

HEALTH PSYCHOLOGY | RESEARCH ARTICLE

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Cogent Psychology (2017), 4: 1283829



Received: 26 October 2016
Accepted: 14 January 2017
Published: 09 February 2017

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Reviewing editor:
Peter Walla, University of Newcastle,
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Depression and anxiety among medical students: Examining scores of the beck depression and anxiety inventory and the depression anxiety and stress scale with student characteristics

Bulent Ediz¹, Alis Ozcakir² and Nazan Bilgel^{2*}

Abstract: To evaluate the psychological well-being of medical students a relatively new self-report questionnaire (the depression, anxiety, and stress scale) was used alongside an established instrument (the beck depression and anxiety inventories) in a group of medical students. A total of 928 medical students (49.4% female; 50.6% male) participated voluntarily into this cross-sectional study. Students completed the Turkish versions of the depression anxiety stress scale (DASS), beck depression, and anxiety inventories together with a questionnaire about their socio-demographic characteristics. Mild and moderate levels of depression were found in 30.5% and severe and extremely severe levels of depression in 8.5% of students. Mild and moderate levels of anxiety and stress were present in 35.8% of the participants. Depression and anxiety were more frequently reported by female students. Depression was more frequent among first-year students, students in a poor economic situation and those who were not satisfied with their medical education. The frequency of depression and anxiety were seen to decrease with increasing grades. Bland and Altman plots showed an agreement between beck inventories and depression, anxiety, and stress scales, whereas the agreement between anxiety scales was found to be better than that of depression scales. Depression and anxiety are

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PUBLIC INTEREST STATEMENT

Medical students are exposed to many stressful experiences during their training and often they must cope with this situation alone. Studies showed that stress, anxiety, and depression is more common in the medical community than the general population. As future physicians mental well-being of the medical students is an important issue and should be considered seriously. Mental well-being is a prerequisite for them to fulfill their oath "primum non nocere (first, do no harm)." Improvements for a better, humanistic, and student-centered medical education, reorganization of existing mental health services for students according to their needs and follow up those in high risk could be helpful to protect and improve their mental health by increasing the perception of that they are not alone on their challenging way of becoming physicians. It would be a nice feeling to be sure of that none of their patients will be shouting after them: "Medice, curate ipsum! (Physician heal yourself)."

seen frequently among medical students in Turkey. The psychological distress was influenced only to a modest degree by traditional socio-demographic characteristics. Either the traditional Beck inventories or the newer depression anxiety and stress scales can be used for non-clinical screening purposes in individuals.

Subjects: Medical Education; Medical Statistics; Anxiety & Mood Disorders

Keywords: depression; anxiety; DASS-42; Beck inventories; medical students; Bland and Altman plots; measurement agreement

1. Introduction

A high frequency of depression and anxiety among medical students is an important issue in both Eastern and Western countries. The existing literature, mostly from the Western world and especially from the USA, consistently demonstrates higher overall psychological distress among medical students than in general population (Dahlin & Runeson, 2007; Dyrbye, Thomas, & Shanafelt, 2006; Goebert et al., 2009; Zoccolillo, Murphy, & Wetzel, 1986). Most of the studies on anxiety and depression have been cross-sectional surveys on small samples which have been intended to document prevalence and associations between depression/anxiety and students' demographic or personality characteristics and academic performance (Dahlin & Runeson, 2007; Dyrbye et al., 2006; Goebert et al., 2009; Zoccolillo et al., 1986). Different tools have been used in these studies and the one most employed is the Beck Depression Inventory (BDI). Both the prevalence and the levels of depression have been seen to vary from one medical school to other and also among different classes of medical study. Zoccolillo et al. (1986) found the two-year prevalence of depression to be 12%, and 22% of students had a BDI score higher than 9. The existing literature consistently demonstrates higher overall psychological distress among US and Canadian medical students relative to both the general population and age-matched peers (Dyrbye et al., 2006). A multicenter study among 2,000 medical students and residents in the USA found the overall depression rate as 21.2% and higher among female students (Goebert et al., 2009).

