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Mental health of Brazilian university students during the Covid-19

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Abstract

This study aimed to investigate the effects of positive and negative affects, anxiety, and obsessive and compulsive thoughts and behaviors on Brazilian university students during the Covid-19 pandemic. Participated in this study 492 students, aged 18 years or over, from all regions of the country. The survey was conducted between April and May 2020, using self-report instruments applied in the online format. The results indicated that 37% ($N=182$) of the students had a high level of anxiety and 46.1% ($N=227$) moderate levels for obsessive and compulsive thoughts and behaviors. In addition, it was found that positive affects were negatively correlated with anxiety, as well as with obsessive and compulsive thoughts and behaviors, while negative affects were positively correlated with independent variables. It is concluded that the mental health of university students must be monitored during pandemics.

Keywords: Covid-19; pandemic; higher education; anxiety; OCD.

SAÚDE MENTAL DOS ESTUDANTES UNIVERSITÁRIOS BRASILEIROS DURANTE A PANDEMIA DE COVID-19

Resumo

Este estudo teve como objetivo investigar os efeitos dos afetos positivos e negativos, da ansiedade e dos pensamentos e comportamentos obsessivos e compulsivos nos estudantes universitários brasileiros durante a pandemia da Covid-19. Participaram deste estudo 492 estudantes de todas as regiões do país e com idades a partir de 18 anos. A pesquisa foi realizada entre os meses de abril e maio de 2020, por meio de instrumentos de autorrelatos aplicados no formato *on-line*. Os resultados indicaram que 37% ($N = 182$) dos estudantes apresentaram alto nível de ansiedade e 46,1% ($N = 227$) níveis moderados para os pensamentos e comportamentos obsessivos e compulsivos. Além disso, verificou-se que os afetos positivos se relacionaram negativamente à ansiedade, assim como se relacionaram negativamente aos pensamentos e comportamentos obsessivos e compulsivos, enquanto os afetos negativos se relacionaram positivamente às variáveis independentes. Conclui-se que a saúde mental dos estudantes universitários deve ser monitorada durante pandemias.

Palavras-chave: Covid-19; pandemia; ensino superior; ansiedade; TOC.

SALUD MENTAL DE ESTUDIANTES UNIVERSITARIOS BRASILEÑOS DURANTE LA PANDEMIA COVID-19

Resumen

Este estudio tuvo como objetivo investigar los efectos de los afectos positivos y negativos, la ansiedad y los pensamientos y comportamientos obsesivos y compulsivos en estudiantes universitarios brasileños durante la pandemia de Covid-19. En este estudio participaron 492 estudiantes de todas las regiones del país y mayores de 18 años. La encuesta se realizó entre los meses de abril y mayo de 2020, utilizando instrumentos de autoinforme aplicados en formato online. Los resultados indicaron que el 37% ($N = 182$) de los estudiantes tenían niveles altos de ansiedad y el 46,1% ($N = 227$) niveles moderados de pensamientos y comportamientos obsesivos y compulsivos. Además, se encontró que los afectos positivos se correlacionaron negativamente con la ansiedad, así como el pensamiento y el comportamiento obsesivo y compulsivo se correlacionaron negativamente, mientras que los afectos negativos se correlacionaron positivamente con variables independientes. Se concluye que la salud mental de los estudiantes universitarios debe ser monitoreada durante las pandemias.

Palabras clave: Covid-19; pandemia; educación superior; ansiedad; TOC.

1. Introduction

The epidemic of the new severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2 coronavirus), which causes the Covid-19 disease, spread originally in the Wuhan region of China and quickly spread to Europe and the rest of the world (Vinkers et al., 2020). The Covid-19 pandemic is a global public health problem that has affected countries like Brazil, requiring government measures to reduce its transmission. Among the main measures are quarantine and social distancing. According to Brooks et al. (2020), quarantine can be defined as the segregation of people who have potentially contracted a contagious disease and aims to prevent the spread of such disease to other individuals. On the other hand, the concept of social distancing, for the author of this study, is splitting the community into two groups: those contaminated by COVID-19 and those who are, so far, healthy.

