

Examination of Factors Affecting Mental Distress Among Dental Students: A Cross-Sectional Study

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ABSTRACT

Objective: Depression, anxiety, and stress (DAS) are quite common among dental students. It should be the duty of the educational institution to deal with these mental disorders that are observed during a challenging education. The aim of this study was to determine the levels of DAS among dental students and explore possible factors that may cause these disorders.

Methods: This cross-sectional study was conducted among dental students at Çanakkale Onsekiz Mart University, which offers dental education in Turkey. The form created with Google Forms was distributed to the students with a URL link to collect socio-demographic information and data related to DAS levels.

Results: The majority of dental students exhibited levels of DAS severity ranging from 'severe' to 'extremely severe'. Females exhibited higher levels of anxiety and stress than males, while their resilience was lower. Those with financial support responsibilities towards their families similarly showed significantly higher anxiety and stress levels ($p < .05$, for both). It was also found that DAS levels increased up to the fourth-grade, peaking at the fourth-grade, and then significantly decreased in the fifth-grade. Dissatisfaction regarding examination and teaching methods was associated with the DAS level of dental students.

Conclusion: It is believed that methodological improvements in education will have a positive contribution to the mental health of dental students. Dealing with related mental disorders is also of critical importance for enhancing the quality of treatments provided to patients and consequently, making progress in the healthcare system.

Keywords: Anxiety, dental students, depression, mental health, stress

1. INTRODUCTION

Mental disorders such as depression and anxiety, which are attracting increasing attention globally, negatively affect individuals' lives, performance, working life, etc (1). In addition, stress occurs when environmental pressure and demands exceed the abilities of individuals (2). Therefore, depression, anxiety, and stress (DAS) levels are critical and significant indicators of mental health (3).

Deterioration in mental health, which is an important determinant of quality of life and satisfaction, has become a common problem for university students in developed and developing countries (4). Students need to adapt to the university period to cope with academic demands along with new challenges and responsibilities (5). It has been shown

that students who choose departments that provide health education are more prone to stress (6). However, stress is higher among dental students compared to other healthcare branches (7). High demand due to the need for manual skills for clinical practice, sensitive and greater laboratory workload, increased competition, and most importantly, a small working area such as the oral cavity in patients who mostly have phobias, are among the reasons. Moreover, due to its versatility, dental education involves the challenging task of both conveying up-to-date content and preparing students to overcome the challenges that may arise after graduation. Therefore, students are faced with an overloaded curriculum (8).

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Eremsoy et al. (9) stated that the relationship between anxiety and depression is very important. In addition, increased stress might be related to moderate anxiety and depression symptoms (10). Previous research showed that students who frequently exhibit stressful lives experience high levels of burnout (11). Similarly, Koh et al. (12) detected high levels of IL-2 in highly stressed students and demonstrated the effect of stress on the immune system.

Considering the relationships between stress, depression, and anxiety, identifying and resolving the causative factors is extremely critical. This type of information has extremely important contributions to institutions that determine health policies in improving the mental health of students (13). Although there are studies conducted for this purpose, there is a lack of research on which factors are effective among dental students. In addition to all these reasons, the university should be taken into consideration in dental education policy as an institution that supports students' mental health and quality of life in addition to dental education (14). Therefore, this study aims to shed light on health policymakers by determining the levels of DAS among dental students and exploring possible factors that may cause these disorders.

2. METHODS

2.1. Ethics Statement

This cross-sectional study was approved by the Ethics Committee of Çanakkale Onsekiz Mart University Graduate Education Institute (*project no*: 2023-YÖNP-0400; *app. no*: 07/44) and was conducted in accordance with the Helsinki Declaration. All students participating in the study were informed about the purpose of the study. They participated in the study voluntarily and had the right to withdraw their participation.

2.2. Study Population and Design

The data of the study were gathered from dental students of the Faculty of Dentistry at Çanakkale Onsekiz Mart University. The power of the study was calculated as 0.95 using G*Power software (V3.1.9.2) (α -error 0.05, and effect size 0.25). Due to the intense curriculum, lack of common free time, and most importantly, to fill out the questionnaires without feeling pressured, a data collection form was created using Google Forms, and a URL link was distributed to the students. There was an information note at the beginning of the questionnaire, accompanied by detailed information about the study, explaining that completion was voluntary, anonymous, and not part of the course notes. Participants who were younger than 18 years of age, did not complete the psychometric tests or refused to confirm the informed consent form were not included in the study. At the end of the study, data from 198 participants who completed the questionnaire completely were included in the final analysis. To ensure data security, the form was not set to public. The form consisted of questions to gather data on the following

main two headings: socio-demographic information and questionnaires.

