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# Depression symptoms, anxiety, stress and related factors in medical students

# Síntomas depresivos, ansiedad, estrés y factores asociados en estudiantes de medicina

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**Abstract**

**Introduction:** Mental health is a serious public health problem, a high prevalence of depressive symptoms, anxiety and stress is reported in medical students. Objective: To identify the frequency and determinants of mental health problems of medical students at a university in 2018.

**Methods:** Cross-sectional study with 813 medical students at a university in Cali-Colombia

**Results:** The prevalence of depression was 31.7%, anxiety (59.9%), and stress (37.3%). 64.4% were women, the average age was 21.9 ± 3.6 years. The variables that explain independently of presenting mental illness were: male sex OR: 0.48 (95% CI: 0.36-0.65), number of hours of weekly class OR: 1.01 (95% CI: 1.0-1.02) for anxiety, career satisfaction OR: 0.61 (95% CI: 0.39-0.97). As a protective factor for depression, sports hours in week to variables depression OR: 0.95 (95% CI: 0.91-0.99), anxiety OR: 0.95 (95% CI: 0.92-0.98), and, stress OR: 0.91 (95% CI: 0.88-0.95).

**Conclusions:** The study found high prevalence of mental illness in medical students that can be explained by sex, number of hours of weekly class, satisfaction with the race and weekly sports hours. Key words: depression, anxiety, stress, sociodemographic variables.

**Resumen**

**Introducción:** La salud mental se constituye un grave problema de salud pública, se reporta una alta prevalencia de síntomas depresivos, ansiedad y estrés en estudiantes de medicina.

**Objetivo:** Identificar la frecuencia y determinantes de problemas de salud mental de estudiantes de medicina en una universidad en 2018.

**Métodos:** Estudio corte transversal con 813 estudiantes de medicina en una universidad de Cali-Colombia

**Resultados:** La prevalencia de depresión fue 31.7%, ansiedad (59.9%), y estrés (37.3%). El 64.4% fueron mujeres, la edad promedio fue 21.9 ±3.6 años. Las variables que explican de manera independiente de presentar enfermedad mental fueron: sexo masculino OR: 0.48 (IC 95%: 0.36-0.65), número de horas de clase semanal OR: de 1.01 (IC 95%: 1.0-1.02), para ansiedad, la satisfacción con la carrera OR: 0.61 (IC 95%: 0.39-0.97). Como factor protector de depresión, las horas deportivas en la semana se consideran un factor protector para las variables depresión OR 0.95 (IC 95%: 0.91-0.99), ansiedad OR 0.95 (IC 95%: 0.92-0.98), y estrés: OR 0.91 (IC 95%: 0.88-0.95).

**Conclusiones:** El estudio mostró alta prevalencia de enfermedad mental en estudiantes de medicina que puede explicarse por sexo, número de horas de clase semanal, satisfacción con la carrera y horas deportivas semanales.

## Key study facts

| | |
|---|---|
| **Objective** | To identify the frequency and determinants of mental health problems in medical students at a University in 2018 |
| **Study design** | Cross-sectional study |
| **Source of information** | Virtual surveys - DASS 21 questionnaire. 813 medical students at a University in Cali-Colombia |
| **Population/sample** | 813 medical student on university Cali-Colombia |
| **Statistical analysis** | A descriptive analysis was performed using a frequency table and measures of central tendency and dispersion (mean ± standard deviation) for qualitative and quantitative variables, respectively. Associations were calculated using univariate and multivariate logistic regression models to calculate the adjusted odds ratio, with a significance level of p<0.20 required for inclusion in the multivariate model |
| **Main findings** | A high prevalence of mental illness in medical students that can be explained by sex, number of weekly class hours, career satisfaction and the number of hours per week of engagement in sports. |

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## Introduction

Among the many mental health disorders, a topic that has caused great commotion in the health faculties of the University sector is depression. Depression is defined as, "a frequent mental disorder, characterized by the presence of sadness, loss of interest or pleasure, feelings of guilt or lack of self-esteem, sleep or appetite disorders, feeling tired and lack of concentration" (1). In medical students, in comparison to the general population, a high prevalence of anxiety and stress has also been reported, associated with depression (2,3).

