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Evaluation of Self-reported Stress and Provoking Factors of Conservative Dentistry Clinic Procedures for Clinical Dental Students: A Prospective Study

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ABSTRACT

Objectives: This study aimed to prospectively evaluate the self-reported stress levels of a cohort of clinical dental students from various conservative dentistry procedures and to identify stress-provoking factors.

Materials and Methods: An online survey-based prospective cohort study was conducted on a cohort of 83 clinical dental students from Jordan University of Science and Technology. Data was collected from the cohort of dental students at two measurement points that were twelve months apart. The first point was in the fourth year and the second was in the fifth year. The survey collected socio-demographic data, contained a 7-point Likert stress level scale questions of 6 conservative dentistry procedures (Class I - V and RCT), and YES/NO questions about stress-provoking factors. Wilcoxon signed rank and McNemar tests as well as descriptive statistics were used to evaluate and describe the differences in stress levels between the distinctive characteristics of students.

Results: The study found significant differences in the reported stress levels between students, in their fourth and fifth years, in every procedure ($p < 0.001$), except for the Root Canal Treatment (RCT) procedure. RCT procedure had the highest reported mean stress levels. Students with distinguished GPAs reported the highest reported stress levels. Female students reported higher mean stress levels in every procedure in the fourth year. The most agreed-upon stress-provoking factor was the availability/quality of dental materials.

Conclusions: As students advance through the clinical years, their stress levels from conservative dentistry procedures decrease. Through this study, attention will be directed to the procedures that stress students the most, consequently giving more time or sessions for practicing to ease these procedures and get the best dental treatment outcomes from them with the least amount of stress.

Keywords: Stress, Clinical skills/topics, Clinical Procedures, Dental education.

1. Introduction

Stress arises from external physical or mental factors that can impact physical and psychological well-being (1). Dental education can be a significant cause of stress for dental students. The literature has observed more stress levels among dental students than in the general population (2). Also, it was concluded that during the clinical years, this stress increases (3).

Dental students are under higher stress due to the fact

that they need to combine extensive knowledge with manual training (4,5). Additionally, they must develop and employ interpersonal communication skills throughout their education and training (5). During the clinical phase, additional sources of stress arise, such as patient care, patient management, and the difficulty of acquiring certain procedural clinical skills (6).

The type of procedures students perform during their clinical training can alter this stress. However, only a

handful of studies have been carried out on this topic. One study assessed self-reported stress in various pediatric dentistry procedures and found that dental students reported higher levels of stress in operative procedures (7). Another study evaluated the stress levels of dental students while performing diagnosis, caries treatment, and endodontic treatment phases in conservative dentistry (8).

Conservative dentistry clinic is among the most stressful and skill-intensive clinics for undergraduate clinical students and includes endodontic and restorative procedures. The restorations comprise the treatment of dental cavities as described in the Black Caries classification (i.e., Class I, Class II, Class III, Class IV, and Class V) (9,10).

There have been limited works published on evaluating the stress of dental students; however, the present study is, to the best of our knowledge, the first to evaluate the stress of clinical dental students from conservative dental procedures prospectively. Hence, the aim of this study is to prospectively evaluate stress levels reported by a cohort of clinical dental students from different conservative dentistry clinic procedures and to identify stress-provoking factors related to this stress.

2. Materials and Methods

2.1 Ethical Considerations

Ethical approval for this study was granted by the Institutional Review Board (IRB) of Jordan University of Science and Technology. An informed consent was obtained from the participants.

2.2 Study Design and Participants

This online survey-based prospective cohort study was conducted using Microsoft Forms on a cohort of clinical dental students. Data collection took place at two measurement points twelve months apart at the end of the 2021/2022 and 2022/2023 academic years consecutively at Jordan University of Science and Technology. A survey pilot study involving twelve students was carried out and the required modifications,

including improving the clarity of the questions and omitting unnecessary questions, like place of residence, were made. Then, the survey was sent online individually to fourth year students. All fourth-year students who completed the survey at the end of their fourth year were followed up and sent the same survey at the end of their fifth year.

