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ANALYSIS OF TEST ANXIETY AMONG STUDENTS OF MEDICAL SCIENCES: A CROSS-SECTIONAL STUDY

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ABSTRACT

Test anxiety is a pathological fear that occurs before and during testing. It can be manifested with both somatic and cognitive symptoms. The purpose of this crosssectional study was to analyse test anxiety among students at the Faculty of Medicine in Novi Sad. A total of 375 respondents completed the Test Anxiety Inventory – TAI, a widely used inventory for assessing test anxiety that is most commonly used in school and student populations. Sociodemographic and educational characteristics of the respondents were collected as well. In this sample, 15.5% of participants experienced no anxiety, 42.2% mild anxiety, 36.5% moderate anxiety, while 5.8% demonstrated severe anxiety. The average overall TAI score was 48.25 points. Females, those who finance studies on their own, those who renewed a previous year of studies and those with a lower grade point average experienced the highest levels of test anxiety. There was no statistically significant difference in the intensity of test anxiety between students from different study programs (medicine, dentistry, pharmacy, and nursing science) and different years of studies at this faculty. This study discovered a significant number of students suffering from test anxiety, which can be a factor affecting their academic performance. We identified the vulnerable population of students who should be given priority access to professional counseling.

Keywords: test anxiety, medical students, academic performance, test anxiety inventory.

INTRODUCTION

Fear is an emotion that arises in situations where there is an objective danger to the person and is usually accompanied by physical symptoms such as tachycardia, tachypnoea, increased muscle tone, sweating etc., whose purpose is to prepare the individual to "fight or flight" the danger. On the contrary, anxiety is a form of pathological fear, characterized by a feeling of inner worry and concern that "something bad will happen". It occurs when there is no objective danger or when the emotional response to potential danger is not appropriate (Latas, 2016). A particular form of anxiety is test anxiety, which can be defined as "the set of phenomenological, physiological, and behavioural responses that accompany concern about possible negative consequences or failure on an exam or similar evaluative situation" (Zeidner, 1988). Nowadays, testing has become an integral part of our society and is being used not only for educational purposes but also in other aspects of life. This phenomenon was noted long ago by Sarason (1959) who stated that "we live in a test-conscious, test-giving culture in which the lives of people are partly determined by their test performance". Therefore, it is not surprising that anxiety before and during tests has become a prominent problem in schools and universities worldwide because the student's "chances of being admitted into a higher education setting, passing a bar or board exam or obtaining professional licensure are all predicated on the quality of one's test scores" (Spielberger, 2015).

Early studies considered test anxiety as a single symptom that could be objectified by one-dimensional tests. However, since the early 1970s, a new understanding of test anxiety appeared when it included two basic components: emotionality and worry. The emotional component of test anxiety refers to the reactions of the autonomic nervous system presented before, during and after testing, such as hypertension, tachycardia and palpitations, excessive sweating, nausea, dry mouth, hyperventilation, dizziness, restlessness, tremor and weakness (Tsegay, Shumet, Damene, Gebreegziabhier, & Ayano, 2019). Worry refers to the psychological and cognitive aspects of test anxiety, i.e., internal dialogue and negative thoughts mainly related to the potential consequences of failing the test for further education, comparing own results with peers, the reaction of parents if poor results are achieved, reasons for poor preparedness for the test, etc. (Cassady, & Johnson, 2002; Reteguiz, 2006). This cognitive component of test anxiety has a higher correlation with decreased test performance than the emotional component, causing the student to "freeze up" mentally and be unable to recall the information that is required or to have wandering thoughts (Stojanović et al., 2018).

The development of test anxiety can be determined by several factors. On the one hand, there are the characteristics of the test/oral exam itself: the difficulty of the tasks that the student needs to complete, time limit, the atmosphere in which the test is performed, the characteristics of the examiner and its teaching and evaluating methods (Duraku, 2017). On the other hand, the characteristics of the individual, such as the desire to succeed, the capacity to process information, the ability to think scholastically, student's learning techniques (for example studying overnight), can also have an important role in developing test anxiety (Putwain, Woods, & Symes, 2010). Students of medical sciences are thought to have the highest levels of test anxiety (Schaefer, Matthess, Pfitzer, & Köhle, 2007). The reasons for this are numerous, such as the volume of learning material, extensive course load, long duration of exams, a high percentage of oral exams, reduced time for leisure activities, as well as the fact that during clinical rotations they come into contact with critically ill patients and death (Khoshhal, Khairy, Guraya, & Guraya, 2017).

