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# Evaluating the educational environment among Saudi board dental residents at King Abdulaziz Medical City in Riyadh using PHEEM tool

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## Abstract

**Background** The quality of education and the learning environment significantly influence dental trainees' success and experiences. However, the impact of the educational environment on dental residents in Saudi Arabia remains unexplored. This study aimed to assess the educational environment among dental residents at King Abdulaziz Medical City (KAMC) using the Postgraduate Hospital Educational Environment Measure (PHEEM) instrument, shedding light on its influence and providing insights for improvement.

**Methods** A cross-sectional survey was conducted among 85 dental residents from various specialties at King Abdulaziz Medical City in Riyadh, Saudi Arabia, using the PHEEM instrument to evaluate the educational environment. Data analysis involved descriptive statistics, the Shapiro-Wilk test for score normality, and comparative analyses to explore the relationships between PHEEM scores and sociodemographic characteristics, specialties, residency years, and health habits.

**Results** A total of 85 dental residents completed the survey. The majority of participants were aged 25 years and older (96.5%), female (56.5%), and single (78.8%). Most of the participating dental residents were Saudi board orthodontic residents (18.8%), and they were at the R2 level of training (32.9%). 88.2% were non-smokers, and 78.8% of them practiced physical activity. The PHEEM assessment revealed an overall score of 117.12 out of 160, with subscale scores of 41.54 out of 56 for role autonomy, 44.66 out of 60 for teaching, and 30.92 out of 44 for social support. Factors like age, marital status, and smoking were associated with lower scores, while being female and physically active were linked to higher scores. Notably, R3 residents had significantly lower scores than R1 residents ( $p < 0.05$ ).

**Conclusion** This study evaluated the educational environment in Saudi board dental programs at KAMC, revealing an overall positive atmosphere but highlighting the need for improvement in certain areas. Despite some limitations,

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this research represents a significant step toward assessing and enhancing the educational environment for dental residents in Saudi Arabia, ultimately ensuring a better learning environment for future dental professionals.

**Keywords** Educational environment, Residency, PHEEM, Dental education, Saudi board, Dental residents

## Background

Dental education in Saudi Arabia has witnessed significant development over the years to meet the growing demands in oral health care and to maintain high standards in dental education and practice. Dental schools are spread across different regions and have been remarkably increasing; currently there are 35 Dental Colleges offering undergraduate programs leading to Bachelor of Dental Surgery (BDS) degree graduating [1]. These schools aim to graduating competent dentists by adopting dynamic curriculum, which offers university-based dental training, with quality education and research opportunities.

Graduated dentists pursue further training and advanced degrees to improve their level of expertise. The available postgraduate dental education programs allow them to either specialize in a specific area of dental practice or higher academic degrees. The Saudi Commission of Health Specialties offers various postgraduate residency and specialization programs in different dental specialties including family dentistry, orthodontics, restorative dentistry, prosthodontics, endodontics, periodontics, paediatric dentistry, oral medicine and pathology and oral and maxillofacial surgery [2]. These programs are offered in different basis [2]. There are 3-year long programs such as family dentistry, orthodontics, restorative dentistry, prosthodontics, endodontics, and paediatric dentistry [2]. Whereas other programs like periodontics and oral medicine and pathology are 4 years long, and oral and maxillofacial surgery is 5 years long [2].

Institutions offering postgraduate medical/ dental programs strive to provide high-quality education and training services by considering various factors that significantly influence the educational and training experience of postgraduate trainees [3, 4]. Among these factors, the learning environment, which plays a pivotal role in shaping the educational experience; and has been linked to academic achievement, perception, behaviour, and overall success [3, 4]. The learning environment is defined by the American Medical Association (AMA) as a social system including the learner (including the external relationships and other factors affecting the learner), the individuals with whom the learner interacts, the setting and purposes of the interaction, and the formal and informal rules/policies/norms governing the interaction [3]. Efforts have been devoted to developing the Postgraduate Hospital Educational Environment Measure questionnaire (PHEEM) [4, 5]. This tool can assess the

quality of the learning environment and contribute valuable information for improvement and quality assurance.