Studies from other parts of the world have also shown a high prevalence of depression and anxiety among medical students. The prevalence of depression among Swedish medical students was found to be 13% (Dahlin & Runeson, 2007). A study from Lithuania found that symptoms of anxiety and symptoms of depression were prevalent in medical students at 43 and 14%, respectively (Bunevicius, Katkute, & Bunevicius, 2008). Cross-cultural differences are important in experiencing and evaluating depressive symptoms, which may contribute to the differences in depression prevalence in Eastern and Western countries. Studies from Eastern countries have also revealed moderate to high depression prevalence among medical students (Aktekin et al., 2001; Basnet, Jaiswal, Adhikari, & Shyangwa, 2012; Bayram & Bilgel, 2008; Bostanci et al., 2005; Ozdemir & Rezaki, 2007; Roh, Jeon, Kim, Han, & Hahm, 2010; Sidana et al., 2012). A nationwide cross-sectional study from South Korea showed major depression prevalence among first-year medical students to be 6.5% and this was significantly higher among female students, those living alone and those with financial difficulties (Roh et al., 2010). A study from India found the overall prevalence of provisionally diagnosed depressive and major depressive disorders among medical students to be 21.5 and 7.6%, respectively, whereas the year of study and academic performance of the students had a statistically significant association with depression (Sidana et al., 2012). A study from Katmandu found the prevalence of depression to be 29.8% with significantly higher rates among female and first-year medical students (Basnet et al., 2012). Several studies from Turkey have also revealed a high prevalence of anxiety and depression among university students (Aktekin et al., 2001; Bayram & Bilgel, 2008; Bostanci et al., 2005; Karaoglu & Seker, 2010; Ozdemir & Rezaki, 2007). There are few studies concerning medical students. Aktekin and colleagues reported (2001) a worsening in overall mental health, and high levels of depression, and anxiety among first- and second-year medical students. Another study related to the mental well-being of medical students from the year 2008 reported that 20.3% of medical students had anxiety, 29.3% had depressive symptoms with significantly high levels of depression in male and second-year students (Karaoglu & Seker, 2010).

Many tools are available to assess overall mental health, including depression and anxiety, the most widely used of which is the Beck Depression Inventory—BDI—(Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). The BDI is a well-established questionnaire used to screen for depression, which has been validated for use in non-psychiatric patients, including students (Beck, Steer, & Carbin, 1988). The original version of BDI was revised to reflect the diagnostic criteria of the Diagnostic and Statistical Manual for Mental Disorders 4th Edition and as such, items assessing symptoms of weight loss, changes in the body image, and somatic preoccupation were deleted in BDI-II (Beck, Steer, & Brown, 1996). The original validation of the BDI-II was performed on students and on psychiatric outpatients (Beck & Steer, 1991; Beck, Steer, Ball, & Ranieri, 1996; Storch, Roberti, & Roth, 2004). These studies supported the BDI-II two factor structure measuring cognitive-affective and somatic depressive symptoms. The internal consistency was found to be high and the concurrent validity was supported by positive correlations with self-reported measures of depression and anxiety.

The Beck Anxiety Inventory (BAI) was developed to assess clinical anxiety (Beck, Epstein, Brown, & Steer, 1988). The developers presented the initial psychometric properties of the instrument and suggested that the BAI was internally consistent, had good test-retest reliability and discriminated between anxious and depressed individuals. Although the developers of the BAI emphasized its use for psychiatric patients, the focus upon physiological symptoms of anxiety may extend the utility of the instrument to non-clinical samples as well.

The DASS is a 42-item, single, self-reported measure of anxiety, depression, and stress, developed by Lovibond and Lovibond (1995a). The developers originally intended to create a measure that would maximally discriminate between depression and anxiety. During the scale's development, items not specifically related to depression and anxiety formed a third group characterized by chronic non-specific arousal. More items were added to this group, and the third scale, the stress scale, emerged. Lovibond and Lovibond (1995b) employed predominantly non-clinical samples for scale development on the basis that depression and anxiety represent dimensional, not categorical constructs. Studies have suggested that the DASS has adequate convergent and discriminant validity both in clinical and non-clinical populations (Crawford & Henry, 2003; Lovibond & Lovibond, 1995a, 1995b).

The present study aimed to answer the following questions:

- (1) What is the prevalence of depression, anxiety, and stress among medical students and are there any relationship between socio-demographic factors and psychological distress?
- (2) What is the measurement agreement of Beck Inventories and Depression Anxiety and Stress Scales?