Even though some levels of anxiety can be helpful for students, motivating them to achieve a greater score on tests and preparing them for more stressful events in the future clinical practice, increased level of test anxiety and an inadequate coping with it can lead to the inability to take exams, decreased academic performance and drop out of college, unfulfilled intellectual potential, low self-esteem and a devastating effect on the personal well-being (Dyrbye, Thomas, & Shanafelt, 2006; Neuderth, Jabs, & Schmidtke, 2009; Galal, Vyas, Hackett, Rogan, & Nguyen, 2021). It is not rare that avoidance behaviour is being used as a coping mechanism to overcome test anxiety, leading to procrastination in preparing for exams (Custer, 2018).

Multiple studies showed that around 20-40% of students, especially those studying medical sciences and law, experience symptoms and signs of test anxiety, ranging from moderate to severe (Hashmat, Amanullah, & Aziz, 2008; Alghamdi, 2016). Of these, 10% of students require some type of the available treatments to alleviate it. Only a small number of students are familiar with the ways of overcoming test anxiety (Neuderth et al., 2009), such as coping strategies related to time-management, testing skills, nutrition, exercise, relaxation methods, such as listening to music during test-taking and cognitive control (Galal et al., 2021) with only 7-13% seeking counselling services (Schaefer et al., 2007; Fleckenstein, Krüger, & Ittner, 2019).

The aim of this study was to estimate the prevalence of test anxiety among students of different study programmes at the Faculty of Medicine in Novi Sad, Serbia, as well as to investigate the relationship of test anxiety and some demographic and educational parameters.

MATERIALS AND METHODS

Study setting

The Faculty of Medicine in Novi Sad was founded in 1960 and is a higher education institution within the University of Novi Sad which conducts higher education of the first level in Medicine (six years of integrated studies), Dentistry and Pharmacy (five years of integrated studies both), and Nursing Science, Medical Rehabilitation and Special Education and Rehabilitation (four years of academic studies, all), as well as scientific research in the fields of Medical Sciences,

Social Sciences and Humanities, and Interdisciplinary Programmes. Within the field of higher education, the faculty also conducts studies of the second and the third level, as well as various forms of studies of knowledge innovation and vocational education. Studies at this faculty can be financed from the budget of the Republic of Serbia, or by students themselves, depending on the success achieved in high school (for the first year of studies) or the achieved number of ECTS (European Credit Transfer and Accumulation System) credits (for the second and further years of study). The year of study can be renewed if students do not achieve the anticipated number of ECTS credits in the actual academic year. Student's achievement from each subject is presented by a numerical grade on a scale from 5 to 10, where it is considered that the student has passed the exam if a grade of 6 (the lowest) to 10 (the highest) is achieved. One of the criteria of academic success during studies is the Grade Point Average (GPA), which is the arithmetic mean of all previously achieved grades.

Study sample and questionnaire used

In January 2018, before the upcoming exam period, we conducted a cross-sectional study among students of the Faculty of Medicine in Novi Sad, Serbia to analyse test anxiety among students attending different study programmes in the field of medical and healthcare sciences. The participants were asked to anonymously and voluntary complete the questionnaire which consisted of two sections. The first part of the questionnaire was related to the general data about the student: gender, age, study programme, GPA, the possibility of a study year renewal and the mode of study's financing. The second part was related to the analysis of test anxiety among students, and for that purpose the Test Anxiety Inventory - TAI was used (Latas, 2016; Westberry, 1980). The questionnaire was created on the Google Forms online platform, and the link to the questionnaire was distributed via social networks. The informed consent was integrated within the questionnaire's preamble, and by clicking on the marked button, participants agreed to participate in the study.

The TAI is a widely used inventory for the assessment of test anxiety and has the largest application on the school and student populations. It measures individual differences in test anxiety as a situation-specific personality trait using the subscale of worry and emotionality and has shown good psychometric characteristics in numerous studies (Ali, & Mohsin, 2013). The test consists of 20 questions. Respondents were asked to answer honestly how often they experienced specific symptoms of anxiety before, during, and after tests or oral exams. The answer to each question is presented in the form of a four-point Likert-type scale: "never", "sometimes", "often" and "always". The answer to each of the 20 questions is scored 1 (never), 2 (sometimes), 3 (often), and 4 (always) points. The minimum overall score in TAI is 20 and the maximum is 80 points. Based on the overall TAI score, four different levels of test anxiety can be singled out: no anxiety (20-35 points), mild anxiety (36-50), moderate anxiety (51-65) and severe anxiety (66-80). Questions under numbers 2, 8, 9, 10, 11, 15, 16 and 18 are from the emotionality subscale, questions under numbers 3, 4, 5, 6, 7, 14, 17, and 20 are from the worry subscale, and the remaining questions 1, 12, 13, and 19 reflect general anxiety in the student, which may not be related to oral exam or test.

