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Factors Affecting Dental Students' Clinical Performance: A Study at Two Public Jordanian Universities

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ABSTRACT

Objectives: This study investigated the impact of different factors that affected the dental students' clinical performance at two public Jordanian universities (The University of Jordan (UJ) and Jordan University for Science and Technology (JUST)) in the academic year 2021/2022.

Materials and Methods: This study's sample consisted of (361) male and female dental students at their clinical years (4th and 5th years) from both universities. Survey approach was used and data-collection window was opened for 4 months. Survey was validated using face validity and content validity and Cronbach's alpha internal-consistency test. Data collection was carried out through an online valid and validated questionnaire. The questionnaire covered 15 different factors and data was analyzed by descriptive statistics and independent-samples t-test.

Results: Several student-related and institutional factors have shown impacts on the clinical performance of dental students. There was a statistically significant difference between genders, where female students were more adversely affected by the several factors than male students. Also, the results showed that there were no statistically significant differences attributed to institution and year of study (4th year and 5th year). Factors associated with the institution roles, such as instructor's attitude and time limitation, had greater impacts on the clinical performance of dental students than factors that are associated with dental students themselves.

Conclusions: The study highlights the need to take students' feedback into account to enhance their undergraduate clinical experience. Addressing university-related factors, such as the attitude of the supervisors in the student clinics, the time allocated for the students to finish clinical tasks, and the advisory help available for the students, are crucial for enhancing the quality of dental education.

Keywords: Student-related factors, Dental education, University-related factors, Clinical performance.

1. Introduction

The field of dental education does not only demand academic and theoretical excellence, but also practical clinical proficiency. The clinical performance of dental students is a multi-faceted outcome influenced by a myriad of factors that extend beyond theoretical

knowledge. Therefore, intense research has been taking place; not only to identify the factors, but also to measure their impacts on students' performance and to find potential solutions that may enhance the clinical experience, as well as the performance of dental students around the world (1-3).

In Jordan, dentistry has been taught in two public universities in the country; The University of Jordan (UJ)-Amman and Jordan University of Science and Technology (JUST)-Irbid. Recently, more public and private universities had opened dental schools, but none of them started clinical years yet. Students start their clinical training at both UJ and JUST at the beginning of the summer term of the 3rd year until the end of the 5th year. Clinical practices involve all the applied specialties of dentistry, including oral diagnosis, oral radiology, oral surgery, oral medicine, periodontology, orthodontics, prosthodontics, endodontics, pediatrics, and conservative dentistry.

Enhanced clinical experience during dental college has been linked to greater success in dental career among dental students. Studies have consistently demonstrated the positive correlation between clinical exposure and future professional achievements (4, 5). A systematic review conducted by Gallagher et al. identified a strong association between the quantity and quality of clinical exposure and improved clinical performance among dental students and future career development (6).

Since clinical training directly influences the future professional dental practices of students as well as the outcome of the dental care provided, many studies have examined the various factors that affect the students' clinical experience. These studies focused on the role of university in the clinical practice outcomes (7, 8). The university-related influence is the outcome of multiple sub-factors that include, but are not limited to, the role of clinical and academic faculty, curriculum, time limitations, set clinical requirements, infrastructure, and instructors' availability and attitudes.

Umbach and Wawrzynski emphasized the importance of higher order cognitive activities for the students. They also showed that higher levels of engagement and active learning for students was achieved when the staff used active and collaborative learning strategies, involved students in experiences, engaged with them and pushed them academically, and provided enriching educational opportunities (9). These findings support the perception that the cooperative and supportive faculty plays a substantial role in producing better students' clinical learning outcomes (10).

