

THE PREDICTIVE FACTORS OF ANXIETY AND DEPRESSION IN A SAMPLE OF BIOMEDICAL SCIENCES STUDENTS: A PILOT STUDY

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Annotation. Depression and anxiety are most frequent among different mental disorders and the comorbidity between the two mental health outcomes has been found to be high. Taking into account that nearly 30% of medical students suffer from anxiety or depression in Europe, this study is unique as **there has been no** other publication **so far** that offers an assessment of the two mental health outcomes concurrently in a population of biomedical sciences students. The objective of this study was to evaluate the prevalence and predictive factors of anxiety and depression in a sample of biomedical sciences students. This cross-sectional research was carried out in March and April of 2020. 174 students of Biomedical Sciences of Vilnius University were investigated. The prevalence of case-level anxiety and depression was found in 33,3% and 4,6% of Lithuanian biomedical students' population, respectively. Students with potential anxiety hazards were related to psychosocial and economic circumstances. Students with potential depression hazards were related only to poor housing and/or economic circumstances (Odds Ratio (OR) 3,5, 95% CI: 1,3–9,6) and low income (OR 3,4, 95% CI: 1,1–10).

Keywords: biomedical sciences; mental health; anxiety; depression; mental health disorders.

INTRODUCTION

Mental disorders are important concerns of health care system in all countries. Mental illness contributes significantly to the global burden of mental disorders (i.e., 13% disability adjusted life-years lost) (Vigo et al., 2016). Among different mental disorders, depression, anxiety, and somatization are more frequent (Hanel et al., 2009; World Health Organization, 2017). Therefore, depression is shown to be one of the most common health problems among university students (Ibrahim et al., 2013; Naja et al., 2016). Medical students experience depression at a higher rate than the general population (Brenneisen et al., 2016) or students from other specialties (Iorga et al., 2018). Nearly 30% of medical students suffer from anxiety or depression in Europe (Haldorsen et al., 2014; Moutinho et al., 2017).

It is common knowledge that the involvement in the academic performance is largely perceived as a positive challenge. However, the stress triggered by a potentially increasing learning capacity and developing competences, if viewed negatively, can be detrimental to the student's mental health (Kumaraswamy, 2013, Murphy & Archer, 1996). A continuous demand and psychological distress not only cause a negative effect on the students' psychological well-being (Mosley et al., 1994), but can also precipitate depression and anxiety (Andrews & Slade, 2001; Doom & Haeffel, 2013). In addition, students with a significant financial burden exhibit more severe symptoms of depression and anxiety (Shao et al., 2020). The anticipated financial hardships are significantly associated with mental health disorders (Bernhardt et al., 2012; Brenneisen et al., 2016; Yusoff et al., 2013; Fawzy & Hamed, 2017; Wege et al., 2016). Housing accommodations can also impact the mental health of medical students (Aktekin et al., 2001, Liu et al., 1997). Thus, the objective of this study was to evaluate the prevalence and predictive factors of anxiety and depression in a sample of biomedical sciences students.

MATERIAL AND METHODS

First to fourth year students enrolled in the biomedical study programmes of the Faculty of Medicine of Vilnius University were selected for the study. This research was carried out in March and April of 2020. The average age of the participants was $21,4 \pm 2,6$ years (95% CI: 21,1–21,8). According to the gender, the participants were divided into groups of female (75,9% (n = 132)) and male (24,1% (n = 42)). The numbers of the participants studying in different programmes of biomedical sciences were as follows: Medicine (23,6% (n = 41)), Kinesitherapy (31,6% (n = 55)), Public Health (25,6% (n = 45)), Pharmacology (8% (n = 14)), Odontology (5,2% (n = 9)), Ergotherapy (3,4% (n = 6)), and Rehabilitation (2,3% (n = 4)).

This cross-sectional research was carried out by using the questionnaire. The questionnaire consisted of 58 open-ended and closed-ended types of questions. The personal interview survey was performed by an interviewer. The first part of the questionnaire included the questions on the

sociodemographic factors such as gender, age and study programme. The second and fourth parts of the questionnaire surveyed the respondents on anxiety, depression, external stressors and health indices.

