Can emotional states interfere with self-esteem and mental health during pandemic context on health students in low middle-income country?

Os estados emocionais podem interferir na autoestima e na saúde mental em contexto de pandemia em estudantes da área da saúde em país de renda média baixa?

¿Pueden los estados emocionales interferir con la autoestima y la salud mental durante el contexto de pandemia en estudiantes de salud en un país de ingresos medios bajos?

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Abstract
The university experience is considered a factor that increases stress and affects health of students. Studies have shown distancing measure is associated with depression in young adults. This study aimed to assess the impacts of social isolation on health students due the COVID-19 pandemic. It is a primary study sought to investigate the levels of depression, anxiety and stress by DASS-21, mental components by SF-36, and self-esteem by RSES. The 358 health students accessed the form. The average age was 23.4 years, 75.4% women, and 24.6% men. We divided the selected groups for comparative analysis between academic degree (Undergraduate student-UG/Graduate student-G), gender (Women-W/Men-M) and practitioners of physical activity (Yes-Y/No-N). Principal Component Analysis showed the DASS-21, RSES and SF-36 scales interact into two dimensions that correlate positively and negatively. The findings showed UG suffer greater pressure on mental states than G (W<7166, p-value<0.002). The practice of physical activity was not a factor of difference between any of the anxiety, stress or depression states (W=16012, p-value=0.5205) and intra-group interaction (Chi-square= 22.007, df=20 and p=0.3401) were not significant. We found a high positive correlation between mental health, vitality and social aspects, which might be related to social distancing and self-esteem aspects need answers.
Keywords: COVID-19; Students, Health occupations; Physical distancing; Mental health.

Resumo
A experiência universitária é considerada um fator que aumenta o estresse e afeta a saúde dos estudantes. Estudos mostraram que a medida de distanciamento está associada à depressão em adultos jovens. Este estudo teve como objetivo avaliar os impactos do isolamento social em estudantes da área da saúde devido à pandemia de COVID-19. Trata-se de um estudo primário que buscou investigar os níveis de depressão, ansiedade e estresse pelo DASS-21, componentes mentais pelo SF-36 e autoestima pelo RSES. Os 358 estudantes da área da saúde acessaram o formulário. A média de idade foi de 23,4 anos, 75,4% mulheres e 24,6% homens. Dividimos os grupos selecionados para análise comparativa entre grau acadêmico (Graduação-UG/Pós-Graduação-G), gênero (Mulher-W/Homem-M) e praticantes de atividade física (Sim-S/Não-N). A Análise de Componentes Principais mostrou que as escalas DASS-21, RSES e SF-36 interagem em duas dimensões que se correlacionam positiva e negativamente. Os achados mostraram que o UG sofre maior pressão nos estados mentais do que o G (W<7166, p-value<0,002). A prática de atividade física não foi fator de diferença entre nenhum dos estados de ansiedade, estresse ou depressão (W=16012, p-value=0,5205) e interação intragrupo (Qui-quadrado= 22,007, df=20 ep= 0,3401) não foram significativos. Encontramos uma alta

correlação positiva entre saúde mental, vitalidade e aspectos sociais, o que pode estar relacionado ao distanciamento social e aspectos de autoestima que precisam de respostas.
Palavras-chave: COVID-19; Estudantes de ciências da saúde; Distanciamento físico; Saúde mental.