2.3. Data Collection Tools

2.3.1. Socio-demographic information form

The following information about the participants was recorded: gender, age, body mass index, number of siblings, place of birth, and family status. In addition, information about their university life, such as grade, grade repetition, and last term's average, as well as information about their social life, such as smoking, alcohol consumption, substance addiction, and place of residence, were recorded. Additionally, educational, social, and family information regarding possible stressors were also recorded.

2.3.2. Depression Anxiety Stress Scale-21 (DASS-21)

DASS-21, which is the short form of the Depression Anxiety Stress (DAS) Scale, measures DAS simultaneously, was designed to provide the highest level of discrimination between the three components and also exhibits high validity and reliability. The validity of DASS-21 for the Turkish population was confirmed by Saricam (15). This scale, which has 21 items, is scored on a 4-point Likert scale from zero (never) to 3 (always).

2.3.3. The Patient Health Questionnaire-9 (PHQ.9)

PHQ.9 is a nine-item survey intended to identify depression in primary care and other medical settings. The standard cut-off score determined in the first study on PHQ.9 in determining possible major depression is 10 or above (16).

Due to the widespread usage of the PHQ.9 for evaluating and tracking the severity of depression, a seven-item anxiety scale, designed with a response format similar to the PHQ-9, was created to diagnose generalized anxiety disorder (GAD.7) (17). While its primary objective was originally to diagnose generalized anxiety disorder, it was soon discovered that the GAD.7 also demonstrated a high degree of accuracy in screening for panic disorders, social anxiety, and post-traumatic stress disorder (18). Additionally, the PHQ-15, which evolved from the original PHQ research, is now increasingly employed to gauge the severity of somatic symptoms and potentially identify the presence of somatization and somatoform disorders (19).

2.3.4. Connor-Davidson Resilience Scale (CD-RISC)

Among various tools for measuring resilience, the original CD-RISC received high marks in psychometric assessments, demonstrating sufficient internal consistency, test-retest reliability, and construct validity. A factor analysis of the 25-item scale identified five dimensions related to personal characteristics that facilitate successful adaptation to adversity: personal competence, high standards, and tenacity; trust in one's instincts, tolerance of negative emotions, and

the fortifying effects of stress; positive acceptance of change and secure relationships; control; and spirituality (20).

Spearman correlation was applied. The significance level was set at $p < .05$.

2.4. Statistical Analysis

Statistical analyses were performed using SPSS (version 20.0.; IBM SPSS Statistics for Windows, Armonk, NY) and MedCalc® statistical software (version 22.002; MedCalc Software Ltd, Ostend, Belgium). The Kolmogorov-Smirnov test was applied to test the normality of data. Descriptive analysis involved the utilization of means, standard deviations, and percentages. To conduct a comparative analysis, we employed Independent Samples t-tests and One-way ANOVA. In the case of correlational analysis, the

3. RESULTS

Of the 198 dental students included in this study, 138 were female participants (69.7%) and 60 were male participants (30.3%), and their average ages were 21.43 ± 1.43 and 22.10 ± 1.75 , respectively. Of the included participants, 28 (14.1%) were first-grade, 35 (17.7%) were second-grade, 61 (30.8%) were third-grade, 38 (19.2%) were fourth-grade and 36 (18.2%) were fifth-grade students. Other sociodemographic characteristics of the dental students participating in the study are presented in Table 1.

Table 1. Comparison of DAS scores among dental students with different sociodemographic characteristics.