In a qualitative review by Brooks et al. (2020), a total of 3166 scientific articles were found, among which 24 studies examined the psychological impact of quarantine initiated during outbreaks of severe acute respiratory syndrome (SARS), Ebola, H1N1 influenza, Middle East respiratory syndrome (MERS) and equine influenza. The results found indicate the presence of negative psychological effects,

including symptoms of post-traumatic stress, confusion, and anger, during the quarantine periods. Stressing factors included, for example, fears of infection, frustration, boredom, financial loss, among others. In this connection, it is essential to understand the psychological phenomena derived from the pandemic context in different social groups. The particular interest of this article is the understanding of the psychological aspects of Brazilian university students.

A recent study carried out in China with 7,143 university students, indicated that 0.9% of the interviewees were experiencing a severe anxiety condition while 21.3% had mild anxiety. In addition, the results showed that delays in academic activities were positively associated with anxiety symptoms (Cao et al., 2020). Another investigation with 460 Portuguese university students found that the participants during the pandemic had significantly higher levels of depression, anxiety, and stress compared to the students investigated during the period preceding the pandemic (Maia & Dias, 2020). A survey conducted in Mexico showed that 37.92% of the university students who were in isolation developed stress and 36.3% sleep problems, and these numbers were higher for the group of women and younger students (18–25 years old) (González-Jaimes, Tejeda-Alcántara, Espinosa-Méndez, & Ontiveros-Hernández, in press). Furthermore, a study carried out in China with university students found that individuals who were less satisfied with the control measures were associated with lower rates of positive affects and higher rates of negative affects (Wang, Jing, Han, Jing, & Xu, 2020).

However, it should be noted that empirical studies carried out in the Brazilian context on the psychological aspects of higher education in a pandemic situation are still scarce. Thus, this article addresses a recent problem and a gap, since national and international studies with university students as the target audience are scarce and encompass the joint study of several variables. In this connection, the present study aimed to investigate the effects of positive and negative affects, anxiety, and obsessive-compulsive thoughts and behaviors in Brazilian university students during the COVID-19 pandemic.

Research conducted before the pandemic found significant correlations between affections and negative constructs, such as anxiety, stress, and depression (Gouveia et al., 2019). In addition, Eisner, Johnson, and Carver (2009) obtained results that demonstrated that measures to regulate positive affect enabled an important contribution to predict anxiety disorders and obsessive-compulsive disorder.

Thus, based on the studies cited above, it was hypothesized that:

- H1a: Positive affects will relate negatively to anxiety.
- H1b: Positive affects will relate negatively to obsessive-compulsive thoughts and behaviors.
- H2a: Negative affects will positively relate to anxiety.
- H2b: Negative affects will positively relate to obsessive-compulsive thoughts and behaviors.

In addition, a few additional hypotheses were developed. Barros et al. (2020) consider that Brazilian women show a higher frequency of depression/sadness and anxiety/nervousness feelings compared to men, and that periods of social distancing would cause variations in negative behaviors and feelings. Thus, it was hypothesized that:

- H3: There will be a difference in average responses between men and women for the constructs appraised.
- H4: Students undergoing a long period of social distancing will have higher rates of negative affects, anxiety, and obsessive-compulsive thoughts and behaviors.

2. Method

2.1 Participants

The initial sample was composed of 530 participants; however, taking into account the investigation inclusion criteria (students over 18 years old and attending higher education), the final sample included 492 participants. Among them, 75.6% identified themselves as female, 24.2% as male, and 0.2% identified themselves as others and aged 18 years or over. In addition, university students from all Brazilian regions participated, yet, with prevalence of students from the State of Minas Gerais (55.5%) followed by the States of Rio de Janeiro (20.3%) and São Paulo (9.6%). Regarding religiosity, 60.6% of the participants reported they followed a religion, while 39.4% answered they had no religious beliefs.