Resumen
La experiencia universitaria es considerada un factor que aumenta el estrés y afecta la salud de los estudiantes. Los estudios han demostrado que la medida de distanciamiento está asociada con la depresión en adultos jóvenes. Este estudio tuvo como objetivo evaluar los impactos del aislamiento social en estudiantes de salud debido a la pandemia de COVID-19. Es un estudio primario que buscó investigar los niveles de depresión, ansiedad y estrés por DASS-21, componentes mentales por SF-36 y autoestima por RSES. Los 358 estudiantes de salud accedieron al formulario. La edad promedio fue de 23,4 años, 75,4% mujeres y 24,6% hombres. Dividimos los grupos seleccionados para el análisis comparativo entre grado académico (Estudiante de grado-UG/Estudiante de posgrado-G), género (Mujeres-W/Hombres-M) y practicantes de actividad física (Sí-S/No-N). El análisis de componentes principales mostró que las escalas DASS-21, RSES y SF-36 interactúan en dos dimensiones que se correlacionan positiva y negativamente. Los hallazgos mostraron que UG sufre una mayor presión sobre los estados mentales que G (W<7166, valor p<0,002). La práctica de actividad física no fue factor de diferencia entre ninguno de los estados de ansiedad, estrés o depresión (W=16012, p-valor=0,5205) y la interacción intragrupo (Chi-cuadrado= 22,007, df=20 y p= 0.3401) no fueron significativas. Encontramos una alta correlación positiva entre la salud mental, la vitalidad y los aspectos sociales, lo que podría estar relacionado con el distanciamiento social y los aspectos de autoestima necesitan respuestas.
Palabras clave: COVID-19; Estudiantes del área de la salud; Distanciamiento físico; Salud mental.

1. Introduction

Many public health measures have been taken to mitigate the spread of contagion and collapse of health services about the new coronavirus pandemic (COVID-19), among which are measures of social distancing (Dong & Bouey, 2020; World Health Organization, 2020). As a result, health agencies around the world-instructed governments, in all spheres, to implement restrictions on daily study and work activities. In addition to being an unusual situation, it was accompanied by fear of the consequences of an infection still little known, such as in relation to the financial condition and living in home (Son et al., 2020; Wang et al., 2020).

However, this measure of distancing results in changes in the social and behavioral relationships of young people (Chen, Sun, & Feng, 2020). Matthews et al. (2016) emphasize that social relationships are considered sources of support and that their absence can have implications for health and well-being. They demonstrated that social isolation and loneliness are moderately correlated and are associated with depression in young adults.

The university experience is considered a factor that increases emotional stress and affects the quality of life and health of students (curricular and extracurricular activities, excessive study hours, competitiveness, sleep deprivation, changes, uncertainties and challenges) (Lipson & Eisenberg, 2017; Acharya et al., 2018; dos Anjos de Paula et al., 2014). Consequently, students become vulnerable to psycho-emotional factors and may develop mental health problems, which have a negative impact on academic performance, motivation, satisfaction and confidence in the ability to complete the course (Campos et al., 2017; Lipson & Eisenberg, 2018).

Given the importance of the information mentioned, this study assessed the impacts of social isolation on health students due the COVID-19 pandemic, through the levels of anxiety, stress and depression, as well as to analyze mental components and self-esteem. Our hypothesis is that there is a compromise of these variables in health students caused by social distancing.

2. Methodology

2.1 Study Design

This primary study using an exploratory sectional follow-up used a structured form on Google Forms®. The form was sent via email and social networks from May to November 2020. The Research Ethics Committee of Federal University of

Sergipe approved this study by CAEE number: 30877520.9.0000.5546 and report number: 4.144.508. We perform the study in accordance with STROBE checklist.

2.2 Participants

The study included health students in the face-to-face modality, with active status, from the public and private education network reside in low middle-income country. We emphasize that the convenience sample allowed for the criterion of minimal statistically detectable effect given a specified effect size of Cohen's d= .3 with 80% power (alpha=.05 and sample size (Goldberg, van der Linden, Ballew, Rosenthal, & Leiserowitz, 2019). Data from participants who did incomplete the form were excluded from the analysis. The Google Forms® contained the Informed Consent Form as mandatory filling to allow the following steps regarding the measures to assess the study outcomes.

2.3 Measures

Demographic variables included age, biological sex, regular physical exercise, course year and academic degree.

For the variables of depression, anxiety and stress, we used the Depression, Anxiety and Stress Scale - Short Form (DASS-21) which has 21 items, which indicates the degree of certain symptoms in the last week. Moving on to the subscales: anxiety from 0 to 9 (minimum), 10 to 14 (moderate) and 15 to 42 (severe and extremely severe); stress from 0 to 18 (minimum), 19 to 25 (moderate) and 26 to 42 (severe and extremely severe); and depression from 0 to 13 (minimum), 14 to 20 (moderate) and 21 to 42 (severe and extremely severe) (Vignola, 2013; Martins et al., 2019).

