

Research Article

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The Area of Undergraduate Courses Can Impact the Search for Alternatives to Improving the Mental Health of University Students Facing Stressful Situations

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Abstract

Introduction: University education brings several stressors to students, from high demands related to the field of study to the challenges of early adulthood (often away from family). The pandemic has added other stressors to university life, bringing the need to improve coping strategies to deal with stress in order to maintain or improve students' mental health. This study investigated whether the tools students use to maintain or improve mental health in stressful situations vary depending on their undergraduate course or field of study.

Materials and Methods: 458 students from 24 different undergraduate courses were evaluated. The courses were allocated to four fields/ areas of knowledge ((i) Agriculture/Biological Sciences, (ii) Engineering/Exact Sciences, (iii) Health Sciences, and (iv) Humanities/Social Sciences).

Results: Students in courses in the Humanities and Social Sciences area had more perception of the negative impact generated by the pandemic on their mental health. Reading non-academic books and watching relaxing movies or series were alternatives sought mainly by students in Health Sciences and Humanities/Social Sciences. Students in the health field were the ones who most sought alternatives to maintain mental health, including more significant physical activity practice and alcohol consumption in this population.

Discussion: The most significant concern about minimizing the impact on mental health was prevalent among health students. However, they were not the ones who perceived the most considerable harm to their mental health, which may be related to the study area of these students' courses, which always addresses the importance of health (physical and mental). Thus, the study highlights the importance of discussing mental health in other undergraduate courses since university life can be particularly stressful for many individuals at this stage.

Conclusions: The graduation course or the knowledge field seems to influence the self-perception of the impact of a stressful event on mental health and the alternatives to minimize it.

Keywords: Biological sciences; Engineering; Health sciences; Humanities; Social sciences; COVID-19; Alcohol use

Introduction

In 2020, the World Health Organization declared COVID-19 a pandemic. At that time, several countries suspended several in-person activities due to quarantine. In this scenario, many universities closed down their campuses, stopped, or had various restrictions related to face-to-face activities [1]. The shift to online teaching, remote work, or home study led many people to combine their professional and academic responsibilities with domestic activities [2]. All the alterations brought by the pandemic, coupled with the fear of the disease and its associated morbidity and mortality, resulted in significant psychological stress for most individuals during that period [3,4].

The entire situation, which involved stress related to COVID-19, bringing with it the fear of contagion and complications or even the loss of one's own life or that of family members, added to the stress related to the accumulation of tasks in the domestic environment and the deprivation of various activities that could previously bring relaxation, due to quarantine, led to many studies on the impact of the pandemic on mental health being carried out [5,6]. The pandemic has also raised other concerns among college students that have acted as potential stressors, such as the possibility of delays in completing courses and the future of their profession or job prospects, as the economy has also declined during the period [7,8].

Although several studies were conducted within the university community—focusing mainly on students and professors in the health field—few have examined a broader range of academic disciplines or different undergraduate programs, even without comparing them [9–13]. While attending college, students acquire diverse knowledge related to their field. This cumulative knowledge prepares them for future careers but may also provide valuable skills for their everyday life [14,15].

Once there are different areas of study, each one contributing uniquely to the student's daily life, and also given that students often have diverse profiles that can influence their choices of study areas, this research focused on observing whether there were differences about the self-reported impact of the pandemic on the mental health of students in different areas. Additionally, the strategies used to cope with stressful situations may vary among students from different fields of study. Therefore, this study aimed to investigate whether the area of an undergraduate course influences the search for alternatives to improve or maintain the mental health of university students facing stressful situations.

Materials and Methods

Students of a Brazilian public University were invited by email to respond to a Google Forms survey that included various questions, including age, course information, self-reported mental impact of the pandemic, and strategies to overcome it. The study received approval from the Ethics Committee of the author's institution (CEP/UFTM - approval number 5.039.066). It was conducted using ethical principles outlined in the World Medical Association Declaration of Helsinki. Before participating, interviewees provided informed consent after reading the study's objectives, procedures,

and ethical guarantees. Only students over 18 years old who were regularly enrolled at the university were allowed to access the questionnaire. Students not attending classes during the pandemic (2020 and 2021) were excluded from the study.

