

## Levels of depression, anxiety and stress in undergraduate students practicing choir singing

Níveis de depressão, ansiedade e estresse em universitários praticantes de canto coral

Niveles de depresión, ansiedad y estrés en estudiantes de pregrado practicantes de canto coral

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### Abstract

**Introduction:** Undergraduate students face significant mental health issues during Higher Education, such as depression, anxiety and stress. In this sense, it is thought that sessions of choir singing can soften these issues. **Methodology:** This study analyzed the levels of depression, anxiety and stress in undergraduate students after four weekly choir singing sessions. Forty-five participants answered the questionnaire of sociodemographic conditions and the Depression, Anxiety and Stress Scale (DASS-21). The data obtained was statistically analyzed. **Results:** The analysis did not observe statistical significance ( $p < 0.05$ ), however, the values showed clinical relevance. High frequencies of severe symptoms of anxiety (24.5%), depression (31.2%) and stress (24.5%) were observed in the last week of the study, 24.4% of the participants had two or more severe symptoms in the last week of the study and there was a high mean of the scores for those who presented two or more severe symptoms. The gender variable indicated higher levels of anxiety (28.6%), depression (42.9%) and stress (42.9%) in men. The color variable identified higher levels of anxiety (31.6%), depression (47.4%) and stress (31.6%) in black. **Discussion:** High values were observed in university students even after four choir singing sessions and these levels were higher in male and black students. **Conclusion:** Due to the clinical relevance, further studies may be conducted with the analysis of different variables, in order to expand the knowledge related to the benefits of choral singing and to mitigate mental health issues during Higher Education.

**Keywords:** Depression; Anxiety; Stress; Singing; Mental health.

### Resumo

**Introdução:** Os estudantes de graduação enfrentam problemas significativos de saúde mental durante o Ensino Superior, como depressão, ansiedade e estresse. Nesse sentido, pensa-se que sessões de canto coral são capazes de amenizar essas questões. **Metodologia:** Este estudo analisou os níveis de depressão, ansiedade e estresse em universitários após quatro sessões semanais de canto coral. Quarenta e cinco participantes responderam ao questionário de condições sociodemográficas e à Escala de Depressão, Ansiedade e Estresse (DASS-21). Os dados obtidos foram analisados estatisticamente. **Resultados:** A análise não observou significância estatística ( $p < 0,05$ ), porém os valores apresentaram relevância clínica. Altas frequências de sintomas graves de ansiedade (24,5%), depressão (31,2%) e estresse (24,5%) foram observadas na última semana do estudo, 24,4% dos participantes apresentaram dois ou mais sintomas graves na última semana do estudo e houve alta média dos escores para aqueles que apresentaram dois ou mais sintomas graves. A variável sexo indicou maiores níveis de ansiedade (28,6%), depressão (42,9%) e estresse (42,9%) nos homens. A variável cor identificou maiores níveis de ansiedade (31,6%), depressão (47,4%) e estresse (31,6%) nos negros. **Discussão:** Valores elevados foram observados em universitários, mesmo após quatro sessões de canto coral. Esses níveis foram maiores em estudantes do sexo masculino e negros. **Conclusão:** Devido à relevância clínica, novos estudos podem ser realizados com a análise de diferentes variáveis, a

fim de ampliar o conhecimento relacionado aos benefícios do canto coral e amenizar problemas de saúde mental durante o Ensino Superior.