2. Methods

2.1. Study design

This was a cross-sectional study, performed at a single medical school in Bursa, Turkey and was based on volunteering, anonymity, and self-reporting. This study was conducted in the 2010–2011 academic year and lasted 9 months.

2.2. Ethical issues

Approval for the study was granted by Institutional Ethics Committee (10.27.2009, with approval number 2009–3/14). The study was conducted in accordance with the Declaration of Helsinki. Written informed consent forms were seen and approved by the Institutional Ethics Committee during the approval process of the study. All participants gave written informed consent before taking part and the informed consent forms were collected in a separate file.

2.3. Study participants

All students who were enrolled at the corresponding medical school during the time of the study were accepted as possible study participants. Students who gave written consent for the participation were included in the study. At the time of the study a total of 1,338 students were enrolled and 928 (458 women; 470 men) participated in the study. The participation rate was 69.4%. The mean (Mean \pm SD) age of the participants was 21.99 ± 2.37 years. Distribution of the students according to their grades was as follows: first year 12.2%; second year 15.6%; third year 17.1%; fourth year 17.5%; fifth year 15.1%; sixth year 22.5%.

2.4. Study instruments

- (1) A questionnaire prepared by the researchers about the social and demographic characteristics of the participants.
- (2) The Depression Anxiety and Stress Scale- 42 (DASS-42) Turkish Version
- (3) The BDI-II is a 21-item self-reported questionnaire in which each item consists of four statements indicating different levels of severity of a particular symptom experienced over the past week (Beck, Steer, & Brown, 1996). Scores for all 21 items are summed up to yield a single depression score. The Turkish version of the BDI-II has demonstrated good convergent and discriminant validity and also high internal consistency (Kapci, Uslu, Turkcapar, & Karaoglan, 2008). Scores of 0–12 are considered in the normal range, 13–18 as mild, 19–28 as moderate, and scores of 29–63 are considered to indicate severe depression. In this study, the internal consistency (coefficient alpha) for the BDI-II Turkish Version was .92.
- (4) The BAI consists of 21 symptoms that are rated on a four-point severity scale referring to the experience of symptoms over the past week (Beck, Epstein et al., 1988). Scores for the 21 items are summed up to yield a single anxiety score. Scores between 0 and 17 are considered as normal and mild anxiety, whereas scores over 25 are considered as severe anxiety. The Turkish version of the BAI has demonstrated good convergent and discriminant validity and also high internal consistency (Ulusoy, Sahin, & Erkmn, 1998). In this study, the internal consistency (coefficient alpha) for the BAI Turkish Version was .92.

DASS-42 is a 42-item instrument measuring current (within the past week) symptoms of depression, anxiety, and stress. Each of the three scales consists of 14 items answered using a 0–3 scale, where 0 = did not apply to me at all, and 3 = applied to me very much or most of the time (range of possible scores for each scale is 0–42). Scores for the depression, anxiety, and stress scales are determined by totaling the scores for the relevant 14 items. Scores considered in the normal range are 0–9 for depression, 0–7 for anxiety, and 0–14 for stress. Values above these ranges indicate the degree of the problem from mild to extreme (Lovibond & Lovibond, 1995a).

The Turkish version of the DASS-42 is similar to the original and previous studies have demonstrated good convergent and discriminant validity and also high internal consistencies for all three scales of the DASS-42 in Turkish language (Bayram & Bilgel, 2008; Bilgel & Bayram, 2010). In this study, the internal consistencies (coefficient alpha) for each scale were: Depression .93; Anxiety .87; Stress .91.

2.5. Procedure

Printed questionnaires were distributed in closed envelopes to the participants and collected back after one week, again in closed envelopes. There were no identification marks either on the envelopes or on the questionnaires. Data were analyzed using IBM SPSS Statistics® v22 licensed institutionally. Descriptive statistics and binary logistic regression analyses were applied. Measurement agreement between Beck Inventories and DASS-42 was analyzed by the intraclass correlations (Shrout & Fleiss, 1979) and Bland Altman Plot Tests (Bland & Altman, 1999) using MedCalc® v12.7.2 licensed to one of the authors. Before these analyses the data were first transformed to a percentage of the full-scale score to take into account the differences in maximum scores.