The clinical environment and social support have been shown to influence the success, perceptions and learning outcomes of medical trainees and postgraduate medical students [6, 7]. Moreover, faculty support and mentorship, access to digital educational resources, positive learning cultures have been associated with trainees' professional development, clinical and academic growth [8–11]. In postgraduate dental education, several studies assessed the residents' perception of the learning environment [12–14]. These studies have revealed both positive and negative attitudes toward essential factors such as self-autonomy, social support, educational setting, and atmosphere. Therefore, acknowledging the effect of the learning environment is vital, as it can affect the quality and success of dental residency programs.

Health institutions should strive to continuously enhance the learning environment, as it greatly impacts the capability of the dental residents to achieve their training goals. The improvement can be achieved through addressing the weaknesses, accepting them, and planning to improve outcomes and support trainees.

To our knowledge, the educational environment among dental residents in Saudi Arabia has not yet been investigated. It is imperative to understand its effect for target improvements that enhance the quality of the training, educational services, and satisfaction levels. Our study aimed to assess the perception of the educational environment among dental residents at King Abdulaziz Medical City (KAMC) using PHEEM instrument. Shedding light on the impact of environmental measures on postgraduate dental education can provide insights and increase awareness to advance the learning experience of dental residents. Supervisors at KAMC can also consider utilising this information to maintain the positive factors and address areas of weaknesses.

## Methods

### Study design

This cross-sectional study was conducted using a survey approach. Dental residents from all dental specialities at King Abdulaziz Medical City in Riyadh, Saudi Arabia were recruited using a convenience sampling method between May 2023 and June 2023. The inclusion criteria were dental residents enrolled in Saudi board programs and actively undergoing training at King Abdulaziz Medical City, while exclusions comprised residents from other centres and those who had deferred their studies.

### Sample size

Employing a 95% confidence interval, a 5% margin of error, and a 50% assumed response distribution, a minimum sample size of 79 participants was required.

### Data source and data collection

To assess the educational environment of the residency program, the English version of the “Postgraduate Hospital Educational Environment Measure” (PHEEM) [14, 15], as presented in Appendix 1, was employed. PHEEM is a widely used instrument for assessing the postgraduate medical education learning environment [5, 15, 16] and it has demonstrated reliability and content validity in various countries, including Saudi Arabia [5, 13, 17–22]. This questionnaire, accessible for academic and research purposes [5, 13, 15, 17, 18], comprises 40 items divided into three subscales that address perceptions of role autonomy, teaching, and social support [15, 16]. Scoring is conducted using a five-point Likert scale, ranging from 0 (strongly disagree) to 4 (strongly agree), with a maximum possible score of 160 [15, 17].

Information on socio-demographic factors (age, gender, marital status), specialty; Periodontics (SB-Perio), Orthodontics and dentofacial orthopedics (SBO-DO), Oral Medicine and Pathology (SB-OMP), Endodontics (SBE), Pediatric Dentistry (SBPD), Restorative Dentistry (SBRD), Family Dentistry (SBFD), Prosthodontics (SB-Pros), and Oral and Maxillofacial Surgery (SB-OMS), residency year (R1, R2, R3, R4, and R5) and health habits (smoking status and physical activity) were included as part of the questionnaire. The questionnaire was organized into three sections:

The questionnaire included 3 sections:

Section A: Socio-demographic and health habits data.

Section B: Residency training program data.

Section C: 40-items Postgraduate Hospital Educational Environment Measure (PHEEM).

The administration of the questionnaire in English aligned with the expected language proficiency among dental residents due to the nature of their studies. Distribution of the questionnaires was primarily overseen by two designated authors who are dental residents at King Abdulaziz Medical City in Riyadh, where they handed out the questionnaires at appropriate instances. The questionnaire was distributed through an online questionnaire using Google forms. The two authors collected the complete questionnaires by handing each resident a device with the questionnaire through face-to-face interaction, ensuring prompt clarification of doubts if any arose. This ensured that data collection was completed