**Palavras-chave:** Depressão; Ansiedade; Estresse; Canto; Saúde mental.

### Resumen

**Introducción:** Los estudiantes de pregrado enfrentan importantes problemas de salud mental durante la Educación Superior, como depresión, ansiedad y estrés. En este sentido, se piensa que las sesiones de canto coral son capaces de paliar estos problemas. **Metodología:** Este estudio analizó los niveles de depresión, ansiedad y estrés en estudiantes universitarios después de cuatro sesiones semanales de canto coral. Cuarenta y cinco participantes respondieron el cuestionario sobre condiciones sociodemográficas y la Escala de Depresión, Ansiedad y Estrés (DASS-21). Los datos obtenidos fueron analizados estadísticamente. **Resultados:** El análisis no mostró significación estadística ( $p < 0,05$ ), pero los valores fueron clínicamente relevantes. Se observaron altas frecuencias de síntomas severos de ansiedad (24,5%), depresión (31,2%) y estrés (24,5%) en la última semana del estudio, 24,4% de los participantes presentaron dos o más síntomas severos en la última semana del estudio y hubo una puntuación media alta para aquellos que tenían dos o más síntomas graves. La variable género indicó mayores niveles de ansiedad (28,6%), depresión (42,9%) y estrés (42,9%) en los hombres. La variable color identificó mayores niveles de ansiedad (31,6%), depresión (47,4%) y estrés (31,6%) en los negros. **Discusión:** Se observaron valores altos en estudiantes universitarios, incluso después de cuatro sesiones de canto coral. Estos niveles fueron más altos en los estudiantes varones y negros. **Conclusión:** Debido a la relevancia clínica, se pueden realizar nuevos estudios con el análisis de diferentes variables, con el fin de ampliar los conocimientos relacionados con los beneficios del canto coral y paliar los problemas de salud mental durante la Educación Superior.

**Palabras clave:** Depresión; Ansiedad; Estrés; Canto; Salud mental.

## 1. Introduction

Enter in a Higher Education Institution represents a transition in the lives of many young people. During this stage, undergraduate students face several changes, such as family distancing, establishment of new bonds, dedication to university activities and to professional activities (Barbosa et al., 2020).

As a result of these transformations, many students develop psychiatric disorders during their academic life. The literature indicates that the undergraduate students are quite vulnerable to psychological distress, being a population with a high prevalence of mental disorders (Ariño & Bardagi, 2018). Thus, it is possible to notice that these high rates are consolidated by the trajectory of charges that the student experiences at the university, with the responsibility of many tests, seminars, works and internships (Gomes et al., 2020). In this scenario, some of the main mental health issues identified in undergraduate students are depression, anxiety and stress (Lacerda, 2015).

Depression is described by a lack of courage and loss of interest in performing different activities. The disorder has a multifactorial origin and makes it impossible for the individual to perform routine activities. Thus, it has a huge impact on interpersonal relationships and academic trajectory, affecting directly the quality of life of many students (Aquino et al., 2019). This disorder has a higher prevalence in undergraduate students when compared to the general population. This prevalence is related to excessive responsibilities, demotivation and academic pressure (Fernandes et al., 2018).

Anxiety is characterized as an uncomfortable mood that accompanies several behavioral changes (Lantyer et al., 2016). In addition, it involves the triggering of physical and psychological reactions, such as tachycardia, sweating, fear and anticipatory concerns. These reactions are good to the organism because they warn a potential danger. However, when exacerbated, they become harmful to individuals. In the case of undergraduate students, they negatively affect the performance of students in different activities (Gomes et al., 2020; Ramos et al., 2019).

Stress is a response of the organism to any event considered challenging. This response is capable of involve physical, mental and hormonal reactions (Langoski et al., 2015). In the academic context, the tests, deadlines, teaching-learning methodologies and the need for assertiveness are challenges presented to the students, being considered as stressors to this group (Lameu et al., 2016).

In this context, music has been used as an adjunct form to help reduce the rates of mental health issues among students and improve the quality of life of undergraduate students, considering that it contributes to the reduction of anxiety, depression, feelings of anger, stress and sadness (Oliveira et al., 2019). Music is also capable of providing relaxation, feelings of well-being and comfort, improvement of self-esteem, learning, memory and language, facilitation of communication processes and expansion of the capacity of individual regulation of emotional aspects (Muñoz et al., 2020; Oliveira et al., 2019)

In this study, more specifically, the effects of music were analyzed through a choral singing activity.