A meta-analysis that included 129,000 medical students from around the world reported a prevalence of depression of 27%, compared to 9% in the general population and also found that 11% of medical students had suicidal thoughts (3,4). The research found that only 16% consulted their doctor for this. It was found that the most important factors associated with depression and suicidal thoughts were stress and anxiety (3,4). There have been a limited number of mental health studies with medical students in Colombia but those that have been published have reported similar figures, finding a prevalence of depression of 47%, establishing significant associations with stress, anxiety and academic load (5,6).

University medical students can generally be affected by factors such as academic demands, difficulties in learning development, schedule intensity, group pressures, competitiveness among classmates, quality of sleep and consumption of addictive substances, among others, which can alter, into the long term, the health of students. In most cases, several of the above-mentioned factors can present a risk for the presentation of mental disorders including depression and others (7).

In the process of identifying symptoms of depression, stress, anxiety and associated factors, the health professional can use self-applied questionnaires which have been validated. In the clinical sector, these tools are interpreted according to various standardized scales which can identify whether the individual requires some type of intervention, either with a psychologist or with a psychiatrist. These scales do not claim to offer a definite diagnosis, since the scales do not evaluate the clinical criteria but rather prioritize characteristic aspects. To confirm the diagnosis of a mental disorder, therefore, a personalized clinical evaluation is required (8).

In the medicine program of the Universidad Libre Cali, approximately nine hundred students are enrolled, for whom there is no previous record or information about their mental health. The objective of this study was to determine the prevalence of depressive symptoms and associated factors in medical students enrolled at this University. The identification of these factors will be useful for the implementation of effective interventions aimed at prevention, early identification and management of these conditions. Given the importance of these pathologies in the Colombian population, their characterization and improvement are part of 1 of the 8 dimensions contemplated in the ten-year public health plan 2012-2021 (9).

## Methods

A descriptive cross-sectional study was carried out on all (850) students who were enrolled in the medicine programme, from the first semester to the last year of internship. For this reason, the exact sample size was not calculated (Figure 1). The data collection was carried out over a period of three months (May to July 2018). This research was approved as a piece of risk-free research by the Ethics Committee of the Universidad Libre.

To determine the prevalence of mental disorders (depression, anxiety, stress and associated factors), two questionnaires were used. The questionnaires, and the delivery of the questionnaires, were developed in the systems department of the Universidad Libre Cali. A virtual platform was used where each student used a link to enter, to answer the survey and to return their completed answers. The participants were previously informed of the objectives of the study and those who agreed to participate in the research voluntarily signed the informed consent and filled out the questionnaires. The interviewers were members of the research team who were present throughout the time it took to fill out the survey. They were available to answer any questions from the participants. Students who did not agree to participate or who did not complete the main variables were excluded. The questionnaires were identified with a unique 6-digit number (anonymous). The surveys used were:

1. A sociodemographic questionnaire which included questions aimed at gathering general data including date of birth (to calculate age), sex, semester, program, city of residence and University, amongst other questions. No variables were collected that identified the identity of the participant.

2. The DASS 21 questionnaire assesses depression, anxiety and stress. This short scale (21 items), which is validated in Spanish (10), simultaneously measures the three emotional states, is easy to apply in clinical and non-clinical populations, and is useful for different age groups, including University students who are studying health-related subjects (11). The total score obtained allows a classification of the results of the variables - depression, anxiety and stress – according to various levels - normal, mild, moderate, severe and extremely severe (12).