**Table 1** Guide for interpretation of the PHEEM score (S. Roff et al., 2005) [5]

I. Perceptions of role autonomy:	Score	Interpretation
	0–14	very poor
	15–28	a negative view of one's role
	29–42	a more positive perception of one's job
	43–56	excellent perception of one's job
II. Perceptions of teaching:		
	0–15	very poor quality
	16–30	in need of some retraining
	31–45	moving in the right direction
	46–60	model teachers
III. Perceptions of social support:		
	0–11	non-existent
	12–22	not a pleasant place
	23–33	more pros than cons
	34–44	a good supportive environment

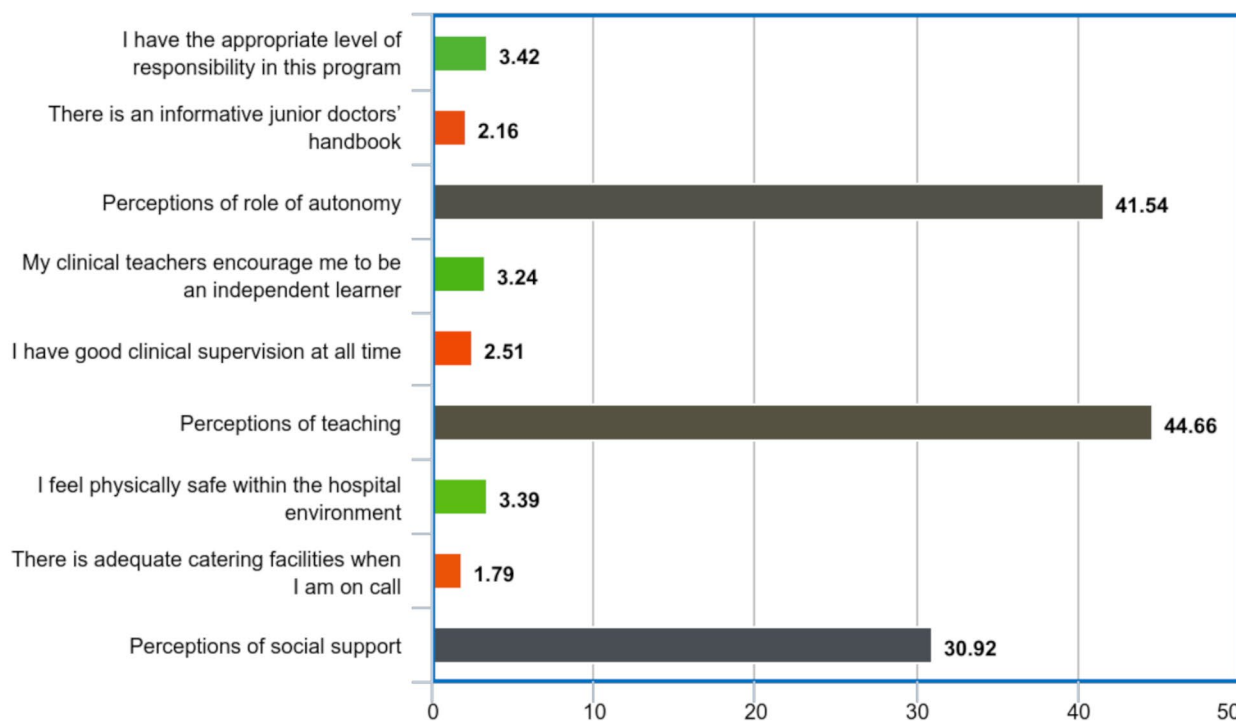
**Table 2** Distribution of study characteristics among dental residents (N=85)

Study characteristics	Total N=85, n (%)	
<i>Demographic factors</i>		
Age	< 25 years	3 (3.5)
	≥ 25 years	82 (96.5)
Gender	Male	37 (43.5)
	Female	48 (56.5)
Marital status	Single	67 (78.8)
	Married/divorced	18 (21.2)
<i>Dental training</i>		
Specialty	SB-PERIO	7 (8.2)
	SBO-DO	16 (18.8)
	SB-OMP	5 (5.9)
	SBE	10 (11.8)
	SBPD	12 (14.1)
	SBRD	13 (15.3)
	SBFD	7 (8.2)
	SB-PROS	12 (14.1)
	SB-OMS	3 (3.5)
Level	R1	25 (29.4)
	R2	28 (32.9)
	R3	25 (29.4)
	≥R4	7 (8.2)
<i>Personal habits</i>		
Smoking status	Non-smoker	75 (88.2)
	Smoker	10 (11.8)
Physical Activity	No	18 (21.2)
	Yes	67 (78.8)