Variable	DASS-21			PHQ.9 mean±SD	GAD.7 mean±SD	PHQ.15 mean±SD	CD-RISC mean±SD
	Depression mean±SD	Anxiety mean±SD	Stress mean±SD				
Gender							
Male (n=60)	11.18±5.03	7.97±5.56	11.08±4.96	14.15±7.19	11.87±6.05	12.32±6.18	63.85±16.35
Female (n=138)	12.33±5.35	10.33±5.46	12.79±4.91	16.53±6.34	13.80±5.37	17.02±5.92	54.83±16.07
p-value (t)	.159 (1.415)	< .05* (2.780)	< .05* (2.241)	< .05* (2.328)	< .05* (2.237)	< .001** (5.070)	< .001** (-3.609)
BMI							
Below 18.5 (n=27)	12.56±5.24	10.15±4.63	13.26±4.58	16.11±6.35	14.07±5.41	17.85±5.19	58.89±15.96
18.5 – 24.9 (n=137)	11.76±5.26	9.51±5.76	12.05±4.88	15.66±6.72	13.09±5.56	15.33±6.47	56.76±16.71
25.0 – 29.9 (n=29)	11.93±5.57	9.41±5.65	12.14±5.55	15.69±7.22	12.97±6.07	14.79±6.57	62.07±16.67
30.0 and above (n=5)	15.40±3.36	10.60±6.47	13.80±6.76	18.80±4.87	13.40±7.70	15.40±7.54	46.40±14.43
p-value (F)	.448 (.889)	.923 (.160)	.612 (.605)	.772 (.373)	.861 (.250)	.252 (1.374)	.182 (1.638)
Number of siblings							
0 (n=16)	12.75±4.74	10.81±5.99	11.50±4.61	15.38±6.48	13.44±5.85	14.88±6.72	54.38±11.86
1 (n= 72)	12.51±4.88	10.14±5.58	12.86±4.66	16.97±5.97	13.93±5.26	16.86±5.58	55.81±17.18
≥2 (n= 110)	11.53±5.58	9.09±5.52	12.00±5.22	15.11±7.09	12.71±5.84	14.87±6.71	59.18±16.82
p-value (F)	.390 (.946)	.312 (1.172)	.424 (.861)	.178 (1.742)	.357 (1.036)	.107 (2.263)	.298 (1.218)
Place of birth							
Town/city (n=144)	12.13±5.16	9.87±5.69	12.22±5.04	16.06±6.40	13.18±5.65	15.90±6.38	55.17±15.15
District/Village (n=54)	11.61±5.60	8.93±5.26	12.41±4.83	15.13±7.41	13.30±5.67	14.78±6.31	63.96±18.79
p-value (t)	.542 (.610)	.291 (1.058)	.816 (-.233)	.383 (.875)	.898 (-.128)	.269 (1.108)	< .05* (-3.085)
Family status							
Together (n=171)	11.96±5.21	9.81±5.51	12.38±5.00	15.94±6.53	13.42±5.64	15.65±6.35	57.08±16.63
Divorced (n=14)	11.50±5.65	7.86±5.61	11.14±4.66	15.57±6.32	11.57±5.67	14.86±5.63	61.71±13.56
Death (n=13)	12.85±6.03	8.85±6.48	12.08±5.22	14.38±9.10	12.23±5.63	15.69±7.71	59.46±20.04
p-value (F)	.792 (.233)	.399 (.924)	.665 (.409)	.717 (.333)	.406 (.906)	.904 (.101)	.556 (.589)
Responsibility for financial support to the family							
Yes (n=11)	14.64±6.10	13.73±6.62	16.00±5.29	18.55±10.42	15.91±6.73	18.55±6.36	57.09±13.78
No (n=187)	11.83±5.19	9.37±5.44	12.05±4.88	15.65±6.40	13.05±5.55	15.42±6.34	57.59±16.83
p-value (t)	.086 (1.726)	< .05* (2.552)	< .05* (2.594)	.382 (.913)	.103 (1.640)	.114 (1.587)	.923 (-.097)
Last term's average							
AA (n=1)	14.00	14.00	20.00	17.00	12.00	24.00	73.00
BA (n=13)	11.15±5.93	9.00±5.80	13.85±5.44	15.85±6.19	13.77±6.04	14.62±6.90	59.85±18.69