Data distribution was assessed using the Kolmogorov-Smirnov test, and the homogeneity of variances was tested with the Levene test. The data exhibited a non-parametric distribution or no homogeneity of variances, and analysis was performed using Chi-square tests for categorical data, Crosstab Pearson Chi-Square tests, Spearman or Pearson correlation, and the Kruskal-Wallis test followed by the Games-Howell post hoc test when differences were found. A p-value of less than 0.05 was considered statistically significant.

Results

Four hundred fifty-eight students from 24 different degree courses answered the questionnaire. The courses were allocated into four knowledge science areas. They presented a non-normal distribution [$p < 0.001$, Kolmogorov-Smirnov test]: Agriculture and Biological Sciences ($n=50$), Engineering and Exact Sciences ($n=125$), Health Sciences ($n=172$) and Humanities and Social Sciences ($n=111$). There was a predominance of answers from students in the health area, followed by answers from the engineering/exact and humanities/social sciences areas. The agriculture/biological sciences were the area with fewer responders. The Crosstab Pearson Chi-Square test evidenced differences in the course distribution into the four areas [$X^2(69)=1374$, $p < 0.001$] (for Course distribution into the areas, see Figure 1).

The age of the students was classified into the following groups: (i) 18 to 21 years - born between 2000 and 2003, (ii) 22 to 25 years - born between 1996 and 1999, (iii) 26 years or older - born in 1995 or earlier. The distribution of age groups was non-parametric [$p < 0.001$, Kolmogorov-Smirnov test]. The Crosstab Pearson Chi-Square test does not evidence differences in the age distribution in the four areas [$X^2(6)=10.83$, $p > 0.05$] (for Age distribution into the areas, see Figure 2).

Over 90% of students in all areas reported that the pandemic had a significant impact on their mental health [$X^2(3) = 2.63$, $p > 0.05$]. When asked about this impact:

"If the pandemic has had any impact on your mental health, do you consider it to have been:

(i) Positive (good) impact. (ii) Negative (harmful) impact. (iii) It had a negative impact but had some (minor) positive aspects. (iv) It had a positive impact but had some (minor) negative aspects. (v) There was no impact."

In all areas, most students indicated that it had a negative impact but had some (minor) positive aspects, and that difference was evidenced by the Crosstab Pearson Chi-Square test [$X^2(12)=29.97$, $p < 0.005$]. The Games-Howell post hoc test evidenced the difference ($p < 0.05$) between Humanities/social sciences students who perceived a more significant negative impact on their mental health than Health and Engineering/Exact Sciences students (for the Mental Health Impact into the areas, see Figure 3).

	Course	Total Frequency (%)	Area Frequency (%)
Agriculture and Biological Sciences (n=50)	Agriculture	3.3	30.0
	Biology	6.6	60.0
	Food Engineering	1.1	10.0
Engineering and Exact Sciences (n=125)	Chemical Engineering	5.5	20.0
	Chemistry	2.8	10.4
	Civil Engineering	3.7	13.6
	Electrical Engineering	1.3	4.8
	Environmental Engineering	2.6	9.6
	Mathematics	2.0	7.2
	Mechanical Engineering	4.4	16.0
	Physics	2.4	8.8
	Production ou Manufacturing Engineering	2.6	9.6
Health Sciences (n=172)	Biomedical Sciences	10.0	26.7
	Medicine	6.3	16.9
	Nursing	5.0	13.4
	Nutrition	4.4	11.6
	Physical Education	2.6	7.0
	Physical Therapy and Occupational Therapy	9.2	24.4
Humanities and Social sciences (n=111)	Geography	4.4	18.0
	History	3.7	15.3
	Languages	4.1	17.1
	Pedagogy (Full Teaching)	0.4	1.8
	Psychology	6.3	26.1
	Social Service	5.2	21.6

Figure 1: Course distribution into the areas: Agriculture and Biological Sciences, Engineering and Exact Sciences, Health Sciences, and Humanities and Social Sciences. The number of participants within each area (n) is indicated in parentheses. Total frequency (%) is the percentage of students in the course, considering the total number of participants in the survey. Area Frequency (%) represents the percentage of students in the course, considering the total within the area where the course was inserted.