in a time-efficient manner and enhanced data quality. 85 residents responded to the questionnaire between May 2023 and June 2023, with participation being entirely voluntary and anonymous. The time taken to complete the survey was approximately 3 min. Subscales were interpreted according to the practical guide using the PHEEM written by S.Roff et al. (2005) [5] (Table 1).

**Table 3** Mean of each question in PHEEM, subscales total scores and cumulative overall scale scores (N=85)

Domains		Mean ± SD
<b>Perceptions of role autonomy: (14 Questions)</b>		
Item	statement	
Q1	I have a contract of employment that provides information about hours of work	2.72 ± 1.10
Q2	I had an informative induction program	3.19 ± 0.68
Q3	I have the appropriate level of responsibility in this program	3.42 ± 0.64
Q4	I have to perform inappropriate tasks*	3.06 ± 1.00
Q5	There is an informative junior doctors' handbook	2.16 ± 1.01
Q6	I am bleeped inappropriately*	2.47 ± 0.87
Q7	There are clear clinical protocols in this program	3.00 ± 0.90
Q8	My hours conform to the new deal	2.84 ± 0.87
Q9	I have the opportunity to provide continuity of care	3.28 ± 0.67
Q10	I feel part of a team working here	3.24 ± 0.81
Q11	I have opportunities to acquire the appropriate practical procedures for my grade	3.18 ± 0.71
Q12	My workload in this job is fine	2.59 ± 1.16
Q13	The training in this program makes me feel ready to be a SPR/consultant	3.24 ± 0.72
Q14	My clinical teachers promote an atmosphere of mutual respect	3.16 ± 0.80
<b>Total score out of 56</b>		41.54 ± 6.69
<b>Perceptions of teaching: (15 questions)</b>		
Item	statement	
Q1	My clinical teachers set clear expectations	3.13 ± 0.81
Q2	I have protected educational time in this post	2.89 ± 0.90
Q3	I have good clinical supervision at all time	2.51 ± 1.23
Q4	My clinical teachers have good communication skills	3.06 ± 0.85
Q5	I am able to participate actively in educational events	3.05 ± 0.77
Q6	My clinical teachers are enthusiastic	2.80 ± 0.90
Q7	There is access in an educational programme relevant to my needs	2.94 ± 0.82
Q8	I get regular feedback from seniors	2.96 ± 0.96
Q9	My clinical teachers are well organised	2.88 ± 0.93
Q10	I have enough clinical learning opportunities for my needs	3.09 ± 0.78
Q11	My clinical teachers have good teaching skills	2.92 ± 0.92
Q12	My clinical teachers are accessible	3.11 ± 0.71
Q13	Senior staff utilize learning opportunities effectively	3.19 ± 0.70
Q14	My clinical teachers encourage me to be an independent learner	3.24 ± 0.78
Q15	The clinical teachers provide me with good feedback on my strengths and weaknesses	2.89 ± 0.95
<b>Total score out of 60</b>		44.66 ± 9.18
<b>Perceptions of social support (11 questions)</b>		
Item	statement	
Q1	There is racism in this post*	3.16 ± 0.96
Q2	There is sex discrimination in this post*	2.99 ± 1.21
Q3	I have good collaboration with other Doctors in my grade	3.22 ± 0.73
Q4	I have suitability access to careers advice	2.78 ± 1.05
Q5	This hospital has good quality accommodation for junior doctors, especially when on call	2.65 ± 0.99
Q6	I feel physically safe within the hospital environment	3.39 ± 0.64
Q7	There is a no-blame culture in this post	2.62 ± 1.00
Q8	There is adequate catering facilities when I am on call	1.79 ± 1.07
Q9	My clinical teachers have good mentoring skills	2.95 ± 0.84
Q10	I get a lot enjoyment out of my present job	2.71 ± 0.94
Q11	There are good counselling opportunities for junior doctors who fail to complete their training satisfactorily	2.66 ± 0.92
<b>Total score out of 44</b>		30.92 ± 5.98
<b>Cumulative total score out of 160</b>		117.12 ± 20.26