3. Results

3.1. Socio-demographic characteristics

The distribution of students according to their socio-demographic characteristics is shown in Table 1.

At the time of the study most of the students' parents were married (96.8%) and alive (94.9%).

Table 1. Socio-demographic characteristics of students

Characteristics	No. (%) of participants
<i>Gender</i>	
Male	470 (50.6)
Female	458 (49.4)
<i>Mother's education</i>	
Primary or less	472 (50.9)
High school	250 (26.9)
University or more	206 (22.2)
<i>Father's education</i>	
Primary or less	214 (23.1)
High school	272 (29.3)
University or more	442 (47.6)
<i>Mother's occupation</i>	
Housewife	655 (70.6)
Other	273 (29.4)
<i>Father's occupation</i>	
Unemployed	23 (2.5)
Worker	129 (13.9)
Civil servant	254 (27.4)
Professional	227 (24.5)
Other	295 (31.8)
<i>Number of sisters/brothers</i>	
0-1	397 (42.8)
2-3	418 (45.0)
4+	113 (12.2)
<i>Economic status</i>	
Good	337 (36.3)
Moderate	546 (58.8)
Poor	45 (4.8)
<i>Was it your own preference to study medicine?</i>	
Yes	805 (86.7)
No	123 (13.3)
<i>Are you satisfied with your medical education?</i>	
Yes	316 (34.1)
No	338 (36.4)
Not sure	274 (29.5)

3.2. Depression, anxiety, and stress

According to the DASS-42 instrument the mean depression, anxiety, and stress scores (Mean \pm SD) were 9.04 ± 7.47 ; 7.85 ± 5.83 ; and 13.15 ± 7.38 , respectively. The percentages of participants in the severe and extremely severe levels for depression, anxiety, and stress were 8.5, 12.0, and 5.4%. According to the Beck Inventories the mean scores for depression and anxiety were 9.94 ± 9.32 , and 10.89 ± 9.45 , respectively. The percentage of participants with severe levels of depression was 5.3%, whereas that with severe levels of anxiety was 9.8%.

Students with and without depression and anxiety according to the DASS-42 and Beck Inventories are shown in Table 2.

According to both scales, 23.2% (215/928) of participants were depressed, whereas this percentage was 30.6% for the BDI and 39.0% for the DASS. According to both scales, 53.6% (497/928) of the participants were not depressed, whereas this percentage was 69.4% for the BDI and 61.0% for the DASS.

In terms of anxiety, 17.1% (159/928) were anxious according to both scales, whereas this percentage was 20.7% for the BAI and 34.2% for the DASS. According to both scales, 62.3% (578/928) of the study group were not anxious. This percentage was 79.3% for the BDI and 65.8% for the DASS.

We applied a binary logistic regression analysis to evaluate the possible impact of socio-demographic characteristics of students on depression, anxiety, and stress. We preferred a non-parametric statistical test because Q-Q plots showed that depression and anxiety scores were not normally distributed. Thus, students according to their DASS-42 scores with normal levels of depression, anxiety, and stress were coded as “0” and those with mild, moderate, severe, or extremely severe levels of depression, anxiety, and stress as “1.” The results of these analyses are shown in Table 3.

The following results were obtained from the regression analyses:

3.3. Depression

Depression decreased with increasing years ($p = .001$; 95.0% CI = .721–.919).

Depression was 1.8 times more among female students ($p = .000$; 95.0% CI = 1.331–2.391).

Depression was 1.4 times more among students with a moderate ($p = .044$; 95.0% CI = 1.008–1.898) and 2.9 times more among students with a poor ($p = .03$; 95.0% CI = 1.438–5.683) economic situation than those with a good economic situation.

