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Screening for Depression, Anxiety, and Stress in the initial and middle stages of the COVID-19 pandemic in a university's community in the Mid-West Brazil, 2020

Triagem para Depressão, Ansiedade e Estresse nos estágios inicial e intermediário da pandemia de COVID-19 em uma comunidade universitária do Centro-Oeste do Brasil, 2020

Detección de Depresión, Ansiedad y Estrés en las etapas inicial y media de la pandemia de COVID-19 en una comunidad universitaria del Centro-Oeste de Brasil, 2020

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Abstract
Objective: To measure the prevalence of depression, anxiety and stress levels in a university community during the COVID-19 pandemic. Methods: A cross-sectional exploratory-descriptive study was implemented in two stages, in the initial and middle stages of the COVID-19 pandemic in Brazil, with a sample of a university community in emergency remote learning. Results: The prevalence of high scores (Extremely severe) for depression, anxiety and stress, respectively, were 27.34 (25.30-29.47), 27.12 (25.08-29.25) and 19.38 (17.59-21.30) in the initial stage and 25.79 (24.11-27.82), 26.01 (24.33-28.05) and 17.18 (15.76-18.98) in the middle stage of the pandemic. Conclusions: The prevalence of high scores for the screened psychological disorders were high in both stages of the pandemic. We recommend preventive and care actions for the university community in periods of crisis such as the pandemic. Future studies can look at the trend in prevalence rates over time as social distancing measures, the pandemic and emergency remote learning are slowing down.
Keywords: COVID-19; Depression; Anxiety; Stress; University Community.

Resumo
Objetivo: Medir a prevalência de níveis de depressão, ansiedade e estresse em uma comunidade universitária durante a pandemia de COVID-19. Métodos: Um estudo transversal exploratório-descritivo foi implementado em duas etapas, nas fases inicial e intermediária da pandemia de COVID-19 no Brasil, com uma amostra de uma comunidade universitária em ensino remoto emergencial. Resultados: As prevalências de escores altos (Extremamente graves) para depressão, ansiedade e estresse, respectivamente, foram 27,34 (25,30-29,47), 27,12 (25,08-29,25) e 19,38 (17,59-21,30) na fase inicial e 25,79 (24,11- 27.82), 26.01 (24.33-28.05) e 17.18 (15.76-18.98) na fase intermédia da pandemia. Conclusões: A prevalência de altos escores para os transtornos psicológicos rastreados foi alta em ambas as fases da pandemia. Recomendamos ações preventivas e de cuidado para a comunidade universitária em períodos de crise como a pandemia. Estudos futuros podem analisar a tendência das taxas de prevalência ao longo do tempo, à medida que as medidas de distanciamento social, a pandemia e o aprendizado remoto de emergência estão diminuindo.
Palavras-chave: COVID-19; Depressão; Ansiedade; Estresse; Comunidade Universitária.

Resumen
Objetivo: Medir la prevalencia de los niveles de depresión, ansiedad y estrés en una comunidad universitaria durante la pandemia de COVID-19. Métodos: Se implementó un estudio transversal exploratorio-descriptivo en dos etapas, en la etapa inicial y media de la pandemia de COVID-19 en Brasil, con una muestra de una comunidad universitaria en emergencia de aprendizaje a distancia. Resultados: La prevalencia de puntuaciones altas (Extremadamente grave) para depresión, ansiedad y estrés, respectivamente, fueron 27,34 (25,30-29,47), 27,12 (25,08-29,25) y 19,38 (17,59-21,30) en la etapa inicial y 25,79 (24,11- 27.82), 26.01 (24.33-28.05) y 17.18 (15.76-18.98) en plena etapa de pandemia. Conclusiones: La prevalencia de puntuaciones altas para los trastornos psicológicos cribados fue alta en ambas etapas de la pandemia. Recomendamos acciones preventivas y de atención a la comunidad universitaria en periodos de crisis como la pandemia. Los estudios futuros pueden observar la tendencia en las tasas de prevalencia a lo largo del tiempo

a medida que las medidas de distanciamiento social, la pandemia y el aprendizaje remoto de emergencia se están desacelerando.
Palabras clave: COVID-19; Depresión; Ansiedad; Estrés; Comunidad Universitaria.

1. Introduction

Use Throughout the last two years, a worldwide pandemic of the coronavirus-19 disease (COVID-19) has been challenging managers and health professionals, insofar as it refers to the construction of rapid diagnoses, creation of protocols for effective treatments and medications, development and dispensing vaccines and, above all, actions that ensure the deceleration of the contagion curve and minimization of the number of cases and deaths related to COVID-19 (Nkengasong, 202; Ventura et al., 2020). This challenge became even more complex when considering the unequal social and living conditions of different groups around the world, so that the pandemic not only exposed the subjects to a new disease, but also opened wide social inequities and injustices, generating concerns and needs for public policies and specific health programs that meet the needs and specificities of the most vulnerable groups (Farias & Leite Junior, 2021; Takuan et al., 2020; Ventura et al., 2020).

Studies are needed for the impacts of the COVID-19 pandemic on mental health, quality of life and psychological well-being of different audiences (Vindegaard & Benros, 2020; Xiong et al., 2020). In general, investigations are revealing that the reports on the new disease, with high power of contagion and lethality, as well as the rapid and uncontrolled proliferation of the new coronavirus, widely spread by the mass media, contributed to increase fear and uncertainty about the future, favoring symptoms such as sleep and eating disorders, psychological disorders, and suicidal ideations (Vindegaard & Benros, 2020; Xiong et al., 2020). In addition, the funerary rituals, essential for the elaboration of the mourning process, also underwent changes, exacerbating the suffering of families, further compromising the mental health of these individuals (Crepaldi et al., 2020; Dantas et al., 2020).

In Brazil, as in many parts of the world, in the first months of the pandemic, physical and social distancing measures were imposed seeking to reduce the contamination curve and reduce the number of hospitalizations and deaths (Nkengasong, 2021; Malta et al., 2020; Who, 2022). Despite their importance, these measures suddenly changed the population's routine, requiring the adoption of new habits and behaviors (eg, use of masks and gel alcohol, avoidance of body contact), as well as the closing of important spaces of social interaction, such as religious institutions, leisure and entertainment services, as well as restrictions on trade and, at times, imposition of lockdown (Aquino et al., 2020 Who, 2022).