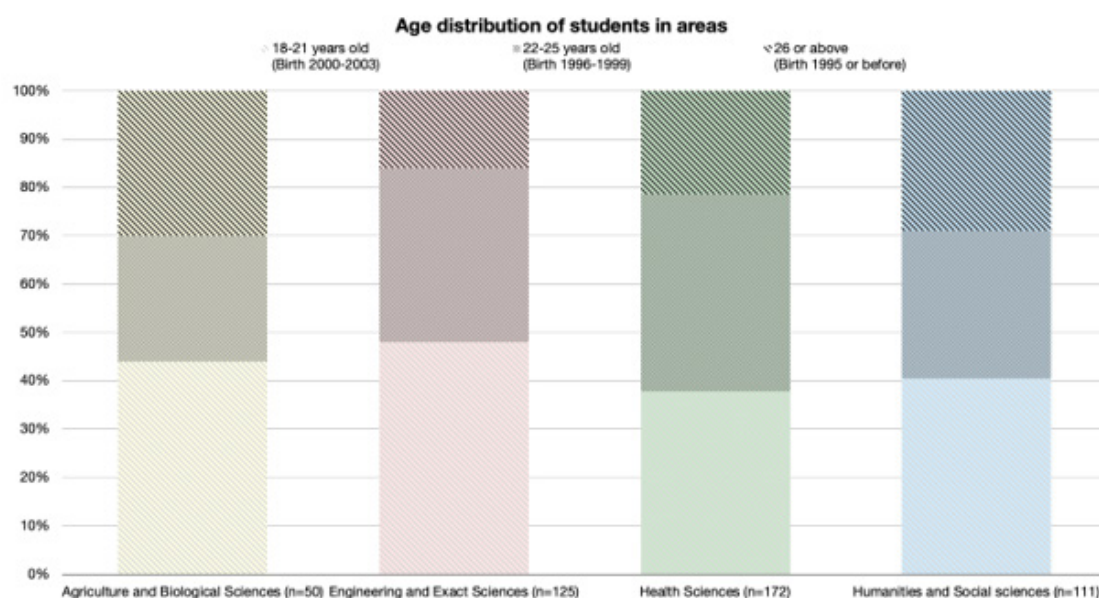


Figure 2: Age distribution of students in areas: Agriculture and Biological Sciences, Engineering and Exact Sciences, Health Sciences, and Humanities and Social Sciences. The number of participants within each area (n) is in parentheses. Students aged 18 to 21 are at the bottom of each area bar; those aged 22 to 25 are at the middle, and those aged 26 or above are at the top.