In addition, according to the 2018 Brazil Economic Classification Criterion, 41.1% of the sample was classified as Class C2 (average household income BRL 1,691.44); 31.1% was classified as Class D-E (average household income BRL 708.19);

25.5% was classified as Class C1 (average household income BRL 2,965.69); 1.8% was classified as B2 (average household income BRL 5,363.19); and 0.4% was classified as B1 (average household income BRL 10,386.52). None of the participants were classified as Class A.

With regard to educational institutions, 22.6% were students from the State University of Minas Gerais, but the majority (77.4%) of students was from other institutions. Regarding the learning modality, 98.4% of the students participated in the face-to-face learning method, 1% in both the face-to-face and online learning modalities, and 0.6% in the distance learning modality (DL). In the students' sample, 54.9% were not taking classes at the time of data collection (April and May 2020), while 45.1% stated they were having classes during this period through remote education, which implies a change and adaptation in the original learning modality from a good part of the university students.

In addition, with regard to the courses in which the participants were enrolled, there were students in the Exact, Human, Biological, and Health sciences areas. It was noted that 35.4% attended the Psychology course, 11.9% were members of different Engineering Courses, 3% were Pedagogy students, and others, demonstrating the wide scope of the investigation, given the different areas of knowledge. With regard to the study periods, it should be noted that there was a greater concentration of students from the 1st semester (22.8%), followed by students from the 3rd (18.7%) and the 5th (18.3%) semesters.

It was also asked to the university students how long they had been in voluntary isolation, and the answers were different. It is important to note that 4.3% marked 0 days of isolation due to the fact that they continued to work. Reviewing the data, it was noted that the participants, for the most part, stated that the days in isolation reported were an approximate number; others stated that they were not counting the isolation days for different reasons, such as anxiety. Among the participants, 95.5% were not alone during this period and 91.7% stayed with their family.

In addition, for a better understanding of the subject, we sought to find out whether the sample group had been given some type of previous psychological or psychiatric diagnosis, so that it would be possible to differentiate whether the data obtained for anxiety and OCD in the present investigation referred to a disorder already present in the individual or if it developed during the pandemic. The results

indicated that 66.1% of the students investigated did not have any type of diagnosis; however, it is noteworthy that 8.1% reported having a diagnosis of Depression and 7.5% a diagnosis of Generalized Anxiety Disorder.

2.2 Instruments

Anxiety can be conceptualized as an indefinite and unpleasant feeling that includes fear, apprehension and is characterized by moments of tension or discomfort derived from something unknown or strange (Biaggio & Natalício, 1979). The Spielberger, Gorsuch & Lushene (1970) 's State-Trait Anxiety Inventory (STAI) was used for the assessment of this construct; it was translated, adapted, and validated into the Brazilian Portuguese language by Biaggio and Natalício (1979). This inventory has two scales that evaluate such a construct as state (STAI-S) and a trait (STAI-T). However, for this study, only the first scale mentioned was used, since the objective was to assess the anxiety of undergraduate students at a point in time. STAI-S consists of 10 items, and the answers are of the Likert type with a range from 1 = absolutely not to 4 = very much. Thus, the interpretation of results is performed by adding the numbers marked in the table.

Positive and negative affects can be defined as positive and negative feelings related to a certain context (Pires, Filgueiras, Ribas & Santana, 2013). Such constructs were measured using the reduced version of the Positive and Negative Affect Schedule (PANAS), adapted to the Brazilian context by Pires et al. (2013). The instrument consists of 20 items (for example: "inspired"; "irritated") to be answered on a five-point Likert scale, ranging from never (1) to always (5). The items are distributed in two dimensions: positive affects and negative affects, which, in the version by Pires et al. (2013), presented coefficients of internal consistency equal to 0.88 and 0.90.