To assess the students' mental health and psychological distress, we used HADS questionnaire (Zigmond & Snaith, 1983). To evaluate the students' state of health and the external stressors causing psychological distress, the following questionnaires were employed: WHOQOL-100 (Jankauskas & Jatulienė, 2008) questionnaire of life quality relating to health, the WHO questionnaire on health and behaviour (Proškuviene & Černiauskienė, 2009), a questionnaire, to evaluate the subjective health and well-being of students constructed by the Lithuanian University of Health Sciences (LSMU) and the researchers of the University of Bielefeld (Germany). The reasons that cause psychological distress and health indications were classified according to the classification system of ICD-10 (The International Statistical Classification of Diseases and Related Health Problems) (World Health Organization, 2019).

Standard descriptive summary statistics were used to characterize the responses. All normally distributed continuous variables are presented as means \pm standard deviations (SD), whereas qualitative variables are presented as relative frequencies (in percentage (%)). The linear regression analysis was used to test the association between HADS-A and HADS-D. The multinomial logistic regression analysis was used to relate HADS-A and HADS-D and socio-economic factors (gender, external stressors), and the results were presented by Odds Ratios (ORs) with 95% Confidence Interval (CI). The significance level was set at $p < 0,05$ in all statistical tests. The method of parameter estimation used in this study was maximum likelihood and several techniques were used to assess the appropriateness, adequacy and usefulness of the model using the Likelihood-Ratio test, Hosmer and Lemeshow (H-L) test statistic, Wald (W) statistic, the estimated coefficient (β), with standard error (SE) (< 5) and Nagelkerke R^2 statistic. The statistical analysis was performed using Stata version 12.1 (StataCorp, College Station, TX, USA), SPSS V.25 for Windows (Corporate headquarters 1 New Orchard Road Armonk, NY, USA) and Microsoft Excel (Microsoft Corporation, One Microsoft Way, Redmond, WA, USA). The biomedical research was conducted according to the principles expressed in the Declaration of Helsinki. The students were also assured of the confidentiality of their responses.

RESULTS

Mental Health of Students

As seen in *Figure 1*, the results of the study show that the average of HADS-A subscale score, as reported by biomedical students, equaled to $8,2 \pm 4,5$ (95% CI: 7,5–8,8). 20.7% of biomedical students were suffering from mild anxiety and almost every third student (33,3%) was diagnosed with severe anxiety. Meanwhile, the average of HADS-D subscale score of the subject group corresponded to $4,1 \pm 3,4$ (95% CI: 3,6–4,6). 10,3% of biomedical students were diagnosed with mild depression and 4,6% of students were found to experience the symptoms of severe depression.

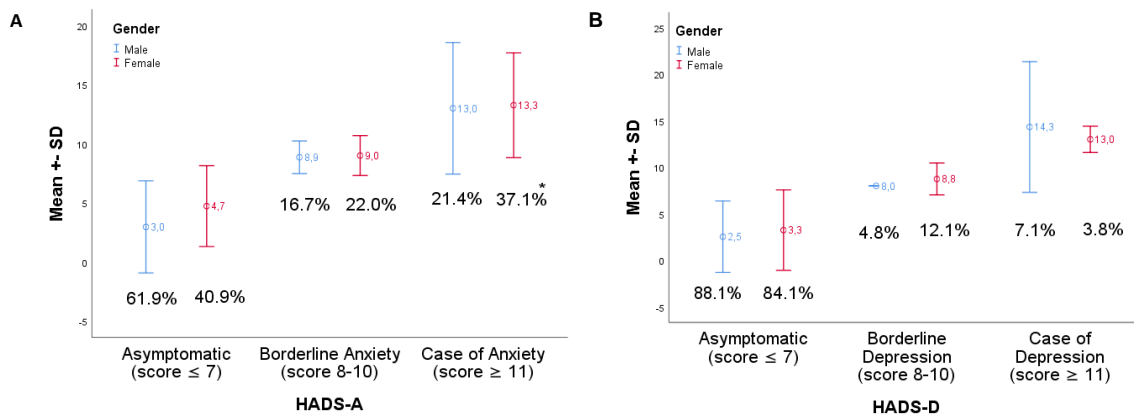


Figure 1. Anxiety and depression according to gender

The examination of group distribution in terms of anxiety and depression symptoms based on gender revealed that female students (37,1%) were more likely to experience the symptoms of severe anxiety than male (21,4%) ($p = 0,05$). A more detailed analysis of the results confirmed that women had a 2,6 higher

odds of experiencing symptoms typical of anxiety disorder compared to men (odds ratio (OR) 2,6; 95% CI: 1,1–6,1; $p = 0,026$).