BB (n=106)	11.74±5.51	9.76±5.65	12.36±5.11	15.45±6.85	13.27±5.62	15.84±6.32	57.08±15.63
CB (n=61)	12.67±5.03	9.92±5.59	12.46±4.61	16.93±6.38	13.84±5.48	16.21±6.23	57.98±17.63
CC (n=11)	10.36±3.44	7.64±5.20	9.09±3.94	12.64±7.45	9.55±5.87	11.36±6.49	60.09±18.66
Unknown (n=6)	13.83±5.12	8.00±5.33	10.00±4.60	16.17±6.49	11.50±5.68	13.50±5.09	49.83±19.17
p-value (F)	.625 (.699)	.718 (.577)	.086 (1.964)	.475 (.910)	.294 (1.235)	.139 (1.687)	.738 (.550)
Place of residence							
With family (n=11)	11.55±6.07	8.64±5.85	11.64±5.64	13.27±6.81	10.36±4.50	12.18±4.69	54.91±18.12
At home (n=128)	12.30±5.17	9.68±5.74	12.62±4.96	15.91±6.69	13.26±5.90	15.87±6.36	58.75±16.69
Hostel (n=59)	11.39±5.37	9.64±5.25	11.64±4.90	16.07±6.66	13.64±5.15	15.64±6.55	55.49±16.28
p-value (F)	.530 (.636)	.838 (.177)	.422 (.867)	.429 (.849)	.206 (1.591)	.183 (1.712)	.400 (.922)
Smoking							
Yes (n=85)	12.53±5.06	9.84±5.88	12.38±4.95	16.48±6.84	13.96±6.02	16.20±6.46	57.59±18.74
No (n=113)	11.58±5.41	9.44±5.36	12.19±5.02	15.30±6.54	12.65±5.29	15.14±6.29	57.55±14.96
p-value (t)	.208 (1.263)	.625 (.489)	.800 (.254)	.219 (1.233)	.103 (1.636)	.248 (1.159)	.987 (.017)
Alcohol consumption							
Yes (n=115)	12.48±5.11	10.06±5.61	12.69±4.83	16.82±6.35	13.90±5.44	16.46±6.24	56.34±17.32
No (n=83)	11.30±5.45	8.99±5.51	11.70±5.14	14.41±6.91	12.25±5.80	14.40±6.38	59.27±15.60
p-value (t)	.121 (1.556)	.183 (1.337)	.168 (1.383)	< .05* (2.537)	< .05* (2.050)	< .05* (2.274)	.223 (-1.222)
Substance addiction							
Yes (n=7)	11.29±5.91	10.71±5.44	10.29±8.52	14.71±11.34	11.71±7.83	12.00±7.64	56.43±18.80
No (n=191)	12.01±5.26	9.57±5.60	12.35±4.82	15.85±6.49	13.27±5.56	15.73±6.30	57.61±16.61
p-value (t)	.722 (-.357)	.596 (.531)	.548 (-.636)	.801 (-.263)	.476 (-.715)	.128 (-1.527)	.855 (-.184)
Working outside of school							
Yes (n=17)	11.29±5.17	10.12±5.92	12.18±6.17	16.29±7.94	12.88±6.19	13.71±7.28	63.29±17.28
No (n=181)	12.05±5.29	9.56±5.56	12.28±4.87	15.76±6.58	13.24±5.60	15.77±6.27	57.03±16.53
p-value (t)	.573 (-.564)	.697 (.391)	.934 (-.083)	.755 (.313)	.802 (-.252)	.201 (-1.282)	.138 (1.489)
History of psychiatric disease							
Present (n=40)	12.88±5.17	10.93±5.99	12.68±5.10	17.55±6.61	13.65±5.78	16.78±6.01	51.90±17.47
Absent (n=158)	11.76±5.29	9.28±5.44	12.17±4.95	15.37±6.65	13.10±5.62	15.30±6.44	59.00±16.17
p-value (t)	.233 (1.197)	.096 (1.674)	.568 (.572)	.065 (1.857)	.584 (.549)	.190 (1.314)	< .05* (-2.440)
Family history of psychiatric disease							
Present (n=54)	12.87±5.25	10.91±6.17	12.96±5.02	18.39±6.49	14.93±6.04	17.33±6.79	53.15±17.48
Absent (n=144)	11.65±5.26	9.13±5.29	12.01±4.95	14.84±6.52	12.57±5.36	14.94±6.10	59.22±16.07
p-value (t)	.148 (1.452)	< .05* (1.881)	.233 (1.197)	< .05* (3.418)	< .05* (2.660)	< .05* (2.379)	< .05* (-2.312)
Grade							
1 st (n=28)	9.64±5.47	7.89±4.57	9.71±4.50	14.18±6.47	11.50±4.72	12.96±6.27	59.00±13.42
2 nd (n=35)	12.29±5.43	9.23±5.57	11.54±4.80	15.97±6.20	13.17±5.70	15.31±6.24	58.20±20.79
3 rd (n=61)	12.38±4.31 [†]	10.57±5.35 [†]	12.80±4.66 [†]	16.36±5.71	13.66±5.01	16.74±5.65 [†]	56.44±15.80
4 th (n=38)	14.82±4.99 ^{††§}	11.89±5.82 ^{††§}	15.29±4.43 ^{††§}	18.53±6.80 [†]	15.42±5.19 [†]	17.97±6.94 [†]	54.84±17.59
5 th (n=36)	9.86±5.33 ^{§††}	7.28±5.38 ^{§††}	10.89±5.02 ^{††}	13.11±7.66 ^{§††}	11.50±6.91 ^{††}	13.47±5.97 ^{§††}	60.61±14.95
p-value (F)	< .001** (6.313)	< .05* (4.641)	< .001** (7.214)	< .05* (3.766)	< .05* (3.162)	< .05* (4.301)	.603 (.686)
The number of grade repetitions							
0 (n=176)	11.95±5.31	9.51±5.44	12.44±4.86	15.77±6.64	13.32±5.53	15.62±6.25	57.40±16.35
1 (n=20)	12.50±5.29	10.30±6.95	11.25±5.75	16.90±6.55	12.75±6.26	15.85±7.24	57.50±19.47
≥2 (n=2)	10.00±1.41	11.50±4.95	7.50±6.36	8.50±12.02	8.50±10.61	11.00±9.90	72.50±12.02
p-value (F)	.787 (.240)	.746 (.293)	.236 (1.454)	.232 (1.474)	.453 (.795)	.586 (.536)	.445 (.812)
Stressors							
Only education (n=72)	11.74±4.92	9.86±5.51	12.65±4.75	15.53±6.89	13.18±5.90	15.71±6.65	61.64±16.93