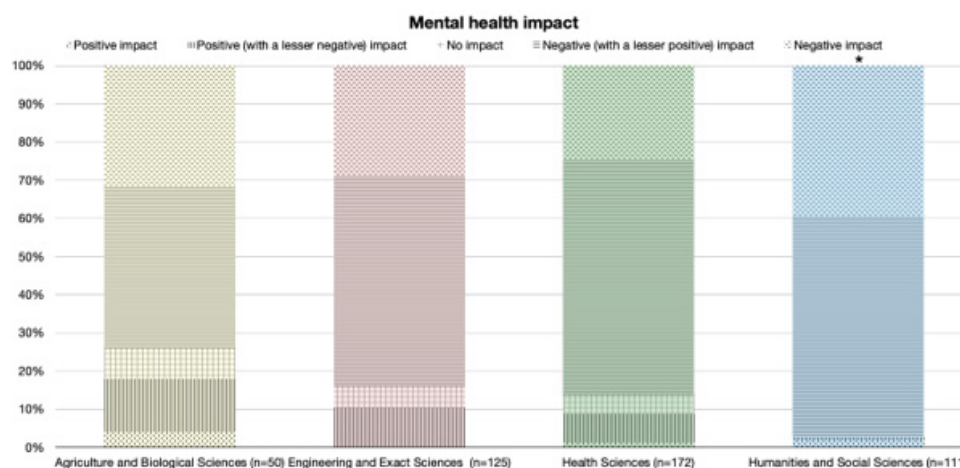


Figure 3: Mental health impact. The bars represent the frequency of answers in the four areas: Agriculture and Biological Sciences, Engineering and Exact Sciences, Health Sciences, and Humanities and Social Sciences. The number of participants within each area (n) is in parentheses. The pandemic impact on their mental health was considered: Positive impact (at the bottom of each area bar), Positive with a lesser negative impact (over the positive), No impact (at the Middle – absent in Humanities and Social Sciences), Negative with a lesser positive impact (the most prominent area into each bar), and Negative impact (at the top of the bars). * $p < 0.05$: Humanities/social sciences differ from Health and Engineering/Exact Sciences; Kruskal-Wallis test followed by Games-Howell post hoc.

When discussing non-pharmacological therapies and activities that can improve or maintain mental health, some answers to the question “Do you use any non-pharmacological therapy or perform any techniques or activities to try to improve (or maintain) your mental health?” appear to be influenced by the specific area of study, like the practice of physical activities or sports, reading literature or non-academic books, and watching relaxing movies or series.

The practice of sports and physical activities encompasses a variety of pursuits, including dancing, cycling, gym workouts,

walking, running, and other forms of exercise. The Levene test for homogeneity of variances indicated that the assumption of homogeneity was rejected ($p < 0.05$) across the four-course areas. Notably, Health Sciences students were more likely to practice physical activities. Analysis using the Kruskal-Wallis test [$X^2(3) = 13.16$, $p < 0.005$] revealed significant differences among the areas. The Games-Howell post hoc test identified statistically significant differences ($p < 0.05$), showing that sports or physical activities were more practiced in Health Sciences than in Agriculture/Biological Sciences and Humanities/Social Sciences. Figure 4 provides a better view of Physical Activity/Sports in different areas (Figure 4).

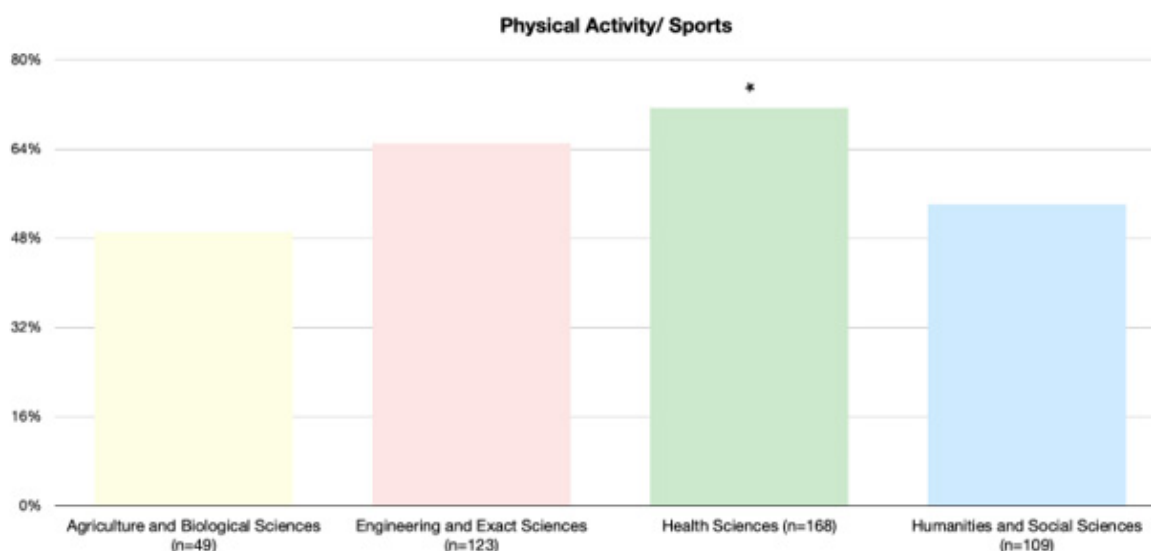


Figure 4: Physical Activity and Sports Practice. The bars represent the frequency of students that practiced physical activity or sports to reduce the impact on mental health in the four areas: Agriculture and Biological Sciences, Engineering and Exact Sciences, Health Sciences, and Humanities and Social Sciences. The number of participants within each area (n) is in parentheses. * $p < 0.05$: Health Sciences differ from Agriculture/Biological and Humanities/social sciences; Kruskal-Wallis test followed by Games-Howell post hoc.