Table 2. Distribution of students with and without depression and anxiety according to the scales

		DASS-42 depression scale		Total
		Depression (-)	Depression (+)	
BECK depression inventory II	Depression-	497 (77.2)*	147 (22.8)*	644 (69.4)**
	Depression+	69 (24.3)*	215 (75.7)*	284 (30.6)**
	Total	566 (61.0)*	362 (39.0)*	928 (100.0)
BECK anxiety inventory	DASS-42 anxiety scale		Total	
	Anxiety (-)	Anxiety (+)		
	Anxiety-	578 (78.5)*	158 (21.5)*	736 (79.3)**
Anxiety+	33 (17.2)*	159 (82.8)*	192 (20.7)**	
Total	611 (65.8)*	317 (34.2)*	928 (100.0)	

Note: Numbers in parentheses are percentages.

*% within rows.

**% within columns.

Table 3. Binary logistic regression analyses for depression, anxiety, stress, and socio-demographic characteristics of students

		B	Sig.	Exp (B)	95.0% CI EXP(B)	
					Lower	Upper
Depression	Grade	-.206	.001	.814	.721	.919
	Gender (Female)	.579	.000	1.784	1.331	2.391
	Economic status		.006			
	Moderate	.325	.044	1.384	1.008	1.898
	Poor	1.05	.003	2.858	1.438	5.683
	Number of sisters/brothers	.064	.199	1.066	.967	1.174
	Satisfaction with education		.001			
	Not satisfied	.670	.000	1.953	1.373	2.779
	Do not know	.224	.214	1.251	.879	1.782
Anxiety	Grade	-.214	.000	.807	.717	.910
	Gender (Female)	.585	.000	1.795	1.350	2.385
	Own preference to study medicine (No)	.597	.005	1.817	1.199	2.752
Stress	Grade	-.101	.107	.903	.798	1.022
	Gender (Female)	.652	.000	1.919	1.440	2.558
	Mother's occupation (Housewife)	.545	.021	1.725	1.085	2.745
	Economic status		.042			
	Moderate	.316	.047	1.371	1.005	1.872
	Poor	.735	.033	2.086	1.060	4.104

References: Gender = male students; mother's occupation = other; economic status = good; own preference to study medicine = yes; satisfaction with medical education = satisfied.

Depression was 1.9 times more among students who were not satisfied with their education ($p = .000$; 95.0% CI = 1.373–2.779).

3.4. Anxiety

Anxiety decreased with increasing years ($p = .000$; 95.0% CI = .717–.910).

Anxiety was 1.9 times more among female students ($p = .000$; 95.0% CI = 1.350–2.385).

Anxiety was 1.8 times more among students who did not choose to study medicine of their own will ($p = .005$; 95.0% CI = 1.199–2.752).

3.5. Stress

Stress was 1.9 times more among female students ($p = .000$; 95.0% CI = 1.440–2.558).

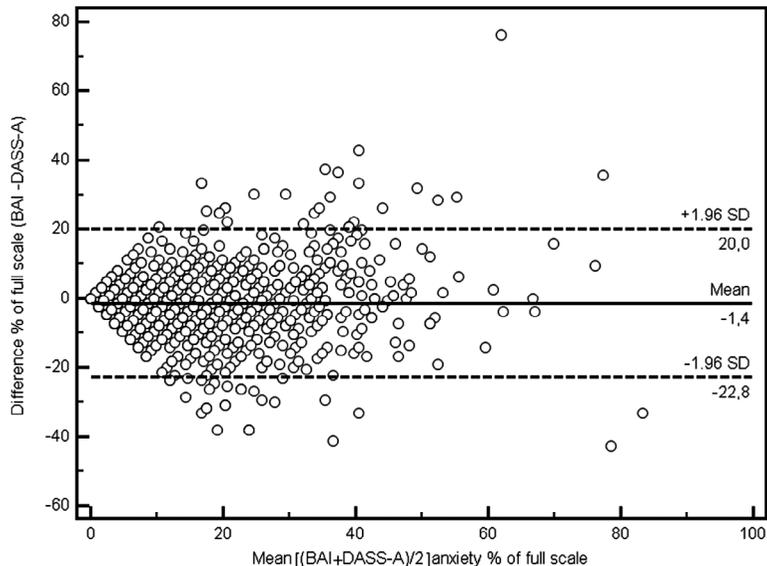
Stress was 1.7 times more among students whose mothers' were housewives ($p = .021$; 95.0% CI = 1.085–2.745).