Only social (n=8)	9.25±6.86	4.00±3.02 [†]	9.13±5.14	8.88±6.15 [†]	9.50±5.86	12.00±5.45	64.63±20.64
Only others (n=8)	4.75±1.83 [†]	5.38±2.77 [†]	4.63±2.67 ^{†‡§}	9.25±3.69 [†]	7.63±0.52 [†]	10.88±5.72	64.13±8.66
Education and social (n=41)	11.59±4.89 [§]	8.68±4.75 [‡]	12.07±4.86 [§]	15.51±5.76 ^{‡§}	12.73±5.09 [§]	15.95±5.38 [§]	55.56±14.69
Education and others (n=17)	10.65±4.87 [§]	8.41±5.27 [‡]	11.82±4.19 [§]	14.94±6.03 ^{‡§}	13.94±5.96 [§]	14.59±6.86	58.53±18.67
Social and others (n=1)	14.00 [§]	3.00	8.00	11.00	9.00	9.00	47.00
All (n=51)	14.63±4.87 ^{†‡§†‡‡‡}	12.08±5.84 ^{†‡§†‡‡‡}	13.82±4.72 ^{‡§}	18.94±6.12 ^{†‡§†‡‡‡}	14.94±5.27 ^{‡§††}	16.92±6.41 ^{‡§}	51.18±15.62 ^{†‡§}
p-value (F)	< .001** (6.104)	< .001** (4.867)	< .001** (5.371)	< .001** (5.396)	< .05* (3.058)	.092 (1.849)	< .05* (2.731)
Overburdened exam schedule							
Yes (n=165)	12.38±5.09	10.05±5.60	12.84±4.93	16.47±6.59	13.77±5.75	16.24±6.41	57.31±16.73
No (n=33)	10.00±5.78	7.39±5.01	9.42±4.20	12.48±6.23	10.42±4.09	12.39±5.15	58.85±16.37
p-value (t)	< .05* (2.399)	< .05* (2.534)	< .001** (3.720)	< .05* (3.203)	< .05* (3.183)	< .05* (3.241)	.629 (-.484)
Dissatisfaction with exam criteria							
Yes (n=165)	12.53±5.17	10.05±5.68	12.87±4.86	16.44±6.71	13.75±5.62	16.26±6.44	57.55±17.02
No (n=33)	9.24±4.98	7.42±4.53	9.30±4.50	12.67±5.62	10.52±4.99	12.27±4.84	57.67±14.88
p-value (t)	< .05* (3.359)	< .05* (2.498)	< .001** (3.890)	< .05* (3.019)	< .05* (3.074)	< .05* (3.370)	.970 (-.038)
Dissatisfaction with the teaching method							
Yes (n=152)	12.89±5.11	10.20±5.74	12.95±4.95	16.73±6.54	13.83±5.62	16.10±6.46	56.70±16.78
No (n=46)	9.00±4.69	7.65±4.56	10.04±4.41	12.76±6.30	11.17±5.26	13.93±5.81	60.43±16.02
p-value (t)	< .001** (4.604)	< .05* (2.762)	< .001** (3.572)	< .001** (3.639)	< .05* (2.849)	< .05* (2.036)	.183 (-1.337)

* $p < .05$, ** $p < .001$, t: Independent Samples t-test, F: One-way ANOVA

†, ‡, §, ††, and ††† show the significant difference according to the item in the 1st, 2nd, 3rd, 4th, and 5th rows, respectively.

BMI: body mass index, DASS: Depression Anxiety Stress Scale, PHQ: Patient Health Questionnaire, GAD: Generalized Anxiety Disorder, CD-RISC: Connor-Davidson Resilience Scale

The frequencies of DAS severity levels among dental students were presented in Figure 1. According to the data obtained from females, it was observed that anxiety and stress levels were significantly higher than males ($p < .05$, for both). In addition, PHQ.9, GAD.7, PHQ.15 and CD-RISC values similarly showed significant differences compared to males. Significant differences were also found among places of birth; Participants born in a district/village reported higher resilience than participants born in a town/city ($p < .001$). Those with financial support responsibilities towards their families similarly showed significantly higher levels of anxiety and stress ($p < .05$, for both). The scale scores of participants who consumed alcohol were found to be higher than those who did not consume alcohol, but these scores were statistically significant only in the PHQ.9, GAD.7, and PHQ.15 scales ($p < .05$ for these scales). Among those who stated that they had a family history of psychiatric disease, a significant difference was found in the anxiety level (DASS-21) and the other scales ($p < .05$). In addition, it was observed that participants who reported a history of psychiatric illness both in themselves and their families showed less resilience ($p < .05$). All participants also reported high levels of DAS related to education (Table 1).