**Fig. 1** Summary of PHEEM subscales mean scores (N=85)

### Statistical analysis

Data were analysed using SPSS version 26 (IBM). Descriptive statistics presented categorical variables in frequencies and percentages, while means and standard deviations characterized continuous variables. The normality of scale scores was assessed using the Shapiro–Wilk test for continuous variables. Comparative statistical analyses were conducted to determine associations between PHEEM scores and socio-demographic characteristics, different specialties, residency years, and health habits. A significance level of  $P < 0.05$  indicated statistical significance.

### Ethical considerations

The study was ethically approved by the Institutional Review Board of King Saud University (No.23/0296/IRB) and the head of the research setting. Each participant was provided with an information sheet comprehensively describing the study, along with a consent form to confirm their willingness to participate. Participation in the study was entirely voluntary and conducted in an anonymous manner. To ensure participant confidentiality, a distinct code number was assigned to each individual exclusively for analysis.

### Results

Table 2 shows the distribution of study characteristics among participated dental residents. A total of 85 dental residents completed the questionnaire. The majority of participants aged 25 years and older (96.5%,  $n=82$ ), female (56.5%,  $n=48$ ) and single (78.8%,  $n=67$ ). In regard to dental training, most of participated dental residents were Saudi board orthodontic residents (18.8%,  $n=16$ ) and at R2 level of training (32.9%,  $n=28$ ). Finally, 88.2% of participated dental residents were non-smoker ( $n=75$ ) and 78.8% of them practice physical activity ( $n=67$ ).

Summary of the response for each question in PHEEM, subscales total scores and cumulative overall scale scores are summarized in Tables 3 and Fig. 1. In terms of perception of role autonomy, item 3 “I have the appropriate level of responsibility in this program” had the highest mean among other items ( $3.42 \pm 0.64$ ) while item 5 “There is an informative junior doctors’ handbook” was poorly rated (mean value of  $2.16 \pm 1.01$ ). For perception of teaching, the item (Q14) regarding encouragement of dental resident to be an independent learner by clinical teacher was highly rated by participants with a mean of  $3.24 \pm 0.78$ , while participants poorly rated item (Q3) regarding having a good clinical supervision at all times ( $2.51 \pm 1.23$ ). In regard to perception of social support, item (Q6) “I feel physically safe within the hospital environment” had the highest mean score of ( $3.39 \pm 0.64$ ) and

**Table 4** Multiple linear regression between sociodemographic factors, dental training, health habits and PHEEM cumulative total score

	Crude associations	
	$\beta$ [95%CI]	P value
<i>Sociodemographic factors</i>		
<i>Age</i>		
< 25 years	1.00 [Reference]	
$\geq 25$ years	-7.83 [-31.60, 15.95]	0.514
<i>Gender</i>		
Male	1.00 [Reference]	
Female	0.93 [-7.94, 9.79]	0.836
<i>Marital status</i>		
Single	1.00 [Reference]	
Married/divorced	-5.80 [-15.47, 3.86]	0.236
<i>Dental training</i>		
<i>Specialty</i>		
SB-PERIO	1.00 [Reference]	
SBO-DO	-15.33 [-33.70, 3.04]	0.101
SB-OMP	-7.14 [-30.88, 16.59]	0.551
SBE	0.86 [-19.12, 20.83]	0.932
SBPD	-14.98 [-34.26, 4.30]	0.126
SBRD	-10.68 [-29.69, 8.32]	0.266
SBFD	-15.00 [-36.67, 6.67]	0.172
SB-PROS	-8.81 [-28.09, 10.47]	0.366
SB-OMS	-16.81 [-44.78, 11.16]	0.235
<i>Level</i>		
R1	1.00 [Reference]	
R2	-7.56 [-18.50, 3.37]	0.173
R3	-13.00 [-24.24, -1.76]	0.024
$\geq R4$	-9.81 [-26.80, 7.18]	0.254
<i>Health habits</i>		
<i>Smoking</i>		
Non-smoker	1.00 [Reference]	
Smoker	-3.53 [-17.16, 10.09]	0.607
<i>Physical activity</i>		
No	1.00 [Reference]	
Yes	2.55 [-8.20, 13.30]	0.639

item (Q8) "There is adequate catering facilities when I am on call" had the lowest mean score of (1.79 $\pm$ 1.07) among other items.

