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Sources of stress and well-being among Saudi Arabian undergraduate dental students

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ABSTRACT

The study aimed to evaluate the sources of stress and well-being among Arabian dental undergraduate students. The online questionnaire containing three domains, sociodemographic, Dental Environmental Scale-39, and WHO well-being scale-6, was sent to dental undergraduate students across Saudi Arabia. The responses of the participants were measured on a scale ranging from 0 (not stressful) to 5 (highly stressful). The achieved stress scores were compared using SPSS version 17.0 (SPSS Inc., Chicago, USA) with a P-value of ≤0.05 of a significant level. Five hundred and ninety-nine participants from 25 dental schools in Saudi Arabia were involved in the state study sample. The majority of the participants were males, 57.9% (347), and 30% of the participants were interns. The mean Dental Environment Stress (DES)

scores for females and males were 3.42 ± 0.81 and 3.2 ± 0.8, respectively ($p > 0.05$). The mean DES stress scores for first, second, third, fourth, fifth-year students, and interns were 2.96 ± 0.19, 3.15 ± 1.1, 3.14 ± 0.81, 3.45 ± 0.77, 3.45 ± 0.8, and 3.9842 ± 0.72 ($p < 0.05$). Female dental students (3.06 ± 0.88) reported higher stress scores for the living accommodation DES domain than the males (2.93 ± 0.77) ($p < 0.05$). Male students (3.02 ± 1.02) reported a more increased well-being index compared to females (2.67 ± 0.94) with non-statistical significance ($p > 0.05$). Third-year dental students (3.05 ± 0.93) scored higher on well-being, while first-year students scored low (2.34 ± 0.80). An association was found between first-year perceived stress and well-being scores among the study population for living accommodation, personal, and academic factors ($p < 0.05$). Within the study's limitations, Saudi dental undergraduate students had high levels of perceived stress. Among them, female students were more stressed about living accommodations than males. Fifth-year students are more stressed compared to other years dental undergraduate students. The well-being of dental undergraduate students attending dental schools is associated with living accommodations, personal factors, and academic work in Saudi Arabia.

Keywords: *Dental student, education, psychology, stress, well-being*

INTRODUCTION

Medical and dental students encounter many challenges that affect their psychological health.[1,2] Such challenges include overwhelming academic loads, decreased relaxation time, pressure to maintain high grades, and dealing with specific medical procedures and patients.[1,3,4,5] Burnout is defined as a syndrome of psychological lethargy, skepticism, and decreased professional capability, which happens regularly with individuals whose work involve serving others.[6] Burnout among medical and dental students is an area of active investigation.[7–14] Fewer studies have investigated burnout among dental students in several countries, with burnout prevalence of 22.3% in Turkey, 7% in Colombia, and 10–20% in Germany.[8] In two Jordanian studies, dental students had high levels of burnout.[10,11] However, according to our knowledge, burnout was not investigated among dental students in Saudi Arabia. Despite the apparent higher prevalence of burnout among medical students than among dental students in most studies, a second German study found that dental students had a higher burnout rate than medical students.[14] This result may be due to different tools used to measure burnout. No study has investigated burnout among medical or dental students in private colleges in Saudi Arabia. Nevertheless, few studies, and none in Saudi Arabia, have investigated perfectionism among dental students. Dentist, in particular dental student, has higher stress and burnout than any other medical student, and there is no study emphasizing stress and its relation to the well-being of undergraduate dental student at Saudi Arabia University in particular. Therefore, the aims of the study include the following:

- To identify the sources of stress among dental students.

- To evaluate the specific stressors related to the year of study and gender.
- To investigate relationships between stress and well-being.

MATERIALS AND METHODS

A cross-sectional survey was planned to assess stress levels among dental students in Saudi Arabia. This survey was an exploratory, non-experimental observational study. The study has been approved by the Institutional Review Board, Majmaah University, Saudi Arabia, under IRB No. MERU-September.1/COM-2021/3-3. The Raosoft online sample size calculator was used for the sample size calculation.[15] Based on the previous surveys,[16,17] in an assumption of 3,000 active Saudi dental society members, a response distribution of 50%, while the margin of error and confidence intervals are 5 and 95%, respectively, were made to reach a sample size of 341 dental students. Questionnaires were sent to undergraduate dental students in Saudi Arabia with a welcome note explaining the study's aims and objectives. The contribution was voluntary, and the identity of the participants remained anonymous. Only undergraduate dental students attending Saudi Arabia universities and dental schools with Arabian ethnicity were included in this study. Postgraduate dental students, students attending other dental courses and non-Saudi universities, and non-Saudi students were excluded from the study. The questionnaire was sent through social media via google forms, and the response was restricted one response was per device. Upon completing the questionnaire, the participants were no longer able to modify their responses. The questionnaire includes demographic details (sex, age, study year, ethnicity, and university/college information) and a modified version of the DES questionnaire and World Health Organization (WHO) Five Well-being Index to assess psychological well-being.