In addition, following the use of the linear regression method, the relationship between the symptoms of depression and anxiety was found (Figure 2). The data confirmed that the symptoms of anxiety predicted 42% of depression symptoms ($R^2 = 0,42$; $\beta 0,5$; 95% CI: 0,4–0,6; $p < 0,0001$).

The scores of HADS-A and HADS-D are presented as means \pm standard deviations (SD); The distribution of men and women by mental disorders are presented as relative frequencies (in percentage (%)); * - a significant difference between the male and female group members (%) according to the case-level HADS-A ($p = 0,05$) (χ -squared test was used)

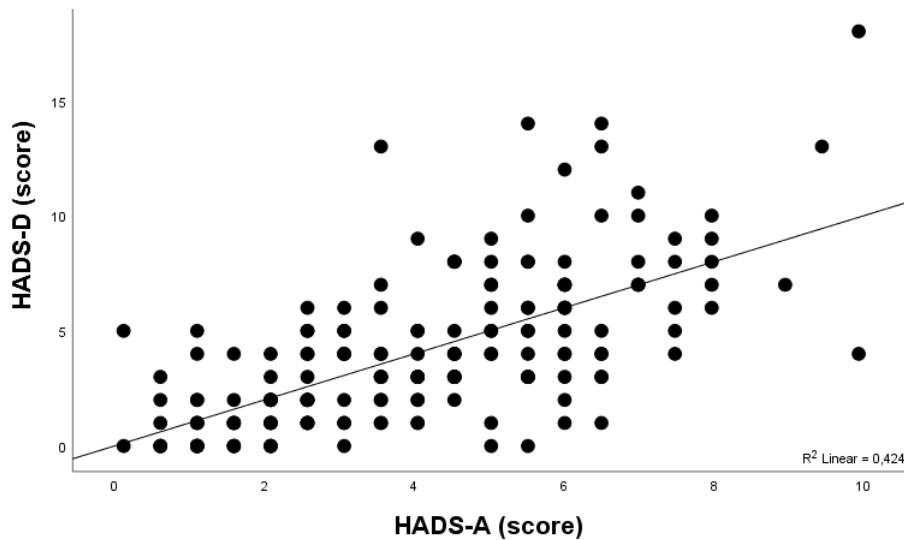


Figure 2. The correlation between the HADS-A and the HADS-D
Model summary: $R^2 = 0,42$; $\beta 0,5$, 95% CI: 0,4–0,6; $p < 0,0001$; $y = 0,13+0,49*x$.

Psychological Distress and External Stressors

Psychological distress can be external, related to the environment and result from the internal response to external stressors. The risk factors involved in developing a psychological stress in biomedical students cover the problems linked to education such as difficulty studying the course (95,4%) and a specificity of biomedical sciences studies (91,4%), also the problems arising from the detachment from practical work (82,7%). The external stressors that less likely contribute to students' mental stress are related to the problems triggered by educational maladjustment and discord with classmates (e. g. the competition among students) (64,9%), bad personal relationship with a spouse or a partner (68,9%), a negative social environment (e. g. conflicts with friends) (60,3%), low income (60,3%), high levels of emotional expression within the family (53,9%), poor housing and/or economic circumstances (51,7%), and employment while studying (43,2%). As indicated in Table 1, female students versus male students are more prone to experience psychological distress related to difficulty studying the course (OR 2; 95% CI: 1–3,8) and problems with friends (OR 1,8; 95% CI: 0,9–3,5).

Table 1

The association between the gender of students and the external stressors					
Female ^a	β	SE	W	p	Exp(β) (95% CI)
Difficulty studying the course	0,7	0,3	4,2	0,04	2 (1; 3,8)
Problems in relationship with spouse or partner	-0,6	0,3	4,5	0,034	0.6 (0,3; 1)
Conflicts with friends	0,6	0,3	3,9	0,052	1.8 (0,9; 3,5)
Constant	-1,6	0,9	3,4	0,065	0

^a – reference category is male; β is the estimated coefficient, with standard error SE (< 5); W is the Wald test statistic; Nagelkerke $R^2 = 0,2$; Exp(β) is the predicted change in odds for a unit increase in the predictor (Odds Ratio (OR)); CI – confidence interval.

