

## ORIGINAL RESEARCH

# A comparative study of stress amongst different hierarchies of paediatric dental providers

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**Abstract**

Stress, a state of mental or emotional strain or tension brought on by challenging or demanding events might hamper a dentist's ability to react quickly and prudently. Their ability to deal with difficult patients may also be compromised, especially when dealing with frightened or anxious people. The main goal of this study was to survey a wide range of dental professionals from different backgrounds, including undergraduates, general practitioners and specialists, and determine how much stress each group was experiencing and how it affected both the participants and the treated patients. A sample size of an estimated 300 participants (defined by a 95% confidence interval and a 5% margin of error) was found to be sufficient for this investigation. About 178 responses were received to the 300 Google Forms questions, a response percentage of 59.3%. Of those surveyed, 77% had work experience ranging from zero to five years. Women made up 30% of the population, while men made up 70%. Furthermore, the patient-to-dentist ratio was neither a significant worry nor a source of stress because the majority of dentists saw between 0 and 10 patients per month. General dentists and specialists treated the patients with higher awareness, in-depth understanding and care than undergraduates did because they frequently reported having less experience than the other categories in this study did. The fact that a sizable majority of the respondents had between 0 and 5 years of experience further explains the high stress levels. High anxiety levels were present among dental undergraduates, highlighting the necessity of stress management instruction and support services in training programmes.

**Keywords**

Stress; Paediatric dentistry; Undergraduates; General dentists; Paediatric dentistry specialists

## 1. Introduction

Stress, a state of mental or emotional strain or tension resulting from adverse or demanding circumstances can negatively affect a dentist's ability to make the right decisions and act fast. Especially when dentists are dealing with fearful or stressed individuals, stress may also affect their ability to deal with uncooperative patients. Paediatric dental practitioners have a more complicated relationship with their patients as it is a three-way relationship that includes the child's caretaker. Therefore, and because of other factors, paediatric dental practitioners have a higher level of stress. In the investigation of levels of stress by Gisour *et al.* [1], the comparison of stress among the three groups revealed that students, general dentists and specialists had stress levels of medium-to-severe, moderate and mild, respectively. This finding indicates that dentistry can be classified under stressful occupations. Another finding [2] published in a 2018 study showed a higher anxiety level in younger dental students (76.7% compared to 23.3%). Storjord

*et al.* [3] also reported that stress was less in experienced dental students than in new ones.

A sensation of worry, nervousness or unease over something having an unclear consequence constitutes the psychological and physiological condition known as anxiety [4, 5]. Both patients and dentists may experience difficulties as a result of anxiety. The psychological and physiological causes of dentist anxiety in dental offices are complicated and multifactorial; and in recent years, anxiety has also increased due to COVID-19 [6–18]. Numerous studies have examined the degree of stress and anxiety dental students and professionals experience, as well as the contributing causes [19–21]. Stress is a response to a specific event or situation perceived as challenging or threatening [1, 2]. It is a natural and normal part of life, and in small amounts, it can actually be helpful in motivating us to act and accomplish tasks. However, if stress becomes chronic, it can negatively impact mental and physical health. Anxiety, on the other hand, is a feeling of

unease, apprehension or worry, which is often accompanied by physical symptoms such as sweating, trembling or an increased heart rate [4, 5]. Unlike stress, anxiety does not necessarily have a specific trigger or cause, and it can be more long-lasting. While stress and anxiety can both have negative effects on mental and physical health, the key difference is that stress is a response to a specific situation, while anxiety is a more general feeling of worry or apprehension, which can persist even with no clear threat.

The physical signs of anxiety can include one or more of the following: trepidation, difficulty concentrating, fear of the worst, irritability, restlessness, shortness of breath, nausea, muscle tension, temporomandibular disorders [22–26], dry mouth and cold or sweaty hands and feet, as well as numbness or tingling in the hands or feet [27, 28]. On the other hand, the psychological symptoms could also consist of one or more of the following: difficulties paying attention or staying focused, memory issues, depressive symptoms such as hopelessness and lethargy, poor appetite, development of an excessive attachment to a safety object or person, and finally, a tendency to avoid crowded places [29–32]. Another study, conducted in 2010 on 815 medical students at the Nishtar Medical College, found that anxiety and sadness declined with student age and were higher in female students than in males [33].