In the educational context, as in universities, face-to-face classes were suspended and replaced by remote learning mediated by Internet based information and communication technologies, which required teachers, technicians and students to suddenly adapt to a new learning scenario, while organizing to ensure their survival and that of their families (Reimers, 2021; Santos et al., 2021). Studies prior to the pandemic already pointed to the worrying scenario related to the mental health of university students and professors, indicating a context marked by an objective and subjective overload, responsible for a high prevalence of psychiatric symptoms, such as stress, depression and anxiety (Ariño & Bardagi, 2018; Padovani et al., 2014). Other investigations have shown that, in the midst of the COVID-19 pandemic, remote teaching and work not only brought harm to learning, but also has been contributing to the impairment of mental health and pointing to the need to plan interventions that minimize these effects among university communities (Cao et al., 2020; Husky, et al., 2020; Li et al., 2020; Maia & Dias, 2020; Santos et al., 2021).

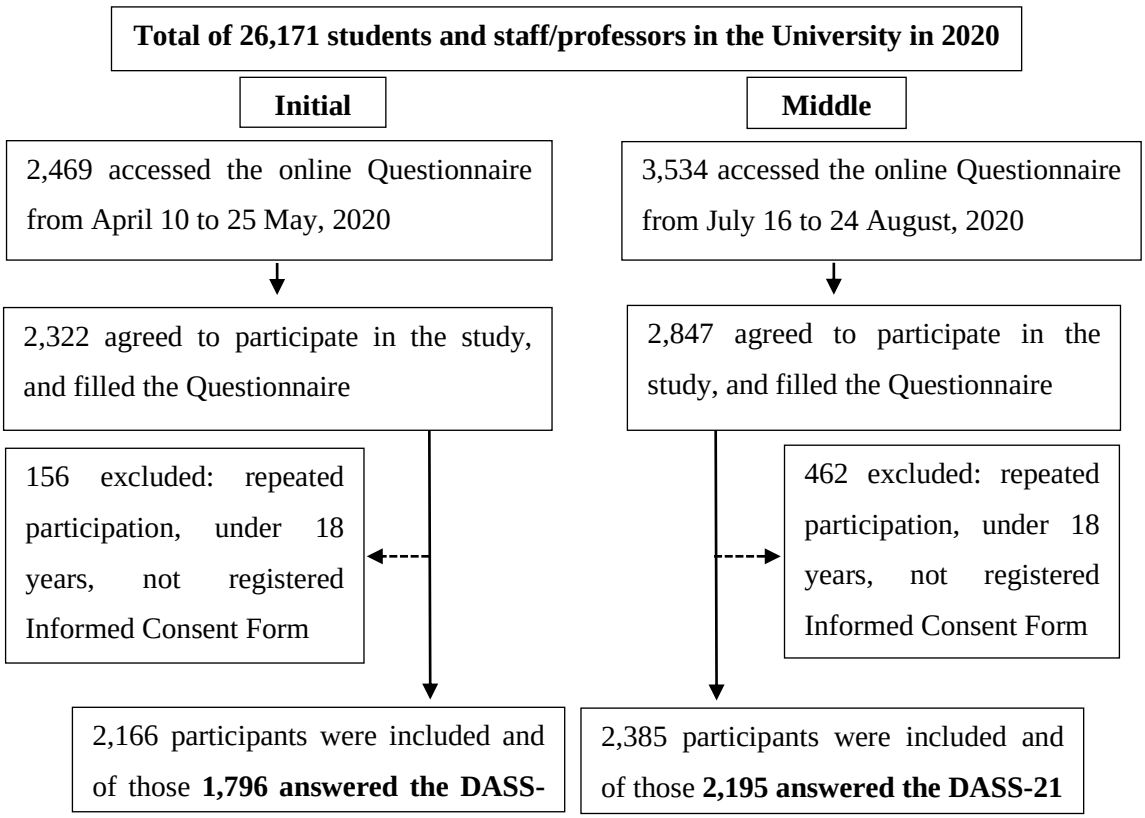
Then, this study aims to present the prevalence of measured levels of depression, anxiety and stress in university community from Mid-West Brazil during the initial and middle stages of the COVID-19 pandemic.

2. Methodology

2.1 Study Design, Study Population and Sampling

A cross-sectional exploratory and descriptive study (Samiperi et al., 2013) was implemented in two waves, in the initial and middle stages of the COVID-19 pandemic in Brazil, with a sample of a university community in emergency remote learning (ERL) due to the pandemic. In 2020, the study population was composed by 22.873 students whom at the time of the study were enrolled in undergraduate or graduate courses and by 3.298 active technical staff and professors from the ten campuses of the University (Figure 1). Participants who voluntarily agreed to participate answered the study questionnaire after signing an Internet based Informed Consent Form (ICF). The rationale for choosing this set of participants was based on the stable link with the University, both as students or servants, in order to ensure a good level of participation in subsequent waves of data collection.

Figure 1. Flowchart of participant' sampling process in both stages.



Source: Authors.

2.2 Data Collection and Tools

Given the pandemic and lockdown scenario, the first wave of cross-sectional data collection, the initial stage, was carried out between April and May 2020, less than a month after the University's measures of social and physical distancing with remote work and remote lectures. The second wave, middle stage, was taken between July and August 2020. A self-applied internet based questionnaire was generated on Google Form containing sociodemographic characterization, questions on access to Information and Communications Technology, time and modalities of adherence to measures of social distancing and to the University ordinances that set up remote work and remote classes from March 17, 2020. Perceptions, attitudes and difficulties in relation to the pandemic and mental health assessment using the Depression, Anxiety, and Stress Scale (DASS-

21).

DASS-21 is a 21 Likert-type self-reported questionnaire consisting in 3 dimensions: depression, anxiety and stress. The responses for each dimension is based on a 4-point Likert scale ranging from 0 ('did not apply to me at all') to 3 ('applied to me very much or most of the time'), from a version validated in Brazil (Vignola & Tucci, 2014). Respondents were scored in different levels: "Normal" or "Mild" or "Moderate" or "Severe" or "Extremely severe". The questionnaire was available online at the homepage, social media, and weekly newsletter of the University, and was also inserted on the user area of the Academic Management System and the Virtual Learning Environment (AVA), what increased access and visibility to the study, with a consequent increase in the number of participants, registered in the third week of data collection.