Other studies have examined the effects of student-centered factors on the clinical performance of students, with stress being a crucial and prevalent factor that affects students' performance and well-being (11-13). Previous studies have found that students experienced severe stress due to many reasons, such as difficulty in getting suitable patients, patients not arriving on time or missing their appointments, academic overload, tension caused by exams and grading, and scarcity of time to complete assignments and clinical requirements (12, 14). Studies denoted that students experienced different levels of stress due to different reasons according to their year of study. Fourth-year students experienced stress mainly due to their fear of failure, as their fourth year is their first initial exposure to the clinical environment. However, fifth-year students were more stressed due to their fear of time limitation and inability to complete clinical requirements.

Studies also found that the effect of these factors varied according to gender. Females reported greater stress related to the time limitation to complete their tasks, while male fellow students' severe stress was mainly due to the academic overload. Other studies have argued that female students faced greater stress due to their hormonal cycles, where female university students performed slightly worse on academic tasks during their menstrual cycles and when having a pre-menstrual syndrome (15). A previous study showed that female nursing students experienced increased restrictions in practical performance (16).

A study examined the factors influencing the clinical performance of dental students. The authors explored multiple variables, including students' prior academic achievements, motivation, self-perception, stress levels, and faculty support (17). The findings highlighted the significance of these factors in shaping the clinical performance of dental students and emphasized the need for interventions to address these influences and enhance student clinical outcomes.

Studies investigating the different factors that shape the clinical experience of dental students mainly focus on individual factors, such as stress and psychological factors (13, 18). Few other papers examined the relationship between factors and the level of impact that they have on each other (19).

1.1 Aims of the Study

The current study aimed to investigate the effects of various factors on the clinical performance of dental students at two public universities in Jordan. This was to provide a perspective form the students' point of view about these factors and the level of influence that they had on the students. No previous studies have compared the influence of factors between the UJ and JUST.

The current study aimed to measure the impact of both student-related factors and university-related factors on the dental students' clinical performance in Jordan. Then, it tried to examine the student-related factors and identify items that have the highest level to affect the clinical performance of dental students. Moreover, this study looked at the university-related factors and identified items with the highest level to affect the clinical performance of dental students. Finally, the project aimed to investigate whether differences existed between variables, such as university, year of study, and gender.

2. Materials and Methods
2.1 Data Collection

A self-report questionnaire was developed and used during the first semester of the academic year 2021/2022, at the schools of Dentistry at the UJ and JUST. A validated online /survey was sent to 4th-and 5th-year students *via* social-media platforms (Facebook groups, Instagram, LinkedIn, X, and WhatsApp groups) as well as a printed format through direct interactions with students in both the hospital and college buildings. Data-collection window was opened for 4 months (September 2021 until December 2021). Sample size was calculated based on a confidence level of 95% and a margin of error of 5%, for a population of 4th-and 5th-year dental students amounting to approximately 3000 students at that time (n= 341). The research questionnaire was constructed and divided into 2 sections:

Section 1: Demographic information, which included: Gender (Female, Male), Year of Study (4th Year, 5th Year), and University (UJ, JUST).

Section 2: Included 15 items, in which each item investigated one of the factors that may affect the dental students' clinical performance.

The 15 items were sub-divided into two categories of factors:

Student-related Factors: (Items 1-9) included Place of Residence, Competition with Fellow Students, Student Burnout, Quality of Sleep, Emotional Support, Fear of Failure, Fear of Falling behind, Difficulty in Finding Suitable Patients, Patient's Gender.

University-related Factors: (Items 10-15) included Time Limitation, Curriculum, Academic Advising, Clinical Infrastructure, Instructors' Attitudes, Clinical Staff.

Each of the items was rated on a 10-point Likert-type scale, where 1 was "Not Likely at All" and 10 was "Most Likely".

2.2 Study Instrument Validity and Reliability

Validity of the instrument was assessed using face validity and content validity. The instrument was presented to a panel of experts at the school of Dentistry and the Deanship of Scientific Research at the University of Jordan. The panel members were asked to provide their opinions about the number of items, their relevance to the purpose of the study, the suitability of the scale used, clarity of the items, as well as to suggest any modifications or deletions. The Institutional Review Board under the decision number (2021-72) approved the final instrument.