To assess self-esteem, we used the Rosenberg Self-Esteem Scale (RSES), which classifies the level of self-esteem in low, medium and high. The scale consists of ten statements: five referring to a positive view of yourself and five referring to a negative self-assessment. It uses a four-point Likert scale where the alternatives will vary between "strongly agree" and "strongly disagree" (Rosenberg, 1965; Sbicigo et al., 2010).

To assess the quality of life (QOL), we used the Medical Outcome Study 36-item Short-From Health Survey (SF-36). The scale has eight domains, however, we analyze only the mental component: vitality (VIT), social aspects (SA), emotional aspects (EA) and mental health (MH). The score will vary from 0 to 100%, where the higher the better the health status and with that the better quality of life (Ciconelli, 1997).

2.4 Statistical analysis

We distributed the collected data in a spreadsheet and then we analyzed them by the software R Core Team (2020). The validation of the scales was performed using Guttman's Lambda (Guttman, 1945; Revelle and Zinbarg, 2009), subsequently analyzed individually and in association. The groups of students were separated between Sex-biological (Women-W/Men-M), Academic degree (Undergraduate student-UG/Graduate student-G) and physical activity practitioners (Yes-Y/No-N). The data were analyzed by median by Mann-Whitney test between groups and Kruskal-Wallis to compare the combined individuals within 8 groups (W-UG-Y, W-UG-N, W-G-Y, W-G-N, M-UG-Y, M-UG-N, M-G-Y, M-G-N), corrected by Dunn's post-test and considered p <0.05. The scales were standardized by z-score transformation. The interaction between the DASS-21, RSES, and SF-36 scales was initially analyzed by Independence Chi-square test and posterior Spearman's correlation test. Principal Component Analysis (PCA) analysis was chosen to understand the response of the interaction between the scales (Lê et al., 2008). The analyzes were reduced in 2 dimensions defined by the contribution response of the variables in the dimensions.

3. Results

The 358 health students accessed the form. Three students did not accept consent and one had missing data, being excluded from this study. At the end, we analyzed the data of 354 students. The average age was 23.4 years (±5.66), with women students (75.4%) more prevalent than men students (24.6%). About 43.50% of the students did not practice any physical activity. Regarding the academic year, 18.64% were graduate student 81.36% were undergraduate students, mainly medicine (16.67%) and physical therapy (15.54%). More details in Table 1.

Table 1. Characteristics of participants.

Sociodemographic data	
n= 354	
Age (years), mean (SD)	23,4 (± 5,66)
Sex, n (%)	
Women	267 (75.4%)
Men	87 (24.6%)
Physical activity, n (%)	
Body building	91 (25.71%)
Dance	22 (6.21%)
Does not practice any physical activity	154 (43.50%)
Other*	65 (18.36%)
Sports	22 (6.21%)
Academic degree, n (%)	
Graduate student	66 (18.64%)
Undergraduate student	288 (81.36%)
Course, n (%)	
Dentistry	36 (10.17%)
Medicine	59 (16.67%)
Nursing	44 (12.43%)
Nutrition	22 (6.21%)
Occupational therapy	38 (10.73%)
Other**	45 (12.71%)
Pharmacy	40 (11.30%)
Physical therapy	55 (15.54%)
Speech Therapy	15 (4.24%)

*Other: aerobic, calisthenics, cycling, functional exercise, home exercises, Muay Thai, Pilates, running, surf, swimming, walking, yoga. **Other: health graduate students, medical residency. Fonte: Autores.

We divided the selected groups for comparative analysis between academic degree (Undergraduate student-UG/Graduate student-G), gender (Women-W/Men-M) and practitioners of physical activity (Yes-Y/No-N).

