



Analysis of Factors Related to Anxiety and Depression in Medical Students

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Abstract. The psychological well-being of university students, particularly those pursuing medical education, has garnered widespread attention. These students hold the potential to shape the future of societal progress, with medical students shouldering a crucial responsibility for the development of overall community health. However, many medical students are susceptible to psychological disorders such as anxiety and depression due to high levels of stress. While numerous studies have investigated factors contributing to the prevalence of psychological ailments in the general population, there has been a limited focus on analyzing this phenomenon specifically among medical students. This study utilizes a sample of 886 medical students, gathering information regarding their personal backgrounds, academic pursuits, psychological states, and physical health conditions. The aim is to discern which subgroups have a higher prevalence of anxiety or depression. Employing statistical analysis, the relationships between various factors and the occurrence of psychological disorders are examined. Through differential analysis, factors with a stronger correlation to psychological disorders are identified. Notably, factors like study duration and emotional fatigue exhibit a positive association with anxiety and depression, while factors such as academic year and academic efficacy demonstrate a negative correlation. Furthermore, gender and health status exhibit robust correlations with the manifestation of anxiety and depression.

Keywords: Anxiety · depression · medical students · correlative factors

1 Introduction

The psychological well-being of college students has garnered extensive attention. The university phase, which signifies the transition between academic and social realms [10], marks the initial steps of students venturing into the societal arena. However, due to factors such as uncertainty about the future, substantial academic pressure, challenges in interpersonal relationships, and insufficient self-confidence, college students are susceptible to experiencing psychological health issues such as anxiety and depression [12].

Among various academic disciplines, medical students particularly warrant significant concern as they encounter heightened psychological health challenges [2,3,8]. Their prolonged academic duration, substantial academic pressures, and the weight of future employment prospects create a formidable environment. Moreover, the daily exposure to patients' ailments and suffering brings about negative emotions, thereby increasing the likelihood of psychological health problems.

Despite the plethora of research focusing on factors contributing to psychological disorders, there remains a relative scarcity of investigations concentrating on medical students. Consequently, this study primarily revolves around medical students as a specific sample group, delving into their prevalence and severity of psychological disorders. Concurrently, we aim to discern potential factors contributing to the onset of psychological ailments and analyze the varying degrees of correlation between these factors and psychological disorders.

2 Related Work

Many researchers have initiated investigations into the psychological well-being of medical students. Medical students exhibit higher levels of depression, anxiety, and stress symptoms [7,15]. Such psychological disorders as anxiety and depression can potentially have adverse effects on medical students' personal and professional lives, leading to issues like insomnia and even triggering thoughts of suicide [9].

Mao *et al.* [13] found that the occurrence of depression and anxiety among medical students is influenced by a variety of factors, including individual characteristics, socioeconomic status, and environmental factors such as gender, academic year, family structure, family income, parental educational background, and social support. Additionally, Ahad *et al.* [1] revealed that age, gender, employment status, and accommodation situation are significant factors affecting stress levels among medical students. Notably, female students tend to experience higher stress levels, and those engaged in clinical internships face greater stress compared to pre-internship periods. It's noteworthy that the findings by Moutinho *et al.* [15] emphasize significant variations in the psychological well-being of medical students across different semesters.

Early detection and treatment of mental disorders are crucial for achieving favorable recovery outcomes and reducing the risk of relapse [6,14]. Typically, questionnaire surveys are employed for the early screening of anxiety and depression patients. Among these, the STAI-T [16] and CESD [11] questionnaires are

commonly utilized, each specifically designed for screening anxiety and depression symptoms, respectively.