2.3 Data analysis

We looked at the overall prevalence of different levels (Mild, Moderate, Severe and Extremely severe) of depression, anxiety, and stress and differentiated it by sex (male or female), type of link with the University (student, staff or professor), and other selected sociodemographic variables. The scale's reliability was assessed with Cronbach's alpha (α) and the validity was assessed with the correlation between the scale dimensions, both varying according to the dimensions and the stage. Means, standard deviations, Cronbach's alpha, and correlations are presented in Supplementary material (Figure 2).

Figure 2. A) Means, standard deviation (sd), and Cronbach's alpha; B) Correlations for depression, anxiety, and stress screened with DASS-21 in a Brazilian University during initial (*left bottom* (B)) and middle (*right upper* (B)) stages of the COVID-19 pandemic, 2020.

A

Screened outcome	**Initial stage**		**Middle stage**	
	Mean (sd)	**Cronbach's alpha**	**Mean (sd)**	**Cronbach's alpha**
Depression	1.26 (0.95)	0.936	1.18 (0.97)	0.947
Anxiety	0.93 (0.84)	0.895	0.87 (0.85)	0.902
Stress	1.44 (0.88)	0.905	1.34 (0.89)	0.914

B

Screened outcome	**Middle stage**		
	Depression	Anxiety	Stress
Initial stage			
Depression	-	0.76	0.82
Anxiety	0.74	-	0.83
Stress	0.80	0.81	-

Source: Authors.

Data obtained from participants who answered the DASS-21 were included in this descriptive analysis of rates of depression, anxiety, and stress symptoms. Sociodemographic characteristics were obtained: sex (Male/Female), age (aggregated in groups), race/skin color (White/Black/Yellow/Indigenous), educational level (Primary-Secondary

education/University degree/Master's-PhD degree), Have any religion? (yes/no), marital state (Married-With partner/Single), Children (yes/no), Health professional? (yes/no), Whom do you live with? (Spouse/Family/Friends-Peers/Alone).

2.4 Ethical Standards

The research project was submitted to the National Research Ethics Commission (CONEP), receiving a favorable opinion for its realization.

3. Results

After excluding repeated participations, respondents aged less than 18 years old, questionnaires with high levels of missing data, and/or questionnaires with Informed Consent not registered data from 1,796 participants from the initial stage and 2,195 participants from the middle stage were analyzed in this study (Table 1). In both stages, students (78.84% and 81.37%), females (65.70% and 60.36%), young – 18 to 29-year age bracket (67.26% and 59.73%), white (54.18% and 55.58%) and single people (71.33% and 66.56%) were the majority of both samples. Mean age in the initial stage was 28.3 years (standard deviation [sd]=10.1) and in the middle stage was 30.24 years (sd= 10.65)

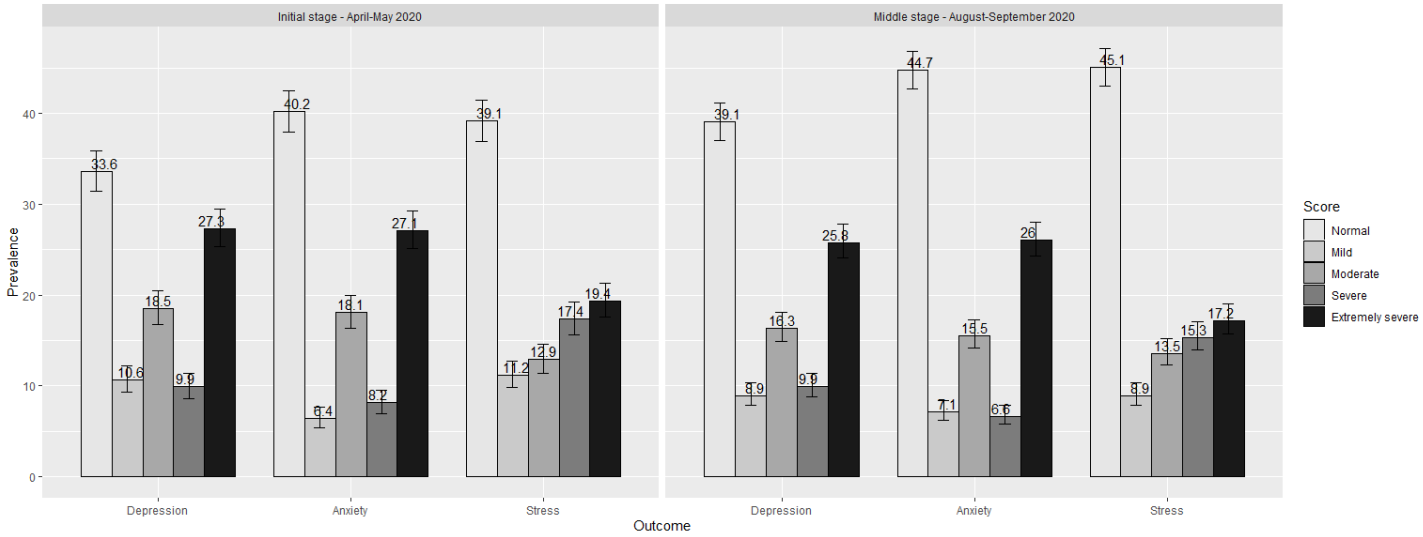
Table 1. Sociodemographic characteristics of participants sampled to the study in a Brazilian University Community during initial (April - May) and middle (August - September) stages of the COVID-19 pandemic, 2020.