3.1 Depression Anxiety and Stress Scale (DASS-21)

The values obtained by DASS-21 showed a high level of reliability for internal consistency (λ=0.95). (a) By academic degree: for anxiety, the UG group (median=8) presented a difference between average anxiety states compared to the normal ones in the G group (median = 4) (W=7596, p-value=0.0105). For depression, the status of the groups is normal, but the UG group (median=12) presents a level 50% higher than the G (median=8) (W=7256, p-value=0.00266). For stress, the state of the UG group (median=14) is moderate and the G group (median = 10) with a medium stress state (W=7166, p-value=0.00178). The assessment of dependence on academic degree was observed for the state of stress (X2=10,091, df=4 and p-value=0.03893), but not for depression (X2=8.7457, df=4 and p-value=0.06778) and anxiety (X2=3.1519, df=4 and p-value=0.5327). (b) By gender: for anxiety, the W group (median=8) showed no difference between the average anxiety states compared to the normal ones in the M (median=4) (W=12964, p-value=0.102). For depression, the status of the groups is normal for the W group (median=12) and for the M group (median=10) (W=12505, p-value=0.283). For stress, the state of group W (median=14) is moderate and for group M (median=12) the average stress (W=13888, p-value=0.00598). The assessment of sex dependence was observed for the state of stress (X2=10.648, df=4 and p-value=0.03082), but not for depression (X2=1.7109, df=4 and p-value=0.7887) and anxiety (X2=4.6126, df=4 and p-value=0.3294). (c) For practitioners of physical activity: for anxiety, group N (median=6) did not present any difference between anxiety states for group Y (median=6) (W=15705, p-value=0.748). For depression, the status of the groups is normal, group N (median=11) and group Y (median=12) (W=14715, p-value=0.472). For stress, the state of group N (median=14) and group Y (median=14) is moderate (W=14724, p-value=0.478). The assessment of dependence on physical activity was not observed for any of the states: stress (X2=0.11612, df=4 and p-value=0.9984), depression (X2=1.7704, df=4 and p-value=0.7779) and anxiety (X2=5.2338, df=4 and p-value=0.2641). For the intersection of individuals between groups, there was no difference in the comparison between the 8 groups, for A (X2=16.7, df=20 and p=0.673), D (X2=21.8, df=21 and p=0.408) and S (X2=18.9, df=21 and p=0.594).

3.2 Rosenberg Self Esteem Scale (RSES)

The RSES showed a high level of reliability for internal consistency (λ=0.91). (a) By academic degree: the UG group (median=21) does not differ from the result of the G group (median=21), therefore self-esteem is similar to the groups (W=9285, p-value=0.615). (b) By gender: group W (median=21) does not differ from the result of group M (median=21), so self-esteem is similar to the groups (W=9285, p-value=0.77). (c) For practitioners of physical activity: the difference in group N (median=22) and the result of group Y (median=21) is not significant, so self-esteem is similar to the groups (W=18604, p-value < 0.001, effect=0.179). For the intersection of individuals between groups, there was no difference between the 8 groups (X2=27.9, df=27 and p=0.4418).

3.3 Medical Outcome Study 36-item Short-From Health Survey Scale (SF-36)

The SF-36 showed a high level of reliability for internal consistency of the analyzed variables (λ=0.8).

Emotional aspects (EA):

Findings for the EA analysis showed significant differences when we compared students by academic degree (W=11193, p-value=0.01384) for G greater than UG in an interval of 33%. The data for W and M students biological-sex (W=10346, p-value=0.09451), physical activity practitioners (W=15797, p-value=0.6498) and intra-group interaction (Chi-square=3.0617, df=4 and p=0.5475) were not significant.

Social aspects (SA):

The SA values analysis showed significant differences when comparing W and M students biological-sex (W=9348.5, p-value=0.005658), with the W students value less than M in 20% range. For students by academic degree (W=10980, p-value=0.04635) group G is greater than UG in a 20% range. The data for physical activity practitioners (W=14782, p-value=0.5125) and intra-group interaction (Chi-square=7.1788, df=9 and p=0.6185) were not significant.