In regard to the cumulative total scores to identify the measures of the environment as overall, the mean overall score of the PHEEM out of 160 was 117.12 (Standard deviation [SD]: 20.26, range: 65–158) which indicates that the overall educational environment of the training center has more positives than negatives. The perception of role autonomy total score out of 56 was 41.54 (SD: 6.69, range: 24–56), which indicates more positive perception of one's job role among the participants. The perception of teaching total score out of 60 was 44.66 (SD: 9.18, range: 17–60), which indicates that dental residents believed that the teachers are moving in the right direction in their training. Finally, the perception of social

support total score out of 44 was 30.92 (SD: 5.98, range: 16–44), showing that the participants perceived more pros than cons in social support provided to them in the training centre (Table 3).

The crude associations between different factors (sociodemographic factors, dental training, and health habits) and PHEEM cumulative total score is shown in Table 4. In regard to sociodemographic factors and health habits, dental residents who were  $\geq 25$  years ( $\beta$ : -7.83; 95%CI: -31.60, 15.95), married/divorced ( $\beta$ : -5.80; 95%CI: -15.47, 3.86) and smokers ( $\beta$ : -3.53; 95%CI: -17.16, 10.09) were associated with lower PHEEM cumulative total score compared to their counterparts. Dental residents who were females ( $\beta$ : 0.93; 95%CI: -7.94, 9.79) and those who practice physical activity ( $\beta$ : 2.55; 95%CI: -8.20, 13.30) were associated with higher PHEEM cumulative total score compared to residents who were males and physically inactive. However, dental residents' level of training was the only variable that showed statistically significant difference, as R3 dental residents ( $\beta$ : -13.00; 95%CI: -24.24, -1.76) were significantly associated with lower PHEEM cumulative total score compared to R1 residents ( $p < 0.05$ ).

## Discussion

The Saudi board dental programs in KAMC have great exposure in terms of providing both hospital and university-based training, held in King Saud bin Abdulaziz University for Health sciences (KSAU-HS) [23]. Some faculty members from KSAU-HS supervise the residents during their clinical and didactic sessions, adding a different perspective to their learning experience [23]. Such setting can guarantee that residents have protected educational time, have more research exposure, and the ability to participate in educational events shared by the university [24]. It was found that residents who participated in research were more satisfied with their residency [25].

The aim of this study was to evaluate the educational environment at KAMC, and it is considered the first study utilizing PHEEM tool among dental residents in Saudi Arabia. The previous studies have used PHEEM tool predominantly with medical residents and interns [19–22, 26, 27]. The mean PHEEM score of the current study was 117.12/160, indicating that the educational environment has more positives than negatives, and this is aligned with other studies among medical residents in Saudi Arabia [19–22, 26, 27]. Most of the participants were SBO residents, and this is because this program in KAMC has the highest number of residents, with a total of 22. Unlike SB-OMP and SB-OMS, where they only have 5 residents.

With regard to PHEEM subscales, specifically perceptions of teaching, dental residents generally believed their teachers were moving in the right direction. However,

having good clinical supervision at all times was poorly reported, similar to Saudi board family medicine residents in KSA [26, 27]. Clinical supervision is an integral part of the teaching process, and it involves sharing knowledge along with providing regular feedback to residents [28–30]. It supports residents towards their path of becoming independent reliable specialists and ensures that patients receive the required treatment with the best quality of care [28–30]. Barriers to effective clinical supervision can be lack of time, heavy workload, reduced number of staff, and lack of training [27–31]. For the perceptions of social support, having catering facilities when on call received the lowest score, similar to Saudi board urology residents [32].