The questionnaire about the sociodemographic variables was prepared by the main researchers according to the study population, in which characteristic variables of the population were taken into account including sex, age, semester of study and other sociodemographic factors reported in other studies including the number of hours of leisure participated in during a typical week, the hourly intensity of classes, the hours of sports the student does, amongst other variables (13). This questionnaire was evaluated in a pilot study with approximately 50 students. For the DASS21 questionnaire, its respective cut-off points had already been used in previous studies to measure the severity of symptoms of depression, anxiety, and stress. This was therefore used as the screening instrument of choice for this study due to its easy application, validity and reliability (14).

The reliability of the DASS21 scale for depression, anxiety and

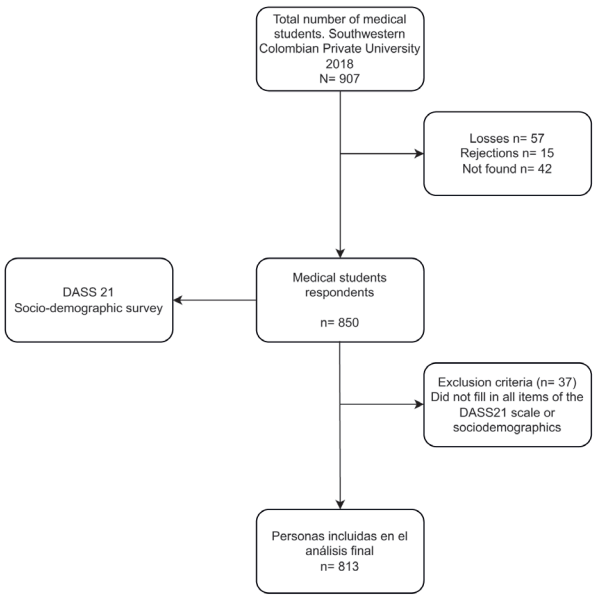


**Figure 1.** The selection of medical students from a private University in southwestern Colombia, 2018

stress in the University population was reported with a correlation of r= 0.70 in a sample of 8,983 University subjects (). Validity was significantly correlated with the BAI (r= 0.71), the BDI (r= 0.70) and the total severity index of the SCL–90–R (r= 0.70). A lower measure was also found to correlate with the SCL-90-R anxiety scale (r= 0.68) and with the other scales. In other words, the DASS21 is a reliable instrument, with acceptable performance in the University population that does not consult for mental disorders, with adequate construct, convergent and discriminant validity, as well as solid internal consistency (15).

**Plan for statistical analysis**

A descriptive analysis was performed using a frequency table and measures of central tendency and dispersion (mean ± standard deviation) for the qualitative and quantitative variables, respectively. Associations were calculated using univariate and multivariate logistic regression models to calculate the adjusted odds ratio. p <0.20 was considered as an appropriate level of statistical significance for inclusion in the multivariate model. Confidence intervals were placed at 95%. A p-value of <0.05 was considered statistically significant. All analyzes were performed in Stata13® (StataCorp, College Station).

## Results

Of a total of 907 students in the medicine program, 850 students who agreed to participate in the study were surveyed. Of these, 4.3% (n = 37) were eliminated due to problems with the completion of the questionnaires which meant that, in total, 813 surveys were analyzed (Figure 1).

A total prevalence of depression (31.7%), anxiety (59.9%) and stress (37.3%) were found in the sample population. Table 1 describes the classification of the variables under study according to their degree of severity. 64.4% (n= 491) were women and the average age was 21.9 ±3.6 years. In the case of men, depression, anxiety and stress were less prevalent, being significant only for stress and the occurrence of having a mental illness decreases by 52% compared to women (Tables 2 and 4). Depression, anxiety and stress were found to decrease with age; significance was only found for anxiety where its occurrence decreases by 7.0%. Variables such as the number of semesters completed, the hours of leisure and the hours of art in the week do not influence the occurrence of depression, anxiety and stress (p <0.05) (Tables 3 and 4). The relationship with the hours of class in the week is not clear, however, because there seemed to be an increase in the prevalence of anxiety with a greater number of hours of study each week, although this increase is very low (1%) (Table 4).