The DES questionnaire[18–20] comprises 39 items, with a scale of 0 (not stressful) to 4 (extremely stressful). These items are planned to be grouped into five stressor domains including living accommodation (4 items), personal factors (13 items), educational environment (5 items), academic work (8 items), and clinical factors (9 items). WHO well-being scale consisted of a five-item questionnaire with a time frame of the previous 2 weeks. Its interpretation was made by the score obtained, which ranged from 0 to 100, with higher scores meaning better well-being.[21,22]

Statistical Analysis

The data were tabulated and the descriptive statistics were done using SPSS version 17.0 (SPSS Inc., Chicago, USA). Descriptive statistics included a frequency table, means, and standard deviations. The web well-being index was used as a reference to compare all five factors among all the study subjects. T-test, ANOVA analyzed the data, Tukey's post hoc test, and linear regression; a p-value $\leq$ 0.05 was considered statistically significant. For the regression analysis, the WHO well-being scale was used as the reference point for comparison. The multivariate linear regression analysis used the association between DES five domains and the WHO well-being scale has been carried out.

RESULTS

Overall, 599 dental undergraduate students responded to the survey from entire Saudi Arabia. Among the students, 57.9% (347) were males, and 42.1% (252) were females. The study sample consisted students from first to fifth year, and interns were 22 (3.7%), 30 (50%), 83 (13.9%), 117 (19.5%), 167 (27.8%), and 180 (30.1%), respectively (Figure 1). Dental undergraduate students from 25 universities/colleges responded to the survey. Most of them were from Majmaah University 74 (12.4%). Only 10 participants (1.7%) responded from Taif University, Baterjee Medical college, and Mustaqbal University, as illustrated in Figure 2.

The overall mean scores of the DES questionnaire (39 stressors of 5 domains) among the Saudi

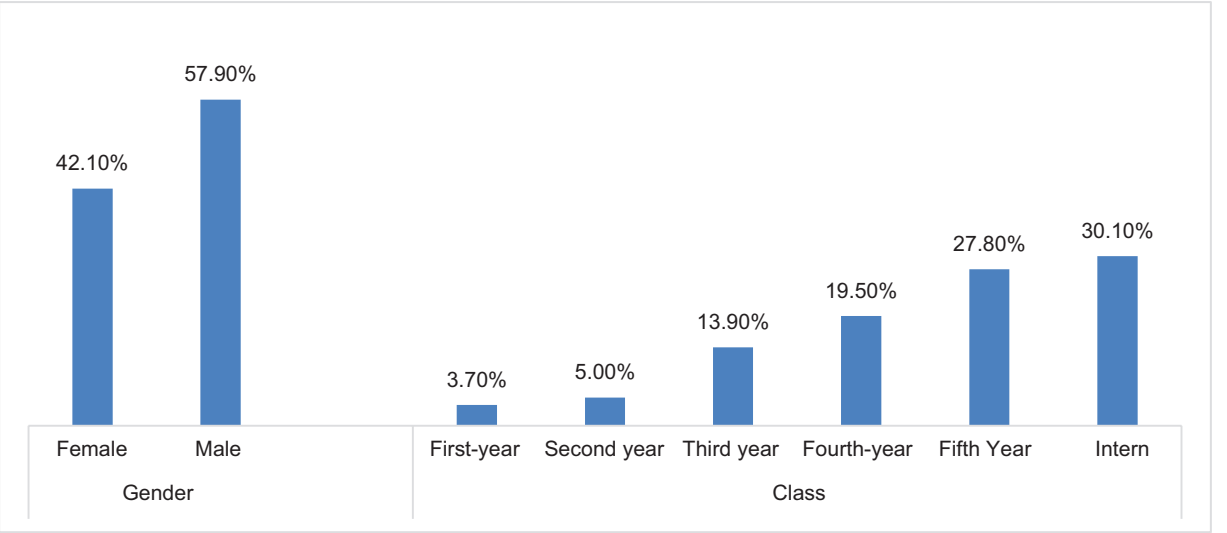

FIG. 1. The distribution of undergraduate dental students on the basis of gender and study year.