Finally, the obsessive-compulsive disorder (OCD) has two components: an obsessive component that can be defined as thoughts, images, and impulses that occur repeatedly, and are usually linked with anxiety, that the individual cannot control; and a compulsive component, characterized by recurrent and repetitive acts or behaviors, which the patient performs in order not to enter a state of marked anxiety (Fatori et al., 2020). In this study we will work with the nomenclature of obsessive-compulsive thoughts and behaviors because the procedures for diagnosing OCD have not been carried out. To assess obsessive-compulsive thoughts and

behaviors, the Yale–Brown Obsessive–Compulsive Scale (Y–BOCS) was used, which required some adjustments to the text (Item example: “How much of your time is occupied by thoughts about COVID–19? “) in order to be favorable to the social context provided by the coronavirus pandemic. According to the revised instrument by Fatori et al. (2020), this scale consists of eight items, to be answered on a scale that ranges from 0 to 4, and provides a result for the obsession severity score and the compulsion severity score. Besides, according to Fatori et al. (2020), the Y–BOCS also has a total score, which is the sum of all items and presents a range from 0 to 32; this index is used for the analyses.

2.3 Data collection and analysis procedures

Data collection was carried out online through a questionnaire created in Google Forms; respondents had given prior agreement to the investigation by completing the Free and Informed Consent Form (FICF). The investigation was approved by the Research Ethics Committee (in Portuguese, *Certificado de Apresentação para Apreciação Ética* – CAAE: 30602520.1.0000. 0008). The participants were composed of a convenience type sample, that is, a sample of the population that is accessible to the investigator. Thus, data collection was not carried out in the relevant educational institutions, but the interviewees were contacted through social networks, such as WhatsApp, Facebook, Instagram, and the institutional sites, between April and May 2020.

In the data analysis, initially, the Confirmatory Factor Analysis of the instruments was performed, with a view at verifying the structure of each scale for the collected sample, using the Mplus software, version eight, with the parameters being estimated by the Weighted Least Squares Mean and Variance Adjusted (WLSMV) estimator, because this estimator is an option for modeling categorical data. Then, the different measurement models were tested. In order to verify the fit of the model to the data, the following indicators were considered: Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Root–Mean–Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR) (Byrne, 2001). Values below 0.06 for RMSEA and SRMR and values greater than 0.95 for CFI and TLI were considered as good fit rates (Brown, 2015). The hypotheses were tested by modeling structural equations. The error probability was established at 5%, and the internal consistency of the instrument was further analyzed using the composite

reliability index (omega), considering the interval between 0.80 and 0.90 as ideal (Streiner, 2003).

A posteriori, descriptive analyses of the sample group and of the collected variables were carried out, as well as correlations between the variables, using Spearman's rho. In addition, we sought to investigate the predictive effects calculated by linear regression. The work also sought to identify differences between groups (t-test and ANOVA).

3. Results

Initially, confirmatory factor analyses were performed for each of the instruments used in the survey. All scales maintained their original structures and presented adequate fit indexes. Then, intending to verify whether the variables were discriminating against each other, the general measurement model was calculated, with the inclusion of all the variables proposed in the study. This model was initially composed of five factors and 58 items ($\chi^2[gl] = 2905.39 [1058]$, RMSEA = 0.06, CFI = 0.86, TLI = 0.85).

Subsequently, internal consistency of the measures was verified and investigated by the composite reliability index (omega). The results indicated that the instruments had excellent rates. In addition, the averages and standard deviations of the scale were evaluated as well as the correlations between them (see Figure 3.1).

In addition, the following scores were considered for the calculation of the STAI classification: low (20–30), medium (31–49) or high (≥ 50) level of anxiety (Barros, Nishiura, Heilberg, Pfeferman, & Kirsztajn, 2011). For this sample, it was observed that 37% ($N = 182$) of the individuals experienced a high level of anxiety, while 63% ($N = 310$) had medium levels. It should be noted that low levels of anxiety were not found in this sample. The findings further indicated that 52.4% ($N = 258$) of the students had weak symptoms, 46.1% ($N = 227$) moderate symptoms and 1.4% ($N = 7$) severe symptoms for Obsessive–Compulsive Disorder.

Figure 3.1. Averages, standard deviation, correlations of the measurement model, and composite reliability.