2.3 Survey Contents

The survey contained fourteen questions:

- Three of them were to collect socio-demographic data with questions about gender, grade point average (GPA) (distinguished, excellent, very good, good), and year of study (fourth/fifth year).
- Six of them utilized a 7-point Likert scale (0 – No stress, 6 – High stress) that assessed the levels of reported stress of 6 conservative dentistry procedures (Class I - V and RCT).
- Five were YES/NO questions about stress-provoking factors including the availability/quality of the dental materials, the use of indirect vision, the use of rubber dam, establishing diagnosis and grade assessment.

2.4 Statistical Analyses

Statistical analyses were carried out using Microsoft Excel (Microsoft Corporation, Redmond, WA, USA) software and Jamovi Software, version 2.2.5. Normal distribution for the stress-level scales was evaluated using the Shapiro–Wilk test and normal distribution was not found. Wilcoxon signed rank and McNemar tests as well as descriptive statistics were used to evaluate and describe the differences in stress levels between the distinctive characteristics of students from two consecutive years of study, accumulative GPA, and gender. The level of statistical significance was determined by a two-sided alpha of 0.05.

3. Results

3.1 Study Participants

The study sample consisted of 83 students, 57 (69%) of whom are females. The majority (55%) of the students had an excellent GPA (Table 1).

Table 1: Characteristics of participants

Gender	GPA				Total
	Distinguished	Excellent	Very Good	Good	
Female	2	34	18	3	57
Male	2	12	11	1	26
Total	4	46	29	4	83

3.2 Reliability of the Scale

To check the reliability of proposed stress scales, Cronbach’s alpha coefficient was calculated; in which a value over 0.7 suggests high reliability (11). The Cronbach's alpha coefficient for the scales was 0.857, which indicates a high reliability level.

3.3 Year of Study and Stress Levels

RCT procedure had the highest reported mean stress

levels in the fourth and fifth years, while Class-I procedure had the lowest. Students, in their fourth year, have reported higher mean stress levels in every procedure (Table 2).

Wilcoxon signed rank test showed that there were significant differences in the reported stress levels between the two measurement points, the fourth year and the fifth year, in every procedure, except for the RCT procedure (Table 2).

Table 2: Stress levels in fourth-and fifth-year students according to the procedure

Procedure	Mean ± SD		Median		p-Value (Wilcoxon)
	Fourth year	Fifth year	Fourth year	Fifth year	
Class I	1.35 ± 1.33	0.74 ± 1.04	1.00	0.00	< 0.001*
Class II	3.47 ± 1.43	2.27 ± 1.55	3.00	2.00	< 0.001 *
Class III	2.30 ± 1.61	1.29 ± 1.22	2.00	1.00	< 0.001 *
Class IV	2.01 ± 1.57	1.12 ± 1.10	2.00	1.00	< 0.001 *
Class V	1.70 ± 1.36	0.89 ± 1.02	2.00	1.00	< 0.001 *
RCT	3.96 ± 1.60	3.64 ± 1.81	4.00	4.00	0.209

* P<0.01.

3.4 GPA and Stress Levels

Students with distinguished GPAs reported the highest mean of reported stress levels in every procedure

in their fourth and fifth years. The mean reported stress levels based on GPAs are presented in Table 3.