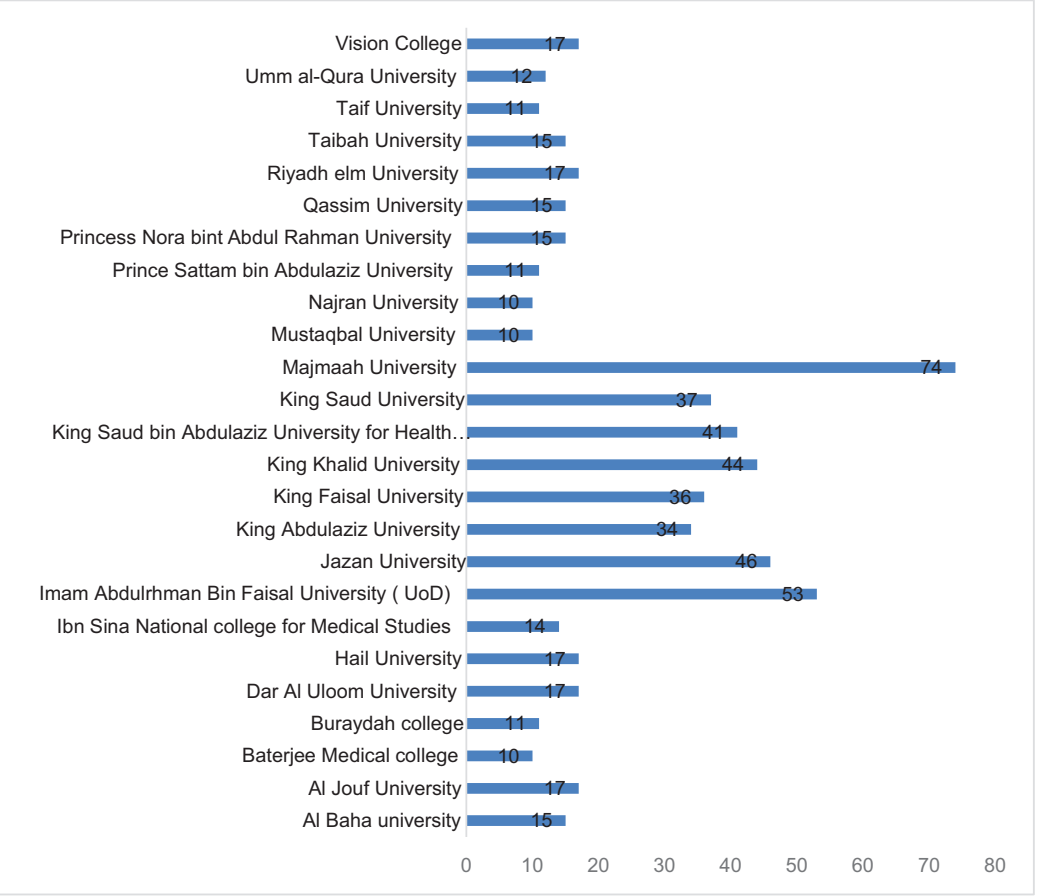

FIG. 2. The distribution of undergraduate dental students on the basis of colleges.

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Arabian dental undergraduate students are summarized in Table 1. The overall mean score was higher for the academic factors domain (3.73 ± 0.83) and lower for the living accommodation domain (2.98 ± 0.82); the mean scores for personal factors, education environment, and clinical factors domains were 3.11 ± 0.72, 3.27 ± 0.84, and 3.53 ± 0.84 respectively.