Additionally, a 2011 study at Plovdiv University in Bulgaria found that dental students experience considerably more dental anxiety at the beginning of their training than at the conclusion [34]. In terms of postgraduate students, a study conducted in India on 50 postgraduate medical students demonstrated that a number of factors, including age and the nature of the course, contributed to raising the level of stress and anxiety among these students [35]. To investigate the circumstances causing anxiety in medical and dentistry students, several studies were conducted [36–38]. Very few studies have studied the relationship between anxiety and postgraduate paediatric dentistry students. The primary objective of this research was, therefore, to clarify this problem by speaking with a range of dental professionals from different backgrounds, including students, general dentists and specialists. This would make it easier to gauge what is the degree of stress in each group, how it affects its members, and how it treats them in relation to the industry.

## 2. Materials and methods

### 2.1 Study design

This was a cross-sectional, questionnaire-based study conducted among specialists, general dentists and undergraduates, randomly selected from the institutions in Saudi Arabia concerned with dental practice/teaching. The STROBE guidelines were employed for the purposes of this investigation [39]. The primary demographic variable taken into account while constructing the questionnaire included the nationality, gender, educational status, sector involved, their region and years of experience. The members were requested to rate on a scale from 0 (none) to 10 (high).

### 2.2 Study sample

The Raosoft online survey size calculator (18) was used to estimate that a sample size of around 300 (determined by a 95% confidence interval and a  $\pm 5\%$  margin of error) would suffice for the purposes of this study.

### 2.3 Inclusion criterion

Only individuals in the practice/study of paediatric dentistry were selected. Different categories of experience of dental practitioners—undergraduates, general dentists and specialists in the field of paediatric dentistry were targeted specifically to better assess the objectives of this study.

### 2.4 Exclusion criterion

Respondents who did not submit themselves to filling the consent form prior to answering the questionnaire were rejected from the domains of this study. Dental practitioners/undergraduates from other branches of dentistry were also not considered for the purpose.

### 2.5 Reliability tests

The data for this study was collected using a questionnaire, which has been previously employed by Farokh-Gisour *et al.* [1] and was modified to suit this setting. A number of items were changed, and one item was removed. The dependent variable in the present study was the stress level during paediatric dental treatment, which was rated on an 11-point Likert scale (ranging from 0 = no stress to 10 = severe stress). The dependent variable in the study was the stress level experienced during paediatric dentistry, measured using an 11-point Likert scale. The operationalization and definition of “stress level” and the rationale for using the Likert scale were provided in detail. In this study, the stress level was operationalized and defined as the self-reported subjective feeling of anxiety, tension or worry the participants experienced during paediatric dental treatment. The use of the Likert scale also enabled the comparison of stress levels across different types of dental practitioners and the identification of any significant differences. This information could be used to develop interventions or training programs aimed at reducing stress levels during paediatric dental treatment. The stress level was measured on an 11-point Likert scale, ranging from 0 (no stress) to 10 (extreme stress).

The independent variable in the study was the type of dental practitioner, including dental undergraduates, general dentists and paediatric dental specialists, which was manipulated to investigate its effect on the dependent variable, *i.e.*, stress levels during paediatric dental treatment.

Twenty postgraduate paediatric dentists working at Saudi government hospitals were handed the questionnaire as part of a test to establish the intraexaminer reliability of the questionnaire. The same 20 postgraduate paediatric dentists were provided the same questionnaire to complete after a month, and the results were compared (Cohen’s kappa).

To calculate the Cohen’s kappa test for the intraexaminer reliability of the questionnaire, the ratings by the 20 postgraduate paediatric dentists on the same questionnaire at two different

time points (test and retest) were compared. The kappa coefficient provided a measure of the agreement between the two sets of ratings, after accounting for chance agreement. Since the ratings were continuous on a scale from 0 to 10, they were first converted into categorical ratings. The categories were defined as low (0–3), moderate (4–7) and high (8–10) stress levels.