The analysis of data concerning the reading of literature and non-scientific books revealed a lack of homogeneity in variances (Levene, $p < 0.05$). The reading was a more sought-after alternative by Health and Humanities/Social Sciences students. Differences among the various areas were assessed using the Kruskal-Wallis test, which showed significant results [$X^2(3) = 26.69$, $p < 0.001$].

The Games-Howell post hoc test indicated that reading in the Health and Humanities/Social Sciences areas differed significantly from that in the Engineering/Exact Sciences and Agriculture/Biological Sciences areas ($p < 0.05$). For a more precise visualization of the differences in reading across the four areas, please refer to Figure 5.

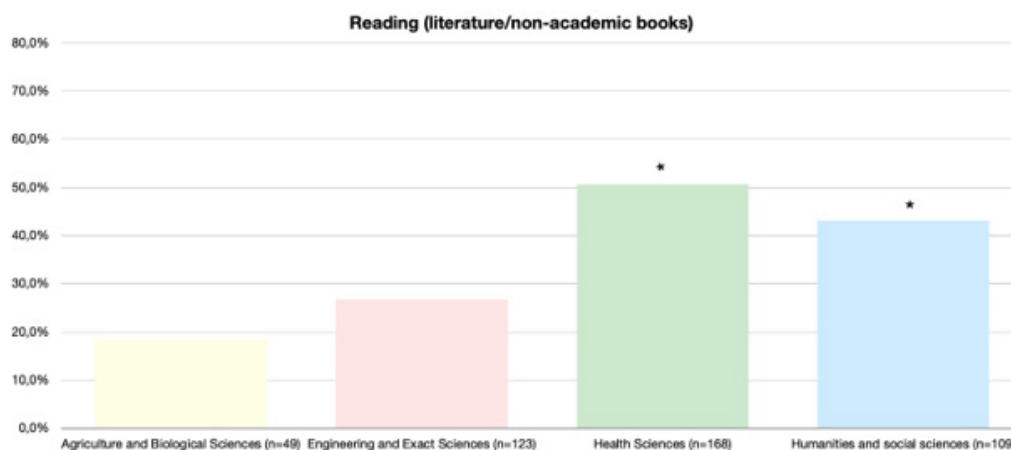


Figure 5: Reading of literature or other non-academic books. The bars represent the frequency of students that read to reduce the impact on mental health in the four areas: Agriculture and Biological Sciences, Engineering and Exact Sciences, Health Sciences, and Humanities and Social Sciences. The number of participants within each area (n) is in parentheses. * $p < 0.05$: Health and Humanities/Social Sciences areas differed from Engineering/Exact Sciences and Agriculture/Biological Sciences areas; Kruskal-Wallis test followed by Games-Howell post hoc.

Another practice used to minimize the impact on mental health, which varies by area, was watching relaxing films or series (Levene [$p < 0.005$]; Kruskal-Wallis test [$X^2(3) = 16.55$, $p < 0.005$]). Research indicates that students in Health and Humanities/Social Sciences report higher levels of engagement in this practice. The

Games-Howell post hoc test showed a significant difference between these groups and those in Agriculture/Biological Sciences ($p < 0.05$). Results of watching Relaxing Movies/Series in the areas are shown in Figure 6.