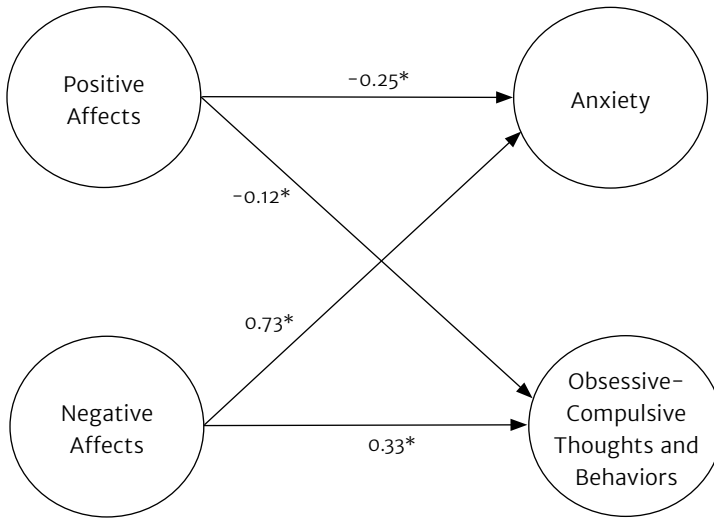
	M	SD	1	2	3	4
1. Anxiety	2.80	0.57	0.92	-0.12*	0.36**	0.14*
2. Positive Affects	2.55	0.76		0.91	-0.44**	-0.40**
3. Negative Affects	3.20	0.83			0.92	0.46**
4. Obsessive-compulsive thoughts and behaviors	1.55	0.62				0.85

Note: The internal consistencies are shown diagonally; * $p < 0.01$, ** $p < 0.001$; M = Mean; SD = Standard Deviation.

In the hypothesis test, it was found that, in hypothesis 1a, it was confirmed ($\beta = -0.25$; $p = 0.000$) that the positive affects were negatively correlated with anxiety, Hypothesis 1b was also confirmed, which refers to the negative prediction of positive affects on obsessive and compulsive thoughts and behaviors ($\beta = -0.12$; $p = 0.005$). It was also verified that the negative affects were significantly and positively related to the state of anxiety ($\beta = 0.73$; $p = 0.000$), thus supporting hypothesis 2a. In addition, negative affects were also negatively and significantly associated with obsessive and compulsive thoughts and behaviors ($\beta = 0.33$; $p = 0.000$), meeting hypothesis 2b (Figure 3.2).

Another analysis carried out in this article was the t-test to verify differences between the average responses for the constructs investigated considering the gender group (female and male) and higher education institutions (State University of Minas Gerais – UEMG – and other institutions). The results showed a difference between the mean responses for the gender group, indicating that women had higher averages in the constructs of negative affects and obsessive-compulsive thoughts and behaviors than men. However, for the construct positive affects, this difference between the means was higher for men. In addition, no differences were identified between the means for the anxiety phenomenon (Figure 3.3). These findings, therefore, partially confirm hypothesis 3.

Figure 3.2. Model tested in the study.



Note: * = $p < 0.05$.

Figure 3.3. Mean differences between men and women – T-test

	Statistic	<i>p</i>	Difference between means	Difference error
Anxiety	-0.40	0.69	-0.01	0.03
Positive Affects	-3.70	< 0.001	-0.29	0.08
Negative Affects	3.40	< 0.001	0.29	0.09
Obsessive-Compulsive Thoughts and Behaviors	1.94	< 0.05	0.13	0.07

Finally, ANOVA was carried out to verify the difference between the average responses of higher education students to the study variables and the time spent implementing social distancing. To this end, the following groups were set up: 0 days implementing social distancing, 1 to 30 days of social distancing, 31 to 59 days of social distancing, 60 or more days of social distancing. The data demonstrated a significant difference over time only for the positive affects construct ($p = 0.01$), indicating that people who were not in social distancing had higher averages of

positive affects than the groups in social distancing (Figure 3.4). The results also indicated that there was no statistical difference between the mean responses for the constructs anxiety, negative affects, obsessive-compulsive thoughts, and behaviors for the period of social distancing. However, there was an increase in the mean responses for anxiety and obsessive-compulsive thoughts and behaviors among groups that had maintained social distancing for a longer time.