Characteristics	**Initial stage N= 1,796**		**Middle stage N= 2,195**	
Gender	**n (%)**	*p-value*	**n (%)**	*p-value*
Female	1,180 (65.70)	*0.001*	1,323 (60.36)	*<0.001*
Male	616 (34.30)		869 (39.64)	
Age (mean= 28,3; sd=10,1)			(mean=30.24; sd=10.65)	
18 - 29 years	1,208 (67.26)		1,311 (59.73)	
30 - 49 years	495 (27.56)	*<0.001*	727 (33.12)	*<0.001*
50 + years	93 (5.18)		157 (7.15)	
Status				
Student	1,416 (78.84)		1,786 (81.37)	
Staff	276 (15.37)	*<0.001*	241 (10.98)	*<0.001*
Professor	104 (5.79)		168 (7.65)	
Race/skin color				
White	973 (54.18)		1,220 (55.58)	
Black/Mulato	735 (40.92)	*<0.001*	890 (40.55)	*<0.001*
Indigenous/Yellow	88 (4.90)		85 (3.87)	
Marital status				
Married/With partner	515 (28.67)	*<0.001*	734 (33.44)	*<0.001*
Single	1,281 (71.33)		1,461 (66.56)	
Children				
Yes	1,383 (77.00)	*<0.001*	635 (28.93)	*<0.001*
No	413 (23.00)		1,560 (71.07)	
Religion				
Yes	1,223 (68.10)	*<0.001*	1,506 (68.61)	*<0.001*
No	573 (31.90)		689 (31.39)	
Health care worker				
Yes	106 (5.91)	*<0.001*	157 (7.15)	*<0.001*
No	1,690 (94.09)		2,038 (92.85)	
Risk group for COVID-19 severe illness				
Yes	442 (24.61)	*<0.001*	749 (34.12)	*<0.001*
No	1354 (75.39)		1446 (65.88)	
Cohabits?				
With Family/Partner	1,312 (73.05)		1,741 (79.32)	
With Friends/Roommates	146 (8.13)	*<0.001*	131 (5.97)	*<0.001*
No, lives alone	338 (18.82)		323 (14.72)	

Source: Authors.

Overall numbers and prevalence rates of participants screened “Mild”, “Moderate”, “Severe” and “Extremely severe” for depression, anxiety and stress in both stages is presented in figure 3 and in Table 2. Different levels of depression, anxiety, and stress for both stages under analysis are presented in Tables 3, 4 and 5 and in figures 4 and 5, according to selected sociodemographic characteristics. The tables and figures also show the 95% confidence bounds (95% C.I). The numbers and rates of participants who did not present any symptoms, i.e, those screened “Normal”, are not shown, except in Figure 3.

Figure 3. Prevalence rates and 95% confidence intervals for screened levels of depression, anxiety, and stress in a Brazilian University Community during initial and middle stages of the COVID-19 pandemic, 2020.



Source: Authors.

In the early stage of the pandemic, the prevalence of mild levels of depression, anxiety and stress were 10.63% (9.27-12.17), 6.40 (5.34-7.66) and 11.19 (9.79-12.76), respectively, while the prevalence rates of extremely severe levels were 27.34 (25.30-29.47), 27.12 (25.08-29.25) and 19.38 (17.59-21.30). During the middle stage, the rates were 8.93 (7.91-10.36), 7.11 (6.21-8.43) and 8.93 (7.91-10.36) for mild levels of depression, anxiety and stress, respectively. But the prevalence rates of extremely severe levels in the middle stage were 25.79 (24.11-27.82), 26.01 (24.33-28.05) and 17.18 (15.76-18.98) (Table 2). The prevalence rates of depression, anxiety and stress for each degree of symptoms stratified by sex, age group, status, race/skin color, risk group for COVID-19 and healthcare worker in both stages are presented in Tables 3, 4 and 5.

Table 2. Overall number (n) and prevalence rates (%) of different levels of depression, anxiety and stress for both stages in a Brazilian University Community during initial and middle stages of the COVID-19 pandemic, 2020.

Outcome	Level: n (%) [95% C.I]							
	Initial stage (n= 1,796)				Middle stage (n= 2,195)			
	Mild	**Moderate**	**Severe**	**Extremely severe**	**Mild**	**Moderate**	**Severe**	**Extremely severe**
Depression	191 (10.63) [9.27-12.17]	333 (18.54) [16.78-20.43]	178 (9.91) [8.59-11.41]	491 (27.34) [25.30-29.47]	196 (8.93) [7.91-10.36]	358 (16.31) [14.93-18.08]	217 (9.89) [8.81-11.37]	566 (25.79) [24.11-27.82]
Anxiety	115 (6.40) [5.34-7.66]	325 (18.10) [16.36-19.97]	147 (8.18) [6.98-9.57]	487 (27.12) [25.08-29.25]	156 (7.11) [6.21-8.43]	341 (15.54) [14.19-17.28]	145 (6.61) [5.75-7.89]	571 (26.01) [24.33-28.05]
Stress	201 (11.19) [9.79-12.76]	232 (12.92) [11.42-14.58]	312 (17.37) [15.66-19.22]	348 (19.38) [17.59-21.30]	196 (8.93) [7.91-10.36]	297 (13.53) [12.27-15.19]	336 (15.31) [13.97-17.04]	377 (17.18) [15.76-18.98]

Source: Author.

Table 3. Prevalence rates (%) of different levels of depression by selected characteristics for both stages in a Brazilian University Community during initial and middle stages of the COVID-19 pandemic, 2020.