Evidence have already notice that the simple act of singing is related to some physiological benefits, such as strengthening of the vocal system, cardiorespiratory functions and neurological networks related to endocrine stress and the immune system (Kang et al., 2018). Moreover, the organization of people in singing groups, as occurs in a choir, also generates health benefits to the participants. A recurrent finding of the literature is that the regular choral singing activity is associated with expanded perceptions of affection, well-being and quality of life. These and other potential benefits of group singing are attributed to aid in solving various physical and mental health problems (Bullack et al., 2018).

In addition to offering support services to students, it is necessary to evaluate the mental health conditions of these students during graduation.

Thus, the aim of the study was to evaluate the levels of depression, anxiety and stress in undergraduate students who are participants of a choral singing activity.

## **2. Methodology**

### ***Type of study***

The study presents characteristics of an epidemiological clinical study of the type non-randomized clinical trial (quasi-experimental) with pre and post-tests in a single group. Quasi-experiments are research designs that do not have random distribution of subjects by treatments or control groups. Instead, the comparison between treatment and non-treatment conditions should always be made with groups that are not equivalent or with the same subjects before treatment (Selltiz et al, 2007).

### ***Ethical approval***

The study was approved by the Research Ethics Committee of the Federal University of Rio de Janeiro - Campus Macaé with the number 3.076.868, according to resolution 466/2012.

### ***Research site***

University City of Macaé. This location was chosen by the fact that the choral singing activity has been being developed in this place since April 2016. The activity of Choral Singing arises at the University City of Macaé with the objective of promote health, especially the mental health of the participants, and also develop artistic and cultural activity and social integration. The Choir contain students from the three Higher Education Institutions (HEIs) that make up the University City of Macaé, namely the Federal University of Rio de Janeiro (UFRJ), the Fluminense Federal University (UFF) and the Municipal College of Macaé Professor Miguel Ângelo da Silva Santos (FeMASS).

### ***Study period***

The study was conducted during 4 consecutive weeks in June 2019.

### ***Study sample***

45 undergraduate students of the HEI that make up the University City of Macaé enrolled in the choral singing activity. It represents 100% of the choir participants.

### ***Inclusion criteria***

Undergraduate students from the institutions that make up the University City of Macaé, enrolled in the choral singing activity, over 18 years, both sexes, agree to participate in the study by signing the Free and Informed Consent Form.

### ***Exclusion criteria***

Students who use medications or stimulant drugs of the central nervous system or antidepressants such as amphetamine, cocaine, caffeine, fluoxetine, sertraline, amitriptyline, citalopram, paroxetine, weight, tryptanol, remeron during the period of the study.

### ***Evaluation protocols***

The study sample completed the questionnaire on sociodemographic conditions and the Depression, Anxiety and Stress Scale (DASS-21) at the end of each choral singing activity.

#### *1. Questionnaires of sociodemographic conditions.*

The questions were: age, gender, skin color, ongoing course, housing (if the person lives alone, with family, with friends, rent, or home ownership) marital status, naturalness, religion.

#### *2. Evaluation of depression, anxiety and stress.*

The Depression, Anxiety and Stress Scale (DASS-21) is used to evaluate symptoms associated with depression, anxiety and stress in young adults. It consists of 21 items, grouped into three subscales, consisting of 7 items each (Pais-Ribeiro et al., 2004).

The Depression subscale consists of (e) Dysphoria (item 13), (f) Discouragement (item 10), (g) Devaluation of Life (item 21), (h) Self-depreciation (item 17), (i) Lack of interest or involvement (item 16), (j) Anhedonia (item 3), and, (k) Inertia (item 5).

The Anxiety subscale consists of (a) Autonomic Nervous System Excitation (items 2, 4, 19), (b) Skeletal Muscle Effects (item 7), (c) Situational Anxiety (item 9) and (d) Subjective Anxiety Experiences (items 15, 20).

The Stress subscale consists of (l) Difficulty in Relaxing (items 1 and 12), (m) Nervous Arousal (item 8), (n) Easily Shaken/Upset (item 18), (o) Irritation/Exaggerated Reaction (items 6, 11) and (p) Impatience (item 14).

