



Impact of remote learning on the mental health of university students during the COVID-19 pandemic

Beatriz Silveira Seixas¹, Vitoria Arruda de Almeida¹, Julia Brandão Ribeiro¹, Isabella Ferranda e Silva², Marcos Balbino² e Regina Cele Silveira Seixas³

¹Universidade Santo Amaro - UNISA, São Paulo/SP, Brasil.

²Centro Universitário São Camilo, São Paulo/SP, Brasil.

³HCLOE Clínica de Oftalmologia Especializada, São Paulo/SP, Brasil

ABSTRACT

OBJECTIVE

To analyze the impact of remote teaching on the mental health of university students during the COVID-19 pandemic.

METHODS

Survey using an online questionnaire.

RESULTS

The study had 189 participants. 89% were women, and the average age was 23.75 years. The mean value of the Zung scale was 45.16, and most (64.02%) were within the range considered normal. Almost a third had mild anxiety scores and 1.59% had severe anxiety scores. Women showed higher values compared to men (46.30 ± 10.65 compared to 39.86 ± 10.62 , $p < 0.001$). The majority of participants lived with their parents during the pandemic (84.66%) and a minority (2.65%) lived alone. Almost a third reported higher alcohol consumption in the period studied; with higher scores compared to those who did not increase their alcohol intake (48.53 ± 10.99 versus 43.56 ± 10.61 , $p = 0.002$). To overcome difficulties during the pandemic, music was associated with the highest scores and Sport with the lowest. University students who lived alone had higher scores compared to those who lived with others.

CONCLUSION

The COVID-19 pandemic has worsened the psychological profile of university students during distance education. Women and students who increased their alcohol consumption had worse scores.

DESCRIPTORS

Anxiety, Depression, COVID-19, Pandemic, Remote education.

Corresponding author:

Beatriz Silveira Seixas.

Graduanda em Medicina pela Universidade Santo Amaro - UNISA. R. Prof. Enéas de Siqueira Neto, 340 - Jardim das Imbuías, São Paulo - SP, Brasil. São Paulo/SP, Brasil.

E-mail: biiasilveira001@gmail.com

ORCID ID: <http://orcid.org/0009-0002-3057-1771>.

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INTRODUCTION

The new coronavirus (SARS-CoV-2), reported in 2019 in China, in Wuhan, was the worst pandemic outbreak in recent times, and the adoption of preventive measures was necessary to reduce the virus's transmission, as there is no effective treatment for the disease. The spread of the disease was so rapid that on January 30, 2020, the World Health Organization (WHO) declared COVID-19 a Public Health Emergency of International Concern^{1,2}.

Among these measures are social isolation and quarantine, which can cause psychological symptoms such as anxiety, depression, fear, anger, and other conditions^{1,2}.

Due to the conditions of social isolation, universities and schools suspended in-person classes, making distance learning (DL) a new routine, leading to many individual and collective concerns, which had a significant impact on university education during this period. There was a great interest in this subject due to the noticeable drop in performance and motivation among university students with the new teaching method established during the COVID-19 pandemic, with the purpose of exposing the current situation of university academic education through collected data^{1,2}.

University students found themselves anxious or depressed due to delays in activities, disrupting their academic schedules, and facing the prospect of losing a whole semester or more. Thus, this educational interruption exacerbated the psychological pain and suffering of students^{1,2}.

Quarantine generated psychological stress, especially when the duration of isolation had to be extended, causing fear of infection, frustration, limitations in supplies and resources, insufficient communication, financial loss, and stigma. There are several studies in the literature that address the possibility that COVID-19 may result in drastic symptoms of post-traumatic stress, confusion, and anger^{1,2}.

In 2020, Kelmara indicated that most students were practicing social isolation and only leaving home to buy essential products. During this 'stay at home' process, students experienced decreased productivity, mood changes, and feelings of distress and anxiety. Life satisfaction today is lower compared to the period before the pandemic, although there is also the perception of efforts to maintain remote learning activities³.

The aim of this study was to assess the deterioration of mental health, levels of anxiety and depression, and their impact on university students during the use of distance learning (DL) in the COVID-19 pandemic, contributing to the adaptation of teaching and learning environments for students in the post-pandemic period.

METHODS

Population of interest

Participants took part in a prospective study and were invited to complete a structured online questionnaire based on the reference of the author William W. K. Zung⁴, a validated instrument in 2017 by Dunstan and Scott⁵, using the Google Forms platform. Responses were collected in the post-pandemic period between May 16, 2022, and September 15, 2022, from university students, mostly from medical faculties, aged 21-24 years.