It was found that the number of subjects enrolled increases the chance of presenting depression (OR 1.06), anxiety (OR 1.06) and

**Table 1.** Prevalence of depression, anxiety and stress in the total population

| | Normal | Mild | Moderate | Severe | Very severe | Anormal |
|---|---|---|---|---|---|---|
| Depression | 68.0 | 12.0 | 11.8 | 3.5 | 4.0 | 31.0 |
| Anxiety | 40.0 | 11.0 | 23.0 | 10.6 | 14.8 | 60.0 |
| Stress | 63.0 | 14.0 | 11.0 | 8.8 | 2.5% | 37.0 |

**Table 2.** Prevalence of depression, anxiety and stress by sex

| Sex | Depression | Anxiety | Stress |
|---|---|---|---|
| Female | 32.9 | 62.5 | 43.7 |
| Male | 29.8 | 55.9 | 27.3 |

stress (OR 1.80) with the latter two being significant (Table 4).

A relationship was also found between an increase in the hours spent per week doing sport and a decrease in the prevalence of depression and anxiety (by 5%) and for the prevalence of stress (9%). Regarding academic performance, this was found to have a significant influence on reducing depression and stress, although not for anxiety, and only in students who consider their performance to be average; the prevalence of depression decreases by 78%. For students who rate their academic performance as good, depression, anxiety and stress was 91% less compared to those that rated their academic performance as low. For stress, the decrease was 68% and 83% compared to regular and good performance, respectively, when compared to students who rated their performance as poor (Table 4).

The degree of satisfaction with the academic program they are studying increases the prevalence of depression (OR 2.71), anxiety (OR 3.07) and stress (OR 2.67) for students who are neither satisfied nor dissatisfied (indifferent students) compared with dissatisfied students. For students who are satisfied, however, the prevalence of depression, anxiety and stress decreases by 39%, 4% and 15% respectively, compared to those students who are not satisfied. This decrease was, however, only significant for depression (Table 4).

When adjusted in a multivariate logistic regression model (one for each scale), statistically significant differences were found in the number of hours spent practicing sports, academic performance and satisfaction with their chosen academic career. In the case of the depression variable, there was a 41% decrease in its prevalence ($p < 0.05$) in students who were satisfied with their chosen academic career. In the case of the anxiety variable, a 6% decrease was documented in its prevalence ($p < 0.05$) in older students. Finally, in the case of the stress variable, there was a 6% decrease in prevalence in the case of students who participated in sports activities and 71% decrease in those who had a subjective perception of good academic performance (Table 5).

## Discussion

This study, which was carried out in the population of students from the first semester of study to the second semester of internship at a private University in Cali during the end of the first period (January-June) of 2018, sought to determine the prevalence of depression, anxiety and stress and to determine their association with sociodemographic variables. The prevalence of depression, anxiety and stress were calculated by using the DASS21 scales and a questionnaire to collect sociodemographic data from the subjects who participated.

A total prevalence of depression (31.7%), anxiety (59.9%), and stress (37.3%) was found which was high compared to the prevalence of these conditions in the general population. These findings agree with the findings of other studies that also evaluated these variables in medical students and which documented values between 27% and 45% (2,4,6). This compares to the prevalence of depresion previously described for the general population (non-medical students) which has been reported as between 6.0% and 9.3% (1,4), which is obviously a lower value compared to that of the study population.