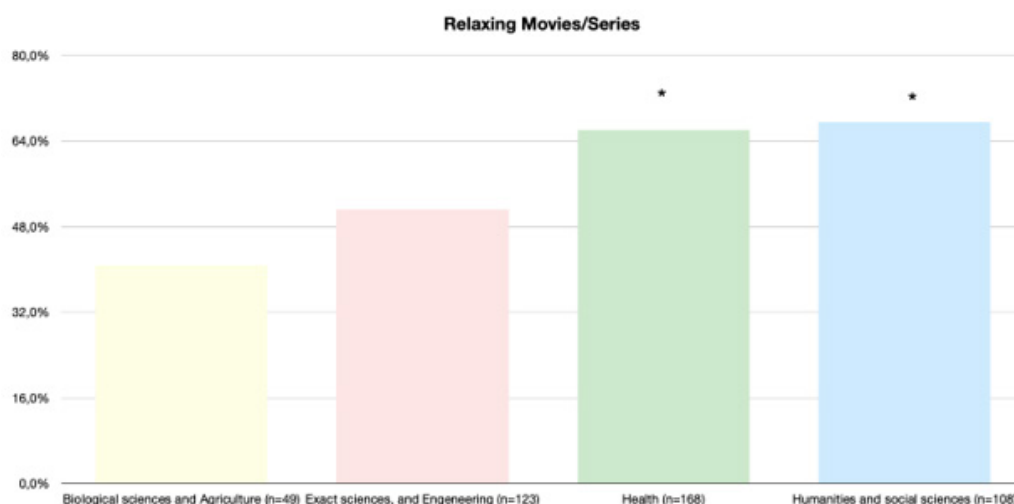


Figure 6: Relaxing Movies/Series. The bars represent the frequency of students that watched relaxing films or series to reduce the impact on mental health in the four areas: Agriculture and Biological Sciences, Engineering and Exact Sciences, Health Sciences, and Humanities and Social Sciences. The number of participants within each area (n) is in parentheses. * $p < 0.05$: Health and Humanities/Social Sciences areas differed from Agriculture/Biological Sciences areas; Kruskal-Wallis test followed by Games-Howell post hoc.

Overall, the findings indicated that students enrolled in Health courses were more likely to seek alternatives to reduce their mental health impact or to maintain their mental well-being [$X^2(3) = 9.47$, $p < 0.05$]. For a clearer understanding of the efforts to improve mental health, refer to Figure 7. However, the use of ethyl alcohol var-

ied between different fields of study [$X^2(3) = 11.38$, $p < 0.05$], with students in Health Sciences reporting a higher usage compared to those in Agriculture and Biological Sciences (see Figure 8 - Kruskal Wallis followed by Games-Howell post-hoc test) (Figure 7 & 8).

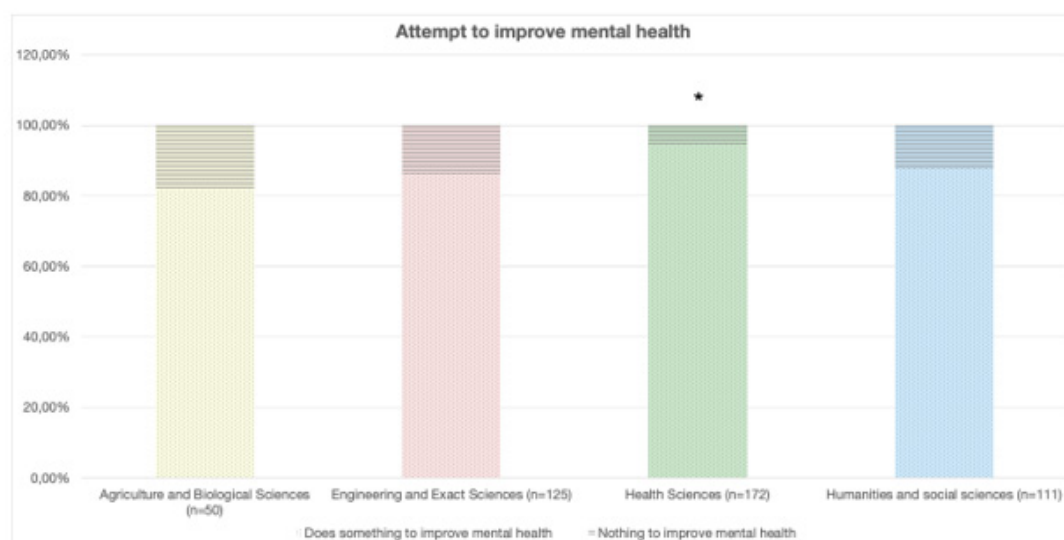


Figure 7: Attempt to improve mental health. The bars represent the frequency of students that attempted (bottom of each bar) or not (top of the bar) to improve mental health in the four areas: Agriculture and Biological Sciences, Engineering and Exact Sciences, Health Sciences, and Humanities and Social Sciences. The number of participants within each area (n) is in parentheses. * $p < 0.05$: Health differed from the areas; Chi-square test.

