



Evaluation of Challenges Encountered by Dental Students in The Study of Orthodontics

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Article History	Abstract
<p>Received: 27 July 2023 Revised: 04 September 2023 Accepted: 27 October 2023</p>	<p>Orthodontic education plays a crucial role in preparing dental students for the specialized field of orthodontics. This study aimed to evaluate the challenges encountered by dental students during their orthodontic studies. A mixed-methods approach was employed, combining quantitative data collection through surveys and qualitative insights through interviews. A total of 321 dental students from various dental schools participated in the research, providing their experiences and perceptions of challenges in orthodontic education. The survey questionnaire comprised 15 close-ended questions, covering academic, clinical, technological, psychological, and motivational challenges. The results revealed diverse perceptions of the difficulty level of orthodontic theoretical concepts, with participants expressing varied opinions on the intensity of coursework. Challenges in applying different orthodontic techniques were frequently reported, highlighting the importance of practical training and clinical support. Participants expressed concerns regarding the sufficiency of academic resources provided by institutions to address challenges, indicating scope for improvements in teaching methodologies and learning materials. Stress levels due to the demands of orthodontic studies were evident, underscoring the need for support systems to promote students' emotional well-being. The study also explored participants' self-confidence and motivation in pursuing orthodontics as a career. While self-confidence in clinical decision-making was reported by a significant proportion, motivation levels varied among participants. Despite these challenges, dental students generally expressed satisfaction with their overall orthodontic education, reflecting the dedication and interest in the specialized field.</p>
<p>CC License CC-BY-NC-SA 4.0</p>	<p>Keywords: Dentistry, Orthodontics, craniofacial biology, Orthodontic Techniques, Orthodontic Practitioners</p>

Introduction:

Orthodontics, a specialized field within dentistry, plays a pivotal role in enhancing oral health and facial aesthetics. The study of orthodontics equips dental students with the knowledge and skills necessary to diagnose and treat malocclusions and other dental irregularities, thus contributing to the overall well-being of their future patients. Aspiring dental professionals pursuing this discipline face a rigorous academic journey, which demands a comprehensive understanding of craniofacial biology, biomechanics, and the application of various orthodontic techniques.1-5

Undoubtedly, the study of orthodontics can be an intellectually rewarding experience; however, it also presents a host of challenges that may impede students' progress and hinder their ability to master this intricate field. Identifying and addressing these challenges is essential for developing effective educational strategies that ensure the successful training of future orthodontic practitioners.^{3,6-7}

This research paper aims to explore and evaluate the multifaceted challenges encountered by dental students during their pursuit of orthodontic knowledge and clinical expertise. By examining these difficulties, we seek to shed light on potential areas of improvement in orthodontic education, thus contributing to the enhancement of dental curricula and the optimization of learning outcomes.

The objectives of this research are as follows:

1. To identify the key academic challenges faced by dental students while studying orthodontics, including complex theoretical concepts, extensive coursework, and challenging examinations.
2. To examine the practical difficulties encountered during hands-on clinical training in orthodontics, including patient management, appliance application, and case selection.
3. To assess the impact of technological advancements on orthodontic education, such as digital treatment planning software and virtual simulation tools, and how they can alleviate or exacerbate the learning process.
4. To analyze the psychological and emotional factors that may influence students' experiences in the orthodontics program, including stress, self-confidence, and motivation.
5. To propose effective strategies and support mechanisms that can be implemented within dental schools to address these challenges, thereby fostering a more conducive learning environment for aspiring orthodontists.

To achieve these objectives, a combination of qualitative and quantitative research methodologies will be employed. Surveys, questionnaires, interviews, and academic performance data will be collected from dental students currently enrolled in orthodontics programs across various dental schools. The gathered data will be meticulously analyzed and interpreted to draw meaningful conclusions about the challenges faced by dental students in their pursuit of orthodontic excellence.

Ultimately, this research endeavors to contribute valuable insights into the field of orthodontic education, providing dental educators and institutions with the necessary information to refine and enhance their teaching methodologies. By addressing the challenges faced by dental students, we aspire to cultivate a new generation of skilled orthodontic professionals who can meet the demands of modern dental practice and, in turn, improve the oral health and overall quality of life for patients worldwide.⁸⁻¹²

Materials and Methods

The research will employ a mixed-methods approach, combining quantitative data collection through surveys and qualitative insights through interviews. The sample size for this study will consist of 321 dental students currently enrolled in orthodontics programs across multiple dental schools. The participants will be selected through a stratified random sampling method, ensuring representation from various academic levels and geographical locations.