Characteristics	Depression levels: % (95% C.I)							
	Initial stage [n= 1,796]				Middle stage [n= 2,195]			
	Mild	**Moderate**	**Severe**	**Extremely severe**	**Mild**	**Moderate**	**Severe**	**Extremely severe**
Sex								
Female	11.27 (9.55-13.25)	18.14 (16.00-20.48)	10.85 (9.16-12.80)	31.02 (28.40-33.76)	8.75 (7.52-10.67)	17.50 (15.73-19.91)	10.03 (8.70-12.05)	29.41 (27.21-32.19)
Male	9.42 (7.28-12.07)	19.32 (16.32-22.71)	8.12 (6.14-10.63)	20.29 (17.23-23.73)	9.21 (7.41-11.37)	14.50 (12.26-17.06)	9.67 (7.82-11.87)	20.25 (17.66-23.11)
Age group								
18 - 29 years	10.93 (9.25-12.86)	18.79 (16.65-21.14)	11.51 (9.79-13.47)	33.69 (31.04-36.45)	8.54 (7.11-10.22)	17.39 (15.40-19.58)	11.21 (9.58-13.08)	35.70 (33.11-38.37)
30 - 49 years	9.90 (7.48-12.96)	20.61 (17.18-24.50)	7.27 (5.21-10.02)	15.35 (12.35-18.90)	9.35 (7.38-11.76)	15.27 (12.77-18.14)	8.53 (6.65-10.86)	13.20 (10.87-15.93)
50 + years	10.75 (5.56-19.31)	4.30 (1.39-11.26)	3.23 (0.84-9.81)	8.60 (4.06-16.72)	10.19 (6.12-16.29)	12.10 (7.63-18.49)	5.10 (2.39-10.13)	1.27 (0.22-5.00)
Status								
Student	10.17 (8.67-11.89)	19.70 (17.68-21.89)	11.44 (9.85-13.24)	31.57 (29.17-34.07)	8.57 (7.49-10.16)	17.08 (15.54-19.10)	10.53 (9.32-12.24)	30.24 (28.29-32.61)
Staff	12.68 (9.11-17.33)	15.94 (11.94-20.92)	3.99 (2.11-7.22)	11.59 (8.18-16.11)	9.96 (6.61-14.63)	13.28 (9.39-18.37)	8.71 (5.60-13.19)	5.81 (3.33-9.76)
Professor	11.54 (6.37-19.66)	9.62 (4.96-17.38)	4.81 (1.78-11.40)	11.54 (6.37-19.66)	11.31 (7.12-17.33)	12.50 (8.08-18.69)	4.76 (2.23-9.49)	7.14 (3.91-12.43)
Race/skin color								
White	11.41 (9.51-13.61)	18.09 (15.75-20.68)	8.94 (7.26-10.96)	27.44 (24.68-30.38)	9.92 (8.33-11.77)	16.07 (14.07-18.28)	9.67 (8.10-11.50)	26.56 (24.12-29.15)
Black/ Pardo	9.52 (7.55-11.94)	19.46 (16.69-22.54)	11.43 (9.26-14.01)	27.07 (23.92-30.47)	7.75 (6.12-9.76)	16.63 (14.27-19.28)	10.34 (8.45-12.57)	24.49 (21.73-27.48)
Indigenous/Yellow	11.36 (5.88-20.34)	15.91 (9.28-25.59)	7.95 (3.53-16.23)	28.41 (19.55-39.18)	7.06 (2.90-15.30)	16.47 (9.62-26.43)	8.24 (3.66-16.76)	28.24 (19.26-39.20)
Risk group for COVID-19								
Yes	8.37 (6.04-11.45)	17.65 (14.27-21.60)	10.18 (7.60-13.48)	33.26 (28.92-37.89)	9.48 (7.52-11.86)	15.22 (12.76-18.04)	9.35 (7.40-11.72)	32.71 (29.38-36.22)
Healthcare worker								

Yes	14.15 (8.40-22.58)	18.87 (12.17-27.88)	8.49 (4.20-15.93)	14.15 (8.40-22.58)	12.10 (7.63-18.49)	17.83 (12.37-24.92)	8.92 (5.14-14.79)	8.28 (4.66-14.03)

Source: Authors.

Table 4. Prevalence rates (%) of different levels of anxiety by selected characteristics for both stages in a Brazilian University Community during initial and middle stages of the COVID-19 pandemic, 2020.

Characteristics	**Anxiety levels: % (95% C.I)**							
	Initial stage [n= 1,796]				**Middle stage [n= 2,195]**			
	Mild	**Moderate**	**Severe**	**Extremely severe**	**Mild**	**Moderate**	**Severe**	**Extremely severe**
Sex								
Female	6.86 (5.52-8.50)	18.56 (16.40-20.92)	7.80 (6.36-9.51)	32.29 (29.64-35.05)	5.81 (4.84-7.49)	16.21 (14.51-18.57)	7.24 (6.14-9.05)	32.20 (29.93-35.03)
Male	5.52 (3.91-7.71)	17.21 (14.36-20.48)	8.93 (6.85-11.53)	17.21 (14.36-20.48)	9.09 (7.30-11.25)	14.50 (12.26-17.06)	5.64 (4.24-7.44)	16.57 (14.19-19.25)
Age group								
18 - 29 years	6.71 (5.39-8.30)	19.04 (16.89-21.39)	9.35 (7.80-11.17)	32.45 (29.83-35.18)	6.64 (5.38- 8.16)	16.40 (14.46-18.54)	8.09 (6.69-9.73)	33.87 (31.32-36.51)
30 - 49 years	5.45 (3.69-7.94)	16.16 (13.09-19.77)	6.67 (4.70-9.33)	17.78 (14.57-21.50)	7.02 (5.32-9.18)	15.54 (13.03-18.43)	3.71 (2.51-5.43)	16.23 (13.67-19.16)
50 + years	7.53 (3.34-15.40)	16.13 (9.60-25.53)	1.08 (0.06-6.69)	7.53 (3.34-15.40)	11.46 (7.12-17.76)	8.28 (4.66-14.03)	7.64 (4.19-13.27)	5.73 (2.82-10.93)
Status								
Student	6.21 (5.04-7.63)	19.42 (17.41-21.60)	9.04 (7.62-10.68)	31.00 (28.61-33.50)	6.94 (5.98-8.43)	15.96 (14.47-17.93)	7.00 (6.03-8.49)	29.96 (28.01-32.32)
Staff	7.61 (4.88-11.56)	13.04 (9.42-17.73)	6.16 (3.74-9.86)	13.41 (9.73-18.13)	7.88 (4.94-12.23)	14.52 (10.45-19.76)	4.56 (2.42-8.24)	7.47 (4.61-11.74)
Professor	5.77 (2.37-12.64)	13.46 (7.82-21.89)	1.92 (0.33-7.45)	10.58 (5.66-18.52)	7.74 (4.35-13.15)	12.50 (8.08-18.69)	5.36 (2.64-10.24)	10.71 (6.65-16.64)
Race/skin color								
White	6.47 (5.05-8.26)	19.01 (16.62-21.65)	8.74 (7.07-10.73)	25.90 (23.20-28.80)	6.97 (5.63-8.58)	16.23 (14.23-18.45)	6.64 (5.34-8.22)	25.74 (23.32-28.31)
Black/ Pardo	6.80 (5.14-8.93)	17.01 (14.40-19.96)	7.62 (5.85-9.84)	28.30 (25.10-31.73)	7.42 (5.82-9.39)	14.61 (12.39-17.14)	6.52 (5.03-8.39)	26.63 (23.78-29.69)
Indigenous/Yellow	2.27 (0.39-8.74)	17.05 (10.16-26.88)	6.82 (2.80-14.81)	30.68 (21.53-41.55)	5.88 (2.19-13.80)	15.29 (8.71-25.10)	7.06 (2.90-15.30)	23.53 (15.29-34.20)