Reliability of the instrument was approved using Cronbach's alpha internal consistency (20) after performing a pilot study. The results showed an acceptable internal consistency as the Cronbach's alpha values for the student-related factors and university-related factors were (0.72) and (0.74), respectively. A value above 0.7 is considered acceptable for internal consistency.

2.3 Statistical Analysis

The data was analyzed using the Statistical Package for Social Sciences software (SPSS), version 26.0 (21). The following tests were used for the purpose of statistical analysis: Descriptive statistics (means, standard deviations, frequencies, proportions), and independent-samples t-test

P-value of < 0.05 was considered statistically significant. Descriptive statistics serves as a tool for summarizing and interpreting data across diverse fields and t-test was used to determine whether there was a significant difference between the means of groups compared against each other.

To describe the statistical means, the 10-point Likert's scale used in the questionnaire was converted into a 5-point scale using the following formula (22):

Category length = (Maximum scale value - Minimum scale value)/Number of categories in the scale.

As per the scale used in the study and the number of categories: (10-1)/5=1.8. The category length is 1.8. Table 1 shows the description of the statistical means after the conversion.

Table 1: Degrees of statistical means using 5-point Likert's scale conversion

Mean Value	Verbal Description
8.24-10	Very Strong
6.43-8.23	Strong
4.62-6.42	Moderate
2.81-4.61	Weak
1-2.8	Very Weak

3. Results

The study included 361 participants. Regarding gender, the sample comprised 237 females (65.7%) and 124 males (34.3%). Participants were drawn from two universities, with 244 students (67.6%) from (UJ) and 117 students (32.4%) from (JUST). In terms of the year of study, the participants were divided into two groups: 244 students (67.6%) were in their 4th year, while 117 students (32.4%) were in their 5th year. The sample is representative of clinical years' dental students' distribution across different academic years from both institutions (based on the number of students of each year).

3.1 The Impact of Student-related and University-related Factors

To investigate the level of impact of the two categories, their means were calculated. The overall mean of all factors is 7.34±1.13, which represents a strong degree value. However, the overall mean for the university-related factors has a higher degree of influence (M=7.86, SD=1.27) than the degree of influence of the student-related factors (M=6.70, SD=1.25).

3.2 Rank of Student-related Factors on the Clinical Performance of Dental Students

All the nine student-related factors were calculated, as explained in the *methods* and shown in Table 2, showing the rank of influence of different students-related factors on the clinical performance of dental students. Difficulty in getting suitable patients (M=8.52, SD=1.98), fear of failure (M=7.91, SD=2.27), and emotional and material support (M=7.85, SD=2.17) came with the highest levels of influence, including financial support and family support. In contrast, place of residence, competition with students and patient's gender were found to have the least levels of influence.

Table 2: Means and standard deviations for the student-related factors

Item	Item Name	Mean	SD	Rank	Verbal Description
Q8	Difficulty in Getting Suitable Patients	8.52	1.98	1	Very Strong Influence
Q6	Fear of Failure	7.91	2.27	2	Strong Influence
Q5	Emotional and Material Support	7.85	2.16	3	Strong Influence
Q7	Fear of Being Unable to Catch Up	7.83	2.14	4	Strong Influence
Q3	Burnout	7.50	2.31	5	Strong Influence
Q4	Quality of Sleep	7.36	2.32	6	Strong Influence
Q1	Place of Residence	6.03	2.75	7	Moderate Influence
Q2	Competition with Students	5.97	2.47	8	Moderate Influence
Q9	Patient's Gender	4.00	2.66	9	Weak Influence

3.3 Rank of University-related Factors on the Clinical Performance of Dental Students

Means of the university-related factors are shown in Table 3, where the most influential factor was the instructors' attitudes (M=8.85, SD=1.54), followed by time limitation (M=8.36, SD=2.00), both with a very strong influence on the clinical performance of dental students. Other factors, such as academic advising, college infrastructure, curriculum, and clinical staff, still had a strong influence with mean values ranging between 7.70 and 7.29.