When the effect of the grades of all participants on the scores was evaluated, it was found that DAS levels increased towards the fourth-grade, with the highest levels being displayed in the fourth-grade. It was determined that all these levels decreased significantly in the fifth-grade. In addition, when DASS-21 was evaluated as three categories, statistically significant differences were obtained between the DAS severity levels of all participants in the different grades ($p < .001$ among all grades) (Figure 2). Accordingly, the 'extremely severe' level had the highest score in the depression and anxiety categories, and the 'severe' level had the highest score in the stress category.

When the correlations of DASS-21 categories with each other and with other scales were analyzed, it was seen that statistically significant results were obtained. Accordingly, the categories showed a positive correlation both with each other (Figure 3) and with the PHQ.9, GAD.7, and PHQ.15 scales showed a negative correlation with the CD-RISC scale (Figure 4).

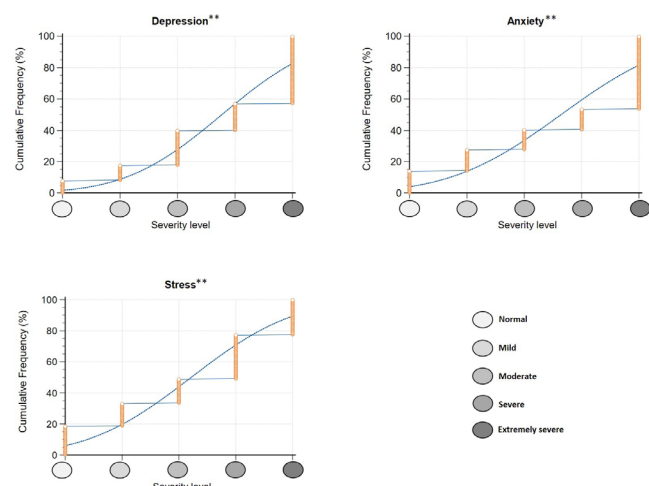


Figure 1. The frequencies of DAS severity levels among dental students. ** $p < .001$ among all levels

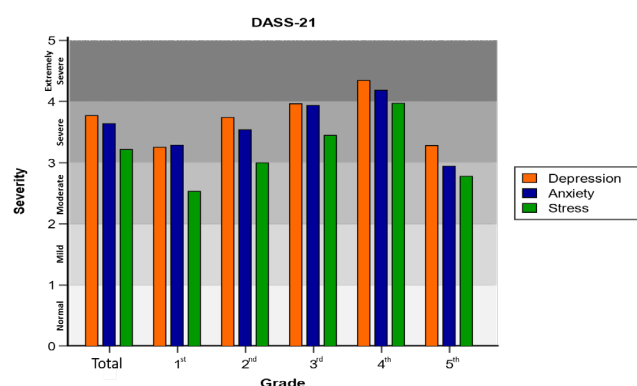


Figure 2. Comparison of participants' DAS levels according to their grades.

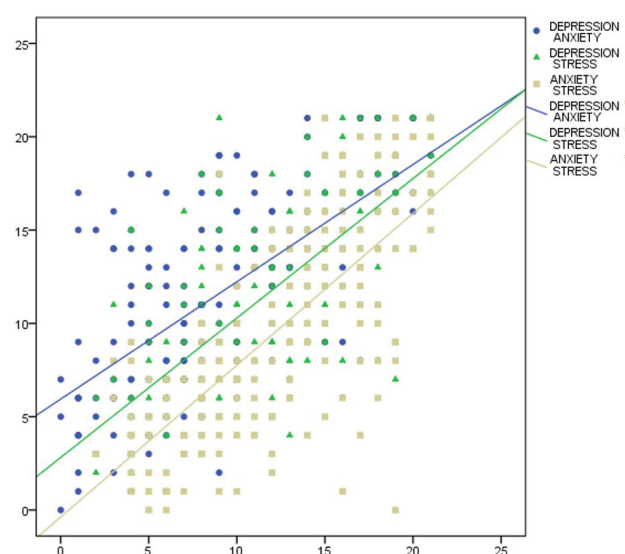


Figure 3. Correlation between DAS values. ** Correlation is significant at the .01 level.

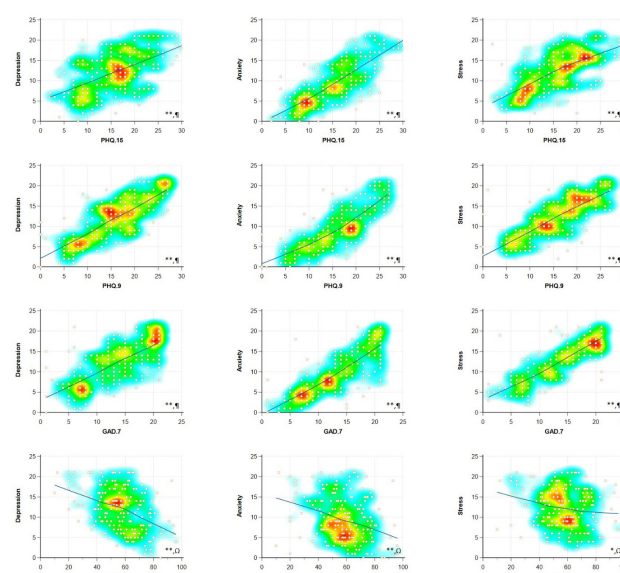


Figure 4. Correlation of DAS levels with the other evaluated scales. * $p < .05$; ** $p < .001$; ¶ rs (+); Ω rs (-)