**Tabla 3.** Prevalence of depression, anxiety and stress by semester attended

| Semester | Depression | Anxiety | Stress |
|---|---|---|---|
| First | 27.4 | 57.7 | 31.0 |
| Second | 35.7 | 61.9 | 46.4 |
| Third | 26.3 | 61.4 | 36.8 |
| Fourth | 36.9 | 72.6 | 45.2 |
| Fifth | 37.5 | 64.3 | 42.9 |
| Sixth | 25.0 | 63.6 | 40.9 |
| Seventh | 24.1 | 65.5 | 36.2 |
| Eighth | 30.4 | 59.4 | 33.3 |
| Nineth | 39.0 | 54.7 | 35.9 |
| Tenth | 35.6 | 52.1 | 34.2 |
| Internship I | 26.8 | 53.7 | 31.7 |
| Internship II | 34.6 | 51.9 | 36.5 |
| Total | 31.7 | 59.9 | 37.3 |

Regarding the results of this study, female gender increased the likelihood that the student would have depression, anxiety or stress, although statistical significance was only documented with the stress variable. This result coincides with that reported in previous studies carried out in medical student population in Brazil and Peru, which found a prevalence of stress in female medical students of 58% (2,16). This finding was not present in all the studies reviewed: a study carried out in the city of Medellin in 2011 found no gender-based difference, for example(14).

On the other hand, the number of class hours per week led to an increase in the prevalence of anxiety ($p < 0.05$). This variable has, however, not been evaluated in a similar way in other previous studies which would allow a comparison. Another variable not evaluated in previous studies is the level of satisfaction of the student with their chosen academic career. In the population of students who stated that they were satisfied with their chosen academic career, there was a significant decrease in the prevalence of depression, a result which was not evidenced for either anxiety or stress. This was not the case for the students who were neither satisfied nor dissatisfied with their chosen academic career (who are indifferent): for these students, there was an increase in the prevalence of depression, anxiety and stress ($p < 0.05$).

Analysing the variable "number of hours of sports per week", the prevalence of depression, anxiety and stress was significantly reduced in the population who participated in sports. This result does not coincide with that reported in a previous study carried

**Table 4.** Factors associated with the presence of symptoms of depression, anxiety and stress of medical students, Cali, Colombia

| Factors evaluated | Depression | | | Anxiety | | | Stress | | |
|---|---|---|---|---|---|---|---|---|---|
| | OR | IC | p | OR | IC | p | OR | IC | p |
| Sex | 0.86 | 0.64-1.17 | 0.34 | 0.76 | 0.57-1.01 | 0.06 | 0.48 | 0.36-0.65 | <0.001 |
| Age | 0.98 | 0.94-1.02 | 0.36 | 0.93 | 0.90-0.97 | 0.01 | 0.97 | 0.93-1.01 | 0.13 |
| Semester (reference basic courses) | | | | | | | | | |
| Clinics | 1.06 | 0.76-1.46 | 0.74 | 0.81 | 0.59-1.10 | 0.17 | 0.83 | 0.61-1.13 | 0.24 |
| Internship | 0.99 | 0.61-1.61 | 0.97 | 0.66 | 0.42-1.04 | 0.07 | 0.81 | 0.51-1.29 | 0.38 |
| Class hours per week | 0.99 | 0.99-1.01 | 0.77 | 1.01 | 1.00-1.02 | 0.02 | 1.00 | 0.99-1.01 | 0.6 |
| Leisure hours during the week | 0.99 | 0.98-1.02 | 0.88 | 0.99 | 0.97-1.01 | 0.17 | 0.98 | 0.96-1.00 | 0.06 |
| Sports hours per week | 0.95 | 0.91-0.99 | 0.00 | 0.95 | 0.92-0.98 | 0.01 | 0.91 | 0.88-0.95 | <0.001 |
| Art hours during the week | 0.98 | 0.89-1.09 | 0.77 | 1.01 | 0.91-1.10 | 0.98 | 0.93 | 0.84-1.03 | 0.15 |
| Number of courses enrolled | 1.06 | 0.99-1.13 | 0.08 | 1.06 | 1.01-1.13 | 0.03 | 1.08 | 1.02-1.15 | 0.01 |
| Academic performance (reference bad) | | | | | | | | | |
| Regular | 0.22 | 0.08-0.40 | 0.01 | 0.92 | 0.35-2.44 | 0.87 | 0.32 | 0.12-0.84 | 0.02 |
| Good | 0.09 | 0.03-0.25 | <0.001 | 0.43 | 0.17-1.14 | 0.09 | 0.17 | 0.06-0.44 | <0.001 |
| Satisfaction | | | | | | | | | |
| Neither unsatisfied nor satisfied | 2.71 | 1.52-4.86 | 0.001 | 3.07 | 1.61-5.88 | 0.001 | 2.67 | 1.48-4.81 | 0.001 |
| Satisfied | 0.61 | 0.39-0.97 | 0.04 | 0.96 | 0.62-1.49 | 0.85 | 1.13 | 0.71-1.80 | 0.61 |
| rotation hours | 0.99 | 0.99-1.00 | 0.27 | 0.99 | 0.98-1.00 | 0.06 | 0.99 | 0.98-1.00 | 0.06 |