Table 3: Stress levels according to the GPA of fourth - and fifth- year students

Procedure	GPA	Mean ± SD		Median	
		Fourth year	Fifth year	Fourth year	Fifth year
Class I	Distinguished	2.50 ± 1.29	1.00 ± 0.00	2.50	1.00
	Excellent	1.20 ± 1.17	0.74 ± 0.98	1.00	0.00
	Very Good	1.41 ± 1.59	0.69 ± 1.23	1.00	0.00
	Good	1.50 ± 0.58	0.75 ± 0.96	1.50	0.50
Class II	Distinguished	4.75 ± 0.96	3.50 ± 1.29	4.50	3.50
	Excellent	3.43 ± 1.42	2.22 ± 1.59	3.00	2.00
	Very Good	3.28 ± 1.49	2.21 ± 1.54	3.00	2.00
	Good	4.00 ± 1.16	2.00 ± 1.41	4.00	1.50
Class III	Distinguished	3.25 ± 1.71	2.75 ± 1.26	3.50	3.00
	Excellent	2.04 ± 1.55	1.33 ± 1.16	2.00	1.00
	Very Good	2.52 ± 1.70	1.00 ± 1.20	3.00	1.00
	Good	2.75 ± 1.26	1.50 ± 1.29	3.00	1.50
Class IV	Distinguished	3.00 ± 1.16	2.25 ± 0.96	3.00	2.50
	Excellent	1.91 ± 1.56	1.13 ± 1.05	2.00	1.00
	Very Good	2.07 ± 1.65	0.82 ± 0.97	2.00	1.00
	Good	1.75 ± 1.50	2.00 ± 1.83	1.00	2.00
Class V	Distinguished	2.00 ± 1.16	1.50 ± 1.00	2.00	1.00
	Excellent	1.59 ± 1.28	0.91 ± 1.13	2.00	0.50
	Very Good	1.86 ± 1.60	0.72 ± 0.84	2.00	1.00
	Good	1.50 ± 0.58	1.00 ± 0.82	1.50	1.00
RCT	Distinguished	5.75 ± 0.50	5.00 ± 1.16	6.00	5.00
	Excellent	3.80 ± 1.56	3.33 ± 1.85	4.00	3.00
	Very Good	3.83 ± 1.67	3.83 ± 1.75	4.00	4.00
	Good	5.00 ± 0.82	4.50 ± 1.73	5.00	5.00

3.5 Gender and Stress Levels

Female students reported higher mean stress levels than males in every procedure in the fourth year. In the

fifth year, females reported higher mean stress levels in Class-I, Class-II, and RCT procedures, while males did in Class-III, Class-IV, and Class-V procedures (Table 4).

Table 4: Stress levels according to gender in fourth -and fifth- year students

Procedure	Gender	Mean \pm SD		Median	
		Fourth year	Fifth year	Fourth year	Fifth year
Class I	Female	1.44 \pm 1.39	0.77 \pm 1.15	1.00	0.00
	Male	1.15 \pm 1.19	0.65 \pm 0.75	1.00	0.50
Class II	Female	3.51 \pm 1.45	2.30 \pm 1.66	3.00	2.00
	Male	3.38 \pm 1.42	2.19 \pm 1.33	3.50	2.50
Class III	Female	2.46 \pm 1.65	1.23 \pm 1.21	2.00	1.00
	Male	1.96 \pm 1.48	1.42 \pm 1.24	2.00	1.00
Class IV	Female	2.04 \pm 1.61	1.09 \pm 1.06	2.00	1.00
	Male	1.96 \pm 1.48	1.19 \pm 1.20	2.00	1.00
Class V	Female	1.89 \pm 1.40	0.88 \pm 1.07	2.00	1.00
	Male	1.27 \pm 1.19	0.89 \pm 0.91	1.00	1.00
RCT	Female	4.12 \pm 1.52	3.68 \pm 1.78	4.00	4.00
	Male	3.62 \pm 1.72	3.54 \pm 1.90	4.00	4.00

3.6 Stress-provoking Factors

Most of the students in their fourth year agreed with the proposed stress-provoking factors. In the fifth year, more than a half considered the availability/quality of

dental materials, the use of indirect vision, and grade assessment as stress-provoking factors, while less than a half considered the use of a rubber dam and establishing diagnosis as stress-provoking factors (Table 5).

Table 5: Answers to stress-provoking factors of fourth -and fifth- year students

Questions	Answers (Yes/No)	N (%)		McNemar	
		Fourth year	Fifth year	X ²	P
Grade Assessment	Yes	64 (77)	69 (83)	0.806	0.317
	No	19 (23)	14 (17)		
Use of rubber dam	Yes	49 (59)	36 (43)	3.76	0.053
	No	34 (41)	47 (57)		
Use of indirect vision	Yes	60 (72)	58 (70)	0.095	0.758
	No	23 (28)	25 (30)		
Establishing diagnosis	Yes	42 (51)	37 (45)	0.581	0.446
	No	41 (49)	46 (55)		
Availability/quality of dental materials	Yes	76 (92)	72 (87)	1.00	0.317
	No	7 (8)	11 (13)		

The most agreed upon factor, in the fourth and fifth years, was the availability/quality of dental materials, where 92% and 87% of the students answered yes, respectively. On the other hand, 51% and 45% of the students in their fourth and fifth years, respectively, agreed that establishing a diagnosis is a stress-provoking factor, which is the least agreed-upon factor.