3 Methods

3.1 Dataset Introduction

The dataset [4, 5] for this study was released in 2020 and encompasses information from 886 medical students. The features comprise individual demographic details ('age', 'year', 'sex', 'glang', 'part', and 'job'), educational aspects ('stud_h', 'mbi_cy', and 'mbi_ea'), psychological conditions ('qcae_cog', 'qcae_aff', and 'mbi_ex'), and physical well-being ('health'). Two labels describing the psychological disorder status are 'stai_t' and 'cesd', which are derived from the STAI-T and CESD questionnaires respectively. These questionnaires are widely employed for screening anxiety and depression patients. The introduction of each feature is shown in the Table 1.

Table 1. Study variables

variable name	description
age	age at questionnaire
year	curriculum year
sex	gender
glang	mother tongue
part	having a partner
job	have a paid job
stud_h	how many hours per week spend on study
health	How satisfied are you with your health
psyt	consulted a psychotherapist or a psychiatrist for health
qcae_cog	QCAE Cognitive empathy score
qcae_aff	QCAE Affective empathy score
mbi_ex	MBI Emotional Exhaustion
mbi_cy	MBI Cynicism
mbi_ea	MBI Academic Efficacy

3.2 Statistical Analysis

This study primarily engages in statistical description and hypothesis testing of the dataset, aiming to identify the relationships between psychological disorders (anxiety or depression) and various features.

Statistical Description. Creating statistical graphs for individual features provides a more intuitive display of the distribution of each feature's quantity, aiding in gaining a deeper understanding of the overall feature distribution within the sample population.

We have chosen two indicators, the proportion of individuals with psychological disorders and the average scores of the affected population, to depict the quantity and severity of psychological disorders. By visualizing the trends of these two indicators in relation to other features, we can gain a clearer insight into the influence of these features on psychological disorders.

Statistical Inference. This study primarily employs two hypothesis testing methods: the t-test and the chi-squared test, to conduct an analysis of dissimilarities among various features.

The independent samples t-test is utilized to compare differences between categorical and quantitative samples (samples A and B). The main steps are as follows:

1. Hypothesis formulation: The null hypothesis assumes no significant difference between samples A and B, while the alternative hypothesis assumes the presence of a difference.
2. Assumption of sampling distribution: Independent samples A and B are assumed to be approximately normally distributed, satisfying the conditions for t-distribution.
3. Calculation of t-value:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{n_1+n_2-2} \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

4. Calculation of confidence interval for means: Using the computed t-value, along with sample sizes and confidence level, the confidence interval for means is calculated, allowing for statistical inference regarding mean differences.

The Pearson chi-squared test is employed for analyzing differences between two categorical sample variables. The statistical measure used is

$$\chi^2 = \sum_{i=1}^r \frac{(n_i - n \cdot p_i)^2}{n \cdot p_i},$$

which assesses the disparity between theoretical frequencies and observed values.