Figure 3.4. Mean difference between groups – ANOVA.

	Statistic	p	Time (days)	N	M	SD
Anxiety	1.70	0.18	0	21	2.36	0.30
			Up to 30	92	2.34	0.27
			Between 31-59	333	2.40	0.28
			60 or more	46	2.45	0.27
Positive Affects	4.23	0.01	0	21	2.99	0.79
			Up to 30	92	2.39	0.76
			Between 31-59	333	2.59	0.75
			60 or more	46	2.43	0.69
Negative Affects	0.99	0.40	0	21	3.34	0.81
			Up to 30	92	3.10	0.91
			Between 31-59	333	3.20	0.80
			60 or more	46	3.35	0.88
Obsessive Thoughts and Behaviors	0.60	0.62	0	21	1.40	0.62
			Up to 30	92	1.53	0.62
			Between 31-59	333	1.56	0.63
			60 or more	46	1.60	0.54

4. Discussion

This investigation aimed to determine the consequences of positive and negative affects, anxiety, and obsessive-compulsive thoughts and behaviors on Brazilian university students during the COVID-19 pandemic. The data obtained indicate that a considerable number of students had medium to high anxiety levels. Thus, these results suggest attention and require measures to reduce these rates by monitoring the mental health of university students. This article corroborates studies

by Cao et al., 2020 and Maia and Dias (2020). In addition, studies conducted prior to the pandemic indicated that about 14% to 19% of students would have some psychological disorder during their academic life (Cerchiari, Caetano, & Faccenda, 2005), and an incidence of around 23% for severe anxiety in specific institutional groups (Fernandes, Vieira, Silva, Avelino, & Santos, 2018). Thus, the findings now obtained indicate a higher rate than those indicated in some previous studies.

With regard to obsessive-compulsive thoughts and behaviors, the results found may correspond to a worsening of the conditions of those university students who already experienced the OCD symptoms or the appearance of the first symptoms during the period of the beginning of the pandemic. It should also be noted that the results obtained in the instruments applied do not assume a diagnostic role, but corroborate important indications of the time frame for the constructs reviewed. According to Banerjee (2020), from the date the COVID-19 pandemic was declared by the World Health Organization (WHO), there has been an increase in notifications to hospitals of people with OCD in different countries, like China, the United States, the United Kingdom, Italy, and India. However, statistical evidence has not yet been established in the scientific literature.

The results found in this study also show that the experience of positive affects even in a pandemic context can reduce anxiety levels and obsessive-compulsive thoughts and behaviors. Such results corroborate a study by Vinkers et al. (2020), emphasizing the importance of positive characteristics during a pandemic. On the other hand, the experience of negative affects originating from the pandemic context can increase anxiety and obsessive-compulsive thoughts and behaviors. Such findings are in line with the studies by Cao et al. (2020) and Maia and Dias (2020), who also identified mental health impairment in this audience.

The outcome also indicated that female students in this study had a higher rate of negative affects compared to men, including worry, discouragement, irritation and obsessive-compulsive thoughts and behaviors. Similar results were found in a study in Mexico, in which the levels of depression and psychosomatic symptoms were higher for the group of women (González-Jaimes et al., in press). This can be explained by the fact that, culturally, men are led to an inhibition of the manifestation and expression of their feelings and affects. Such cultural impact may explain the kind of survey responses by male students. Santos (2015) supports

this argument since it considers that men hardly show their personal feelings, particularly the feelings that denote fragilities such as fear and sadness. This can be understood as a strategy to maintain the image of masculinity, in which emotions are representations of vulnerability. In addition to the above, recent investigations corroborate the data now obtained. Another potential argument is described by Barros et al. (2020), who identified the most frequent reports of feelings of depression/sadness and anxiety/nervousness in women and also a greater impact of the pandemic on female subjects.