McNemar test was used to determine whether there

are statistically significant differences in the proportion of students who agreed and disagreed with the proposed stress-provoking factors in their fourth and fifth years. The results revealed no statistically significant differences (Table 5).

4. Discussion

This study, to the best of our knowledge, is the first

to evaluate prospectively the self-reported stress levels from various conservative dentistry clinic procedures and consider the influence of factors, such as GPA and gender, on this stress. Also, it brought insight into some of the most common procedural stress-provoking factors that can impact stress.

It has been found that RCT procedure had the highest reported stress levels and class-I procedure had the lowest, in the two measurement points. Students, in their fourth year, reported higher levels of stress than in their fifth year in all procedures, with significant differences in all procedures, except for the RCT procedure. Students with distinguished GPAs had the highest reported stress levels in every procedure, in their fourth and fifth years. Females reported higher mean stress levels than males in every procedure in the fourth year, while in the fifth year, the results were inconsistent. Availability/quality of dental materials was the most agreed upon stressor, while establishing diagnosis was the least agreed upon stressor, in the fourth and fifth years.

Mocny-Pachon'ska et al. (8) assessed the levels of stress among 257 Polish dental students while performing certain conservative dentistry procedures and reported that endodontic treatment procedures are the most stressful and that fourth-year students experienced more stress levels than fifth-year students in the endodontic treatments, in agreement with our results. Class-I procedure had the lowest stress levels, which is related to the fact that it is the simplest and most trained restorative procedure.

Stress can have both motivating and detrimental effects; it can motivate students to perform better or reduce their chances of success (12) The results implied this, as it has been found that stress levels were the highest for distinguished and good GPA students. Other studies investigating stress for undergraduate students found that stress scores were negatively correlated with GPA (13–15).

No significant differences in stress levels between males and females were found. A systematic review investigating stress among dental students concluded that most stress level differences between genders are not significant, where religion and traditions might have a significant impact on this issue (16).

Dental students studying in developing countries considered the availability and quality of dental materials as a significant stress factor (17). Bearing in

mind that Jordan is a developing country, more than 85% of the surveyed students, in both years, agreed upon this factor.

Diagnosis is one of the most extensively taught subjects in undergraduate teaching. A study aimed to describe the self-reported confidence levels of 95 final-year Irish and Welsh students in performing different dental procedures found that they were most confident in simpler procedures, such as caries diagnosis (18). Another study assessed the clinical endodontic diagnostic skills amongst undergraduate dental students at pre-clinical and clinical levels and concluded that the endodontic diagnostic skills of undergraduate dental students get better as students advance through their training (19). In the current study, 51% and 45% of the students in their fourth and fifth years, respectively, agreed that establishing a diagnosis, whether it is caries or endodontic, is a stress-provoking factor.

The study is limited by the fact that it is confined to one educational institution with a risk of convenience sample bias. The level of stress in each clinic could be underestimated or overestimated, as a 7-point Likert scale was used. Respondents might be guided by acquiescence bias.

It is recommended that the reasons behind the reported stress-level differences between students in certain procedures be investigated. Further studies can be conducted to explore the effects of practicing more sessions for the most stressful procedures. In addition, it is suitable to expand the study by including other dental students from multiple universities with a bigger sample size. Also, there is a need for other studies to evaluate the stress levels of other procedures from other clinics.

5. Conclusions

Based on self-reported stress, dental schools are considered a stressful environment, especially during the clinical years. The findings indicate that as students advance through the clinical years, their stress levels from conservative dentistry procedures decrease. RCT was reported with the highest and class-I procedure with the lowest stress levels. Students with distinguished GPAs had the highest reported stress levels. Females reported higher stress levels in the fourth year. The highest percentage of students, in both years, agreed that the availability/quality of dental materials is a stress-provoking factor. Through this study, clinical supervisors and faculty members -expectedly- will

direct their attention to the procedures that stress students the most, consequently giving more time or sessions for practicing to ease these procedures. Hence, it is essential to improve the clinical practice setting and get the best dental treatment outcomes from it with the least possible amount of stress.