All items were evaluated using a Likert-type response scale of 4 points, which respond to the severity and frequency of symptoms experienced in the last 7 days - "last week" (0 - "nothing was applied to me", 1 - "applied to me a few times", 2 - "applied to me many times", and 3 - "applied to me most of the time"). The result is given by the sum of the results of the 7 items, obtaining a score for each subscale with a minimum result of 0 and maximum of 21. Thus, higher scores correspond to more negative affective states. For the final score, the values of each subscale were summed and multiplied by two to correspond to the original scale score (DASS-42).

The classification of stress symptoms was: 0-10 = normal; 11-18 = mild; 19-26 = moderate; 27-34 = severe and 35-42 = extremely severe. The classification of anxiety symptoms was: 0-6 = normal; 7-9 = mild; 10-14 = moderate; 15-19 = severe and 20-42 = extremely severe. The classification of symptoms of depression was: 0-9 = normal; 10-12 = mild; 13-20 = moderate; 21-17 = severe and 28-42 = extremely severe (Corrêa et al., 2020).

### ***Data processing and statistical analysis***

The data were analyzed in the software Statistical Package for the Social Sciences - SPSS, version 19. For the characterization of the individuals evaluated, the continuous variables were described by mean, standard deviation (SD) and confidence interval of 95%, and categorical variables as proportion (%). The continuous variables were tested using the Kolmogorov-Smirnov, test to verify whether the data presented normal distribution. Those with nonparametric distribution were compared using the Mann-Whitney test. Fishers' exact test was used for categorical variables. For all tests, the level of statistical significance of p-value was considered  $< 0.05$ .

To evaluate the correlation between the depression, anxiety and stress scores with the choral time and age of the participants, it was used the Spearman's correlation coefficient, because the sample does not present a normal distribution. The classification of correlation coefficients was: correlation coefficients  $< 0.4$  (weak magnitude correlation),  $> 0.4$  to  $< 0.5$  (moderate magnitude) and  $> 0.5$  (strong magnitude) (Hulley, 2016).

The categories referring to the scores for the symptoms of anxiety depression and stress (normal, mild, moderate, severe and extremely severe) were transformed into binary variables: Severe Symptoms [Yes (severe and extremely severe) and No (normal, mild and moderate)] and used as a dependent variable. Subsequently, the number of severe symptoms reported by the participants was calculated, ranging from zero (absence of severe symptoms of anxiety, depression and stress) to three severe symptoms (presence of anxiety, depression and stress).

### **3. Results**

A total of 45 individuals participated in the research. The mean age of the participants was  $23.5 \pm 8.2$  years; mean time of  $8.3 \pm 8.4$  months in choral singing activity. Table 1 shows the characteristics of the study participants.

According to the Table 1, it is possible to observe that the majority were female (84.4%), were under or equal to 19 years (51.1%), were white (57.8%), were single (88.9%), had an income higher than 2 Minimum Wages (55.9%), were Nursing undergraduate students (57.8%), was of the first three periods of the course (60.0%) and had a time in the choir of up to 4 months (62.2%).

**Table 1** - Characterization of the sample of students participating in the Choir. Macaé, 2019. (n=45).

<b>Variables</b>	<b>Mean</b>	<b>SD<sup>a</sup></b>
Age (years)	23.5	8.2
Choir time (months)	8.3	8.4
	N	%
<b>Gender</b>		
Female	38	84.4
Male	7	15.6
<b>Age</b>		
≤ 19 years	23	51.1
≥ 20 years	22	48.9
<b>Color</b>		
White	26	57.8
Black and Brown	19	42.2
<b>Marital Status</b>		
Single	40	88.9
Others	5	11.1
<b>Per Capita Income (n=34)<sup>b</sup></b>		
Up to 2 MW <sup>c</sup>	15	44.1
> 2 MW	19	55.9
<b>Graduation course</b>		
Nursing	26	57.8
Others	19	42.2
<b>Semester of the course</b>		
Up to 3 <sup>o</sup> semester	27	60.0
≥ 4 <sup>o</sup> semester	18	40.0
<b>Choir time</b>		
Up to 4 months	28	62.2
≥ 5 months	17	37.8

Note: a = SD means Standard Deviation; b = only 34 participants knew the per capita income; c = MW means minimum wage. Source: Authors (2023).