Stress was 1.4 times more among students with a moderate ($p = .047$; 95.0% CI = 1.005–1.872) and 2.1 times more among students with a poor economic situation ($p = .033$; 95.0% CI = 1.060–4.104) than those with a good economic situation.

3.6. Measurement agreement

The intraclass correlations between DASS, BDI, and BAI were .82 (95% CI: .79, .84) and .83 (95% CI: .81, .85) for depression and anxiety, respectively. Figure 1 shows the Bland and Altman plots for

Figure 1. Bland and Altman plots of anxiety for the DASS-Anxiety and BAI.

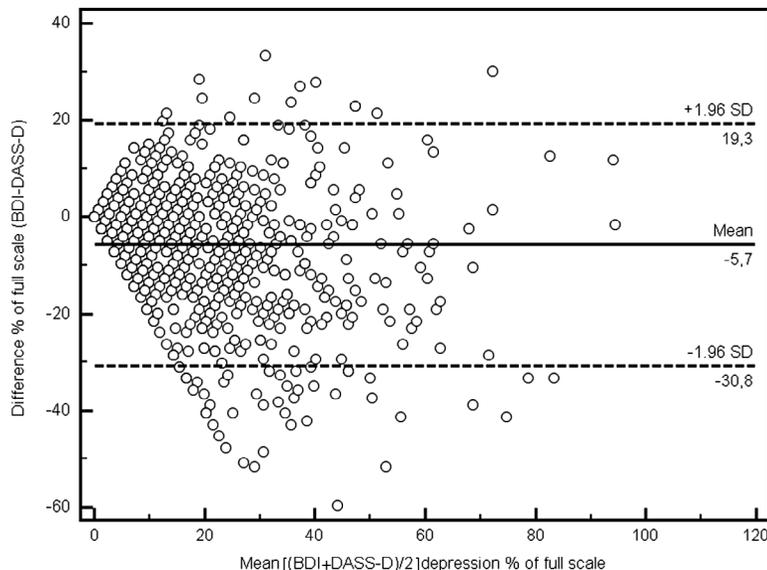


anxiety for the DASS-Anxiety and BAI after the data were first transformed to a percentage of the full-scale score to take into account the differences in maximum scores.

Figure 2 shows the Bland and Altman plots for depression for the DASS-Depression and BDI after the data were first transformed to a percentage of the full-scale score to take into account the differences in maximum scores.

For the anxiety subscale there is good agreement between the two tests, as shown by the relatively small number of points falling outside the 95% limits on the Bland and Altman plot. For the depression subscale the agreement between the two tests is not as good as it is for the anxiety subscale. The agreement seems to be better at higher scores. Most of the points falling outside the 95% limits are at lower scores.

Figure 2. Bland and Altman Plots of depression for the DASS-depression and BDI.



4. Discussion

Depression among medical students is a world-wide phenomenon and despite major changes in medical training it remains a significant issue. In this study, 30.5% of the participants were found to have mild and moderate and 8.5% severe and extremely severe levels of depression. Mild and moderate levels of anxiety were present in 35.8% and severe/extremely severe anxiety in 12.0% of the students. These numbers are higher than those obtained from Western countries and closer to the data of Eastern countries. A multicenter study among 2,000 medical students in the USA revealed that 12.0% had major and 9.2% had mild/moderate depression (Goebert et al., 2009). A study from Sweden found that 13.0% of medical students had depression (Dahlin & Runeson, 2007). Studies from the Eastern countries found higher prevalence of depression among medical students than those from Western countries. For example a study from India showed that 29.1% of the medical students had depression (Sidana et al., 2012), whereas studies from Iran and Pakistan reported the prevalence of depression as 52.6 and 35.1% (Aghakhani et al., 2011; Alvi, Assad, Ramzan, & Khan, 2010). These higher rates of depression could be due to the cultural and religious differences among Eastern and Western countries. Culture affects every aspect of emotions. The collectivism of Eastern cultures can result in feelings of a lost individual identity and sense of self. Identity issues such as these are linked with depression. Furthermore, many rules and social norms which are existing in collectivist cultures may produce many stressors which can lead to anxiety and depression. Our findings may reflect an urgent need to make improvements in medical education in the Eastern world.