References

1. Atkinson JM, Millar K, Kay EJ, Blinkhorn AS. Stress in dental practice. *Dent Update*. 1991;18:60-64.
2. Cooper CL, Watts J, Kelly M. Job satisfaction, mental health, and job stressors among general dental practitioners in the UK. *Br Dent J*. 1987;162:77-81.
3. Halboub E, Alhadj MN, AlKhairat AM, Sahaqi AAM, Quadri MFA. Perceived stress among undergraduate dental students in relation to gender, clinical training and academic performance. *Acta Stomatol Croat*. 2018;52:37-45.
4. Ali K, Cockerill J, Zahra D, Tredwin C, Ferguson C. Impact of progress testing on the learning experiences of students in medicine, dentistry, and dental therapy. *BMC Med Educ*. 2018;2018:18:253.
5. Alzahem AM, van Der Molen HT, Alaujan AH, Schmidt HG, Zamakhshary MH. Stress amongst dental students: A systematic review. *Eur J Dent Educ*. 2011;15:8-18.
6. Polychronopoulou A, Divaris K. A longitudinal study of Greek dental students' perceived sources of stress. *J Dent Educ*. 2010;74:524-530.
7. Davidovich E, Pessov Y, Baniel A, Ram D. Levels of stress among general practitioners, students and specialists in pediatric dentistry during dental treatment. *J Clin Pediatr Dent*. 2015;39:419-422.
8. Mocny-Pachońska K, Doniec RJ, Wójcik S, Sיעiński S, Piaseczna NJ, et al. Evaluation of the most stressful dental treatment procedures of conservative dentistry among Polish dental students. *Int J Environ Res Public Health*. 2021;18:4448.
9. Sheid C, Weiss R. *Woelfel dental anatomy*. 8th edn. Philadelphia: Wolters Kluwer, Lippincott Williams & Wilkins; 2012, P. 504.
10. Sathyanarayanan R, Carounnanidy U. Classification and management of dental caries: New concepts. *Indian J Dent Res*. 2002;13:21-25.
11. Terwee CB, Bot SDM, de Boer MR, van der Windt DAW, Knol DL, et al. Quality criteria were proposed for measurement properties of health status questionnaires. *J Clin Epidemiol*. 2007;60:34-42.
12. Nguyen TTT, Seki N, Morio I. Stress predictors in two Asian dental schools with an integrated curriculum and traditional curriculum. *Eur J Dent Educ*. 2018;22:e594-e601.
13. Lin XJ, Zhang CY, Yang S, Hsu ML, Cheng H, et al. Stress and its association with academic performance among dental undergraduate students in Fujian, China: A cross-sectional online questionnaire survey. *BMC Med Educ*. 2020;20:181.
14. Halboub E, Alhadj MN, AlKhairat AM, Sahaqi AAM, Quadri MFA. Perceived stress among undergraduate dental students in relation to gender, clinical training, and academic performance. *Acta Stomatol Croat*. 2018;52:37-45.
15. Silverstein ST, Kritz-Silverstein D. A longitudinal study of stress in first-year dental students. *J Dent Educ*. 2010;74:836-848.
16. Smolana A, Loster Z, Loster J. Assessment of stress burden among dental students: A systematic literature review and meta-analysis of data. *Dent Med Probl*. 2022;59:301-307.
17. Sofola OO, Jeboda SO. Perceived sources of stress in Nigerian dental students. *Eur J Dent Educ*. 2006;10:20-23.
18. Honey J, Lynch CD, Burke FM, Gilmour ASM. Ready for practice? A study of confidence levels of final year dental students at Cardiff University and University College Cork. *Eur J Dent Educ*. 2011;15:98-103.
19. Alobaoid MA, Aldowah O, Karobari MI. Endodontic clinical diagnostic skills amongst undergraduate dental students: A cross-sectional study. *Healthcare (Basel)*. 2023;10:1655.

Conflict of Interests

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