out in the city of Medellin, where the prevalence of moderate stress in students who played sports was similar to that of those who did not (14). This finding, although it does not clarify the type of sport engaged in, is important because it supports the idea of creating University wellness programs that emphasize sporting activities in populations vulnerable to depression, anxiety and stress. Leisure hours did not contribute to any decrease in the prevalence of any of the dependent variables analyzed.

It is worth mentioning that, in this study, there was no evidence of an association of mental illness with any statistically significant difference in terms of the semester of study. In other studies, this variable has been shown to be related to a greater chance of presenting depression and anxiety in the first and last semesters (2,14). A study conducted on medical students from a private institution in the city of Medellin documented a prevalence of stress of 24% in first-year students (14). The highest prevalence of mental illness in this population was associated with the process of initial adaptation to the medicine program, the high academic load and the presence of multiple extracurricular activities in the case of first-year students. The highest prevalence of stress in final year students is attributed to the stress generated by the transition from student to medical graduate with its associated increases in responsibility.

The risk factors that have been attributed to the presence of these mental health pathologies vary according to different studies but include: the limitation of medicine to cure human suffering; the clinical responsibility towards the patient; the academic load that the profession of medicine requires; the day and night shift hours; the little time for extracurricular activities; and the costs of this course of study, among others (3,7).

The results obtained in this study reinforce the idea of creating psychosocial intervention strategies aimed at this specific population. The creation of extracurricular programs with sports, leisure and artistic activities could help alleviate the negative emotional burden associated with this chosen course of study. Future studies with follow-up of cohorts exposed and not exposed to this type of protective intervention could be carried out in order to analyse their effects on reducing the high prevalence of these mental health issues in this population.

**Strengths**

One strength of the study was the size of the population, since the total sample of medical students from the evaluated university was included in the study, only excluding those who did not decide to participate or who did not fully complete the questionnaires. Since the data collection was carried out prospectively, the accuracy of the information is guaranteed, avoiding the presence of bias. Additionally, it is important to note that the main researchers (Doctors) were present throughout the process of filling out the surveys.

**Weaknesses**

One of the limitations when comparing the results of this study with previous studies is the type of questionnaire used to assess the diagnosis of anxiety, stress and depression. In other studies, the validated questionnaires that were used for the diagnosis of

**Table 5.** Evaluation of factors associated with the presence of symptoms of depression, anxiety and stress of medical students, Universidad privada Cali, 2018. Multivariate analysis