Overall mean scores for the living accommodation domain were more in females (3.06 ± 0.88) compared to males (2.93 ± 0.77), and the findings were statistically significant (p = 0.009). The mean overall scores for the personal factors domain were more in female students (3.13 ± 0.68) compared to male students (3.10 ± 0.75), and the comparison showed non-significant results (p > 0.05). Overall educational environment domain mean scores were more in females (3.38 ± 0.84) compared to males (3.19 ± 0.83), and the findings were statistically non-significant (p > 0.05). A non-statistical significant relation, as found among males (3.65 ± 0.84) and females (3.84 ± 0.84), was evident for the academic factors domain. The overall mean scores for the clinical factors domain were less for males (3.46 ± 0.83) compared to females (3.70 ± 0.82), with non-significant results (p > 0.05). One-way ANOVA showed a non-significant (p > 0.05) comparison of overall DES scores among the males (3.29 ± 1.24) and females (3.43 ± 1.24); the details are summarized in Table 2.

Overall mean scores for the living accommodation domain were higher for second-year students (3.11 ± 1.14) compared to the first, third, fourth, and fifth-year students and interns (Table 3). The findings were statistically significant (p = 0.05). The overall mean personal factors scores were higher for fourth-year students (3.30 ± 0.61) compared to the first, second, third, and fifth-year students and interns. The findings were statistically significant (p = 0.00). Overall educational environment domain mean scores were higher for fourth-year students (3.41 ± 0.75) compared to the first, second, third, and fifth-year students and interns. The findings were statistically significant (p = 0.001). The overall mean scores for the academic factors domain were higher for third-year students (3.91 ± 0.86) than first, second, fourth, and fifth-year students and interns. The findings were statistically significant (p = 0.00). Overall mean scores in the clinical factors domain were higher for fourth-year students (3.73 ± 0.74) compared to the first, second, third, and fifth-year

TABLE 1. Sources of stress mean scores and overall mean dental environment stress scores by year of study.

Domain	Mean	Standard deviation
Overall living accommodation	2.98	0.82
Overall personal factors	3.11	0.72
Overall educational environment	3.27	0.84
Overall academic factors	3.73	0.84
Overall clinical factors	3.56	0.84

TABLE 2. Comparison between psychological disturbance and sources of stress using the five stressor domains based on gender.

Domain	Female (Mean ± SD)	Male (Mean ± SD)	p-value
Overall (Living accommodation)	3.06 ± 0.88	2.93 ± 0.77	0.009*
Overall (Personal factors)	3.13 ± 0.68	3.10 ± 0.75	0.160
Overall (Educational environment)	3.38 ± 0.84	3.19 ± 0.83	0.989
Overall (Academic factors)	3.84 ± 0.84	3.65 ± 0.84	0.914
Overall (Clinical factors)	3.70 ± 0.82	3.46 ± 0.83	0.683

**p < 0.05 = statistically significant.*

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TABLE 3. Comparison between psychological disturbance and sources of stress using the five stressor domains based on the study year.

Domain	First year	Second year	Third year	Fourth-year	Fifth year	Intern	P
Overall (Living accommodation)	2.57 ± 1.01	3.11 ± 1.14	3.02 ± 0.91	2.98 ± 0.8	3.09 ± 0.81	2.90 ± 0.7	0.05*
Overall (Personal factors)	2.82 ± 0.77	3.13 ± 0.85	2.81 ± 0.76	3.30 ± 0.61	3.22 ± 0.73	3.07 ± 0.68	0.00*
Overall (Educational environment)	2.85 ± 0.82	3.00 ± 1.07	3.0 ± 0.783	3.41 ± 0.75	3.35 ± 0.95	3.31 ± 0.73	0.001*
Overall (Academic factors)	3.42 ± 1.02	3.38 ± 1.23	3.57 ± 0.79	3.91 ± 0.86	3.88 ± 0.79	3.65 ± 0.76	0.00*
Overall (Clinical factors)			3.29 ± 0.84	3.69 ± 0.87	3.73 ± 0.74	3.56 ± 0.74	0.00*

**P < 0.05 = statistically significant.*

students and interns. The findings were statistically significant (p = 0.00). The One-way ANOVA comparison among the domain and study showed statistically significant findings (p > 0.001); fourth-year students (3.5 ± 1.2) reported overall higher DES mean scores. In contrast, lower scores were observed in first-year dental undergraduate students (3 ± 1.3), and the second-year, third year, and fifth-year students and interns reported scores of 3.16 ± 1.43, 3.13 ± 1.26, 3.48 ± 1.24, and 3.32 ± 1.19, respectively.