Next, a contingency dataset was created to compare the ratings at the two time points. It had three columns for the low, moderate and high stress levels, and two rows for the test and retest ratings. The number of observations in each cell of the dataset was then counted.

Using this, the observed agreement ( $P_o$ ) was calculated, which is the proportion of cases in which the raters agreed on the stress level rating at the two time points. The expected agreement ( $P_e$ ) was also calculated, which is the proportion of cases in which the raters would be expected to agree by chance. Finally, the kappa coefficient was calculated using the formula:

$$\text{kappa} = (P_o - P_e) / (1 - P_e)$$

Where kappa ranges from  $-1$  to  $1$ , with values closer to  $1$  indicating higher agreement beyond chance [40].

It is to be noted that a 3-level categorical variable was assumed in this example. The calculation would need to be adjusted for different numbers of categories or for ordinal or nominal variables.

The obtained Cohen's kappa value of  $0.72$  indicated a reliably high level of agreement between the two sets of ratings provided by the same group of 20 postgraduate paediatric dentists at two different time points. This suggests that the questionnaire has a high level of intraexaminer reliability, meaning that it is consistent and dependable in measuring the same constructs over time.

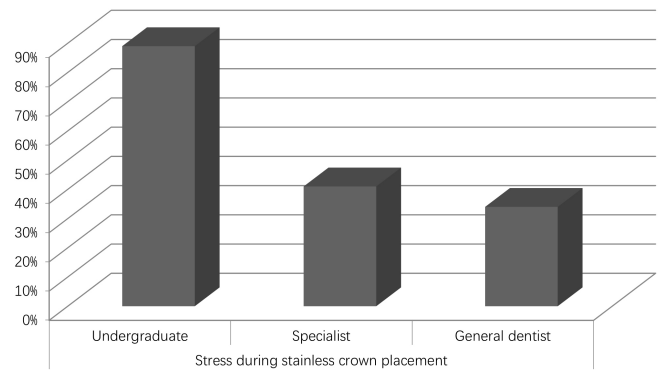
## 2.6 Statistical analysis

The collected data was analysed using IBM SPSS statistics software 24.0 version (Chicago, USA). Data, descriptive statistics, frequency analysis and percentage analysis were used for categorical variables and the mean and standard deviation for continuous variables. To find the significance in categorical data, Chi-square test was used, and the  $p = 0.05$  was considered a significant level.

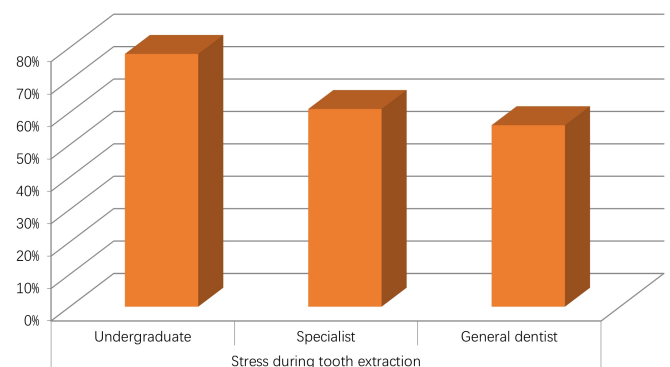
## 3. Results

The demographic characteristics of the selected participants are displayed in Table 1, with Table 2 representing the various sources of stress in the sample size. Figs. 1,2,3,4,5 represent all the different dental procedures that were a part of the questionnaire and identified as sources of stress by the participants. Fig. 1 displays the stress during stainless crown placement as per the answers of the respondents with Fig. 2 showing stress during tooth extraction as per the answers by the respondents. Stress during pulpotomy as per the answers of the respondents is shown in Fig. 3, with Fig. 4 displaying the stress during pulpectomy as per their answers. Finally, Fig. 5 represents