Statistical analysis

Statistical data processing was performed with the assistance of *IBM SPSS Statistics v.23* and *Microsoft Office 2013* software packages. The central tendency of numerical features is represented by the arithmetic mean and the scattering by the standard deviation. In addition, the minimum, maximum values and range are shown. For attribute features, absolute and relative frequencies are shown. From the inference statistics methods, the Student's T-test of independent samples and the analysis of variance (ANOVA) with the LSD (Least Significant Difference) Post Hoc test were used. The selected significance level was set to 0.05.

RESULTS

The study included a total of 375 respondents who completed the Test Anxiety Inventory. The average age of the respondents was 22.31 years, ranging from 18 to 37 years. The gender

structure of the sample, the distribution of respondents related to the study programme, the actual year of study, the way of studies financing, and whether they renewed any of the previous years of study are shown in Table 1.

Table 1. Sociodemographic and educational parameters in study's sample.

Gender	**n**	**%**
Female	284	75.7
Male	91	24.3
Study Program		
Medicine	226	60.3
Nursing Science	35	9.3
Pharmacy	35	9.3
Dentistry	32	8.5
Special education and Rehabilitation	31	8.3
Medical Rehabilitation	16	4.3
Year of Education		
1st	43	11.5
2nd	90	24
3rd	49	13.1
4th	77	20.5
5th	40	10.7
6th	76	20.3
Scholarship Funding		
Government's Budget	290	77.3
Student's Budget	85	22.7
Study Renewal		
Yes	93	24.8
No	282	75.2

The results of this study showed that students presented a mild level of test anxiety in general – the mean value of an overall score measured by the TAI questionnaire was 48.25 (SD = 11.27), with a range from 25 to 75. The mean values by subscales were: emotionality 21.56 (SD = 5.63), with a range of 9 to 23, and worry 17.14 (SD = 4.99), with a range of 8 to 32 points. Considering the previously mentioned levels of test anxiety, 58 participants (15.5%) experienced no anxiety, 158 of them (42.2%) experienced mild anxiety, 137 (36.5%) classified as having moderate anxiety, while 22 (5.8%) demonstrated severe anxiety.

Analysis of test anxiety in relation to the gender of students indicated the existence of a statistically significant difference in the intensity of test anxiety between female and male students. When comparing the overall TAI score, females scored on average 6.98 points more than their male colleagues and this difference was statistically significant ($p < 0.05$). In the subscales emotionality ($t = 3.55$, $p<0.05$) and worry ($t = 2.60$, $p<0.05$), female students also presented statistically significant higher levels of test anxiety than male students.

Considering the mode of study's financing, our results showed that the average overall TAI score for self-financed students was 4.96 points higher than for students whose scholarship was funded from the budget of the Republic of Serbia and this difference was statistically significant ($p<0.05$). Statistically significant differences were also established comparing the mean values on the emotionality subscale ($t = -1.79$, $p<0.05$) and the worry subscale ($t = -2.76$, $p<0.05$).

When comparing the results on the TAI questionnaire among students who renewed at least one of the previous years of study and those who did not, the average TAI scores of students who renewed some years of study were significantly higher ($p<0.05$) on all three TAI subscales – emotionality, worry and overall, than in students who studied continuously.

Using the analysis of variance (ANOVA), the intensity of test anxiety among different study programmes at the Faculty of Medicine in Novi Sad was analysed. In terms of the average overall TAI score, a statistically significant difference in the intensity of test anxiety among different study programmes was not established using ANOVA ($F = 1.908$, $p = 0.092$). The same results were

obtained for the emotionality subscale (F = 1.683, p = 0.138) and the worry subscale (F = 1.441, p = 0.209).

ANOVA was also used to analyse test anxiety at different years of studies. The results showed that there was no statistically significant difference in experiencing test anxiety among students attending different years of studies (from 1st to 6th), both in the average overall TAI score (F = 1.705, p = 0.133), and in the subscales emotionality (F = 1.278, p = 0.273) and worry (F = 1.718, p = 0.130).