Table 3: Means and standard deviations for the university-related factors

Item	Item Name	Mean	SD	Rank	Verbal Description
Q14	Instructors' Attitude	8.85	1.54	1	Very Strong Influence
Q10	Time Limitation	8.36	2.00	2	Very Strong Influence
Q12	Academic Advising	7.70	1.98	3	Strong Influence
Q13	College Infrastructure	7.64	1.83	4	Strong Influence
Q14	Curriculum	7.34	1.88	5	Strong Influence
Q15	Clinical Staff	7.29	2.46	6	Strong Influence

3.4 Influence of Year of Study, University and Student Gender

In order to determine whether there were any differences in the means due to the year of study, university choice and student gender variables, independent-samples t-test analyses were used after the homogeneity of the variance was approved. Table 4 shows the findings of the analysis. The findings indicated that there were no statistically significant differences attributed to the year of study. The findings in Table 5 revealed that there were no statistically significant differences between students from UJ and JUST attributed to both university-related and student-related factors. Significant differences ($p<0.05$) in the level of influence of the factors between males and females were shown in Table 6. For both student-related factors and university-related factors, females were more influenced than males with (M=7.54, SD= 1.07), and (M=6.97, SD=1.14), respectively.

Table 4: Differences in the level of influence of the factors that affect the dental students' clinical performance between 4th- and 5th-year students

Factor	Gender	Mean	SD	t-value	p-value
Student-related Factors	4th Year	6.95	1.30	-1.05	0.30
	5th Year	7.10	1.16		
University-related Factors	4th Year	7.78	1.27	-1.93	0.05
	5th Year	8.05	1.28		
Total	4th Year	7.28	1.16	-1.52	0.12
	5th Year	7.48	1.06		

Table 5: Differences in the level of influence of the factors that affect the dental students' clinical performance between JU and JUST students

Factors	Gender	Mean	SD	t-value	p-value
Student-related Factors	JU	7.11	1.23	1.44	0.15
	JUST	6.86	1.29		
University-related Factors	JU	7.83	1.25	-0.69	0.51
	JUST	7.93	1.32		
Total	JU	7.37	1.12	0.69	0.52
	JUST	7.29	1.16		

Table 6: Differences in the level of influence of the factors that affect the dental students' clinical performance between male and female students

Factor	Gender	Mean	SD	t-value	p-value
Student-related factors	Female	7.23	1.23	5.03	0.00
	Male	6.55	1.18		
University-related Factors	Female	8.01	1.16	3.01	0.003
	Male	7.59	1.43		
Total	Female	7.54	1.07	4.72	0.00
	Male	6.97	1.14		

4. Discussion

The findings of this study portray the problems that dental students face in their clinical practice. University-related factors play a major role in the learning experience of dental students. While students might have control over the student-related factors, such as management of their sleep schedule, using all their accessible resources to find patients, and providing emotional support for their fellow colleagues, university-related factors seem to be harder to influence. For example, students are restricted to a time limit in their clinics in which they have to finish their work with no possible extensions. Moreover, the limited number of instruments, such as X-ray devices and other special instruments, such as the apex locator in endodontic clinics poses a greater effect on the outcome of their work. With the lack of dental care experience for students, instructors are great resources for their students, as they have the adequate knowledge. Hence, students would be looking for their instructors' assistance when they are unable to complete a clinical task more than they would be looking for emotional support, for example (10).

Although one might claim that 5th-year students should endure both university-related and student-related factors effectively better than 4th-year students; due to the fact that the former have greater experience, this might not be true. As students' progress in their study years, their clinical requirements increase and get more advanced. Therefore, as the students' dental care experience increases, a simultaneous increase in the quantity and quality of clinical requirements accompanies the students. Both 4th-and 5th-year dental students seem to be equally affected by the mentioned factors as shown. These results are in contrast with the findings of Al-Amri et al. (23), where they showed that faculty, learning resources and support services had significant impacts on the students' clinical performance.