4. DISCUSSION

Dentistry is one of the most stressful branches among healthcare professionals who work under challenging conditions. Reaching optimum academic knowledge in different topics in a limited period and being able to deal with the oral and dental concerns of patients immediately and efficiently are among the requirements of dental students to be responsible dentists (21). Additionally, dental schools are stressful due to their competitive nature (22). Therefore, the main purpose of this study was to determine the severity and possible factors that may affect DAS levels among dental students.

According to the results of our study, the severity levels of depression and anxiety, ranging from 'severe' to 'extremely severe', among dental students were recorded as 60.1% and 59.6%, respectively. The dental students participating in our study showed a higher prevalence of depression and anxiety than some previously reported rates while showing similar rates to the others. It is assumed that these different rates obtained from different studies are the result of environmental factors such as economic burden due to education and lack of familial support, as well as cultural differences in perception of stress or stressful situations (23). In a study conducted on dentistry students in Turkey, faculty and administration, workload, and students' perceptions of their self-efficacy were identified as the most stress-provoking factors (24). Additionally, certain comorbid medical conditions can also influence DAS scores. A recent study from Turkey reported a high prevalence of bruxism among dentistry students, with students who had bruxism showing higher DAS scores and more sleep-related problems compared to those without bruxism (25). Although the values obtained from the DASS-21 scale did not reach statistical significance, our findings indicated that students who consumed alcohol

had statistically higher depression, anxiety, and somatization scores according to the PHQ (Table 1). The presence of depression and anxiety, which are the most important mental disorders affecting productivity, negatively affects the improvement of health as well as the development of healthcare policies. Therefore, it is certainly expected that the efforts to deal with these disorders and their causes will provide a social benefit that cannot be ignored. Moreover, diagnosis and treatment of these disorders are possible as primary care (26).

Some mental disorders differ in prevalence according to gender and the predominance of disorders such as depression and anxiety in women has been identified (27). The findings of the current study showed that female dental students exhibited significantly higher levels of anxiety and stress than male students (Table 1). Although different findings on this subject were reported in the literature, studies mostly indicate higher levels of anxiety and stress in females (28,29). Consistent with our findings, some studies conducted among dentistry students in Turkey have reported higher scores for depression, anxiety, and stress in female students (24,30). Similar results have also been observed in other countries (31). In addition to the existing literature, our current study demonstrates that male dentistry students exhibit greater psychological resilience and report fewer somatic complaints compared to female students (Table 1). These results could be attributed to the higher likelihood of voicing concerns and emotions in women (32) or to the higher proportion of female students for this study. However, due to the importance of this issue, it is important to track possible environmental risk factors that lead to the gender gap, that is, changes in socioeconomic and cultural situations, and their effects on future symptoms in terms of psychopathologies in gender differences (33).

Psychological resilience refers to an individual's ability to cope with and adapt to adverse conditions. This is crucial for training well-rounded, successful health professionals capable of managing the various challenges they will encounter (34). One of our significant findings regarding psychological resilience is that students raised in urban settings and with a history of psychiatric illness exhibit lower resilience scores than those their counterparts (Table 1). When considering the entire sample, we observed that depression, anxiety, and stress subscale scores were all positively correlated with other measures of psychological well-being (PHQ-9, PHQ-15, and GAD-7), showing high statistical significance. Conversely, a significant negative correlation was found between these subscales and psychological resilience scores. As students' resilience decreases, DAS scores rise significantly (Figure 4). These findings underscore the importance of psychological resilience in relation to DAS levels among dental students.

Lack of financial support increases the likelihood of mental disorders in students (4). Mofatteh (35) stated that lack of financial support, low family income, and poverty are risk factors for DAS in developed and developing countries. Confirming this, in the current study, students who could not

receive any financial support and even had financial support responsibilities towards their families were observed to have high DAS values (Table 1). Such a heavy responsibility added to a difficult educational process is likely to cause mental disorders. Financial management can be a challenge for young students transitioning to independent lifestyles. Therefore, guiding students to achieve work-life balance is important for the quality of their education and mental health (35).