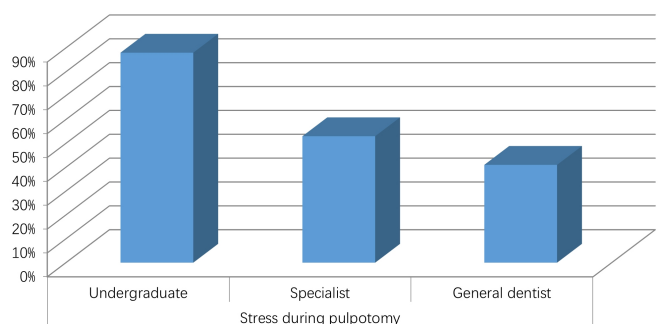
the stress during the space maintainer administration as per the answers of the respondents. The research occurred in a context in which the respondents were expected to declare their gender and nationality. Of the 178 respondents, 70% were male while female accounted for 30%. The level of education for the individual was another factor assessed during the research. It was observed that most of the respondents getting to answer the questions were dental undergraduates as they had the right experience that the research was looking for in this case.



**FIGURE 1.** Stress during stainless crown placement as per the answers of the respondents.



**FIGURE 2.** Stress during tooth extraction as per the answers of the respondents.

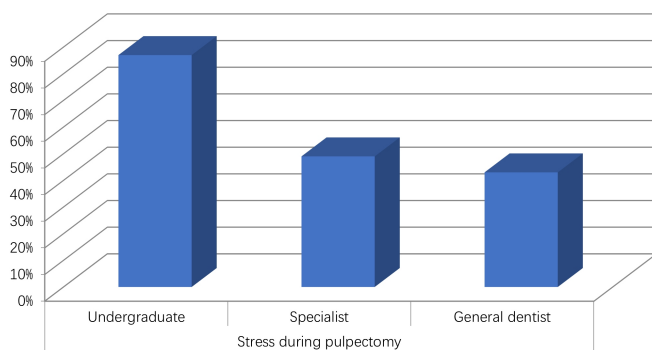


**FIGURE 3.** Stress during pulpotomy as per the answers by the respondents.

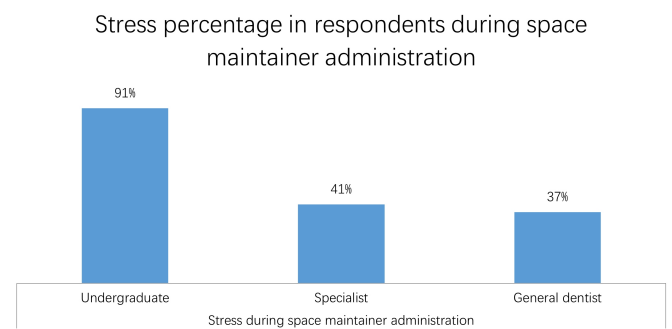
Table 3 presents the mean and standard deviation (SD) values for various variables related to stress levels in different dental procedures. The  $p$ -values indicate the statistical signifi-

**TABLE 1. Demographic characteristics of the respondents.**

Variable analysed	Variable characteristic	Number (n)	Percentage
Nationality	Saudi	161	90%
	Non-Saudi	17	10%
Gender	Male	124	70%
	Female	54	30%
Educational status	Undergraduate	93	52%
	Specialist	26	15%
	General dentist	59	33%
Sector involved	Private sector	104	58%
	Government sector	74	42%
Region	Central	88	49%
	Eastern	34	19%
	Western	56	31%
Years of experience	0 to 5	137	77%
	6 to 10	12	7%
	11 to 15	8	4%
	16 to 20	6	3%
	>20	15	8%

**FIGURE 4. Stress during pulpectomy as per the answers of the respondents.**

cance of the differences observed. Stress levels during pulpotomy were low, with a mean of 0.8 (SD = 1.8). Conversely, stress levels were significantly higher during pulpectomy, with a mean of 3.2 (SD = 4.8), indicating a more stressful experience for dentists performing this procedure. The difference in stress levels between pulpotomy and pulpectomy was statistically significant ( $p < 0.0001$ ). The mean stress level for stainless crown placement was 2.9 (SD = 3.4). Although this procedure was associated with a higher stress level compared to that for pulpotomy, the difference was not statistically significant ( $p = 0.0001$ ). For tooth extraction, the mean stress level