Finally, with regard to the identification of constructs over the period of social distancing, there were no significant differences in a period from 0 to 70 days for anxiety, negative affects and obsessive-compulsive thoughts and behaviors, with the exception of positive affects. The present findings indicate that there was a reduction in the manifestation of positive affects for individuals who had been in social distancing for a longer time. However, it is worth mentioning that an average increase in the constructs was observed, suggesting that, with the extension of the period in social distancing, the levels of anxiety, positive affects, and obsessive-compulsive thoughts and behaviors could be worsened. Such results corroborate the study by Barros et al. (2020).

It should be noted that, in the current pandemic context, other social and educational variables can affect students' emotions and mental health beyond those that were assessed in this study. Among them, we can mention the social and educational impacts suffered in this period, such as the suspension of classroom education and internships and the replacement of classes by remote teaching platforms in public and private Brazilian universities.

Although remote education has been employed in order to minimize the impacts on education resulting from the COVID-19 pandemic, it has been necessary to review and reflect on the consequences of these actions on higher education students. According to the 2019 ICT Household and Individuals survey, only one computer is available in 39% of Brazilian homes. In addition, 85% of the individuals classified in class D-E use only their cell phones to access the internet and only 14% of them use their mobile phones and computers. Thus, some of the anxiety rates and obsessive-compulsive behaviors and thoughts may have arisen or were maximized within this changing context that students experienced at the beginning of the pandemic.

5. Final Considerations

This article provides important theoretical and practical contributions, as it studies the relationship of relevant phenomena to be investigated jointly in this context and provides a view of students at the beginning of the pandemic. It also helps in the future formulation of strategies to mitigate the psychological effects arising from the pandemic. Thus, it is essential that students count on adequate adaptations in their educational framework to reduce the impacts caused by the pandemic. Therefore, it is suggested to create synchronous and asynchronous teaching strategies, providing tools for adaptation of these students, among other support and inclusion strategies. In addition, the specialized assistance of psychological intervention teams that would contribute to the development of positive attitudes and feelings and that would allow the use of psychological tools and resources to reduce negative affects, anxiety and obsessive-compulsive thoughts and behaviors is welcomed.

Although this article presents important contributions, it is worth mentioning also that there are some limitations. The first limitation includes the use of self-report instruments, which can cause problems in the variance, which is common in this method. A second point to consider is that, as it is a convenience sample and results cannot be generalized because, despite the sample having been composed of individuals of all Brazilian regions, it was mainly concentrated in the southeastern region of Brazil. Furthermore, it is disproportional with regard to gender. Thus, the results obtained may not reflect the reality of the entire Brazilian territory. A third limitation is that data collection was carried out exclusively online and without the presence of the investigator, which can influence the response levels; this is why it would be interesting to use, in future research, face-to-face and qualitative data collection. A fourth limitation refers to the study being carried out at the beginning of the pandemic and not covering data from students who maintained social distancing for more than 80 days. Finally, the cross-sectional nature of the research and the data collection at just one time made it impossible to make causal inferences among the study variables. Therefore future investigators can correct this limitation with the adoption of longitudinal designs or studies of diaries, allowing a better understanding of the relationships between the constructs investigated, with the monitoring, for example, of anxiety levels and the observation of the psychological consequences of the pandemic in the long term.

It is suggested to keep at the core of future studies the testing of other models with different antecedents (personality traits, empathy, optimism, resilience) and consequent ones (depression, coping strategies); further, it may be fundamental, to deepen the understanding about the implications of COVID-19 on the attitudes and coping strategies of Brazilian higher education students in a pandemic situation, as well as the adaptation and consequences of remote activities on those students' mental health.

In summary, the present article showed that significant changes in the individuals' levels of mental health occur in pandemic circumstances. Therefore, it is important to have available support strategies and continuous evaluation of Brazilian higher education students, during and after the COVID-19 pandemic, as a way to monitor their mental health in an atypical moment and with considerable changes in the social and educational relationships. In addition, such findings will certainly contribute to the care policies aimed at this specific group with focus on reducing the impact of the pandemic and quarantine on mental health, also to the development of intervention strategies and educational policies aimed at building a climate of healthy teaching and learning, in order to help mitigate the national mental health damage associated with the COVID-19 pandemic.

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