The forms were made available for response only after the approval of the National Commission of Ethics in Research (CO-NEP) and were distributed through a link. The Institutional Review Board of HCLOE Clinics of Specialized Ophthalmology endorsed the study, and all entered data complied with relevant data protection and privacy guidelines. Patients remained anonymous at all stages of the study. Research methods were

in accordance with the principles of the Helsinki Declaration. In the questionnaire itself, a consent form asked the candidate about their desire for voluntary participation, which was answered before proceeding with the questionnaire.

Participants provided information about age, gender, their institution, and who they lived with during the pandemic. They also indicated if they noticed an increase in alcohol consumption and the resources they used to alleviate the effects of the pandemic (in two lists, as first and second choices). Finally, they answered the 20 standardized questions by Zung¹.

Form

A form was inserted into a file on Google Forms, and each of the authors was invited to distribute the questionnaire at their respective university and some at various institutions. Respondents completed the questionnaire using their own devices (cell phones or computers) and uploaded the file to the cloud. The instrument also employed a four-point Likert scale where: "1 = Never," "2 = Rarely," "3 = Almost Always," and "4 = Always."

Questions 1 to 5 characterized the emotional indicators of anxiety, while questions 6 to 20 represented the physical symptoms of anxiety.

For each respondent, the sum of scores of 20 items ranged from 20 to 80. The sum of scores was then converted into an "Anxiety Index" with values ranging from 25 to 100. Following the recommendations of Zung⁴ and Dunstan and Scott⁵, an Anxiety Index <45 indicates "Anxiety within the normal range," a value in the range of 45-59 indicates "Mild to Moderate Anxiety," a value in the range of 60-74 indicates "Moderate to Severe Anxiety," and values ≥75 indicate "More Extreme Anxiety." After three months, we concluded the activities, with the final number of respondents.

Statistical Analysis

The following program was used STATA software (Stata Statistical Software: Release 13, College Station, TX: StataCorp LP). Tables were constructed with numbers and percentages. Numeric variables were tested for their distribution to choose the appropriate tests. Means were compared using Student's t-test (if normally distributed) or Mann-Whitney test (if not normally distributed). To compare three or more groups, we used the ANOVA test (if normally distributed) or the Kruskal-Wallis test (if not normally distributed). The threshold for statistical significance was adjusted to $p < 0.05$.

Inclusion Criteria

University students who had a change in the teaching method during the isolation period required by COVID-19 and who agreed to the informed consent form presented before the questionnaire.

Exclusion Criteria

University students who already used remote learning as the main teaching method before the pandemic period and individuals who disagreed with the informed consent form, as well as all those who did not complete the form.

Risks

The questionnaire in question could bring up memories and feelings experienced by university students during the adaptation to the new teaching model required by COVID-19, due to the need for social isolation. The principles of Resolution 466/12 of CNS were followed.

RESULTS

One hundred and eighty-nine participants completed the questionnaire. The majority were women (79.89%). The average age of the students was 23.75 years. Four educational institutions accounted for more than half of the respondents. Table 1 shows the main characteristics of the study participants.

Table 1. Main characteristics of the study participants.

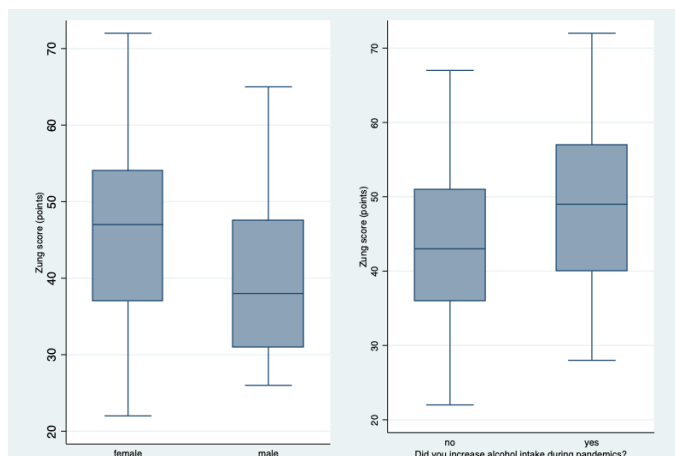
Total respondents n(%)	189 (100,00)
Age - years (mean±SD)	23.75±8.13
Gender n (%)	
Male	36(19.05)
Female	151(79.89)
Prefer not to answer	2(1.06)
University n (%)	
CUSC	59(31.22)
UNISA	23(12.17)
Mackenzie	14(7.41)
UNINOVE	6(3.17)
Other	87(46.03)
Where did you live during the pandemic? n (%)	
With parents	160(84.66)
Wife or husband	16(8.47)
Friend	8(4.23)
Alone	5(2.65)
Escore de Zung (média±DP)	45.16±10.90
Zung score (mean±SD)	
Normal (25-49)	121(64.02)
Mild (50-59)	53(28.04)
Moderate (60-69)	12(6.35)
Severe (>70)	3(1.59)
Helped during the pandemic - first choice n (%)	
Hobby	105(55.85)
Sportes	22(11.70)
Reading	18(9.57)
Television	22(11.70)
Family	14(7.45)
Music	5(2.66)
Religion	1(0.53)
Online courses	1(0.53)