Mental health (MH):

The results obtained for the MH analysis showed significant differences when we compared W and M students biological-sex (W=8790, p-value=0.0006439), with the value of W less than M in 18.75%. For students by academic degree, (W=11583, p-value=0.005495) group G is greater than UG in a range of 18.75%. The data for practitioners of physical activity (W=16056, p-value=0.4915) and intra-group interaction (Chi-square=24.504, df=24 and p=0.4331) were not significant.

Vitality (VIT):

The VIT analysis showed significant differences when we compared W and M students biological-sex (W=8944, p-value=0.01374), with the value of W students less than M students in 18%. For students by academic degree (W=11348, p-value=0.01374) group G is greater than UG in a range of 18% (W=11348, p-value=0.01374). The data for physical activity practitioners of physical activity (W=16012, p-value=0.5205) and intra-group interaction (Chi-square= 22.007, df=20 and p=0.3401) were not significant.

3.4 Correlations between the DASS-21, RSES and SF-36 scales

The independence test for variables presents the RSES scale as independent of other scales (p>0.05). For the SF-36 and DASS-21 scales, most variables are dependent (p<0.01) and the variables internal to the scales showed dependence (p<0.0001) as well (See details in Supplementary File 1). The correlation performed between the components of the scales shows the association between D (depression), A (anxiety) and S (stress) with strong positive correlations (r≥0.6, p<0.001). In the SF-36 domains, findings showed strong relationships correlation between MH (mental health), VIT (vitality) and SA (social aspects) (r≥0.6, p<0.001) and for EA (emotional aspects) the correlations were average (r≥0.3 and ≤0.5, p<0.01). The DASS-21 scale also presented a negative and strong correlation for MH, VIT and SA (r≥-0.6, p<0.001) and a mean for EA with D and E (r=-0.46 and r=-0.32, p <0.01) and low with A (r=-0.23, p<0.05).

3.5 Principal Component Analysis

Standardized data showed a wide distribution into the two main dimensions, the dimensions compete for 68.37% of the variation observed in the variables. The eigenvalues of the first two dimensions, 4.43 and 1.03 were considered, which indicate the level of proximity and interaction between the variables for values close to or greater than 1 (Jollife, 2002; Lê et al., 2008; Kassambara & Mundt, 2020).

The DASS-21, RSES and SF-36 scales interact into two dimensions that correlate positively and negatively (Figure 1). Dimension 1 has in its axis the domain of SF-36 (MH and VIT) with a contribution of 34.28% and DASS-21 (D and S) and with a contribution of 32.01%, these variables present 66.29% of the observed variance at dimension one. Dimension 2 the axis is contributed by the RSES domain in 82.34%. The distribution between UG and G, W and M was correlated at the dimension one, although Y and N was correlated at dimension two with RSES scale. For much details see Supplementary File 1.