Female dental residents had higher PHEEM cumulative total score. Unlike medical residents in King Fahad Hospital of Dammam University, where male residents had higher ranking of the educational environment than females [19]. There was a statistically significant difference among the level of training, as junior residents had higher overall PHEEM score than senior residents. This could be attributed to the fact that junior residents have better clinical supervision, additional educational activities, and receive more feedback than senior residents [33]. Moreover, senior dental residents have an added stress of finishing their clinical cases and preparing for their final board examination. This is in agreement with studies done in psychiatry and intensive care programs, where junior residents were more satisfied with the educational environment than senior residents [15, 18, 34]. A recent study evaluating the educational environment in KSAU-HS using DREEM tool also found that junior students perceived the educational environment better than seniors [35]. In contrast, Khoja AT (2015) reported that senior family medicine residents in KSA had significantly higher overall PHEEM score [21]. Investigating the educational environment allows for the identification of areas of strength and weakness, giving dental residents a better environment to thrive.

### Study limitations

While this study achieved its aim of evaluating the educational environment at KAMC and provided valuable insights, there are some limitations that need to be acknowledged. Firstly, some of the dental residency programs, such as SB-OMP, SB-OMS, SB-Perio, and SBFD, have a low number of residents, which limits the comparability of their educational experiences to larger programs like SBO-DO. Secondly, the use of the PHEEM tool, while pre-validated, employs a 5-point scale to assess the educational environment. This scale may not provide dental residents with the freedom to express specific areas in need of improvement, potentially leading to limitations in the depth of feedback obtained.

Additionally, the findings are specific to the context of KAMC in Riyadh and may not be broadly generalizable or of immediate interest to an international audience. Despite these limitations, this study marks an important step in assessing and enhancing the educational environment for dental residents in Saudi Arabia and provides a foundation for future research to evaluate its relevance in other contexts.

### Conclusion

In conclusion, this study sheds light on the educational environment among dental residents at King Abdulaziz Medical City (KAMC) in Riyadh, Saudi Arabia. The findings, based on the application of the Postgraduate Hospital Educational Environment Measure (PHEEM) tool, reveal an overall positive educational environment. These results indicate that KAMC provides a supportive learning environment for dental residents. Additionally, this study highlights specific areas that require attention and improvement, such as enhancing clinical supervision and addressing disparities in the satisfaction levels of residents at different training levels and between genders. While the study's context-specific nature and limitations—such as the small number of residents in some programs and the constraints of the PHEEM tool—may limit the broader applicability of the findings, it offers valuable insights into the educational environment at KAMC. These insights can inform similar institutions with comparable cultural and educational contexts and provide a foundation for future research.

Looking forward, future research could build upon these findings by employing mixed methods, combining quantitative and qualitative approaches, to gain a deeper and more comprehensive understanding of the educational environment. This approach would offer insights that could benefit similar institutions globally and contribute to enhancing the learning experience for dental professionals, ultimately ensuring an optimal learning environment for future dental professionals.

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### Author contributions

Authorship: M.A.A., L.A.A., and A.A.T., made substantial contributions to the conception and design of the study. D.A.A. reviewed relevant academic literature. L.A.A. and A.M.A. were involved in data acquisition. A.A.T. conducted the analysis and interpretation of data. L.A.A. and A.M.A. wrote the discussion section, while M.A.A. wrote the conclusion and abstract section. M.A.A., L.A.A., D.A.A., A.A.T. and A.M.A. were involved in drafting the manuscript. M.A.A. and L.A.A. were responsible for revising the manuscript. All authors have read and approved the final version of the manuscript.

### Funding

Not applicable.

### Data availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

## Declarations

### Ethics approval and consent to participate

Permission to conduct the study was obtained from the Ethics Committee and the Institutional Review Board of King Saud University (No.23/0296/IRB) and the head of the research setting. Participants were informed about the research objectives. Confidentiality of their information was ensured and all participants provided written informed consent. They were also informed of their right to withdraw from the study at any point.

### Consent for publication

Not applicable in this section.

### Competing interests

The authors declare no competing interests.

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