOQOL-bref and perceived stress (PSS) for university professors (n=318) – Maranhão, Brazil, 2020.

	Mean	SD	Median	Minimum	Maximum
Physical domain (0 to 100)	66.1	17.7	67.9	7.1	100.0
Psychological domain (0 to 100)	61.7	15.6	64.3	4.2	100.0
Social relations (0 to 100)	55.8	14.8	55.4	16.7	100.0
Environment (0 to 100)	56.8	12.3	57.1	21.4	96.9
Quality of life (0 to 100)	56.4	13.0	57.1	21.4	95.3
PSS (0 A 56)	26.6	10.5	27.0	0.0	56.0

PSS: Perceived Stress Scale. Source: Authors' own elaboration (2020). WHOQOL-bref: The World Health Organization Quality of Life. SD: Standard deviation

DISCUSSION

Effects of sociodemographic variables on stress and QOL

The results of this study showed that female participants had higher levels of perceived stress than males. These data are in line with other studies in which women have a greater perception of stressful everyday events¹⁹ and have also occurred equally during the physical and social isolations imposed by COVID-19 in which women perceived more stress than men²⁰ and felt the symptoms of post-traumatic stress more²¹.

A study showed that women are more vulnerable to stress and more prone to post-traumatic stress disorder, as being female can be a risk factor for mental illness due to the increased frequency

of hormonal fluctuations²² or external factors such as social and structural gender inequities²³.

Besides, university professors already faced gender disparities in their own homes when they were responsible for most domestic chores even before the pandemic and experienced disadvantages in opportunities because they have greater responsibilities for family care²⁴. These patterns were accentuated during the physical isolation of COVID-19. This can also explain the differences in stress levels and QOL between the female and male participants in this study.

The age group was another sociodemographic factor that affected stress levels, showing that the younger age group had higher stress levels. Similar results were found in a study conducted in Italy in March 2020 with 2,053 participants in which older ages were associated with lower

stress levels²⁵. A survey in Paraguay of 2,206 people also showed that lower age was significantly associated with higher levels of perceived stress²⁰. Moreover, the professors' work has become more complex due to the requirement that knowledge and effort be applied to using attractive digital tools during synchronous activities⁷. The fact that professors over 60 had not previously used these tools in their daily work may have contributed to a higher stress level among this age.

Having or not having children was not significant for the stress levels of the professors of this study, with this data being similar to the results found during the SARS epidemic quarantine in Toronto, Canada²⁶. However, not having children was associated with higher QOL scores than those who had. These people probably do not have the obligations to perform daily care and implement their children's school activities, which also added to their remote work routines during the pandemic.

Among those who had children, the number of children was significant for both stress and QOL. People who had a single child had higher stress levels and lower QOL scores than those who had two children. This information is similar to that found in 2,760 people in isolation in Australia due to the equine flu (H7N7) epidemic. The highest stress levels in this sample were also found in people who had a single child²⁷. Having two or more children is likely to have a protective effect in times of physical and social isolation².

In line with the findings of this research, there is evidence that people who engage in constant religious practice have lower rates of diseases such as depression and anxiety²⁸. Moreover, it was found that religiosity often helps in managing stress, and contributes to well-being and QOL, accelerating the resolution of emotional disorders²⁹. Besides, practicing religion increases the sense of belonging, allowing individuals to stay active in the community from home, which mitigates some of the loneliness derived from isolation³⁰.

Effects of work variables on stress and QOL

Schools and universities in Brazil were closed during the data collection period for this study. As

a result, professors and students suddenly moved their activities remotely, facing many challenges and opportunities. A particular challenge was the urgent and unexpected request for face-to-face university courses to teach online and a specific opportunity to learn pedagogical content knowledge, mainly related to designing and organizing learning environments with digital technologies³¹. In Maranhão, 4.0% (73.4) of the employees performed remote work, and 68.0% (49.9) of these employees have higher education³².

In this sense, professors and academic institutions must quickly prepare themselves with the necessary skills and tools to adapt to this change. However, the lack of sophisticated technology and experience in developing online learning platforms were the main challenges worldwide³³.

These demands may have had an influence on the results of the sample in this study, as technology generates stress through the conflict between work-home and work-family, increased by work overload and flexibility provided³⁴. Also, these technologies allow multitasking, which can add a layer of necessary decision-making about the choice of the task and its priority order³⁵.

Effects of health variables on stress and QOL

The stress levels of professors with hypertension and diabetes were lower compared to those who did not, diverging from the results of another study in which people with chronic diseases were more stressed¹⁴. It is known that COVID-19 tends to evolve more severely in people with comorbidities³⁶. An explanation for professors with hypertension and diabetes presenting less stress than others may be due to the transfer of work activities to the remote modality, which has enabled a real reduction in exposure to contagion.

This study showed that 72.2% of the participants became infected or had family and friends affected by COVID-19; the stress levels in this group were higher than those who did not. That is similar to the results of an online survey of 71,227 Chinese adults in February 2020, in which almost 50% of family members or friends of people with COVID-19 experienced mild to severe symptoms

of mental illness³⁷. Besides, anxiety levels were significantly higher in people with at least one family member or a friend with COVID-19³⁸.