4 Result and Discussion

4.1 Statistical Analysis

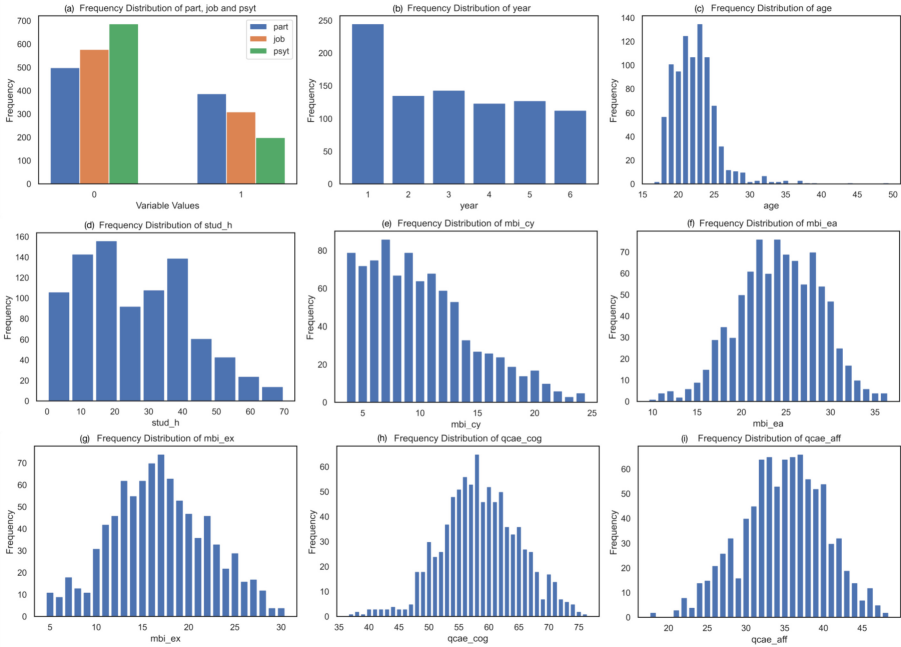


Fig. 1. Frequency Distribution of Each Feature. In Figure (a), the horizontal axis scale of 0 and 1 represents no partner (no job, no psychological treatment) and have a partner (job, psychological treatment) categories, respectively.

Univariate Statistical Analysis. The statistical graphs for each feature are depicted in the Fig. 1.

From Fig. 1(a), it is evident that students without partners outnumber those with partners, and similarly, students without jobs exceed those with jobs. Most students have not undergone psychological therapy over the past year.

Figure 1(b) illustrates that the first-year student count significantly surpasses other academic years, while second to sixth-year students exhibit a more even distribution.

Figure 1(c) indicates that the age distribution of medical students in the sample is concentrated between 18 to 25 years.

Figure 1(d), the highest number of individuals falls within the 10 to 20 h per week study time range. Most individuals do not exceed 40 h of study time per week.

The distributions of other features approximate a normal distribution.

Statistical Analysis of Other Variables' Relationship with Psychological Disorders. The statistical graphs illustrating the proportions of anxiety and depression, as well as the average scores of the affected population, varying with different features, are presented in Fig. 2.