Table 2 shows data on the frequency of symptoms according to the DASS-21 scale. According to this table, the mean level of self-reported anxiety in the last week was  $9.6 \pm 7.6$ . Of the total analyzed, 44.4% had normal symptoms, 8.9% mild symptoms, 22.2% moderate symptoms and 24.5% severe symptoms. The mean level of depression was  $14.4 \pm 10.0$ . Of the total analyzed, 42.2% had normal symptoms, 6.7% mild symptoms, 20.0% moderate symptoms and 31.2% severe symptoms. The mean stress level was  $18.9 \pm 9.0$ . Of the total analyzed, 15.6% had normal symptoms, 42.2% mild symptoms, 17.8% moderate symptoms and 24.5% severe symptoms.

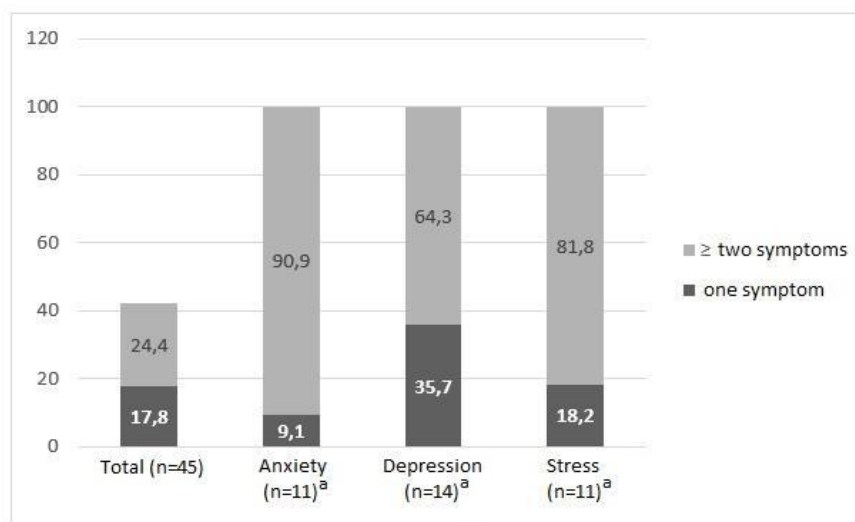
**Table 2** - Frequency of the symptoms (anxiety, depression and stress) on the last week reported by the participants of the choir, obtained by the Depression, Anxiety and Stress Scale (DASS-21). Macaé, 2019 (n=45).

Score DASS-21	Symptoms		
	Anxiety	Depression	Stress
Mean ± SD <sup>a</sup>	9.6 ± 7.6	14.4 ± 10.0	18.9 ± 9.0
Classification of symptoms	N (%)		
Normal	20 (44.4)	19 (42.2)	7 (15.6)
Mild	4 (8.9)	3 (6.7)	19 (42.2)
Moderate	10 (22.2)	9 (20.0)	8 (17.8)
Severe	4 (8.9)	7 (15.6)	7 (15.6)
Extremely severe	7 (15.6)	7 (15.6)	4 (8.9)

Note: a = SD means Standard Deviation. Source: Authors (2023).

Figure 1 shows the frequency (%) of the number of severe symptoms in the last week, according to the presence of severe symptoms for anxiety, depression and stress, according to the DASS-21 scale. According to the figure, 17.8% of the total participants had only one severe symptom in the last week, and 35.7% of those who experienced depression, 9.1% of those who felt anxiety and 18.2% of those who felt stress had only one severe symptom in the last week. Moreover, 24.4% of the total participants had two or more severe symptoms in the last week, and 64.3% of those who experienced depression, 90.9% of those who felt anxiety and 81.8% of those who experienced stress had two or more severe symptoms in the last week.