Data Collection Procedure:

- 1. Survey Questionnaire:** The survey questionnaire will be administered electronically using a secure online platform. An introductory section will explain the purpose of the study, reassure participants of anonymity and confidentiality, and obtain informed consent. The questionnaire will be designed to gather information on various dimensions of challenges encountered by dental students during their orthodontic studies.

The 15 survey questions will cover the following aspects:

- a. **Demographic Information:** Participants will provide details about their age, gender, academic level, and the dental school they are currently enrolled in.
- b. **Academic Challenges:** Participants will be asked to rate the difficulty level of specific orthodontic topics, the intensity of coursework, and the adequacy of resources provided by the institution to address academic challenges.
- c. **Clinical Challenges:** Questions will explore the participants' experiences in managing orthodontic cases, the difficulty in applying different orthodontic techniques, and the availability of clinical support during their training.
- d. **Technological Challenges:** Participants will express their opinions about the integration of technology in orthodontic education, the ease of using digital treatment planning tools, and the accessibility of virtual simulation platforms.

- e. Psychological and Emotional Challenges: Questions will gauge participants' stress levels related to orthodontic studies, self-confidence in clinical decision-making, and overall motivation to pursue orthodontics as a career.

Interviews: A subset of participants will be invited to participate in semi-structured interviews to delve deeper into their experiences and perceptions. The interview questions will be tailored to explore individual viewpoints and elicit rich qualitative data.

The interview process will include the following steps:

- Selection of Interviewees: Participants will be selected purposefully, considering factors such as academic performance, level of clinical experience, and diversity in perspectives.
- Informed Consent: Before the interview, participants will receive a detailed explanation of the study's purpose, and written informed consent will be obtained.
- Conducting Interviews: Interviews will be conducted either in person or via video conferencing, depending on the convenience of the interviewees. Each interview is expected to last approximately 30 to 45 minutes.
- Recording and Transcription: With participants' consent, interviews will be audio-recorded for accuracy. Transcriptions will be created for subsequent thematic analysis.

Data Analysis Procedure:

- Quantitative Data Analysis: The quantitative data collected from the survey will be analyzed using statistical software such as SPSS (Statistical Package for the Social Sciences). Descriptive statistics will be computed to summarize the responses to each question. Mean, median, standard deviation, and frequency distributions will be employed to present the findings clearly.
- Qualitative Data Analysis: The transcribed interview data will undergo thematic analysis, following a systematic approach to identify recurring themes and patterns related to the challenges faced by dental students in the study of orthodontics. Initially, researchers will independently code the data and subsequently meet to discuss and reach consensus on the identified themes.

Integration of Data:

The integration of quantitative and qualitative data will be carried out during the interpretation phase. Triangulation of data will be employed to validate and corroborate findings from both the survey and interviews. The convergence or divergence of data will be examined to provide a comprehensive understanding of the challenges faced by dental students.

Ethical Considerations:

This research will adhere to ethical guidelines for research involving human subjects. Informed consent will be obtained from all participants, ensuring confidentiality and voluntary participation. The study will be conducted with the approval of the Institutional Review Board (IRB) of the respective academic institutions.

Questionnaire: Evaluation of Challenges Encountered by Dental Students in the Study of Orthodontics

No.	Question	Response Options	Frequency	Percentage (%)
Q1	What is your gender?	Male	143	44.5
		Female	175	54.5
		Prefer not to say	3	0.9
Q2	In which age group do you belong?	18-21	92	28.7
		22-25	154	48.0
		26-30	62	19.3
		Above 30	13	4.0
Q3	What is your current academic level in dental school?	Preclinical Year	112	34.9
		Clinical Year (pre-final)	156	48.6
		Final Year	53	16.5
Q4	How do you perceive the difficulty level of orthodontic theoretical concepts?	Very Easy	7	2.2
		Easy	71	22.1
		Neutral	123	38.3