The Association between Anxiety, Depression, and External Stressors

Table 2 and Table 3 show the ORs for the external stressors in relation to the case-level HADS anxiety and/or depression. In the case-level HADS severe anxiety, the ORs for the external stressors such as problems related to the specificity of biomedical sciences studies, problems related to the difficulty of the study course, problems related to social environment (e. g. conflicts with friends), low income were 4,8 (95% CI: 2–11,9), 2,8 (95% CI: 1,4–75,8, $p = 0,005$), 3,7 (95% CI: 1,8–7,7, $p < 0,001$) and 2,2 (95% CI: 1,4–5,8, $p = 0,004$), respectively. In the case-level HADS severe depression, the ORs for only two external stressors such as problems related to poor housing and/or economic circumstances and low income were 3,5 (95% CI: 1,3–9,6, $p = 0,015$) and 3,4 (95% CI: 1,1–10, $p = 0,028$), respectively.

Table 2

The association between the external stressors and the appearance of the symptoms of severe anxiety in students

HADS-A (moderate/severe anxiety ; cut-off score ≥ 11) ^a	β	SE	W	p	Exp(β) (95% CI)
Difficulty to study the course	1,6	0,5	12,1	< 0,001	4,8 (2,0; 11,9)
Specificity of biomedical sciences studies	1	0,4	7,9	0,005	2,8 (1,4; 5,8)
Low income	0,8	0,3	8,1	0,004	2,2 (1,4; 5,8)
Conflicts with friends	1,3	0,4	20,1	< 0,001	3,7 (1,8; 7,7)
Constant	-11,6	1,7	44,9	< 0,001	0

^a – reference category is HADS-A (asymptomatic anxiety; score ≤ 7); β is the estimated coefficient, with standard error SE (< 5); W is the Wald test statistic; Nagelkerke $R^2 = 0,54$; Exp(β) is the predicted change in odds for a unit increase in the predictor (Odds Ratio (OR)); CI – confidence interval; The logic model was adjusted for gender.

Table 3

The association between the external stressors and the appearance of the symptoms of severe depression in students

HADS-D (moderate/severe depression; cut-off score ≥ 11) ^a	β	SE	W	p	Exp(β) (95% CI)
Problem related to housing circumstances	1,3	0,5	5,9	0,015	3,5 (1,3; 9,6)
Low income	1,2	0,5	4,9	0,028	3,4 (1,1; 10)
Constant	-9,2	0,5	5,9	0,015	0

^a – reference category is HADS-D (asymptomatic depression; score ≤ 7); β is the estimated coefficient, with standard error SE (< 5); W is the Wald test statistic; Nagelkerke $R^2 = 0,31$; Exp(β) is the predicted change in odds for a unit increase in the predictor (Odds Ratio (OR)); CI – confidence interval. The logic model was adjusted for gender.

DISCUSSION

The Prevalence of Anxiety and Depression

According to our study, 20,7% of biomedical students were at a high risk of borderline anxiety. The prevalence of the case-level HADS anxiety was about 33% in all the biomedical students we had studied in Lithuania. The data obtained from our research were consistent with the scientific data of other authors (Quek et al., 2019). Those authors conducted meta-analysis and found the prevalence of anxiety to be 33,8% among medical students globally, which was substantially higher than the general population (Quek et al., 2019). As a comparison, the prevalence of anxiety among the general population was found to be 3–25% (Bandelow & Michaelis, 2015; Henry & Crawford, 2015; Kader et al., 2015; Lisspers et al., 1997). According to our data, the symptoms of mild depression were experienced by 10,3% of students. Meanwhile, the case-level HADS depression was present in 4,6% of biomedical students in Lithuania. Thus, the prevalence of severe depression was about 6 times lower among biomedical students in Lithuania compared to the prevalence of case-level depression found in medical students from other countries.