**Figure 1** - Frequency (%) of the number of severe symptoms in the last week, according to the presence of severe symptoms for depression, anxiety and stress, obtained by the Depression, Anxiety, and Stress Scale-21 (DASS-21), reported by the choir members. Macaé, 2019 (n=45).



Note: a = severe symptoms: severe and extremely severe for anxiety, depression and stress.

Table 3 shows the mean scores for severe symptoms for depression, anxiety and stress, according to the number of symptoms reported by the study participants in the last week. For severe anxiety symptoms, the mean score was 20.0 ± 4.5 for those who had two or more severe symptoms, including anxiety. For severe symptoms of depression, the mean score was 28.9

$\pm 4.7$  for those who had two or more severe symptoms, including depression. For severe stress symptoms, the mean score was  $32.7 \pm 3.9$  for those who had two or more severe symptoms, including stress.

**Table 3** - Mean scores for severe symptoms of anxiety, depression, and stress, according to the number of symptoms reported in the last week by the participants, obtained by the Depression, Anxiety, and Stress Scale-21 (DASS-21). Macaé, 2019 (n=45).

Number of severe symptoms	Severe symptoms of Anxiety		Severe symptoms of Depression		Severe symptoms of Stress	
	Mean (SD) <sup>a</sup>					
	No (n=34)	Yes (n=11)	No (n= 31)	Yes (n=14)	No (n=34)	Yes (n=11)
<b>Total</b>	6.2 (4.7)	20.0 (4.3)	8.6 (5.3)	27.1 (4.5)	14.7 (5.5)	31.8 (3.9)
<b>One</b>	8.6 (5.1)	20.0 (0)	13.3 (1.1)	24.0 (2.0)	19.7 (3.4)	28.0 (0)
<b>≥ Two</b>	14 (0)	20.0 (4.5)	16.0 (2.8)	28.9 (4.7)	21.0 (1.4)	32.7 (3.9)

Note: a = SD means Standard Deviation. Source: Authors (2023).

Table 4 shows the mean scores related to severe symptoms for depression, anxiety and stress, relating them to the various variables of the participants of the choir, according to the DASS-21 scale. Although the values found do not have statistical significance ( $p>0.05$ ), they have high clinical importance. The main data to be analyzed will be the percentages of participants who felt depression, anxiety and stress related to the variables of sex and color. About the sex, regarding depression, 28.9% of female participants and 42.9% of male participants had severe symptoms. Regarding anxiety, 23.7% of female participants and 28.6% of male participants had severe symptoms. Regarding stress, 21.2% of female participants and 42.9% of male participants had severe symptoms. About the color, regarding depression, 19.2% of whites and 47.4% of blacks and browns presented severe symptoms. Regarding anxiety, 19.2% of whites and 31.6% of blacks and browns had severe symptoms. Regarding stress, 19.2% of whites and 31.6% of blacks and browns had severe symptoms.



**Table 4** - Mean scores for severe symptoms (severe and extremely severe) for depression, anxiety and stress, according to the variables of the choir participants, obtained by the Depression, Anxiety and Stress Scale-21 (DASS-21). Macaé, 2019 (n=45).