SD=standard deviation.

The mean values of the Zung scale were 45.16 and most (64.02%) were within the range considered normal. Almost a third showed mild anxiety scores, while 1.59% showed severe anxiety scores (Table 1).

Women showed higher values on the Zung scale compared to men. The mean score for women was 46.30±10.65 compared to 39.86±10.62 for men, a statistically significant difference (p=0.0007, Figure 1, left).

Figure 1 - Left: Zung score in the two groups according to gender. Mean for women=46.30±10.65, men=39.86±10.62, p=0.0007. Right: Score of respondents who did not increase their alcohol consumption (43.56±10.61) versus the score of those who did (48.53±10.99), p=0.002. The Wilcoxon rank-sum test was used to calculate p-values.



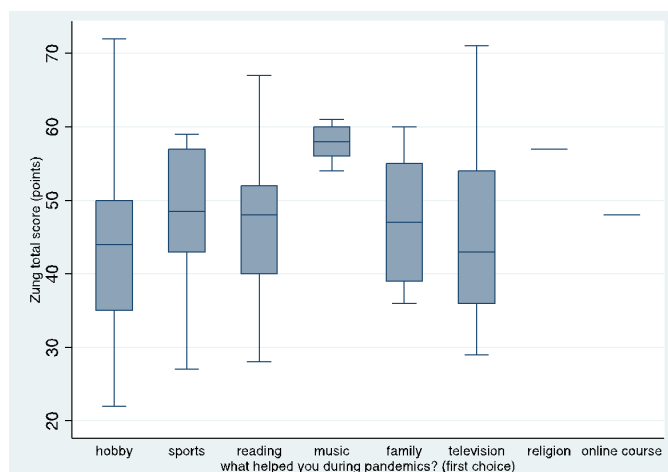
Fifty-seven participants (30.32%) reported higher alcohol consumption during the pandemic.

In relation to the Zung score, comparing those who had increased their alcohol consumption with those who had not, there was a statistically significant difference, with a score of 43.56±10.61 in those who reported not having increased their consumption of the substance versus 48.53±10.99 in those who had increased it p=0.002 (Figure 1, right).

Participants were asked about factors that helped them overcome difficulties during the pandemic, as their first choice. Table 1 shows the first-choice helping factors, with the practice of a hobby being the most frequent for 55.85% of respondents.

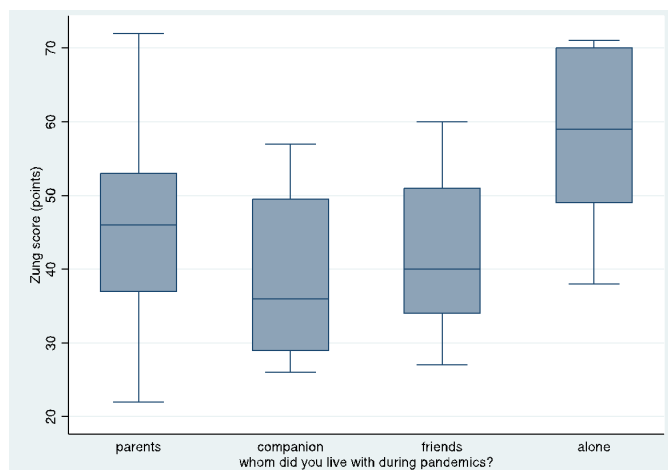
When we associated the activities chosen by the participants as support during the pandemic with the respective Zung scales, we noticed different values according to the activities chosen. The Kruskal-Wallis test showed a statistically significant difference between the activities, with music being associated with the highest Zung scores among the participants (Figure 2).

Figure 2. Box-plot presentation, with medians from the first to the third quartile, between the interviewees' options for dealing with stress and their respective Zung scores. The Kruskal-Wallis test shows a statistically significant difference (p=0.023), with music being associated with higher score values (mean 57.8 versus 45.16, the overall mean value).