The WHO well-being mean score (Table 4) of the study population was 2.87 ± 1.00, while males showed (3.02 ± 1.02) higher mean scores compared to females (2.67 ± 0.94) with statistically non-significant results (p > 0.05). For the predictor "*I have felt cheerful and in good spirits*," males (3.32 ± 1.22) reported significantly high mean scores than females (2.94 ± 1.14), and the comparison was statistically significant (p = 0.034). For the predictors *like* "*I have felt calm and relaxed*," "*I* woke up *feeling fresh and rested*," "*I have felt active and vigorous*," and "*My daily life has been filled with things that interest me*" males reported higher mean scores than females. However, none of the comparisons were statistically significant (p > 0.05).

The overall WHO well-being mean score (Table 5) of the study population was 2.87 ± 1.00; among the dental undergraduate students, the third-year students reported higher mean values (3.05 ± 0.93) while lower mean scores were reported by

TABLE 4. The mean scores of the WHO well-being scale among the study population based on gender.

Predictor	Overall	Female	Male	P
I have felt cheerful and in good spirits	3.16 ± 1.20	2.94 ± 1.14	3.32 ± 1.22	0.034*
I have felt calm and relaxed	2.69 ± 1.26	2.50 ± 1.19	2.83 ± 1.29	0.246
I woke-up feeling fresh and rested	2.59 ± 1.20	2.35 ± 1.18	2.77 ± 1.18	0.872
I have felt active and vigorous	2.94 ± 1.18	2.78 ± 1.13	3.05 ± 1.20	0.618
My daily life has been filled with things that interest me	2.98 ± 1.23	2.76 ± 1.24	3.14 ± 1.19	0.195
Overall (Well-being index)	2.87 ± 1.00	2.67 ± 0.94	3.02 ± 1.02	0.192

**P < 0.05 = statistically significant.*

TABLE 5. The mean scores of the WHO well-being scale among the study population based on the study year.

Predictor	First year	Second year	Third year	Fourth year	Fifth year	Intern	P
I have felt cheerful and in good spirits	2.68 ± 1.09	2.80 ± 1.40	3.46 ± 1.11	3.04 ± 1.21	3.09 ± 1.22	3.27 ± 1.15	0.012*
I have felt calm and relaxed	2.32 ± 1.09	2.60 ± 1.45	2.93 ± 1.22	2.66 ± 1.27	2.65 ± 1.26	2.71 ± 1.25	0.38
I woke-up feeling fresh and rested	1.77 ± 0.69	2.60 ± 1.35	2.71 ± 1.16	2.68 ± 1.27	2.57 ± 1.25	2.60 ± 1.10	0.036*
I have felt active and vigorous	2.50 ± 0.91	3.03 ± 1.38	3.13 ± 1.17	2.71 ± 1.17	2.94 ± 1.28	3.04 ± 1.04	0.045*
My daily life has been filled with things that interest me	2.41 ± 0.96	2.77 ± 1.52	3.02 ± 1.26	2.98 ± 1.23	3.10 ± 1.26	2.97 ± 1.13	0.199
Overall (Well-being index)	2.34 ± 0.80	2.76 ± 1.25	3.05 ± 0.93	2.82 ± 1.03	2.87 ± 1.07	2.92 ± 0.91	0.74

**P < 0.05 = statistically significant.*

first-year students (2.34 ± 0.80) with statistically non-significant results (p > 0.05). For the predictor "*I have felt cheerful and in good spirits*," third-year students (3.46 ± 1.11) reported significantly higher mean scores, and first-year students were observed with lower mean scores (2.68 ± 1.09). The comparison was statistically significant (p = 0.012). For the predictor "*I* woke up *feeling fresh and rested*," first-year students (1.77 ± 0.69) scored significantly less compared to other years' students, while third-year students (2.71 ± 1.16) scored higher than other years' students (p = 0.036). For the predictor "*I have felt active and vigorous*," third-year *students* (3.13 ± 1.17) significantly scored higher mean values while, first year students (2.50 ± 0.91) scored lower mean scores (p = 0.045). For the predictor "*I have felt calm and relaxed*," first-year students (2.32 ± 1.09) scored lower mean values compared to other years' students, while third-year students (2.93 ± 1.22) scored higher than other years' students (p > 0.38). For the predictor "*My daily life has been filled with things that interest me*," fifth-year students (3.10 ± 1.26) significantly scored higher mean values while first-year students (2.41 ± 0.96) scored lower mean scores (p = 0.199). The multiple regression analysis found that the well-being scale is associated with personal and academic factors of Saudi Arabian dental undergraduate students (p < 0.001) while accommodation, education, environmental, and clinical factors did not influence the well-being scale of the students (p > 0.05), the analysis is summarized in Table 6.