**FIGURE 5. Stress during space maintainer administration as per the answers of the respondents.**

was 1.5 (SD = 1.7). Stress levels did not significantly differ compared to that for pulpotomy ( $p = 0.4$ ), suggesting that dentists experienced similar levels of stress during these two procedures. The administration of a space maintainer was associated with a relatively low mean stress level of 1.4 (SD = 1.7). The difference in levels compared to that for pulpotomy was not statistically significant ( $p = 0.15$ ). Lastly, the administration of nitrous oxide resulted in the lowest mean stress level of 0.6 (SD = 1.4). This procedure was significantly less stressful compared to pulpotomy, pulpectomy and stainless crown placement ( $p < 0.0001$ ).

**TABLE 2. Surgeries and the stress percentages associated with them as per the respondents.**

Variable analysed	Variable characteristic	Percentage of respondents
Stress during pulpotomy	Undergraduate	88%
	Specialist	53%
	General dentist	41%
Stress during pulpectomy	Undergraduate	87%
	Specialist	49%
	General dentist	43%
Stress during stainless crown placement	Undergraduate	89%
	Specialist	41%
	General dentist	34%
Stress during tooth extraction	Undergraduate	78%
	Specialist	61%
	General dentist	56%
Stress during space maintainer administration	Undergraduate	91%
	Specialist	41%
	General dentist	37%
Stress during nitrous oxide administration	Undergraduate	N.A. (not available)
	Specialist	N.A.
	General dentist	N.A.

*N.A.: not available.*

**TABLE 3. Mean, standard deviation and *p*-values for the responses provided in the questionnaire.**

Variable	Mean	SD	<i>p</i> -value
Stress during pulpotomy	0.8 (1.0)	1.8 (1.4)	0.0001
Stress during pulpectomy	3.2 (1.6)	4.8 (2.2)	0.0001
Stress during stainless crown placement	2.9 (1.5)	3.4 (2.1)	0.0001
Stress during tooth extraction	1.5 (2.0)	1.7 (1.7)	0.40
Stress during space maintainer administration	1.4 (1.8)	1.7 (1.8)	0.15
Stress during nitrous oxide administration	0.6 (0.9)	1.4 (1.4)	0.0001

*SD: standard deviation.*

#### 4. Discussion

The concern regarding the sector in which the respondents were employed was taken into account. It is imperative to ascertain whether the working environments of dentists contributed to the stress experienced during their work hours. In this study, the activities in both the government and the public sector were examined. It is evident that the research primarily focused on private-sector employees. Another factor considered in the background information was the geographic region of the dental professionals. Determining whether the

region in which the dentists were situated influenced their stress levels was crucial. The results obtained indicate that the study primarily concentrated on the central region. Among the factors contributing to stress among paediatric professionals, one was the patient load they handled. A high ratio of patients to a single paediatric dentist would indicate that they had to deal with numerous stressful situations. From the results, the patient-to-dentist ratio can be observed to not be a significant concern or cause of stress, as most professionals reported handling 0 to 10 patients per month. In such cases, they still had sufficient time for other activities, and the workload



did not contribute to stress. The type of activity in which the professionals engaged and the treatments they provided to patients have been previously debated as potential stressors. The study investigated specific areas within the dentists' operations that could lead to stress. One of the examined operations was the administration of local anaesthesia. It was evident that most professionals experienced less stress when administering anaesthesia treatment to the maxillary region. Conversely, administering anaesthesia to the mandibular region stressed some dentists. Another operation examined was the rubber dam placement. When operating on paediatric patients, dentists are typically expected to use a rubber dam as a basic procedure. The results from respondents regarding this concern are presented in graphs for both maxillary and mandibular regions. The results demonstrate that the placement of a rubber dam during operations is an activity that is not stressful for the majority of professionals, particularly those gaining experience in the paediatric field. Pulpectomy was another process investigated as a potential stressor for dentists. Most respondents in the research were unfamiliar with the procedure, and when asked about the stress they may have experienced during such operations, their limited experience and insufficient skills were determined to be the main factors preventing them from performing the procedure. Another critical operation in paediatric dentistry is the placement of stainless steel crowns. This procedure requires significant skills and experience from dentists. Many dentists recruited for the study had limited experience and had not performed the procedure. However, among those who had experience with the operation, it was determined that it did not cause them stress. In Saudi Arabia, dentists are expected to administer the treatment of space maintainers, which ability depends on the dentist's skills and experience. The study aimed to determine whether this process induced stress in dentists. The results obtained indicated that a majority of the respondents had not engaged in this activity. As most respondents had less than 5 years of experience, they had not specialized in this area. For those who had performed the operation, it was not perceived as stressful. Those who found it stressful may have had varying reasons, such as the time required for the operation and the preparation process for patients.