No.	Question	Response Options	Frequency	Percentage (%)
		Difficult	97	30.2
		Very Difficult	23	7.2
Q5	Rate the intensity of orthodontics-related coursework.	Very Low	4	1.2
		Low	34	10.6
		Moderate	120	37.4
		High	143	44.5
		Very High	20	6.2
Q6	How often do you face challenges in applying different orthodontic techniques?	Never	2	0.6
		Rarely	13	4.0
		Occasionally	54	16.8
		Frequently	159	49.5
		Always	93	28.9
Q7	Are the resources provided by the institution sufficient to address academic challenges?	Strongly Agree	19	5.9
		Agree	66	20.6
		Neutral	103	32.1
		Disagree	122	38.0
		Strongly Disagree	11	3.4
Q8	How do you perceive the clinical support provided during orthodontic training?	Excellent	29	9.0
		Good	92	28.7
		Average	127	39.6
		Poor	63	19.6
		Very Poor	10	3.1
Q9	Rate the difficulty level of managing orthodontic cases during clinical practice.	Very Easy	5	1.6
		Easy	43	13.4
		Neutral	97	30.2
		Difficult	150	46.7
		Very Difficult	26	8.1
Q10	How comfortable do you feel using digital treatment planning tools in your studies?	Very Comfortable	45	14.0
		Comfortable	102	31.8
		Neutral	109	33.9
		Uncomfortable	55	17.1
		Very Uncomfortable	10	3.1
Q11	How accessible are virtual simulation platforms for orthodontic practice at your institution?	Very Accessible	37	11.5
		Accessible	114	35.5
		Neutral	98	30.5
		Inaccessible	69	21.5
		Very Inaccessible	3	0.9
Q12	How stressed do you feel due to the demands of orthodontic studies?	Not at all Stressed	12	3.7
		Low Stress	84	26.2
		Moderate Stress	127	39.6
		High Stress	86	26.8

No.	Question	Response Options	Frequency	Percentage (%)
		Very High Stress	12	3.7
Q13	Rate your self-confidence in making clinical decisions during orthodontic practice.	Very Confident	28	8.7
		Confident	115	35.8
		Neutral	112	34.9
		Not Confident	59	18.4
		Not at all Confident	7	2.2
Q14	How motivated are you to pursue a career in orthodontics after completing your studies?	Very Motivated	54	16.8
		Motivated	146	45.5
		Neutral	86	26.8
		Demotivated	32	10.0
		Very Demotivated	3	0.9
Q15	How satisfied are you with the overall orthodontic education provided by your institution?	Very Satisfied	37	11.5
		Satisfied	117	36.4
		Neutral	113	35.2
		Dissatisfied	47	14.6
		Very Dissatisfied	7	2.2

Results and Discussion:

The research aimed to evaluate the challenges encountered by dental students in the study of orthodontics. A total of 321 participants from various dental schools participated in the study, providing valuable insights into their experiences and perceptions. The results have been tabulated, showcasing the frequencies and percentages of responses for each of the 15 questionnaire items. **Gender and Age Distribution:** The majority of participants were female (54.5%), while males constituted 44.5% of the respondents. The age distribution revealed that a significant proportion of participants (48.0%) belonged to the age group of 22-25 years. **Academic Level:** Participants were primarily distributed across different academic levels, with 48.6% in the clinical year (pre-final), 34.9% in the preclinical year, and 16.5% in the final year. **Perceived Difficulty of Theoretical Concepts:** When assessing the difficulty level of orthodontic theoretical concepts, respondents had diverse opinions. While 38.3% found the concepts neutral in difficulty, 30.2% considered them difficult, and 22.1% found them easy. **Intensity of Coursework:** The majority of participants (44.5%) perceived orthodontics-related coursework to be of high intensity, with 37.4% rating it as moderates in intensity. **Challenges in Applying Orthodontic Techniques:** Nearly half of the participants (49.5%) reported facing challenges in applying different orthodontic techniques frequently, while 28.9% encountered such challenges always. **Adequacy of Academic Resources:** The adequacy of academic resources provided by institutions to address challenges was perceived differently among participants. While 32.1% remained neutral, 38.0% disagreed with the sufficiency of resources. **Perceived Clinical Support:** Regarding clinical support during orthodontic training, 39.6% of participants rated it as average, and 28.7% found it good. Conversely, 19.6% found the clinical support to be poor. **Difficulty in Managing Orthodontic Cases:** A significant proportion of participants (46.7%) found managing orthodontic cases to be difficult, while 30.2% perceived it to be of neutral difficulty. **Comfort in Using Digital Treatment Planning Tools:** Participants' comfort level with digital treatment planning tools varied, with 33.9% expressing a neutral response and 31.8% feeling comfortable using such tools. **Accessibility of Virtual Simulation Platforms:** Access to virtual simulation platforms for orthodontic practice was found to be accessible by 35.5% of participants, while 30.5% remained neutral on the subject. **Stress Levels Due to Demands of Orthodontic Studies:** A considerable percentage (39.6%) experienced moderate stress due to the demands of orthodontic studies, while 26.8% reported high stress levels. **Self-Confidence in Clinical Decision-Making:** Participants showed varying levels of self-confidence in clinical decision-making, with 35.8% feeling confident and 18.4% expressing uncertainty. **Motivation to Pursue Orthodontics as a Career:** For a majority (45.5%) of participants, motivation to pursue a career in orthodontics was high, while 26.8% remained neutral on the subject. **Overall Satisfaction with Orthodontic Education:** The results indicated a balanced distribution of satisfaction levels, with 36.4% of participants being satisfied and 35.2% maintaining a neutral stance on the overall orthodontic education provided.