DISCUSSION

The present study was conducted to identify the perceptions of stress using DES and its association with the WHO well-being index among dental students in Saudi Arabia. Overall, 599 students from 24 different dental colleges in Saudi Arabia participated in this study. In the study sample, most participants were male (57.9%), and the students attending internships (30%) mostly responded to the study. A prior study by Rayyan et al.[23] surveyed 423 dental students. Students from 19 dental colleges in Saudi Arabia participated in that study and most of them

TABLE 6. Summary of multiple regression analysis for predicting WHO-5 scores by dental environment stress domains.

Model		Unstandardized coefficients		Standardized coefficients	t	Sig.
		B	Std. error	Beta		
1	(Constant)	3.101	0.227		13.675	0.000
	Living accommodation	−0.027	0.053	−0.022	−0.507	0.612
	Personal factor	0.251	0.065	0.181	3.837	0.000
	Educational environment	0.044	0.062	0.037	0.711	0.477
	Academic work	−0.373	0.069	−0.314	−5.423	0.000
	Clinical factor	0.089	0.070	0.074	1.261	0.208

a. Dependent variable: well-being index.
**P < 0.05 = statistically significant.*

were females (54%). In another study from Saudi Arabia,[24] 425 of 556 dental undergraduate students participated from the same dental colleges, most of whom were males (68.9%).

In contrast, fourth-year students participated more in the study (22.6%). Aboalshamat et al.[25] performed a study to evaluate stress among 422 pre-clinical dental and medical students from the same college. Among the study participants, the majority were females (53.3%), and 53.1% of third-year students responded. Al-Saleh et al.[26] performed a survey to evaluate stress-inducing factors among dental students from four colleges in Saudi Arabia. In their survey, 548 students participated; most were females, dental students from second, third, fourth, and fifth years and interns responded to the questionnaire. The participant's base year was not included in the study.

The modified version of the DES (mDES) questionnaire was used in the present study to evaluate stress among dental undergraduate students. The WHO well-being scale was also assessed. Furthermore, the influence of the WHO well-being scale on DES domains was also studied. A similar study was conducted by Preoteasa et al.[27] among Romanian second and third-year dental students. Considering the limitations of this research, it is implied that the most significant stressors experienced by dental students are linked to academic and personal factors, with one of the most significant stressors being "fear of failing course or year" in females and "competition or grades" in males. Despite this, they all have a large amount of "Lack of influence in the dentistry school decision-making procedure." Nonetheless, only academic-related pressures appear to predict their good psychological well-being.

A Japanese study[27] reported more DES scores in females (2.06) than that in males (1.92), with statistically significant ($p > 0.05$) results. The participants were 320 dental students from the second, third, fourth, fifth, and sixth years with a 91% response rate. Similarly, in the present study, in all DES domains, females (3.42 ± 0.82) showed higher mean scores than males (3.24 ± 0.8). None of the gender-based comparisons among all the DES domains were statistically significant ($p < 0.05$). Contrarily, another study from Saudi Arabia[25] reported that male students had higher stress than females; however, the authors used Depression Anxiety Stress Scale in the present research and DES was used to measure the stressor; hence, the findings are comparable. Another European research used DES-16 to evaluate stress scores; however, in the present study, we used DES-39 to assess stress among students from various countries, whereas the results are not equal. Naidu et al.[20] reported that among the DES domains, female west Indian students were

observed with higher mean scores than males; however, among the domains, only academic work, and clinical factors, gender-based compassion showed statistically significant results ($p < 0.05$). Similarly, in the present study, females reported higher means cores for all DES domains than males. In contrast, only the living accommodation domain was statistically significant ($p < 0.05$). Based on the West Indian study, a Japanese study, and the present study, female dental students undergo more stress than male dentists.