This study holds significant implications for understanding the factors contributing to stress among paediatric dental professionals. By examining the sector of employment and geographic region, it sheds light on the potential influence of these factors on stress levels. The findings suggest that the patient load, measured by the patient-to-dentist ratio, does not significantly contribute to stress among professionals, with most reporting a manageable workload of 0 to 10 patients per month. Furthermore, specific activities within dental operations were investigated as potential stressors. Administering local anaesthesia was found to be less stressful when performed in the maxillary region compared to the mandibular region. The placement of a rubber dam, a basic procedure in paediatric dentistry, was generally not considered stressful for the majority of professionals, particularly those gaining experience in the field. Similarly, the placement of stainless steel crowns did not stress experienced dentists. Regarding the treatment of space maintainers, most respondents had not

engaged in this activity, likely due to their limited experience. For those who performed the procedure, stress levels varied, potentially influenced by factors such as the duration of the operation and the patient preparation process. These findings provide valuable insights for dental professionals, educators and policymakers. Understanding the specific activities that may contribute to stress allows for targeted interventions and training programs to mitigate stress levels. Efforts can be directed towards optimizing stress management strategies for procedures such as administering anaesthesia in the mandibular region, in which dentists may experience higher stress levels. Additionally, the results highlight the importance of experience and specialized training in minimizing stress for certain operations, such as the pulpectomy and the placement of stainless steel crowns. Future research can further explore these areas and investigate additional factors that may contribute to stress in paediatric dentistry. Ultimately, the findings contribute to the improvement of dental practice and the well-being of dental professionals in their daily work.

When faced with a difficulty or problem, the first step is to acknowledge it; doing so will reduce the amount of time needed to resolve the situation. Dental professionals experience stresses every day and consider a variety of factors during treatment, including the patient's comfort, mood, acceptance and time. Stress will increase, especially if the patient is a child. When determining the stress that the individuals in the department had undergone, one of the other important elements that the study looked into was the years of experience that each of the respondents had. Most of the respondents (77%) had an experience of 0 to 5 years. According to a study by Storjord *et al.* [3], experienced dental students experienced less dental anxiety than new dental students did. This strongly implies that dentistry programme structures inside academic institutions may impact dental anxiety levels. Additionally, a study by Kulsoom and Afsar [38] revealed that first-year students experienced high levels of tension and anxiety, which peaked in the fourth year, when the clerkship phase begins and students rotate between numerous hospital disciplines as their primary training technique. They even noticed that the findings for anxiety and depression in the fourth year were the greatest.

The fact that first-year dental students are more vulnerable to stress and anxiety may explain the variations in dental anxiety as they are in an unfamiliar educational environment. A study from the United States revealed that seniors and juniors have lower stress reactions than sophomores and freshmen have [41], despite the fact that students just starting their studies can suffer more stress owing to the difficulty of transitioning from high school to university. Therefore, the reduction in stress brought on by adjusting to university life may be a general process resulting in diminution of specific concerns (*e.g.*, dental anxiety). Another argument is that students typically become less anxious and more self-assured in later years of study due to low failure rates [42].

Paediatric students and those that have just joined the paediatric profession are expected to be familiar with the preparation of the cavity for class I to class IV. In this research, the stress and the difficulty the students experience when they have to complete the assignments in this field show that the operations in such cases are not stressful to them. During their activities

in the hospital settings, they find the cavity preparations easy.