| | Depresión | | | | | | Ansiedad | | | | | | Estrés | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | OR | | p | ORa | | p | OR | | p | ORa | | p | OR | | p | ORa | | p |
| Sex | 0.86 | 0.64-1.17 | 0.34 | 0.86 | 0.60-1.23 | 0.43 | 0.76 | 0.57-1.01 | 0.06 | 0.82 | 0.58-1.14 | 0.24 | 0.48 | 0.36-0.65 | <0.001 | 0.48 | 0.34-0.68 | 0.00 |
| Age | 0.98 | 0.94-1.02 | 0.36 | 0.98 | 0.93-1.03 | 0.58 | 0.93 | 0.90-0.97 | 0.01 | 0.94 | 0.90-0.99 | 0.01 | 0.97 | 0.93-1.01 | 0.13 | 0.99 | 0.94-1.04 | 0.77 |
| Class hours per week | 0.99 | 0.99-1.01 | 0.77 | 0.99 | 0.99-1.00 | 0.78 | 1.01 | 1.00-1.02 | 0.02 | 1.00 | 1.00-1.01 | 0.04 | 1.00 | 0.99-1.01 | 0.60 | 1.00 | 0.99-1.01 | 0.28 |
| Sports hours per week | 0.95 | 0.91-0.99 | 0.00 | 0.96 | 0.92-1.01 | 0.14 | 0.95 | 0.92-0.98 | 0.01 | 0.96 | 0.92-1.00 | 0.09 | 0.91 | 0.88-0.95 | <0.001 | 0.94 | 0.90-0.98 | 0.01 |
| Number of courses enrolled | 1.06 | 0.99-1.13 | 0.08 | 1.04 | 0.96-1.12 | 0.26 | 1.06 | 1.01-1.13 | 0.03 | 1.01 | 0.94-1.08 | 0.68 | 1.08 | 1.02-1.15 | 0.01 | 1.05 | 0.97-1.12 | 0.18 |
| Academic performance (reference bad) | | | | | | | | | | | | | | | | | | |
| Regular | 0.22 | 0.08-0.40 | 0.01 | 0.27 | 0.08-0.87 | 0.02 | 0.92 | 0.35-2.44 | 0.87 | 1.56 | 0.53-4.50 | 0.41 | 0.32 | 0.12-0.84 | 0.02 | 0.49 | 0.17-1.44 | 0.20 |
| Good | 0.09 | 0.03-0.25 | 0.00 | 0.12 | 0.03-0.38 | 0.00 | 0.43 | 0.17-1.14 | 0.09 | 0.79 | 0.28-2.27 | 0.67 | 0.17 | 0.06-0.44 | <0.001 | 0.29 | 0.10-0.83 | 0.02 |
| Satisfaction | | | | | | | | | | | | | | | | | | |
| Neither unsatisfied nor satisfied | 2.71 | 1.52-4.86 | 0.00 | 2.20 | 1.18-4.21 | 0.01 | 3.07 | 1.61-5.88 | 0.00 | 2.37 | 1.18-4.78 | 0.01 | 2.67 | 1.48-4.81 | 0.001 | 2.36 | 1.24-4.48 | 0.00 |
| Satisfied | 0.61 | 0.39-0.97 | 0.04 | 0.59 | 0.36-0.98 | 0.04 | 0.96 | 0.62-1.49 | 0.85 | 0.71 | 0.44-1.15 | 0.17 | 1.13 | 0.71-1.80 | 0.61 | 1.03 | 0.62-1.71 | 0.89 |

these pathologies are mentioned in the methodology and only the study carried out in Peru used the DASS 21 scale (16). It is also not clear whether students had been diagnosed with depression, anxiety or stress before entering the University (for reasons other than the academic load) which means that the results are possible unreliable because they could include students who were already experiencing mental illness before entering the University. In future research, the use of questionnaires designed for each pathology would allow the collection of more complete information about the pre-existence or not of the pathology and its associated factors which would also allow a better classification of its severity. In the case of stress, for example, given its high prevalence documented in this study, using the academic stressors scale would optimize the analysis of the results.

Most of the cross-sectional studies were conducted at different times of the evaluated semester (beginning, middle and end). In our case, this evaluation was carried out at the end of the semester, during the period of final exams. This could have contributed to an increased prevalence of stress, anxiety, and depression in the population evaluated. Additionally, the variable "academic performance" was obtained via the subjective opinion of the evaluated student: it is suggested that future research could use the grades obtained in the current semester as a better method to classify said performance.