Studies conducted in Malaysia reported that the prevalence of depression and anxiety was higher in students with a family history of psychiatric illness (36,37). Similarly, in this study, higher anxiety values were found in students with a family history of psychiatric diseases (Table 1). McLaughlin et al. (38) suggested that individuals with generalized anxiety disorder have a higher rate of having relatives with anxiety problems than those without. These results were based on data obtained with self-reports. Additionally, the authors emphasize that a positive familial history of anxiety disorder may be a significant environmental etiologic factor for generalized anxiety disorder.

To become a dentist in Turkey, students have to complete a 5-year education. The first three years of this education include preclinical and the last two years include clinical training. Recently, Erdiç et al., in a large sample of dentistry students ($n = 791$), demonstrated that levels of depression, anxiety, and stress increase as students' progress through their academic years (30). Uraz et al. also reported similar findings (24). Accordingly, it was found that the DAS levels obtained from this study increased significantly as the years of education increased, but the highest value was in the fourth-grade and decreased significantly in the senior grade (Figure 2). Similarly, Telang et al. (39) stated that the most stressful period was the transition to clinical training. This is probably because real patients have replaced phantom mannequins used in training. Understanding real patients, each of whom is unique, in the best way possible, competing in the most appropriate diagnosis and treatment, meeting the minimum conditions of the relevant internship in a limited time, and briefly, keeping up with clinical conditions are the burdens of this transition period. We believe that in the final year, self-confidence and coping skills increase due to familiarity with clinical conditions, and therefore, there is a decrease in DAS levels related to clinical education. Another plausible factor that may help explain this situation could be recent policies implemented in our country. As mentioned above, insufficient financial support is associated with DAS scores. Recently, final-year students in medical and dental faculties in Turkey have begun receiving financial support at the level of the minimum wage. The significant reduction in DAS scores observed particularly among final-year students may be related to this financial support.

Finally, dental students exhibited higher DAS values on education-related stressors (Table 1). Similar results were noted for students who found the exam schedule overburdened and expressed dissatisfaction with the exam

criteria and teaching methods. The necessity of theoretical knowledge is indisputable, but the methods can be modified. For example, instead of gathering students in the classroom at certain hours, theoretical lessons can be given with asynchronous remote education and consultancy. In this way, they have the opportunity to listen to lessons efficiently at the time and place most suitable for them. Terlemez et al. (40) also emphasized the importance of interventions that will increase social support in educational programs to protect students from burnout during chronic stress and challenging educational processes. It is essential to transform academic advisory units, generally provided by faculty academic members and assumed to exist in most institutions, into a more active structure that assesses not only students' academic progress but also their social adjustment and stress factors. If needed, it would be appropriate to offer training on advisory skills to faculty academic members within the framework of educational development programs. Additionally, establishing social support units within institutions, ideally coordinated by a psychiatrist, to facilitate referrals when necessary is another crucial aspect. Ensuring the participation of student representatives in relevant academic committees to express their views on education and teaching methods will also make a valuable contribution. To foster a sense of belonging to the institution and provide financial support, involving students (not just for seniors but for all grade levels) in practical applications within the faculty, at levels appropriate to their responsibility, could be an important step. In return, a modest stipend (at least for students with financial need) could be offered. Psychological resilience, in relation to DAS among dentistry students, remains an area insufficiently explored in prior research. Studies indicate that interventions aimed at enhancing resilience among students could be effective (41). We anticipate that future studies will increasingly underscore the importance of this topic. Focusing on individual factors related to this issue, Uraz et al. reported that students who chose dentistry as their top preference in university entrance exams had lower stress levels and fewer health issues (24). This suggests that students who have clear goals and are committed to their chosen field may encounter fewer of these challenges. Other individual factors that might help reduce DAS levels include motivation to fulfill responsibilities, openness to seeking support when faced with stressors, and actively pursuing solutions.

In our study, we were limited to collecting data from dental students studying at a single academic institution in Turkey. Therefore, the results of our study might not be generalized. Future studies involving all institutions are needed to strengthen the validity of our results. Because the current study was a cross-sectional study assessing DAS levels over a specific period, we were not able to show changes over time. Additionally, a causal relationship could not be established. For this purpose, longitudinal studies with larger samples are needed in the future.

5. CONCLUSION

According to the findings of the current study, DAS levels and psychological resilience are too important to be ignored. To minimize these values in dental education, which is known to be challenging, the establishment of guidance within the institution, seminars, and regular monitoring can be considered both to protect the mental health of students as human beings and to indirectly have a positive effect on public health through its impact on the health system. Otherwise, quality in the treatment cannot be expected from a physician whose quality of life has been negatively affected. In this regard, institutions should consider it their duty to seek and offer solutions to this problem and give it at least as much importance as education.

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Author Contributions:

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Design of the study: RA, AT, HB, ŞG

Acquisition of data for the study: RA, EE

Analysis of data for the study: RA

Interpretation of data for the study: RA, ŞG

Drafting the manuscript: RA, HB

Revising it critically for important intellectual content: AT, ŞG, EE

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