It should also be noted that according to our study, 20,7% of biomedical students were suffering from mild anxiety and 33,3% of students were diagnosed with severe anxiety. These results are unexpected, since usually a larger part of the cohort suffers from mild and only a smaller part from severe symptoms. Such data obtained from our study can be explained by the fact that in mental health, one of the more common comorbidities is that of depression and anxiety. Some estimates show that 60% of those with anxiety will also have symptoms of depression, and the numbers are similar for those with depression also experiencing anxiety (American Psychiatric Association, 2013; Brawman-Mintzer et al., 1993; Dunner, 2001; Kessler et al., 1995). There is no evidence that one disorder causes the other, but it is clear from our finding that biomedical students in Lithuania suffer from both disorders. According to our study, anxiety

symptoms have moderate correlations with depressive symptoms in a sample of biomedical sciences students. The comorbidity between anxiety and depression has been found to be high (up to 40%). One theory is that the two conditions have similar biological mechanisms in the brain, so they are therefore more likely to “show up” together. Another theory is that they have many overlapping symptoms, so people frequently meet the criteria for both diagnoses (an example of this might be the problems with sleep seen in both anxiety and depressive disorders). Additionally, when a person is triggered by an external stressor or stressors, these conditions often present simultaneously and are moderately heritable (approximately 40%), the evidence suggests a shared genetic risk across the internalizing disorders (Hettema, 2008).

External Stressors in Mental Disorders

Based on the data provided in the scientific literature, more depression and anxiety symptoms are exhibited among the students with a significant financial burden and a high level of academic stress (Shao et al., 2020). Previous studies have suggested that academic pressure, workload, and financial concerns may have an adverse effect on students' mental health (Bernhardt et al., 2012; Yusoff et al., 2013; Fawzy & Hamed, 2017). Wege et al. (2016) indicated that the expected financial hardships were significantly associated with mental health disorders and psychosomatic symptoms. At the same time, while conducting the biomedical study, we discovered that students with potential anxiety hazards were related to psychosocial circumstances. The problems related to education like the specificity of biomedical sciences studies and the difficulty to study the course were on the rise among biomedical students with severe anxiety in Lithuania. Furthermore, we confirmed the hypotheses that biomedical students who had bad relationship with classmates or friends showed higher anxiety scores, which was consistent with previous studies (Aktekin et al., 2001; Liu et al., 1997). In the meantime, the students with potential depression hazards were related only to economic circumstances. To be more precise, the main factors causing the symptoms of severe depression among our participants were related to poor housing and/or economic circumstances and low income. Given the increasing burden of depression globally, the deepening challenge of income inequality, a lower income of biomedical students was associated with higher odds of having depression not only in Lithuania but also in other Europe countries such as Finland and Poland (Freeman et al., 2016).

Limitations

Our study has a limitation because it does lower sample size, as with the start of the quarantine regime for COVID-19 disease, the direct availability of subjects decreased and we formed a representative sample using the 80% confidence interval (z-score is equal 1,28). In addition, the proportion of students in biomedical study programmes in the representative research sample was maintained not only by the number of students studying at the university, but also by the distribution of men and women in the educational institution. There are 3 times more women than men studying in biomedical science study programmes at Vilnius University of Lithuania. However, the group of female students is more than 3 times larger than group of male students enrolled in the study. This could lead to some statistical errors, and therefore, is a study limitation.

CONCLUSIONS

Biomedical students are at a high risk of anxiety and depression. The symptoms of mild anxiety and depression were experienced by 20,7% and 10,3% of students, respectively. Meanwhile, the prevalence of case-level anxiety and depression were present in 33,3% and 4,6% of Lithuanian biomedical students' population, respectively.

Students with potential anxiety hazards were related to psychosocial and economic circumstances. The problems related to education like the specificity of biomedical sciences studies (OR 4,8, $p < 0,001$) and the difficulty to study the course (OR 2,8, $p = 0,005$) including the problems related to socio-economic environment (conflicts with friends (OR 3,7, $p < 0,001$) and low income (OR 2,2, $p = 0,004$) are resulting in the rising numbers of biomedical students with severe anxiety in Lithuania. Students with potential depression hazards were related only to poor housing and/or economic circumstances (OR 3,5, $p = 0,015$) and low income (OR 3,4, $p = 0,028$).

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