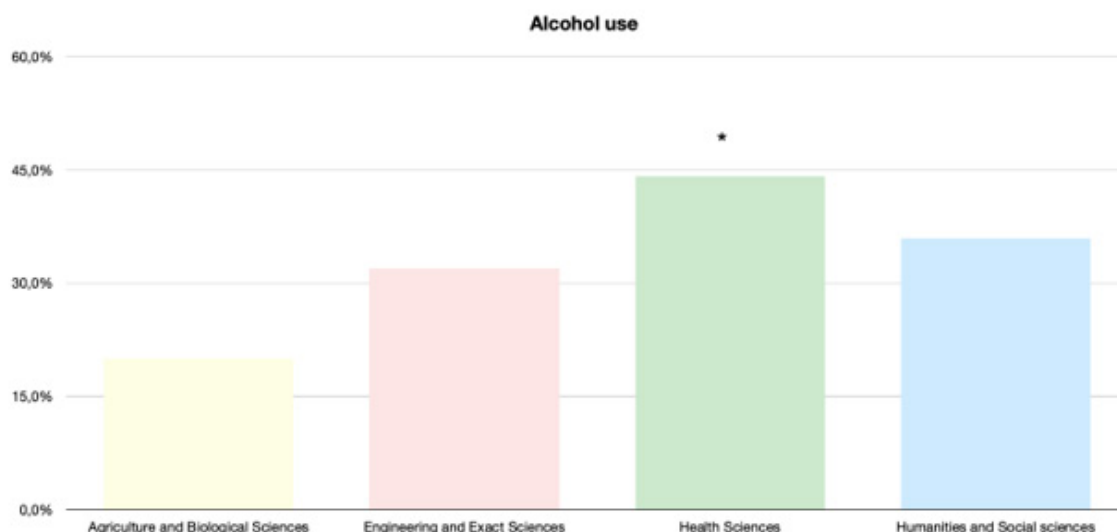


Figure 8: Alcohol use. The bars represent the frequency of students that reported alcohol use in the four areas: Agriculture and Biological Sciences, Engineering and Exact Sciences, Health Sciences, and Humanities and Social Sciences. The number of participants within each area (n) is in parentheses. * $p < 0.05$: Health Sciences differed from Agriculture/Biological Sciences; Kruskal-Wallis test followed by Games-Howell post hoc.

Discussion

The university environment itself can be stressful for many students. The high demands make many feel under constant pressure, often simultaneously in early adulthood [16]. Although the university environment can increase stress, it also can provide a support network, which, in turn, can represent a possible protection for mental health [17]. Students can enhance their coping strategies by participating in extracurricular or other activities [18]. Some studies show tools used by health students to deal with stressful events related to their university period, such as emotional coping strategies through seeking emotional support in final-year medical students [19], or even strategies used by nursing students, such as developing goals for problem-solving [14] or others [20]. Once earlier is the life phase of starting to build up coping skills and protective behavior, like starting elementary school onwards, even greater students seem to achieve mental, social, and academic success [21].

Mental health concerns typically intensify in times of social crisis, such as that generated by the COVID-19 pandemic, which has become one significant public health problem the world has faced in recent decades [22]. During the pandemic, the fear intensified stress and anxiety in healthy people and increased symptoms of pre-existing mental disorders [23]. Along with the stress stemming from the fear of contracting the virus, several factors have altered daily life [24]. In 2020, many countries implemented quarantine measures to control the spread of the pandemic, which resulted in shifts to work and study environments as activities began to take place at home [25,26]. While this change offered excellent safety in reducing the risk of contagion, it also diminished social interactions. Additionally, combining various tasks—such as domestic duties, family responsibilities, and work activities—within a single space often and simultaneously contributed to increased stress levels [27].