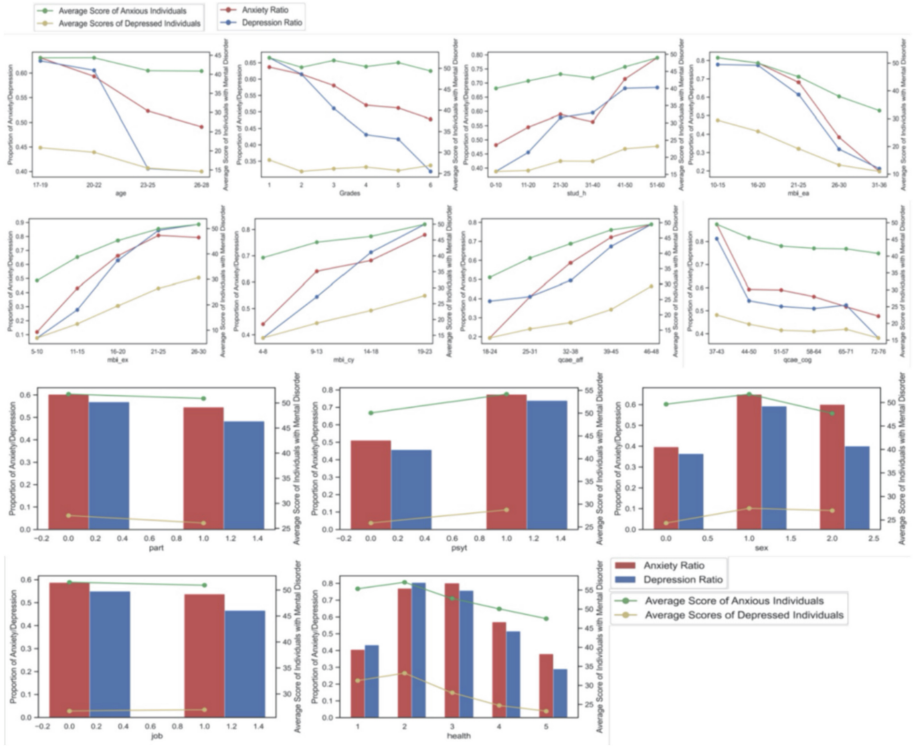


Fig. 2. Anxiety or depression statistical graphs

Features that exhibit a negative correlation with the proportion and severity of individuals with anxiety and depression include: age, academic year, academic efficacy, cognitive empathy, and health status. We observed that as age increases or academic year advances, the proportion of individuals with anxiety or depression decreases. Notably, the proportion of individuals with depression significantly drops after the age of 23. This may be attributed to medical students gradually adapting to the pace of learning, acquiring effective study methods, and consequently reducing the occurrence of anxiety and depression.

Features that show a positive correlation with the proportion and average scores of individuals with anxiety and depression include study duration, emotional exhaustion, cynicism, and affective empathy. We found that individuals with longer study durations exhibit a higher prevalence of psychological disorders, coupled with increased severity.

The presence of a job or a partner appears to have limited influence on anxiety or depression.

4.2 Correlation Analysis

Through t-tests and chi-squared tests, we will determine features that exhibit robust correlations with anxiety and depression, as well as those with weaker correlations.

Table 2. Demographic characteristics of college students - Anxiety and Depression

Variable	Anxiety p-Value	Depression p-Value
Gender	0.000***	0.000***
Job	0.439	0.018**
Part	0.242	0.012**
psyt	0.000***	0.000***
year	0.083*	0.084*
age	0.76	0.626
glang	0.000***	0.000***
stud_h	0.987	0.851
health	0.001***	0.000***
qcae_cog	0.216	0.15
qcae_aff	0.074*	0.405
mbi_ex	0.587	0.053*
mbi_cy	0.005***	0.000***
mbi_ea	0.529	0.578

Note: ***, **, * represent significance levels of 1%, 5%, and 10%, respectively.

Based on the results from Table 2, the following insights can be derived:

For anxiety disorder: In the examination of study duration, the significance p-value is 0.987; concerning the emotional exhaustion and academic efficacy scores from the MBI questionnaire, the respective p-values are 0.587 and 0.529; regarding the presence of a job, the p-value is 0.439. These outcomes indicate that statistically, the aforementioned features do not exhibit significant differences at the given level. In other words, we lack sufficient evidence to support a significant association or disparity between these features and anxiety.

However, when considering features such as gender, history of psychological counseling, native language, and health status, all respective p-values are below 0.05. This suggests the potential existence of some degree of correlation, association, or influence between these features and anxiety. This statistical divergence implies that these features might have a certain impact or role in relation to anxiety emotions.

Regarding depression: Concerning study duration, age, academic efficacy scores from the MBI questionnaire, and QCAE affective empathy scores, the corresponding p-values are 0.851, 0.626, 0.578, and 0.405, all significantly greater than 0.05. From a statistical standpoint, this indicates that these features do not manifest significant differences at the given level. In other words, we lack sufficient evidence to support significant relationships or disparities between these features and anxiety.

However, in the context of gender, history of psychological counseling, native language, health status, and MBI Cynicism scores, the corresponding p-values are all below 0.05. This implies that these features may possess some degree of correlation, association, or influence with anxiety. In terms of statistical analysis, these divergences suggest that these features might hold a certain impact or role in relation to anxiety emotions.

5 Conclusion

In this study, we investigated the statistical relationships between various factors and the occurrence of psychological disorders, revealing patterns of variation in the proportions of individuals affected by psychological disorders and the severity of these disorders across different populations. We identified several factors closely associated with psychological disorders, with gender, native language, and health status potentially exhibiting more significant correlations with anxiety and depression.

Nevertheless, our study does have certain limitations. The size of the dataset is relatively small, and the number of features is limited, which could potentially impact the accuracy of our conclusions. To arrive at more universally applicable conclusions, we require a more comprehensive dataset of medical student information and a larger sample size.

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