ANOVA analysis of test anxiety related to the student's GPA indicated that there was a statistically significant difference (F = 2.225, p <0.05) in the average overall score on the TAI questionnaire (Table 2.). A subsequent LSD test indicated that there was a statistically significant difference in the average overall TAI score between the group of students who had a GPA of 8.00-8.49 and the group with a GPA of 8.50-8.99 (p <0.05), with a higher score in students with a lower GPA. Data in Table 3 show that the same trend exists in other tabular groups, where students with lower GPAs achieved higher overall TAI scores compared to those with higher GPAs. The subscale emotionality did not show statistically significant deviations of the average overall TAI score in students with different GPAs (F = 1.645, p = 0.122). However, at the subscale worry, a statistically significant difference was noticed (F = 3.346, p = 0.002). Using the LSD Post Hoc test, a statistically significant difference (p <0.005) in the average TAI score on this subscale between the group of students with the GPA of 7.50-7.99 and the group with the GPA of 8.50-8.99 was found, with a higher average TAI score in the worry subscale in students with a lower GPA. Data in Table 3. reveals that the same trend also exists in other GPA groups.

Table 2. Analysis of test anxiety related to the grade point average (GPA).

	GPA	Number of students	%	Mean value	Std. deviation	ANOVA F (7.367)	p
OVERALL TAI SCORE	6.00-6.49	3	0.8	59.3333	7.09460	2.225	0.032*
	6.50-6.99	3	0.8	56.0000	7.00000		
	7.00-7.49	11	2.9	48.0000	9.95992		
	7.50-7.99	29	7.7	51.2759	11.22464		
	8.00-8.49	70	18.7	50.9857	10.07579		
	8.50-8.99	110	29.3	47.6091	11.69262		
	9.00-9.49	97	25.9	47.0722	11.08043		
	9.50-10.00	52	13.9	45.4231	11.84433		
	Total	375	100	48.2533	11.26978		

* The selected significance level is set to 0.05 (ANOVA)

Table 3. LSD Post Hoc test for the overall score and worry subscale on TAI questionnaire related to the GPA.

	GPA		Mean value	p
TAI OVERALL	8.00-8.49	8.50-8.99	3.37662	0.048*
		9.00-9.49	3.91355	0.026*
	9.50-10.00	6.00-6.49	-13.91026	0.036*
		7.50-7.99	-5.85279	0.024*
		8.00-8.49	-5.56264	0.007*
TAI WORRY SUBSCALE	7.50-7.99	8.50-8.99	2.20313	0.032*
	9.00-9.49	7.50-7.99	-2.70885	0.009*
		8.00-8.49	-1.60442	0.037*
	9.50-10.00	6.00-6.49	-6.84615	0.019*
		7.50-7.99	-4.12202	0.000*
		8.00-8.49	-3.01758	0.001*
		8.50-8.99	-1.91888	0.020*

*The selected significance level is set to 0.05 (LSD post hoc test).

DISCUSSION

Medical students from the University of Novi Sad showed a mild level of test anxiety in general, scoring an average of 48.25 points on the TAI questionnaire. In two similar studies from Belgrade, Serbia, lower overall TAI scores were established: 41.14 in a study that involved only students of medicine (Latas, Pantić, & Obradović, 2010), and 46.46 in a study which was conducted among nursing students (Stojanović et al., 2018). Examining the level of test anxiety in US medical students just before the exam term (Reteguiz, 2006) the average overall TAI score of 46.32 was established, which is also lower, but similar to the scores achieved in our sample of respondents. On the other hand, in a study among nursing students from Saudi Arabia (Dawood, Al Ghadeer, Mitsu, Almutary, & Alenezi, 2016), participant's total TAI scores ranged from 20 to 74, with a mean score of 53.77, which is higher than in our study.

Using the TAI, we found that only 15.5% of medical students experience no test anxiety, while the majority of them (84,5%) experience some level of test anxiety – mild (42.2%), moderate (36.5%) and severe (5.8%). Using other questionnaires in several different studies, the prevalence of test anxiety among medical students in Ethiopia was 52.30%, in the USA 55%, in Turkey 48%, in Iran 43.4%, and in India 32.3% (Tsegay et al., 2019). In a study by Dawood et al. (2016), 65% of nursing students experienced moderate to severe test anxiety, while 32.5% of pharmacy students experienced test anxiety in a study by Rajiah et al. (Rajiah, Coumaravelou, & Ying, 2014).