The finding stating that there was no difference between all compared factors between the two public dental schools that teach clinical dentistry could be due to the great level of similarity between the two institutions and their students. The majority of students in both universities come from similar backgrounds, similar high-school systems, and similar social and cultural backgrounds. Also, both universities share similar teaching environments, including similar class capacities, similar instructor-to-student ratios, similar curricula, and similar operational and administrative structures.

Finding patients to complete clinical requirements is the student's responsibility in both institutions. With the specific clinical requirements, students believe that finding patients that have the required dental problems is a difficult task, especially when it comes to clinics with high requirements, such as the dental comprehensive care, where students need to carry out multiple dental procedures, such as root-canal treatments, crown/bridge constructions, restorative work, and periodontal care. With the scarcity of suitable patients, students might miss multiple clinics and become unable to finish their requirements, which in turn increases their levels of stress and negatively affects their performance (12).

Similarly, the fear of failure creates a greater burden of stress on the students, hence influencing their clinical work. Regulations at the Jordanian universities specify that when students fail in 1 to 3 courses, they will be given the chance for make-up exams. If they pass these exams, they will proceed to the following year. If they fail in more than 3 courses, they will have to repeat their year of study. Students who fail in the year of study more than 2 times will not be given any more chance of

repetition and will be expelled. Therefore, the fear of having to go through this process induces a greater effect on the students' performance. These results were also similar to the results obtained by Al Samadani and Aldharrab (12).

Results showed that patients' gender is the least influential factor affects the clinical performance. With the scarcity of suitable cases for dental treatments, students pay less attention to the patient's gender and focus more importantly on the pathology that patients have, in order to provide optimal care and complete requirements. This finding could also be due to the increased cultural awareness by both patients and students, which removed the interaction obstacles between both. The increased compatibility and compliance of the patients to receive dental care and resolve their dental and oral complaints consequently increased the levels of students' comfort in treating patients regardless of their gender. These findings were different from the findings of Knight et al. (24), where they showed that the gender construct is an important barrier negatively impacting the patient–provider relationship.

Cultural and contextual factors can play a role in shaping gender differences in influence. For example, in some cultures, females may face more pressure to conform or adhere to societal expectations, which can increase their susceptibility to influence. As gender bias and stereotypes persist in various professional settings, including dentistry, female dental students may face additional challenges due to gender-related bias, where assumptions about their abilities or limited capabilities dominate. Gender bias and stereotypes exist in various societies, including Jordan (25).

The instructors' role is the most influential factor among all university-related factors. Students who interact with cooperative and active instructors report higher levels of clinical knowledge, comfort, and efficiency. On the contrary, students who are supervised by instructors with negative attitudes experience more levels of stress and discomfort as well as lower self-esteem levels. Therefore, it could be concluded that the more positive the instructor's attitude, the better the students' performance and *vice versa* (9).

Time limitation can significantly affect the performance of dental students. The demanding nature of their clinical requirements, responsibility to prepare their own clinics and establish cross-infection control measures, and patients' compliance are all factors that limit their optimal time efficiency. The pressure to meet clinical deadlines can lead to increased stress levels, potentially hindering students' focus, proficiency, and the overall performance. These results are consistent with the results of previous studies (11-13, 17).

5. Conclusions

The findings of this study emphasized the need for greater attention to the dental students' perspective and feedback to provide valuable insights into the effectiveness of the overall clinical experience, hence suggesting practical means for improvement. Ultimately, improving the clinical training for dental students is essential to ensure the provision of high-quality patient care and to better prepare future practitioners for real-world challenges.

Addressing student well-being is central to improving clinical practice. Moreover, it is crucial to dental schools to encourage instructors to adopt positive and supportive attitudes towards dental students to foster an open and respectful environment for students to ask questions and seek help and guidance.

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