The results of our study could not be compared with findings from the same age group of the general population as such data do not exist, but in Turkey the point prevalence rate for depressive symptoms is known to be nearly 20% and clinical depression has a rate of 10% (Küey & Güleç, 1989). It could be concluded that the prevalence of depressive symptoms among our study group was higher than that of the general population. Medical students in their first year reported more depressive symptoms than those of in subsequent years. Similar results have been obtained from some previous studies (Karaoglu & Seker, 2010; Ozdemir & Rezaki, 2007). However, another study from Turkey has pointed to a higher frequency of depressive symptoms among second-year students (Aktekin et al., 2001). The results of the current study showed that female students were at greater risk of depression than male students and this finding is in line with previous studies (Basnet et al., 2012; Dahlin & Runeson, 2007; Goebert et al., 2009; Sidana et al., 2012; Zoccolillo et al., 1986).

This study found a relationship between economic status, depression, and stress. Those who were in a poor economic situation had higher levels of depression and stress. This finding was in line with a previous study of university students in Turkey (Bayram & Bilgel, 2008) and with a study of medical students from South Korea (Roh et al., 2010).

The current study indicated that the psychological distress of medical students was influenced only to a modest degree by the traditional socio-demographic characteristics that we employed in our study. A more complete understanding of what constitutes risk of developing mental problems for medical students will demand a broader approach to study in this field, including measurement of student's personality, social network, and social support, which are known from other studies to be predictors for the development of psychological distress.

The degree of measurement agreement shown by Bland and Altman plots indicated that the two instruments identify broadly similar groups of individuals who may have depression and anxiety, there being no obvious evidence of any consistent systematic bias. However, the cut-off points for depression and anxiety on DASS-42 seem to be set too low. Thus, according to the BDI scores, 30.6% of the study group was depressed, whereas in terms of DASS scores this percentage was 39.0%. As shown in Figure 2, this discordance was more prevalent for lower scores and the values below zero indicated lower BDI scores. Although according to BAI scores, 20.7% and according to the DASS scores, 34.7% of participants were anxious, and the Bland and Altman plots showed better measurement agreement in terms of anxiety.

The conclusions of this study can be summarized as follows:

Our study revealed that female students, first-year students and students in poor economic status are under the risk of developing depression and they should be followed up for early signs of depression. Studies concerning the subjective well-being of medical students should be continued. Improvements for a better, humanistic, and student-centered medical education would be helpful in diminishing the psychological distress of medical students. Reorganization of the existing mental health and counseling services according to the needs of the students will enhance the preventive and treatment capacity of these services and may increase the attendance of those who are seeking help. As a final conclusion we can mention that either the traditional Beck Inventories or the DASS-42 scale can be used for screening purpose in non-clinical individuals to detect a subgroup that may benefit from appropriate psychological or psychiatric interventions.

The cross-sectional, descriptive nature of the study and in particular, the self-reporting assessment of depression, anxiety, and stress should be mentioned as a relevant shortcoming of the study. Furthermore, the results of this study are limited to the students in one medical faculty and cannot be generalized. This study would be more interesting and scientific if we could have the opportunity of clinical assessments for the students with positive test results. Unfortunately, because of the time constraint, organizational and financial obstacles we were not able to perform these clinical evaluations. Further studies are needed to complete these assessments. The cross-sectional nature of this study does not allow causal inference and further studies with longitudinal nature are needed.

Acknowledgments

The authors wish to thank Mrs C.J. Walker for proofreading and editing the English language of this manuscript.

Funding

The authors received no direct funding for this research.

Author Contributions

Bulent Ediz, Alis Ozcakir, and Nazan Bilgel have made substantial contributions to the conception, design, and acquisition of data.

Bulent Ediz has made substantial contributions to analysis and interpretation of data.

Nazan Bilgel have been involved in drafting the manuscript.

Bulent Ediz and Alis Ozcakir have been involved in revising it critically for important intellectual content.

All authors have given final approval of the version to be published.

Competing Interests

The authors declare no competing interest.

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Citation information

Cite this article as: Depression and anxiety among medical students: Examining scores of the beck depression and anxiety inventory and the depression anxiety and stress scale with student characteristics, Bulent Ediz, Alis Ozcakir & Nazan Bilgel, *Cogent Psychology* (2017), 4: 1283829.

Cover image

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