Our results showed that female students experienced higher levels of test anxiety, compared to their male colleagues. Studies conducted among Belgrade (Latas et al., 2010; Stojanović et al., 2018) and US students (Reteguiz, 2006) using the same methodology as in our study, also showed that females had higher levels of test anxiety compared to males. The same results were obtained using different questionnaires (Tsegay et al., 2019; Hashmat et al., 2008; Khoshhal et al., 2017; Afzal, Siddique, & Naqvi, 2012; Jelić, Popov, & Sretković, 2014). These differences are usually explained by the willingness of females to admit their own anxiety (Rohe et al., 2006), but the possibility that females have generally more severe anxiety should not be overlooked (Jelić et al., 2014). However, in some studies, no gender difference in experiencing test anxiety was found (Reteguiz, 2006).

Our study's results showed that the levels of test anxiety are higher in students that finance studies on their own. A review of the available literature did not find any similar results for comparison, maybe due to the unique system of studies financing at universities in Serbia. Considering high scholarship fees, we can speculate that this additional financial pressure on students can be one of the reasons for the development of test anxiety.

Comparing differences in the level of test anxiety among college students, several studies showed that medical students, along with law students, are at the highest risk of experiencing test anxiety (Neuderth et al., 2009; Tosevski, Milovancevic, & Gajic, 2010). Despite this, the study that analysed test anxiety among students of different faculties at the University in Novi Sad, Serbia, showed that there were no statistically significant differences between the faculties of this university (Jelić et al., 2014). The medical students are thought to have the highest levels of test anxiety due to the very demanding curriculum, lack of sleep, diminished time for leisure activities, pressure to perform well on assessments, and the abundance of knowledge they have to acquire at any given day (Galal et al., 2021). In our study, we didn't find significant differences in test anxiety levels among medical students who were attending different study programmes at the Faculty of Medicine in Novi Sad (medicine, dentistry, pharmacy, nursing science, medical rehabilitation, special education and rehabilitation). In one Ethiopian research (Hanfesa, Tilahun, Dessie, Shumet, & Salelew, 2020), medical students were more likely to experience test anxiety, compared to students of nursing science.

In our study, no statistically significant difference was found in test anxiety levels among students attending different years of studies. However, most of the available literature sources indicated that the intensity of test anxiety varies during the years of studies at the university. The highest levels of test anxiety are thought to be present in the first few years of studies, with its intensity decreasing with age and progress of education (Tsegay et al., 2019). Some factors that can lead to the decrease of test anxiety levels in students of the senior years of studies could be

"increased confidence, developing learning skills, positive evaluations in exams and greater knowledge gained from instructors in exams and evaluation methods", as reported by Duraku (2017). In addition, in a study of Belgrade medical students, those attending the 3rd year experienced the highest, while the 6th year students had the lowest levels of test anxiety, which is explained by the fact that in the third year students encounter extensive clinical subjects for the first time (Latas et al., 2010).

Students with lower GPAs and those who renewed one or more study years scored higher average overall TAI scores in our research. This raises the question of whether test anxiety affects students' academic performance. Most studies answer this question in a positive way (Tsegay et al., 2019; Neuderth et al., 2009; Custer, 2018; Everson, Millsap, & Rodriguez, 1991; Dordi Nejad et al., 2011; Lyndon et al., 2014), highlighting the link between test anxiety with poorer academic performance and the linear relationship between anxiety and test scores. The results of this study are also consistent with previous claims. This identifies a population of students with a lower GPA and those who renewed year of their study as vulnerable groups of students, who should primarily be given access to professional assistance in order to improve their academic performance. On the contrary, some studies showed no relationship between test anxiety and academic performance, observed either through a GPA (Dawood et al., 2016; Hahn, Kropp, Kirschstein, Rücker, & Müller-Hilke, 2017) or through a possible study year renewal (Stojanović et al., 2018; Latas et al., 2010).

When interpreting the results, the limitations of this study should be kept in mind. One of the limitations is the gender imbalance of the sample (about 75% of the respondents were female), but such representation of the female gender is proportional to the gender structure of the Faculty of Medicine in Novi Sad. There was also the disbalance related to study programs (a significantly higher number of medical students compared to other students). Further, first-year students completed a GPA part of the questionnaire in correlation to their high school experiences and expectations in college. The level of test anxiety in this study was analysed only based on the results of the TAI questionnaire, without a complete psychiatric-psychological examination.

CONCLUSIONS

The majority of students at the Faculty of Medicine in Novi Sad, Serbia experiences some level of test anxiety (around 85%), mostly at mild or moderate levels. Female students, those who finance their studies on their own, those who have previously renewed a year of studies, as well as those with a lower GPA could be recognised as the vulnerable groups of students who should primarily be given access to professional counselling in order to overcome test anxiety and to possibly improve their academic performance.

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