Pulpotomy is another crucial surgical modality for dentists. It is the process through which they get to determine some of the complications that the patients might face and administer to them the right medication. In this research, the stress that the complicated process could have on the dentists needed to be determined. It was determined that most of the dental undergraduates in the study were not operating, one of the main reasons being its complexity and the experience needed to complete the procedure. The results obtained for the concern can be as summarized in Fig. 3.

Dental practitioners face various types of challenges when treating paediatric patients, particularly with regard to their aggressive behaviour and fear of dental treatments [43]. The stress levels of both the patients and the practitioners are explored, with clinical experience being highlighted as a key factor that can affect a dentist's ability to manage paediatric patients [44]. Recent graduates are also suggested to possibly have an advantage in dealing with paediatric patients due to their undergraduate clinical and didactic training [44]. Several studies have investigated the different behaviours of paediatric patients during dental treatments and the way they affect dentists [45, 46]. The studies suggest that regardless of the behaviour of the children, the dentists tend to be nervous, particularly those with less experience. The importance of educating dental undergraduates on managing paediatric patients and reducing stress levels cannot be emphasized enough. The study by Waggoner *et al.* [46] highlights the importance of understanding the challenges of treating paediatric patients, particularly in emergency situations. It underscores the need for continuous education and training for dental practitioners, particularly those with less clinical experience, to manage the unique demands of treating paediatric patients effectively.

The study by Asokan *et al.* [47] explores the sources of stress among paediatric dental postgraduates in India, using a mixed-method approach. The findings reveal that academic and specialty-related domains were significant stress factors among the participants. The top three factors were identified as receiving an ideal case for clinical exams; financial resources for conferences, dissertation, short studies and publications; and fear of unemployment after graduation. The study also highlights the importance of the psychological well-being of dental undergraduates, and the manner in which identifying stress factors and using appropriate coping strategies can help postgraduates achieve personal, academic and professional success. The mixed-method approach used in this study provides a comprehensive understanding of the sources of stress, and the findings can be useful in developing stress management strategies for paediatric dental postgraduates [47].

One of the fundamental skills and operations in the paediatric department is the simple tooth extraction. The activity involves the diagnosis and then extraction of a tooth from affected patients. The research looked at whether the process would be a source of stress for the dentists in Saudi Arabia. Most dentists participating in the research performed the processes, and it was moderately stressful for most respondents. It was stressful to them as they have to be keen when performing the process, and a mistake would lead to more problems. Clearly, in these cases, the process needs time and attention

from the dentists, hence the stress.

The last area investigated as a possible source of stress for Saudi Arabian dentists was nitrous oxide administration for the patients. In this area, it was determined that most of the respondents had not administered the process and that they could not tell whether the process was a source of stress for them.

The field of dentistry is demanding [48, 49]. The daily interactions that dentists have with patients, as well as the execution of various dental procedures and treatments, subject them to a variety of stressors [50]. A variety of factors may impact dental professionals' psychological well-being, including clinical worry, tension from working with nervous patients, emotional exhaustion and depression. According to published works, dentists are extremely susceptible to the negative effects of stress [51–59]. There has not yet been a thorough examination of the stress that dentists experience at work, the identification of stressors, and the short and long-term effects on their job and health. The scientific literature on the effects of stress on the health and labour of dentists lacks precise information, which is a significant deficiency for dental science as a whole. Given that dentistry is a significant industry, from basic and clinical research in all areas of dentistry to mass production and ongoing improvement of dental materials and equipment, dentists as their end users are burdened by the high prices of dental materials and maintenance of dental equipment, and then by ongoing education, monitoring and application of the most recent scientific knowledge, and as doctors, they are also required to provide their patients with the best care possible [59–61].