Risk group for COVID-19 severe illness								
Yes	5.88 (3.95-8.61)	15.16 (12.01-18.92)	7.92 (5.65-10.94)	40.95 (36.35-45.71)	6.41 (4.81-8.47)	18.29 (15.62-21.29)	7.74 (5.98-9.95)	34.31 (30.94-37.85)
Healthcare worker								
Yes	8.49 (4.20-15.93)	20.75 (13.73-29.95)	3.77 (1.22-9.94)	20.75 (13.73-29.95)	8.92 (5.14-14.79)	10.83 (6.62-17.03)	6.37 (3.27-11.72)	19.75 (14.00-27.01)

Source: Authors.

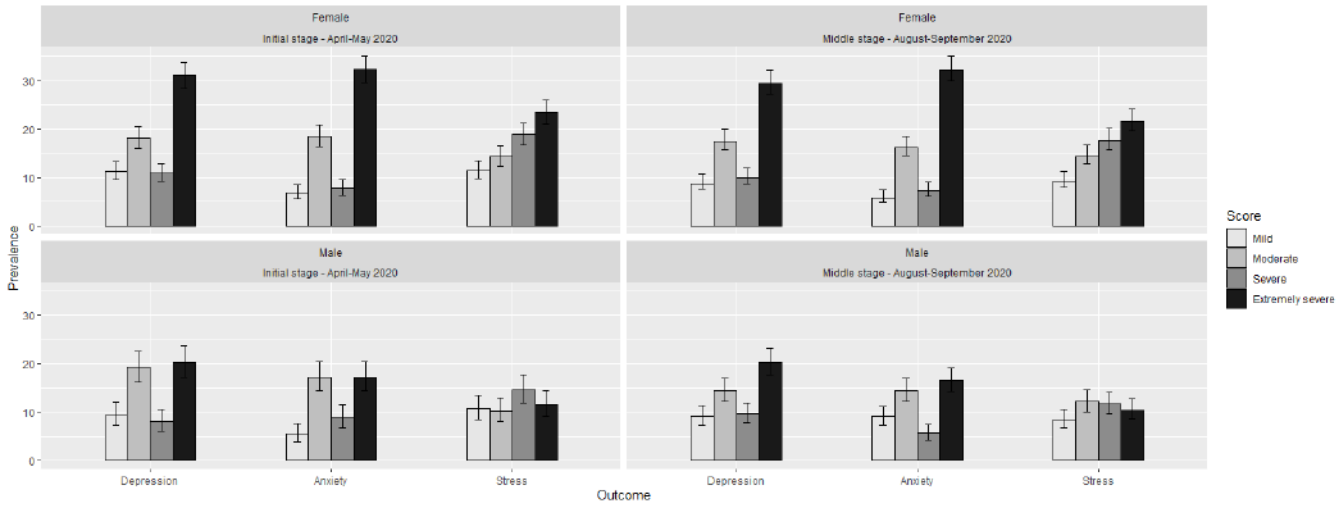
Table 5. Prevalence rates of different levels of stress by selected characteristics for both stages in a Brazilian University Community during initial and middle stages of the COVID-19 pandemic, 2020.

Characteristics	**Stress levels: % (95% C.I)**							
	Initial stage [n= 1,796]				**Middle stage [n= 2,195]**			
	Mild	**Moderate**	**Severe**	**Extremely severe**	**Mild**	**Moderate**	**Severe**	**Extremely severe**
Sex								
Female	11.44 (9.71-13.43)	14.32 (12.40-16.48)	18.81 (16.65-21.19)	23.47 (21.10-26.02)	9.20 (7.93-11.16)	14.40 (12.79-16.67)	17.65 (15.87-20.07)	21.57 (19.62-24.14)
Male	10.71 (8.44-13.49)	10.23 (8.00-12.96)	14.61 (11.97-17.71)	11.53 (9.17-14.38)	8.52 (6.79-10.62)	12.20 (10.13-14.60)	11.74 (9.71-14.11)	10.47 (8.55-12.75)
Age group								
18 - 29 years	11.34 (9.64-13.30)	13.74 (11.88-15.84)	20.36 (18.15-22.77)	23.76 (21.40-26.28)	8.31 (6.90-9.97)	15.26 (13.37-17.34)	19.22 (17.14-21.48)	22.96 (20.73-25.35)
30 - 49 years	11.11 (8.55-14.30)	12.73 (9.99-16.06)	12.12 (9.44-15.40)	11.72 (9.08-14.96)	10.32 (8.25-12.81)	11.69 (9.49-14.31)	10.45 (8.37-12.96)	9.90 (7.88-12.37)
50 + years	9.68 (4.80-18.03)	3.23 (0.84-9.81)	6.45 (2.65-14.05)	3.23 (0.84-9.81)	7.64 (4.19-13.27)	7.64 (4.19-13.27)	5.10 (2.39-10.13)	2.55 (0.82-6.81)
Status								
Student	11.30 (9.72-13.09)	13.77 (12.04-15.70)	19.21 (17.21-21.38)	22.46 (20.33-24.74)	9.18 (8.06-10.82)	14.22 (12.81-16.12)	16.80 (15.27-18.81)	19.88 (18.23-21.99)
Staff	11.23 (7.87-15.71)	10.14 (6.96-14.48)	9.78 (6.66-14.07)	7.97 (5.18-11.98)	8.30 (5.27-12.71)	9.54 (6.27-14.15)	9.96 (6.61-14.63)	2.90 (1.28-6.14)
Professor	9.62 (4.96-17.38)	8.65 (4.28-16.22)	12.50 (7.09-20.78)	7.69 (3.62-15.04)	7.14 (3.91-12.43)	11.90 (7.60-18.01)	7.14 (3.91-12.43)	8.93 (5.26-14.56)
Race/skin color								