Variables	Severe Symptoms											
	Anxiety				Depression				Stress			
	No		Yes		No		Yes		No		Yes	
	N (%)	Mean (SD) <sup>a</sup>	N (%)	Mean (SD)	N (%)	Mean (SD)	N (%)	Mean (SD)	N (%)	Mean (SD)	N (%)	Mean (SD)
<b>Gender</b>												
Female	29 (76.3)	6.3 (4.6)	9 (23.7)	20.4 (4.5)	27 (71.1)	9.3 (5.2)	11 (28.9)	26 (4)	30 (78.9)	14.9 (5.4)	8 (21.2)	31.5 (3.8)
Male	5 (71.4)	5.2 (5.4)	2 (28.6)	18 (2.8)	4 (57.1)	3.5 (1.9)	3 (42.9)	31.3 (4.1)	4 (57.1)	13.5 (6.1)	3 (42.9)	33.3 (4.6)
<b>Age</b>												
≤ 19 years	19 (82.6)	6.5 (4.8)	4 (17.4)	19 (3.8)	18 (78.3)	10.4 (5.0)	5 (21.7)	25.6 (2.6)	18 (78.3)	15.8 (4.4)	5 (21.7)	31.2 (4.1)
≥ 20 years	15 (68.2)	5.7 (4.7)	7 (31.8)	20.6 (4.7)	13 (59.1)	6 (4.5)	9 (40.9)	28 (5.2)	16 (72.7)	13.6 (6.3)	6 (27.3)	32.3 (4)
<b>Color</b>												
White	21 (80.8)	5.8 (4.2)	5 (19.2)	19.2 (3.3)	21 (80.8)	8.3 (5.2)	5 (19.2)	27.6 (5.8)	21 (80.8)	13.1 (5)	5 (19.2)	34.4 (3.2)
Black and Brown	13 (68.4)	6.8 (5.3)	6 (31.6)	20.7 (5.1)	10 (52.6)	9.2 (5.5)	9 (47.4)	26.9 (4)	13 (68.4)	16.6 (5.8)	6 (31.6)	29.7 (3.2)
<b>Per capita income (n=34)<sup>b</sup></b>												
Up to 2 MW <sup>c</sup>	10 (66.7)	5.8 (3.9)	5 (33.3)	21.2 (5.9)	10 (66.7)	8.6 (4.7)	5 (33.3)	26 (2.8)	10 (66.7)	15.4 (4.9)	5 (33.3)	30.8 (4.3)
> 2 MW	14 (73.7)	6.7 (5.1)	5 (26.3)	19.6 (2.1)	14 (73.7)	10.3 (5.2)	5 (26.3)	31.2 (4.6)	14 (73.7)	14 (4.5)	5 (23.3)	33.6 (3.2)
<b>Graduation course</b>												
Nursing	18 (69.2)	6.2 (4.4)	8 (30.8)	20.5 (4.8)	19 (73.1)	8.6 (5.8)	7 (26.9)	26.9 (4.5)	20 (76.9)	14.3 (4.8)	6 (23.1)	32.3 (3.8)
Others	16 (84.2)	6.1 (5.1)	3 (15.8)	18.7 (2.3)	12 (63.2)	8.5 (4.4)	7 (36.8)	27.4 (4.8)	14 (73.7)	15.4 (6.4)	5 (26.3)	31.2 (4.3)
<b>Choral time</b>												
Up to 4 months	22 (78.6)	6.5 (4.4)	6 (21.4)	19.7 (5.4)	20 (71.4)	9.2 (5.0)	8 (28.6)	25.5 (4.7)	22 (78.6)	15.3 (4.8)	6 (21.4)	30.3 (3.2)
≥ 5 months	12 (70.6)	5.7 (5.3)	5 (29.4)	20.4 (2.9)	11 (64.7)	7.5 (5.7)	6 (35.2)	29.3 (3.5)	12 (70.6)	13.8 (6.5)	5 (29.4)	33.6 (4.3)

Note: a = (SD) means Standard Deviation; b = MW means Minimum Wage. Source: Authors (2023).

## 4. Discussion

The study analyzed levels of depression, anxiety and stress in undergraduate students practicing a weekly choral singing activity by using the sociodemographic questionnaire and the DASS-21 scale. The values exposed in this research results have an important clinical relevance in different aspects.

First, it is important to highlight that even after 4 weekly sessions of choral singing, high frequencies of severe symptoms of depression (31.2%), anxiety (24.5%) and stress (24.5%) were observed in the last week of the study. Other studies conducted with college students from different countries also used the DASS-21 scale. In these studies, severe

symptoms values were found between 8.8% and 22.7% for depression, between 12.2% and 41% for anxiety, and between 17.4% and 29% for stress (Basudan et al., 2017; Fawzy & Hamed 2017; Moutinho et al., 2017).