In the Japanese study,[27] fifth-year students reported higher DES scores than others with non-significant comparisons. Similarly, in the present research fourth and fifth-year students observed higher mean scores (3.42 ± 0.84 & 3.42 ± 0.77) compared to other year students who participated in the present study with significant results ($p < 0.05$); the comparison among all domains in DES was statistically substantial ($p < 0.05$). The West Indian study[20] studied individual DES domains based on the year and third-year students (2.41 ± 1.51) were more stressed about living accommodation, education, environment (2.41 ± 1.51), and clinical factors (3.28 ± 1.27); fourth-year students were more stressed about personal factors (1.70 ± 0.8). In comparison, fifth-year students were more stressed about academic work (3.66 ± 0.9). The comparison among the student groups was not made. In a Turkish study,[28] 277 first, second, third, fourth, and fifth-year students participated. The comparison of all domains of the DES scale was performed to evaluate the stress source among the study participants. Among dental undergraduates, fourth-year students showed more stress mean scores for living accommodation (2.23 ± 0.2), faculty and administration (2.65 ± 0.3), workload (3.03 ± 0.2), and clinical factors (2.74 ± 0.2), while first-year students were more stressed about personal factors (2.48 ± 0.6) and education environment and performance pressure (2.77 ± 0.5). The Turkish study[28] found a statistically significant comparison among education environment and performance pressure, faculty and administration, workload, and clinical factors ($p < 0.05$). The living accommodation and personal factors domains in DES showed non-significant results ($p < 0.05$). In the present study, overall mean scores for the living accommodation domain were higher for second-year students (3.11 ± 1.14) compared to other years ($p = 0.05$). Fourth-year students showed higher mean scores for personal factors (3.30 ± 0.61), educational environment (3.41 ± 0.75), clinical characteristics (3.73 ± 0.74) DES domains compared to the first, second, third, and fifth-year students and interns ($p < 0.05$). The findings were statistically significant ($p = 0.00$). The overall mean scores for the academic factors domain were higher for third-year (3.91 ± 0.86) students than the other years' dental students ($p = 0.00$). The present study findings are not comparable with prior studies from Saudi Arabia.[25,26] Aboalshamat et al.[26] performed a study on medical and dental students, and they only involved second and third-year students in the study. Al-Saleh et al.[25] used 6-point scale to investigate stress among the second, third, fourth, fifth, and intern students. Overall comparison among the different study years of dental students in the present study found that fourth-year students are more stressed than the other groups, maybe they are fully engaged in dental clinics, and transitioning from pre-clinical and partial clinics to complete clinics might have caused this stress.

The Japanese study[27] used the well-being Psychological General Well-Being (PGWB)[29] index to investigate the relation with DES. The total score of the PGWB index was significantly associated with DES mean score. An inverse relationship was evident between DES and PGWB. The Turkish study[30] found no correlation between PGWB and DES total scores. However, in the present study authors used the WHO well-being scale to assess the well-being of Saudi Arabian dental students. Therefore, the findings are not comparable. A Romanian study[31] used the WHO well-being scale and reported a relationship between positive well-being, academic performance, and assessments.

Similarly, the present study also establishes a positive relationship between the well-being scale and educational work, and personal factors positively correlated with the well-being scale. A recent systematic review reported that the WHO well-being is one of the best tools to assess population well-being.[22] Prior studies said a positive relationship between the well-being scale and academic performance is evident.[32–34] Another study has also established that the well-being approach seems relevant when considering that positive psychological states are seen as more important in explaining performance than negative ones.[35]

The study involved a population from 25 dental schools across Saudi Arabia; this is the first of its kind. The study can be used as a reference for further studies evaluating stress among dental students. There is no equal participation from all the 25 colleges, and most of them are interns; this might also be a possible limitation of the study. Since it is an online survey, the response rate was unknown. Except for a significant positive correlation between anxiety/depressed mood and health in Saudi Arabian dental students, the relationships between these variables are not established. Understanding possible sources of psychological disturbance are critical, and these are all crucial issues for future investigations.

CONCLUSION

Dental undergraduate students' well-being is associated with living accommodation, personal factors, and academic work in Saudi Arabia. Within the study's limitations, Saudi dental undergraduate students had high levels of perceived stress. Overall, females showed higher stress ($p = 0.05$), and fourth and fifth-year students had higher stress ($p < 0.05$). Female students were more stressed about living accommodations than males. Fourth-year students were stressed about personal factors, education and environments, and academic factors, while fifth-year students were more stressed about living accommodation and clinical aspects.

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DATA AVAILABILITY STATEMENT

The data will be available to the correspondence author upon request**.**

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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