Most of the participants lived with their parents during the pandemic (84.66%) while the minority (2.65%) lived alone (Table 1). There was a difference between the forms of company experienced during the pandemic and anxiety scores. Again, the Kruskal-Wallis test shows a difference between the forms of socialization in the home and the Zung scales, with the highest scores in participants who lived alone (57.4), compared to those who lived with their parents (45.5), partners (39.38) or friends (42.13), p=0.030 (Figure 3).

Figure 3. Relationship between Zung scores and who the interviewees were living with at the time of the pandemic. Kruskal-Wallis test showed p=0.030, significant.



DISCUSSION

This study showed that around a third of respondents (35.98%) experienced some degree of anxiety during the pandemic. Women had higher scores compared to men and around 30% increased their alcohol consumption during the pandemic, with higher anxiety scores. Practicing a hobby, sports, TV and reading were the most commonly described elements for dealing with this difficult period.

Our data shows the difficulty created by the pandemic period and its impact on university society. Despite all the difficult context experienced by society during these months, our study quantifies important data from this period, such as the influence of gender on alcohol consumption and lifestyles on the different anxiety scores.

Data from Guillard et al.⁶ corroborates our findings. In their study with participants from the south of the country, including older people (average age 41.38 years), they described a higher prevalence of anxiety and depression in women and single people. These findings were observed in our study, even though different scales were used to estimate anxiety. In the study carried out here, most of the participants were young university students.

A study in the north-east of Brazil, which included medical students, also showed a higher risk of anxiety in women and a higher risk of depression in students who had reduced their leisure activities or who had reduced their school performance or skin color⁷.

Barreira and Telles⁸ also indicated the need for sports to overcome the negative effects of confinement during the pandemic, with an improvement in mood. In our study, we found that 55.85% of university students had a hobby, with sports being the first choice for 26.74% of our sample. When we analyzed the students who maintained a sporting activity, we found a lower Zung score than those who opted for music.

Our data is consistent with previous findings, which point to common elements, even in populations of different ages and regions of the country. This study has limitations, such as the smaller number of participants than expected, even though the data was collected in five of the country's major university centers. Adherence to answering the questionnaire was low and we noted the influence of the pandemic itself on motivation to take part in the study. The fact that the questionnaires were distributed to medical students may have biased the results, which could have been different for students from other areas.

As the critical moment of the pandemic gradually dissipates, it will be difficult to reflect the exact context of the students in a period that is gradually becoming past. If we compare our findings with the world literature, we see commonalities. Zysset and colleagues⁹ observed that among 1278 students in Zurich, 20% increased their alcohol consumption; the highest consumption was related to males, younger age and those who did not live with their parents. Zysset's study also associated alcohol consumption with anxiety scores, as did the present study. Studies in colleges in the interior of Brazil also showed that the percentage of students who consumed alcohol doubled during the pandemic¹⁰. It is likely that increased alcohol consumption is a marker, reflecting higher levels of anxiety and depression and deserves constant attention.

As analyzed in our research, those who lived alone during the COVID-19 pandemic had a higher Zung score, indicating a high anxiety index. These findings corroborate similar results among the population of young adults in China¹¹ and the United Kingdom¹², which showed more negative effects on mental health and greater dissatisfaction with life in the same period. An Indian study¹³ reports that contact with family and friends can be both good and harmful to its participant, as it depends on the previous relationship the individual had with these peo-

ple. But, in general, there is no denying the likely negative relationship that living alone during the pandemic has had on the mental health of those interviewed.

The importance of our findings, together with other similar studies, points to the need for action by health professionals, especially mental health professionals, in the consequences of the pandemic. The authorities must be aware of the negative impacts on people's mental health. In addition, our data shows effects on university students from private institutions; supposedly with better economic indicators than the majority of the population. It is likely that the outcome in poorer populations will be more dramatic, and more intense action will be needed in this more vulnerable group.

CONCLUSION

This study indicates that the COVID-19 pandemic has indeed worsened the psychological profile of university students interviewed during distance learning. It was noted that the score was worse among women, those who consumed more alcohol and those who lived alone during the pandemic. The interviewees who obtained the best scores were those who kept up a sporting practice and possibly had family support, which may have lessened the impact of this suffering. Further studies on a larger scale, the main limitation of our analysis, would be important in order to improve the observation of the impacts of the pandemic on the psychological profile of the student community and thus create public policies to minimize the disorders created.

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