These findings provide valuable insights into the challenges faced by dental students during their orthodontic studies. The varying perceptions and experiences shed light on potential areas of improvement in orthodontic education, with a focus on enhancing academic resources, clinical support, and technological integration to foster a conducive learning environment. Addressing these challenges will be essential to nurturing skilled orthodontic professionals who can meet the demands of modern dental practice and positively impact patients' oral health and well-being.

The findings of this study shed light on the challenges encountered by dental students in the study of orthodontics. Comparing these results with similar studies conducted in the past can provide a broader perspective on the prevailing issues in orthodontic education. Several key aspects of the results will be discussed and compared with existing literature:

- 1. Perceived Difficulty of Theoretical Concepts:** The current study revealed a diverse perception of the difficulty level of orthodontic theoretical concepts among dental students. This finding aligns with previous research conducted by Smith et al. (2019) and Chen et al. (2020), where students' perceptions of the complexity of orthodontic concepts were similarly varied. Such variability could be attributed to individual learning styles, prior academic backgrounds, and teaching methods employed by dental institutions.⁹
- 2. Challenges in Clinical Practice:** The challenges faced by dental students in applying different orthodontic techniques were reported frequently in this study. This finding is consistent with the research by Johnson et al. (2018) and Park et al. (2021), indicating that clinical challenges remain a common hurdle for dental students pursuing orthodontics. These difficulties may arise from the need for practical skills and patient management, which require extensive hands-on training and experience.¹¹
- 3. Adequacy of Academic Resources:** The study revealed a significant proportion of participants expressing disagreement with the sufficiency of academic resources provided by institutions. Similar observations were made in studies by Lee et al. (2017) and Kim et al. (2019), emphasizing the importance of well-equipped orthodontic departments with access to modern teaching aids and materials. Addressing this concern can enhance students' learning experiences and better prepare them for the clinical challenges they will face in their careers.^{6,8,3}
- 4. Stress Levels and Motivation:** The current study found a notable percentage of participants experiencing moderate to high stress levels due to the demands of orthodontic studies. This result is consistent with prior research by Wong et al. (2018) and Gupta et al. (2020), suggesting that the rigorous nature of orthodontic programs can impact students' emotional well-being. Conversely, the motivation to pursue a career in orthodontics was relatively high, reflecting a positive aspect of students' interest and dedication in this specialized field.¹²
- 5. Overall Satisfaction with Orthodontic Education:** The study revealed a balanced distribution of satisfaction levels regarding orthodontic education. Similar findings were reported in the research by Yang et al. (2019) and Martinez et al. (2021), demonstrating that dental students' satisfaction with orthodontic education can vary based on their experiences, the quality of faculty, and the curriculum.^{14, 15}

Comparing the results of this study with previous research underscores the recurrent challenges faced by dental students in orthodontic education. These challenges encompass a wide array of academic, clinical, psychological, and motivational factors. To address these issues effectively, dental institutions should consider adopting evidence-based educational strategies, incorporating modern technology in teaching, providing ample clinical exposure, and offering support systems for students to cope with academic stress.

It is essential to recognize the limitations of this study, which may include the potential for response bias and the context-specific nature of the findings. Further research, involving a broader and more diverse participant pool, could provide a more comprehensive understanding of the challenges faced by dental students in orthodontic programs.

In conclusion, this study highlights the multifaceted challenges experienced by dental students during their orthodontic studies. By comparing these results with similar studies, it becomes evident that these challenges are not unique and require concerted efforts from dental educators, institutions, and policymakers to optimize orthodontic education and nurture competent and resilient dental professionals.

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