Figure 1. A - Correlation between the scales in the two main dimensions. B - Distribution of the position of the individuals with average position of the groups in the two dimensions.
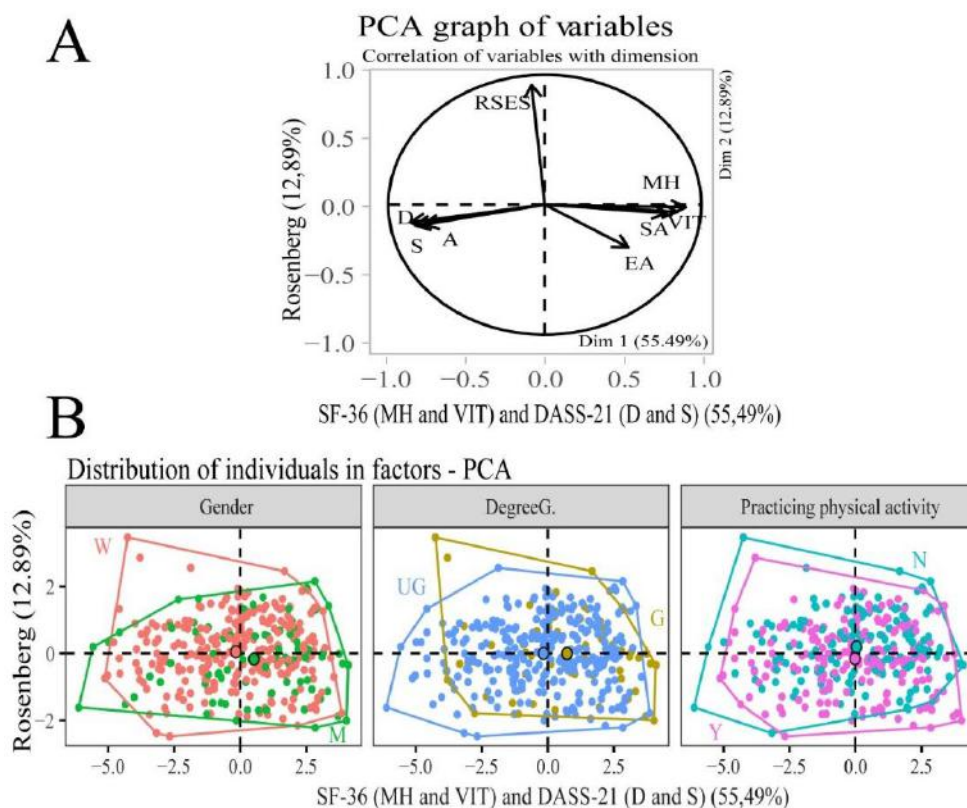
Legend: SF-36: Emocional Aspect (EA), Vitality (VIT), Mental Health (MH) and Social Aspect (SA); DASS-21: Depress (D), Anxiety (A) and Stress (S); Rosenberg (RSES); Woman (W); Man (M); Undergraduated (UG); Graduated (G); Not practicing physical activity (N); Practicing physical activity (Y). Fonte: Autores.

4. Discussion

This study observed the social distancing in emotional states and mental components of health students. The findings lead us to understand that the trajectory of academic development as an undergraduate student exerts greater pressure on mental states than on students who have already graduated. As it was understood, for all states: anxiety, depression and stress, undergraduate health students had higher states than graduate students. When we evaluated students as women or men, the difference between groups was observed for the state of stress, with women more stressed than men during the academic uncertainties of students during the COVID-19 pandemic. The practice of physical activity was not a factor of difference between any of the anxiety, stress or depression states. The self-esteem of these health students is a factor that is independent of states of anxiety, stress or depression, as well as, for mental health, aspects emotional, social or vitality. For the SF-36 variables, undergraduate students and women had worse mental quality of life states in all evaluated factors than graduated and men. Parallel to the DASS-21 scale states, there is a strong negative correlation on the SF-36 mental variables. Mainly mental health and vitality states seem to oppose pathological states of anxiety, stress and depression.

When analyzing a set of scale interaction possibilities through principal component analysis, we observed that these scales follow orientations in two dimensions. We observed that the SF-36 and DASS-21 scales follow the assessment for variables that compete with the individual's neurological states in the first dimension, while in the second dimension the RSES scale has its own autonomy and its construct is not influenced by the results of the others scales.

The psychosocial disorders are frequently seen in undergraduate students. This fact can produce a low academic index and even drop out of the course due to their emotional challenges; either for not taking the desired course or even for not having met their expectations (Hahn et al., 1999). Additionally, the family relationship is one of the main topics that arises as an influence on the student's emotional aspect (Hahn et al., 1999), and currently, online classes manifest themselves as a strong crisis due to an atypical need to reconcile the home environment with remote student tasks (Chen et al., 2020). As found in Son et al. (2020) study, about 54% of students indicated negative impacts of the pandemic on academic issues such as difficulty concentrating, concerns about academic performance, increased class load, depressive thoughts, among other items related to health and lifestyle.