## Conclusions

The adjusted odds ratios found statistically significant differences in the number of hours dedicated to sports, academic performance and satisfaction with the academic career chosen. It was found that anxiety was most prevalent in this population followed by stress and depression. The highest levels of anxiety and depression occurred in the middle of the academic training, while the lowest levels were found in the final semesters. Stress was present in the first semesters, decreasing slightly in the last semesters. The prevalence for each mental illness are high overall with at least one out of every two students having anxiety, one out of every three experiencing stress and one out of every four having depression. Comparing the prevalence for each of the anxiety, depression and stress scales, there were differences between men and women with mental illness being higher in women.

## References


1. OMS. Temas de salud: depresión; 2018. Available from: http://www.who.int/topics/depression/es/

2. Damásio MIL, Pecci MNC, Kleinsorge RR, Granero LAL, Cerrato TSH, da Silva EO, et al. Depression, stress and anxiety in medical students : A cross-sectional comparison between students from different semesters. BMC Res Notes. 2017; 63(1): 21–8.

3. Liselotte ND, Matthew RT, Tait DS. Medical student distress: causes, consequences, and proposed solutions. Mayo Clin Proc. 2005; 80(12): 1613–22.

4. Rotenstein LS, Ramos MA, Torre M, Bradley Segal J, Peluso MJ, Guille C, et al. Prevalence of depression, depressive symptoms, and suicidal ideation among medical students a systematic review and meta-analysis. JAMA. 2016; 316(21): 2214–36.

5. Gutiérrez RJA, Montoya VLP, Toro IBE, Briñon ZMA, Rosas RE, Salazar QLE. Depresión en estudiantes universitarios y su asociación con el estrés académico. CES Medicina. 2010; 24(1): 7–17.

6. Bohórquez PA. Prevalencia de depresión y de ansiedad en estudiantes de medicina. Fac Med Pontif Univ Javeriana. 2010; 1:109–97.

7. Moir F, Yielder J, Sanson J, Chen Y. Depression in medical students: current insights. Adv Med Educ Pract. 2018; 9: 323–33.

8. Agudelo D, Buela CG, Donald SC. Ansiedad y depresión: El problema de la diferenciación a través de los síntomas. Salud Ment. 2007;30(2):33–41.

9. Ministerio de Salud y Protección Social. Plan decenal de salud pública 2012-2021. Ministerio de Salud y Protección Social, Colombia. Available from: www.minsalud.gov.co.

10. Daza P, Novy DM, Stanley MA, Averill P. The depression anxiety stress scale-21: Spanish translation and validation with a Hispanic sample. J Psychopathol Behav Assess. 2002; 24(3): 195–205.

11. Vignola RCB, Tucci AM. Adaptation and validation of the depression, anxiety and stress scale (DASS) to Brazilian Portuguese. J Affect Disord. 2014; 155(1):104-9.

12. Lovibond SH, Lovibond PF. Manual for the depression anxiety stress scales, 2nd Edn Sydney, NSW: Psychology Foundation of Australia; 1995.

13. Khan MS, Mahmood S, Badshah A, Ali SU, Jamal Y. Prevalence of depression, anxiety and their associated factors among medical students in Karachi, Pakistan. J Pak Med Assoc. 2006; 56(12): 583–6.

14. Rodríguez M, Martinez L, Agudelo C. Prevalencia de estrés en estudiantes de medicina de una universidad privada de la ciudad de Medellín, Colombia. Med UNAB. 2013;16(2):53–8.

15. Antúnez Z, Vinet E V. Escalas de depresión, ansiedad y estrés (DASS 21): validación de la versión abreviada en estudiantes universitarios chilenos. Terapia Psicológica. 2012; 30: 49–55.

16. Correa-prieto FR. Estrés académico en estudiantes de medicina de la Universidad Cesar Vallejo de Piura 2013. Rev Cuerpo Méd. 2015; 8(5):80–5.