The study has significant implications for the dental profession in Saudi Arabia. By identifying the degree of stress dental professionals experience, including dental undergraduates, general practitioners and specialists, the study sheds light on the prevalence and severity of stress in the field. The finding that dental undergraduates exhibit high levels of anxiety is particularly noteworthy, as it suggests a need for better support services and stress management training in dental training programs. The determination of an adequate sample size study, as well as its use of a cross-sectional study design and random sampling methods, further strengthens the reliability of its findings. Furthermore, the identification of high levels of stress among dental undergraduates and new graduates in the study emphasizes the importance of providing support and guidance to those entering the field. This could include mentorship programs, counselling services and professional development opportunities aimed at helping new dental professionals navigate the unique challenges and stressors of the field. Overall, the study provides valuable insights into the factors contributing to stress in the dental profession and suggests ways in which dental professionals can be better supported in their work.

The study aimed to identify the degree of stress in different categories of dental professionals and the way it affects their care. However, the study had several limitations affecting the generalizability and reliability of its findings. First off, because this study used paediatric dental undergraduates and practitioners from a specific specified location and was cross-sectional in nature, results may not be entirely typical of postgraduate

paediatric dentists worldwide. Second, despite the inclusion of practitioners from a variety of paediatric dentistry specialties; the sample size is still thought to be too small to demonstrate a variety of meaningful differences. The study used questionnaires to interview specialists, general dentists and dental undergraduates randomly selected from Saudi Arabian institutions involved in dental practice and education. However, the study relied on voluntary participation, which could have introduced self-selection bias into the sample. A sample size of about 300 people was determined to have been adequate, but the response rate was only 59.3%, which may have affected the representativeness of the sample. Additionally, the study had a higher proportion of male (70%) than female respondents (30%), which could have affected the generalizability of the findings to the entire population. The findings also revealed that most of the respondents had between 0 and 5 years of experience, which could have influenced the stress level reported by the respondents. The study also found that dental undergraduates had a lower level of experience compared to that for other categories, and general dentists and specialists handled patients with greater awareness and understanding. Moreover, the study found that dental undergraduates exhibited high anxiety levels, which highlighted the need for support services and stress management training in training programs. However, the study did not explore the sources of stress and the effectiveness of stress management interventions, which could limit the practical implications of the findings.

## 5. Conclusions

This study helped to shed light on the subject of dental anxiety in young patients. General dentists and specialists handled patients with greater awareness, in-depth understanding, and care than dental undergraduates did, which can be attributed to the fact that undergraduates were generally seen to have less experience than the other categories did in this study. Additionally, many of the respondents had between 0 and 5 years of experience, which helps to explain the prevalence of high stress levels. The high anxiety levels in dental undergraduates show the need for support programmes and stress management training in their educational programs.

## AVAILABILITY OF DATA AND MATERIALS

The data presented in this study are available on reasonable request from the corresponding author.

## AUTHOR CONTRIBUTIONS

AK, SAA and FAF—designed the research study. AK, SAA, FAF, MTA, AhAA and AbAA—performed the research. AK, SAA, FAF and MTA—analyzed the data. AK, SAA, MC and GM—wrote the manuscript. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript.

## ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was carried out in accordance with the Helsinki Declaration, and the protocol was approved by the Institutional Review Board at Riyadh Elm University (REU), Riyadh, Saudi Arabia (Protocol number: “FUGRP/2021/224/396/389”, Date: 23 December 2022). All participants gave written informed consent for participation.

## ACKNOWLEDGMENT

Not applicable.

## FUNDING

This research received no external funding.

## CONFLICT OF INTEREST

The authors declare no conflict of interest. Giuseppe Minervini is serving as one of the Editorial Board members of this journal. We declare that Giuseppe Minervini had no involvement in the peer review of this article and has no access to information regarding its peer review. Full responsibility for the editorial process for this article was delegated to JJ.

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**How to cite this article:** Ateet Kakti, Saleh Atallah Albalawi, Fahad Abdullah Fallatah, Moaz Talal Almalki, Ahmed Abdullah Alzahrani, Abdulrahman Abdulmohsen Alsaif, *et al.* A comparative study of stress amongst different hierarchies of paediatric dental providers in Saudi Arabia. *Journal of Clinical Pediatric Dentistry*. 2024; 48(6): 59-68. doi: 10.22514/jocpd.2024.126.