Previous studies (Chen et al., 2020; Wang et al., 2020; Gao et al., 2020; Goularte et al., 2021) have shown that COVID-19-wide spread had a major influence on the mental health of young people and adults, such as increased prevalence of anxiety and depression. Son et al. (2020) reported the effects of the pandemic on mental health of college students, where 71% of students reported that their levels of stress and anxiety increased with the onset of the pandemic. Our study showed that undergraduate students presented stress levels higher than graduate students, and women students tended to be more stressed compared to men students. Undergraduate students showed depressive levels 50% higher than undergraduate students. Fonseca et al. (2021) highlighted the general incidence of depressive symptoms in women (28.3%) among Brazilian university students with high levels of stress. Goularte et al. (2021) emphasized that women were strongly associated with anxiety and depression levels. We also observed significant correlations involving anxiety, stress, depression and mental health, vitality and social aspects of these students.

These health students know the importance of self-care and physical exercise for health and quality of life. However, many students did not continue their physical activity during the pandemic. Nevertheless, this finding needs to be analyzed with caution. Although we consider the lockdown performed during the pandemic, and we did not use a specific scale for the physical activity variable, thus not being able to make a correlation with the mental constructs and physical activity. Despite, the study by Grasdalsmoen et al., (2020) demonstrated a negative association between physical exercise and mental health problems.

According to Romero-Blanco et al. (2020), home confinement was expected to increase a sedentary lifestyle, but in their study, despite the lockdown to contain the COVID-19 pandemic, many students increased their physical activity time, as well as their time in the sitting position. In our study, about 200 health students practiced regular physical activity and 154 students have a sedentary behavior. We correlated mental constructs and self-esteem with physical activity practice. In the statistical analysis, despite having tended to a significant value in the comparison of practitioners and non-practitioners of activity on self-esteem, it was not considered a significant effect due to the number of individuals.

However, we found a high positive correlation between mental health, vitality ans social aspects. They depended on each other. Except the emotional aspects that showed a moderate correlation. Worth highlighting emotional aspects domain in SF-36 has an evaluation profile in relation to work or some regular daily activity, highlighting the time of dedication, the number of tasks or zeal during its performance. These questions may have been interfered with due to the emotional aspect. Considering the social distancing, many health students may not be directly at work or may have dropped out of classes.

Another point that may be influencing psychosocial consequences such as anxiety and depression is fake news, which happen regardless of social strata (Hodgins & Saad, 2020). And when it comes to social strata several situations can influence people's mental health. People in low middle-income countries usually live with 5 or more family members, sharing the same environment as a living room, bed room, bathroom, kitchen. In terms of education, the possibility of remote teaching is another problem in countries like the one investigated, since investment in technology to provide this support for students is scarce (Cash & Patel, 2020; Hodgins & Saad, 2020).

Other limitations deserve recognition. We used an online survey with a convenience sample method, what may not be representative sample of the total health students. The scales used in this study were created for a context of normality, that is, not considering pandemic periods as we are currently living. This factor may have interfered with our findings, so the results need to be interpreted with caution. Another limitation was not applying a specific scale to assess physical activity and not having specific questions related to home activities to follow social distancing.

Regarding the question about how emotional states in a pandemic context can interfere on health students self-esteem and mental health, we identified a gap that made the correlation difficult. The reason women and undergraduate health students showed the worst emotional and mental states might be related to social distancing and self-esteem aspects need answers. Other gaps have been identified and need to be investigated in future research. Can resilience threshold influence mental health? Could the teaching remote process have influenced the didactic learning?

5. Limitations

We did not observe a good distribution of responses across health undergraduate courses. The sample size may limit its generalization. Possibly health students who have a mental health impairment or distress experience were more likely to answer the questionnaire. These findings are uncertain and not generalizable to developed countries.

6. Final Considerations

In our efforts to understand how emotional states can interfere with self-esteem and mental components in health students, we should consider other tools for a more careful analysis. The pandemic has brought about the need to adapt to an atypical reality and future questions need to be developed to identify problems related to mental states that compromise the performance of students in the health area and, consequently, their mental health to ensure a quality teaching-learning process.

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