Several studies have explored the impact of the pandemic on university students [28]; however, many of these studies have primarily focused on undergraduate students or professionals in health-related courses. Thus, to analyze the impact of the pandemic as a stressful situation that impacted the mental health of university students, this study was carried out with students from the most diverse courses at the university, bringing together 24 courses distributed across four areas of knowledge.

The perceived mental impact was generally negative, but Humanities/social sciences students felt it even more negatively than Health and Engineering/Exact Sciences students. The perception of stress may vary between areas, as may the predictors of perceived stress. Saha et al. [29] highlighted that the main predictor in behavioral science students was the need for perfect performance, while for engineering students, it was emotional stability. A study conducted in the United States among undergraduate students from different areas of knowledge found that engineering students presented less anxiety and use of medication, while behavioral sciences, social sciences, social work, and arts and humanities students presented a higher prevalence of mental health problems, possibly due to more excellent knowledge, awareness, and search for help in

these areas [30].

The literature reported the pandemic as a genuinely stressful event, and many studies highlighted the critical impacts of the period on the mental health of different subjects, such as students at different levels of education, teachers, and health professionals, among others. The reaction to a stressful event, or the interpretation of what is considered stressful, varies between people [31]. Few studies show differences in the perception of stress among students in the exact or engineering fields, but some indicate that students in health courses may be more resilient to stressful events, which could explain a lower self-perception of the negative impact on mental health in this population [30].

Besides, during the quarantine, remote classes represented a significant challenge, as they generated insecurity regarding students' learning and their access to the Internet [32]. Some studies have pointed out differences between the different areas, like engineering teachers being best prepared for the online situation [33].

Many studies have shown an increase in moderate to severe levels of depression and anxiety, evidencing a significant increase compared to the pre-pandemic period [34].

The well-being history and the experience of adversity can influence the mental well-being state [35]. On the other hand, an effective reduction in the negative impact of a stressful situation may arise from students' ability to combine different coping strategies [36]. Literature books and relaxing movies/series are relaxation activities [37] that were more sought-after alternatives by health and humanities/social sciences students in the present study. Although sometimes reading seems to be less effective than other relaxing practices for emotional distress [38], the reading of non-academic books is an important alternative used to cope with stress in a large number of studies, including the reading of magazines [39], religious books such as the Bible [40].

While most students reported a negative impact or negative aspects, some of them perceived only positive impacts of the pandemic on their mental health. Indeed, this has been seen in previous studies and could perhaps be explained by the fact that students were using the time to explore new hobbies and interests, as well as to meet up with family when possible, especially when the campus was far from their hometown or even having a feeling of having additional time to devote to study [41,42].

A large number of students usually practice exercising or physical activities to take care of their mental health [43]. The presented data showed that students in the health sciences were more likely to practice physical activities. A study of 6000 Chinese college students identified a relationship between sports practice and physical and mental health [44].

Although humanities/social sciences students perceived a more significant negative impact on their mental health, health sciences students were the most likely to seek alternatives to reduce the negative impact. Some authors reported the predominance of active coping in health students, with less use of avoidance strategies [45,46].

The search for relief from psychological stress prior to consumption is identified as one of the main factors that contribute to the use of these substances [47]. College students (and people in general) tend to increase their use of illicit drugs and tobacco when experiencing feelings of depression, fatigue, stress, anxiety, guilt, or low self-esteem [48,49]. On the other hand, the significant use of alcohol in health field students was present without any relation to the perception of stress [50].

There was a high consumption of alcohol among all area students, but it was more frequent among health sciences students, who were the ones who most sought alternatives to minimize damage to mental health. Indeed, a study made in Japan, including more than 17,000 subjects, has found a relationship between the fear of COVID-19 and drug use [51].

Concerns about minimizing the impact on mental health were primarily noted among students of health area courses, which may be linked to the emphasis on health, including mental well-being, that these students receive during their courses. The findings highlight the importance of addressing mental health in health courses and other fields of study, as university life can be particularly stressful for many students.

These results demonstrated that the graduation course or the knowledge field seems to influence the self-perception of the impact of a stressful event on mental health and the alternatives to minimize it.

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Conflict of Interest

No Conflict of interest.

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