Another interesting finding was the presence of higher stress levels among professors who used some psychotropic medication. This result is in line with the evidence about individuals with a history of mental disorders, or current diagnoses of psychological distress are generally more sensitive to stressors such as social isolation³⁹.

Stress and QOL during COVID-19

The mean score of stress levels of university teachers participating in this study (Mean \pm SD = 26.6 \pm 10.5) is similar to that of other studies that used PSS to measure the stress of Brazilian university professors before the pandemic (Mean = 25.9)⁹, and also to the scores (Mean \pm SD = 29.6 \pm 1.7) found during the pandemic¹⁰.

Considering the results of the WHOQOL-bref of this study, it was noticed that the mean scores were higher for the physical domain (Mean \pm SD = 66.1 \pm 17.7), followed by the psychological (Mean \pm SD = 72.10 \pm 13.0), the environmental (Mean \pm SD = 56.8 \pm 12.3), and the social domain with the lowest mean scores (Mean \pm SD = 55.8 \pm 14.8); this was probably due to the influence of restrictive measures such as social distancing imposed by COVID-19, which dramatically changed the relationship between professors and students.

Slightly different results were found in another study done through an online survey in March and April 2020 with a sample of 2,289 people from the general population of China, in which it was noticed that the environmental domain had the highest mean score (Mean \pm SD = 69.8 \pm 16.7), followed by the social (Mean \pm SD = 69.8 \pm 19.5), and psychological (Mean \pm SD = 57.2 \pm 13.9), while the lowest was found for the physical domain (Mean \pm SD = 54.6 \pm 13.2)⁴⁰.

As in the study with the Chinese population⁴⁰, satisfaction with the QOL was reasonable; however, the difference in the results of university professors in this study was perceived in the relatively low mean scores of the social and environmental domains, and the highest mean scores in the physical and psychological domains.

Drastic changes such as the migration of work activities to the remote modality which caused sudden routine changes, insecurity about maintaining their full salary or contractual instability for professors in the private sector⁴¹, and doubts about the availability of healthcare services due to the imminent collapse of the health-care system may have correlated with the low scores of the social and environmental domains in the participants of this study.

This study has some limitations. The first is related to its design, which does not allow causal inferences to be extracted from the data because it is transversal. Therefore, it is only possible to evaluate the perceived stress and the QOL at the moment. This is because the exposure and the outcome are collected simultaneously, without longitudinal observation of the participants. We emphasize the need for longitudinal studies to understand better the relationship between perceived stress levels and QOL during confinement measures. In addition to longitudinal investigation and more personal data, the study could have benefited from qualitative data as well. This could be added in the shape of short answers, or a small sample of the participants also being interviewed to help explain some of the results.

Another limitation was the lack of information on additional factors associated with perceived stress, such as monthly income or financial status and diagnoses of some participants' mental disorders. This possible gap suggests the need for further studies on this topic. Furthermore, no information was collected regarding the area of knowledge of each participant. This resulted in the inability to identify health distinctions between participants from different areas of expertise.

The electronic survey research is not immune to bias. The sampling bias may occur due to the self-selection recruitment. To reduce our sampling bias, our survey was distributed to various online channels to improve its visibility among our respondents.

Although this study was carried out with university professors, we can go beyond these findings to other education professionals with different educational levels from different areas of Brazil or other countries with similar social and economic inequalities.

CONCLUSIONS

The results of perceived stress and the QOL of professors showed that the majority's stress levels were normal, followed by moderate and high. QOL had an overall average score. The physical domain had the highest mean score among the QOL domains, while the lowest mean score was found for the social domain; despite the difference, both means indicate a good perception of these domains.

As this is a study of the immediate perceptions of COVID-19 among university professors, an understanding of these factors may contribute to the development of intervention programs to relieve stress and improve the quality of life among university professors. The factors that are associated with the stress levels were being female, between 31 and 40 years old, those who had a child, and those who did not perform frequent religious practice. Most had doctorate degrees and felt overloaded by remote work despite using technological tools even before the pandemic.

In one of the poorest regions of Brazil, it is essential to keep mental health a priority by supporting university professors as they respond to student needs because the education received at this time of crisis will contribute to the social and economic recovery of these regions. Thus, this study suggests that universities should promote connectedness, virtual support groups, and events, and professors should check in on one another for mutual support to improve the management of stress and the QOL of professors.

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Competing interests

None declared.

Data availability

The data underlying this article are available in this published article.

Authors' contributions

MNFF and FSS are the principal investigators. FSS, ACPJC, and MSN conceived the study. MNFF, FSS, ACPJC, RAS, and LHS designed the study protocol. MNFF, FSS, and ACPJC were responsible for the implementation of the project. MNFF, FSS, and LHS supervised data collection. All the authors (MNFF, FSS, ACPJC, MSN, RAS, and LHS) were responsible for disseminating the data collection surveys. LHS led the statistical analysis. All the authors carried out the analysis and/or interpretation of these data. MNFF, FSS, and ACPJC drafted the manuscript. MSN critically revised the manuscript for intellectual content. All authors contributed to the development of the manuscript and read and approved the final version.

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