Another relevant aspect is the fact that 24.4% of the participants presented two or more severe symptoms in the last week of the study. Of these participants, 64.3% had depression, 90.1% had anxiety and 84.8% had stress. These data are in line with the literature, which explains the correlation between depression, anxiety and stress in the university context and indicates that stressors in the academic context are able to make individuals more likely to develop anxiety and depression (Jardim et al., 2020; Mondardo & Pedon, 2005). So, it is important to think about the necessity of the establishment of mental health support networks in public universities, in order to identify and intervene quickly in symptomatic individuals who have not developed multiple disorders yet. In this way, collect data to construct this work was also an effective tool to identify participants of the choir who need help.

In addition, we can notice the high mean scores for those who presented two or more severe symptoms, being  $28.9 \pm 4.7$  for depression,  $20 \pm 4.5$  for anxiety and  $32.7 \pm 3.9$  for stress. It is essential to highlight that the maximum score of the DASS-21 scale is 42, a fact that evidences the intensity of self-reported symptoms. Based on these data, it is necessary to reflect on the influence of the various teaching-learning methods on students' mental health, because too many responsibilities are often attributed to university students (Lameu et al., 2016).

Although the table 4 did not show statistically significant relations between the variables, it is possible to perceive a relevant clinical relation.

For the gender variable, the mean scores for severe symptoms obtained for anxiety, depression and stress were higher in males than in females. For anxiety, 23.7% of female participants and 28.6% of male participants. For depression, 28.9% of female participants and 42.9% of male participants. For stress, 21.2% of female participants and 42.9% of male participants. These values differ from those commonly found in studies that also have used the DASS-21 scale, which indicate higher rates of anxiety, depression and stress in female university students (Guimarães, 2014; Iqbal et al., 2015). The main factor thought by the researchers to understand these levels was the predominance of female students in the mental health services offered by some universities, which are important support networks for the reduction of depressive, ansiogenic and stressor factors (Cerchiari et al., 2005; Pinho, 2016). The authors believe that other support networks, such as religion, leisure, family and relationships, can also influence these data.

In addition to the gender variable the percentage of self-declared black and brown individuals with severe symptoms of depression, anxiety and stress was higher than the self-declared white participants. For depression, 47.4% of the black and brown participants and 19.2% of the white participants. For anxiety, 31.6% of the participants black and brown and 19.2% of the white participants. For stress, 31.6% of the participants black and brown and 19.2% of the white participants. A systematic review showed that there are divergences between studies that relate the color variable to the prevalence of mental disorders in the general population, however, some studies also indicate a higher occurrence in black people when compared to white people (Lacerda, 2015).

In this context, it can be thought that historical and socioeconomic factors linked to the black population are capable of interfering with the high rates presented. In Brazil, studies indicate that black people have 50% more chances of suffering discrimination against whites, even if they achieve good wage levels, schooling and social prestige (Smolen & de Araújo, 2017). In addition, many undergraduate students need to add academic obligations to their jobs to remain in the University (Lacerda, 2015). Thus, it is suggested that the trajectory of the black student is even more complex, a fact that can favor high rates of mental health issues.

This research presents some limitations. Although all students of the choral singing activity have integrated the research sample, it is a small value in relation to the population of students of a University. Thus, the small sample size

becomes a limiting factor, because it is impossible to generalize the data. In addition, another limiting factor is that, possibly, other variables not detailed in this study may be able to influence the results obtained, such as income, period, course, among others.

## 5. Conclusion

It was concluded that undergraduate students are at high levels of depression, anxiety and stress even after four choral singing sessions. In addition, among the variables analyzed, the levels of depression, anxiety and stress were higher in male and black students.

Due to the clinical relevance found about the levels of depression, anxiety and stress in undergraduate students, it is suggested that further studies may be conducted with the analysis of different variables, in order to expand the knowledge related to the benefits of choral singing, and, consequently, mitigate damage to the mental health of the undergraduate students.

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