White	13.26 (11.22-15.59)	14.18 (12.08-16.57)	16.14 (13.91-18.63)	19.53 (17.11-22.19)	8.93 (7.42-10.71)	15.25 (13.30-17.41)	15.08 (13.14-17.24)	17.70 (15.63-19.99)
Black/Pardo	8.03 (6.21-10.29)	11.70 (9.51-14.30)	20.00 (17.20-23.12)	18.91 (16.18-21.97)	9.10 (7.33-11.23)	11.57 (9.58-13.90)	14.94 (12.70-17.50)	17.08 (14.70-19.75)
Indigenous/Yellow	14.77 (8.41-24.30)	9.09 (4.29-17.62)	9.09 (4.29-17.62)	21.59 (13.81-31.90)	7.06 (2.90-15.30)	9.41 (4.44-18.20)	22.35 (14.32-32.93)	10.59 (5.26-19.62)
Risk group for COVID-19 severe illness								
Yes	10.63 (7.99-13.98)	10.86 (8.19-14.23)	19.46 (15.93-23.52)	26.92 (22.89-31.36)	10.81 (8.73-13.31)	13.08 (10.80-15.76)	18.29 (15.62-21.29)	22.30 (19.40-25.48)
Healthcare worker								
Yes	13.21 (7.67-21.50)	12.26 (6.95-20.41)	14.15 (8.40-22.58)	9.43 (4.87-17.07)	5.10 (2.39-10.13)	13.38 (8.66-19.94)	12.74 (8.14-19.22)	9.55 (5.63-15.54)
Yes	13.21 (7.67-21.50)	12.26 (6.95-20.41)	14.15 (8.40-22.58)	9.43 (4.87-17.07)	5.10 (2.39-10.13)	13.38 (8.66-19.94)	12.74 (8.14-19.22)	9.55 (5.63-15.54)

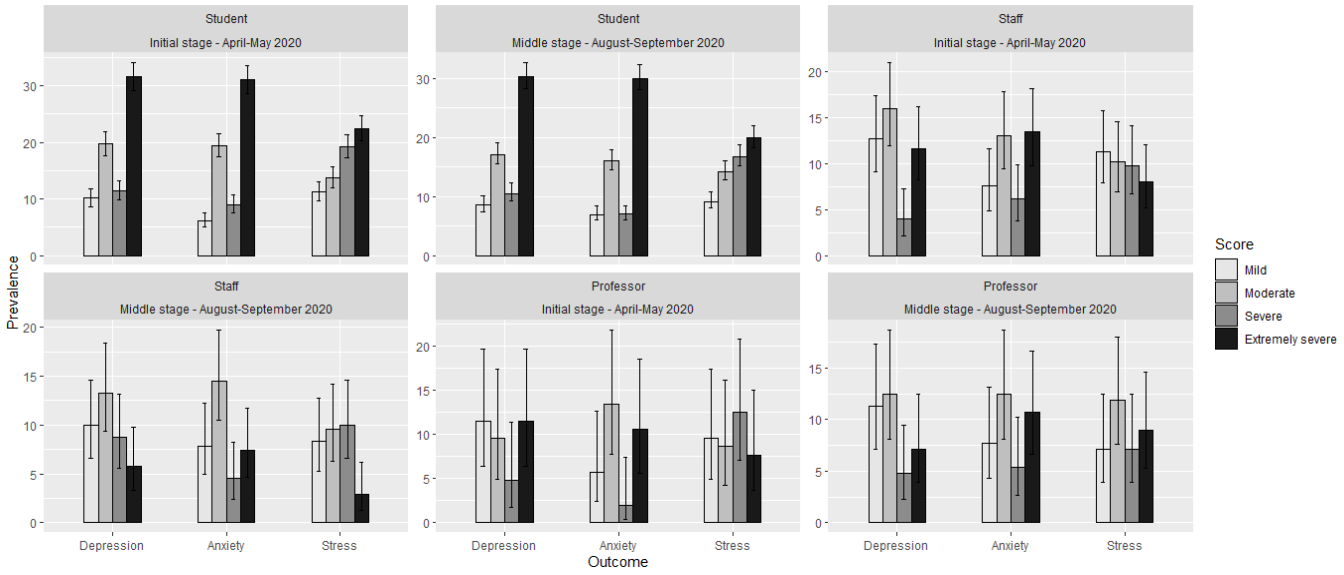
Source: Authors.

Figure 4. Prevalence rates and 95% confidence intervals for screened levels of depression, anxiety, and stress by sex in a Brazilian University Community during initial and middle stages of the COVID-19 pandemic, 2020.



Source: Authors.

Figure 5. Prevalence rates and 95% confidence intervals for screened levels of depression, anxiety, and stress by status in a Brazilian University Community during initial and middle stages of the COVID-19 pandemic, 2020.



Source: Authors.

4. Discussion

The prevalence rates of high scores (Extremely severe) for all screened outcomes (depression, anxiety and stress) were higher in both analyzed stages of the COVID-19 pandemic compared to the other degrees of symptoms. Since the prevalence rates were similarly high in both stages and there may have been more and clear information on the virus in the middle stage, but misinformation in the initial stage, we need to ask what might explain high levels of stress, anxiety, and depression in this university community in both surveyed periods of the pandemic. Meanwhile, in the initial stage, the effects of the stay-at-home orders (confinement/isolation, remote lectures and remote work) and strategies to cope psychologically with the COVID-19 crisis were in its beginning, but probably the fear of the pandemic was in its top. Therefore, this could be

due to a variety of factors that need investigation.

Since the beginning of the COVID-19 pandemic, high prevalence rates of psychological symptoms among university communities have been reported in several studies in different contexts and moments of this international public health emergency (Becker et al., 2021; Cao et al., 2020; Gomes et al., 2021; Husky et al., 2020; Li et al., 2020; Santos et al., 2020; Teodoro et al., 2021). Prevalence rates found in this study are higher than those reported in a study conducted with students in China during the COVID-19 pandemic, whose prevalence of moderate/severe symptoms of anxiety, depression, and stress were 28.8%, 16.5% and 8.1%, respectively (Wang et al., 2020). In a cross-sectional study carried out in Brazil, high rates of depression, anxiety and stress symptoms was estimated among university students (Teodoro et al., 2021).

Given the absence of data corresponding to the period before the pandemic, comparisons with the pandemic period cannot be issued in this population. However, in a Brazilian study, when comparing the periods before and during the COVID-19 pandemic, there as an increase in psychological disorders among university students (Maia & Dias, 2020). Similar rates were observed in the study developed in other investigation, during the pandemic among North American university students, which found high rates of symptoms of anxiety and depression, higher than at any other time preceding the COVID-19 pandemic (Zimmermann et al., 2021).

Some literature claims relationship between the increase in cases of depression and anxiety and remote classes instituted because of the COVID-19 pandemic (Qanash et al., 2020). Other researchers emphasize that the changes and challenges imposed by the pandemic and social distancing measures were added to other factors, especially the previous state of mental health before the pandemic, so that the moment of health emergency further aggravated the psychological suffering of university communities worldwide, which was already of concern (Teodoro et al., 2021).

Other investigations have highlighted virtual teaching and work as important factors associated with negative mental health outcomes among university communities (Becker et al., 2021; Gomes, et al., 2021; Gonzales et al. 2020; Mota et al., 2020; Reimers, 2021, Santos et al., 2021). In a survey conducted in Brazil during the first months of social distancing measures with a sample of university students from different areas of knowledge, researchers found high prevalence of Common Mental Disorders, and the prevalence was even higher among students who reported greater use of the internet (Mota et al., 2021).

Researchers are point out to the impacts of the sudden change from face-to-face to virtual learning/teaching on mental health of university professors and staff, who faced challenges related to coping with COVID-19 and adapting to virtual work, without proper planning or training to prepare them for this transition. This scenario contributed to increase overload and psychological symptoms such as anxiety and stress (Gomes, et al., 2021; Gonzales, et al., 2020).

A systematic review (Becker et al., 2021) reported association between remote learning activities and higher prevalence of psychological illness such as stress, anxiety, mental fatigue, somatic symptoms and burnout among university students. In the same vein, other study (Santos et al. 2021) draw attention to the negative effects of remote teaching on the mental health of teachers who are also overloaded with new demands of virtual work and facing a teaching context for which they were not prepared, generating doubts and anguish about their performance, contributing to psychological distress.

In this sense, parallel to our results, the sudden need to adapt to remote learning, the high overload of academic activities for university professors and staff, added to the challenges of maintaining health and survival amidst the insecurities of the pandemic seem to be important factors that contribute to increase psychological distress. This may explain the high rates of symptoms of depression, stress and anxiety in the two periods investigated. Noteworthy, the worsening of the pandemic extended the duration of social distancing measures to a longer and indeterminate confinement, which may have favored the increase in symptoms of depression, anxiety and stress, found in the present study.

It is difficult to accurately estimate the psychological and emotional impacts of COVID-19 pandemic and that of non-in-class teaching both for students and professors. Since the majority of our sample in this study was students - young¬ people,

the high rates of Severe-to-Extremely severe symptoms for all the three outcomes might be explained by the additional stress and worry experienced by students to adapt to the no longer face-to-face classes. Our findings may not be valid to the overall university community since the sample was non-probabilistic. The results, on the other hand, can serve as a starting point to investigate and understand the psychological impacts of the pandemic.

The findings also corroborate the scientific literature that has highlighted the importance of considering aspects related to individual differences and social inequalities, revealing the need to consider that the negative effects of both the pandemic and social distancing measures are even more severe among some socially and economically vulnerable groups (Aquino et al., 2020; Farias & Leite Junior, 2021; Zacher & Rudolph, 2021). As noticed in this study, the female population showed worsened mental health status, as seen in several publications (Mota et al., 2021; Ribeiro et al., 2021; Teodoro et al., 2021). Regarding university community, it is necessary to remember that women were already in situations of double shifts, characterized by work/study responsibilities and for taking care of domestic/family duties (Lemos et al., 2020; Marques et al., 2020). With the implementation of social distancing measures and remote work/lectures, women became even more overloaded, becoming responsible for the comprehensive care of children, spouses and also academic activities, which may explain the worsened health mental state, when compared to men (Lemos et al., 2020). In addition, studies have also found an increase in domestic violence during the COVID-19 pandemic, placing women in a highly stressful and constant worry situation (Barbosa et al., 2021; Marques et al., 2020).

In the same direction, studies have drawn attention to the fact that social distancing measures aggravated social inequalities already observed in periods prior to the pandemic and that had already been contributing to worse health conditions in the university community (Ariño & Bardagi, 2019; Farias & Leite Junior, 2021; Teodoro et al., 2021). Studies pointed out to a greater vulnerability to psychological distress of minority groups, especially black and low income people, and this phenomenon is strongly related to material conditions, which was compromised during the pandemic (Aquino et al., 2020; Farias & Leite Junior, 2021). From this perspective, black and low income people were more susceptible to unemployment, insufficient financial resources, as well as higher mortality rate by COVID-19, resulting in higher rates of people in psychological suffering and mental outcomes in this populations (Goes et al., 2020; Santos et al., 2020).

It is necessary to consider that individuals who are part of risky groups for COVID-19 also experienced anguish and concerns that aggravated the state of fear and anxiety in view of the new disease (Duarte et al., 2020). Faced with the accelerated and uncontrolled increase in the number of cases and deaths, insufficiency of resources and supplies in health, and in the midst of a series of information, which is not always reliable about the disease and its treatment and prevention, these subjects were faced with an aversive and frightening situation. That scenario may explain the higher prevalence of participants belonging to COVID-19's risky group with extremely severe levels of depression, anxiety and stress, also found in other investigations around the world (Silva et al., 2020).

5. Final Considerations

The results pointed to prevalence of high scores (Extremely severe) for depression, anxiety and stress, respectively, in the initial stage and in the middle stage of the pandemic between the community university. Finally, the surveyed university community experienced a greater psychological impact of the COVID-19 pandemic in the initial and middle stages of the pandemic, as measured by symptoms of depression, anxiety, and stress based on the used psychological assessment tool. This claims the need to implement appropriate preventive and care interventions regarding university community's mental health. It would be important to analyze the trends in prevalence rates over time as social distancing measures, the pandemic and emergency remote learning are slowing down. Further investigation on determinants of individuals' mental health produced by the COVID-19 crisis and by non-traditional learning methods is needed.

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