The Open Dentistry Journal
DOI: 10.2174/0118742106361704241230072807, 2025, 19, e18742106361704
ISSN: 1874-2106
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RESEARCH ARTICLE **OPEN ACCESS**

Perception and Confidence Levels of Dental Students and Newly Graduate Dentists during Prosthodontic Procedures

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Abstract:

Background: Assessing students' perception of their dental school experience is a vital measure of the success and progress of dental education. Hence, the primary objectives of this research were to assess and examine the self-confidence levels of dental students and trainees at the University of Hail, Saudi Arabia, during prosthodontic procedures and to gauge their views on the quality of prosthodontic training.

Methods: Seventy-nine senior students and 39 new interns at the University of Hail, Saudi Arabia, were given surveys while keeping their identities anonymous. The participants were asked to evaluate their confidence level by using a Likert scale ranging from 1 to 5. The Mann-Whitney U test and chi-squared test were used to evaluate the statistical significance between the compared groups.

Results: 49.2% of participants expressed contentment with the number of teeth identified for treatment. 89.8% of participants stated that increased practical experience would enhance their confidence in the field of prosthodontics. Approximately 49.5% of the participants surveyed stated they plan to pursue a specialized area in the coming years. Roughly 49.5% of the participants believed that their prosthodontic practice was at a moderate level. In general, this study's findings suggest that there were no significant differences between males and females ($p > 0.05$), except for rubber dam placement, follow-up appointment, and impression taking, where males exhibited greater confidence than females ($p < 0.05$). There were no significant differences between both groups in the treatment of different teeth ($p > 0.05$). Additionally, there were no significant differences ($p > 0.05$) in self-confidence levels for handling different indications for prosthodontic treatment.

Conclusion: The level of confidence during prosthodontic therapy in this study is regarded as neutral. Compared to the female and senior students, the male interns and students reported higher confidence.

Keywords: Confidence, Prosthodontics, Education, Dental students, Self-assessment, Trainees.

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Cite as: Almohefer S, Alkattan R, Aldakhayel G, Madfa A. Perception and Confidence Levels of Dental Students and Newly Graduate Dentists during Prosthodontic Procedures. Open Dent J, 2025; 19: e18742106361704.
http://dx.doi.org/10.2174/0118742106361704241230072807

Received: October 02, 2024
Revised: December 02, 2024
Accepted: December 03, 2024
Published: February 19, 2025

1. INTRODUCTION

Students must complete theoretical and clinical dental studies during their journey through dental school in order to graduate as competent dentists with the necessary knowledge and experience. Several Saudi Arabian universities offer a six-year curriculum for the college of dentistry, whether it is private or governmental. Throughout their academic program, dental students are required to address patients' oral healthcare needs and provide fixed or removable prostheses for missing teeth as needed. In order to accomplish this, students must have adequate theoretical knowledge and clinical skills.

Self-confidence is the belief in oneself that one can complete activities accurately or effectively on one's own without help. Dental students should get more confident as they progress through their education; this can be primarily observed by assessing the caliber of instruction and/or learning objectives [1, 2]. It is the responsibility of dental education providers to provide graduates with the skills necessary to meet all learning objectives and to treat patients with confidence and competence. After graduation, the graduates would be expected to treat patients with invasive, non-invasive, and irreversible procedures. This could be challenging for a clinician-in-training because it calls for developing clinical skills and taking patient requirements into account in order to offer appropriate care. Procedural confidence can be increased by repeatedly practicing the same activities, although achieving this degree of confidence usually requires additional training and experience [3, 4]. Prior to starting independent work, educators must ascertain the confidence levels of their undergraduate students because this is an essential part of the learning process. Thus, it is critical to uphold high standards of patient care quality and to educate dental graduates for independent, unsupervised clinical practice through supervised education and training.

Teeth loss in patients is steadily declining, with factors including increased awareness, social demands, and less invasive alternatives to tooth extraction, driving the demand for teeth to be retained for longer periods of time [5]. However, as more teeth are retained, the risks for plaque accumulation, dental caries, and periodontal diseases could increase, especially if the treatment provided is poor in design or quality, negatively affecting the outcome [6, 7]. Patients' inability to eat, speak, or smile when teeth are lost is typically the main drive for seeking prosthetic treatment [8]. However, due to the greater cost of fixed prostheses, the clinical/surgical challenges that may incur, and the intricacy associated with clinical steps for tooth- or implant-supported prostheses, removable dentures are still used to replace missing teeth [9]. Hence, removable dentures are still heavily taught and practiced by dental students owing to their low cost, non-invasive nature, and relative ease, especially for patients at dental schools who typically receive treatment at little to no cost. For dental schools in Saudi Arabia, concentrated pre-clinical and clinical studies are thus allocated to removable prostheses with their different types, a factor that is key in delivering treatment that positively affects patients' quality of life [10].

Moving from being a dental student to entering the workforce is a crucial and challenging transition. In the past, a student's preparedness for graduation was evaluated by a combination of written and verbal tests, along with finishing a specific number of clinical tasks. Competence-based methods are becoming more common in assessment, replacing traditional methods where students must show they have met specific goals set by the General Dental Council [11]. Competencies under seven domains are also included in the European guidance [12]. This shift in strategy has raised worry because, once mastery is achieved, there may be little motivation for the student to further improve the skill across various situations. The worry is supported by anecdotal evidence among most dentists [13, 14]. The common belief is that practicing a procedure multiple times not only improves skill but also boosts confidence.

Studies have shown that the knowledge and confidence of dental students in performing different prostheses are typically higher for removable prostheses than fixed prostheses [15]. Moreover, the longer the time allocated to teaching and performance of a clinical procedure, the greater the confidence [2, 16]. There is a lack of data on the level of confidence that dental students have in different prosthodontic procedures. Until this point, only a few studies have been carried out in Saudi Arabia to evaluate the trust levels of dental students in different prosthodontic procedures, which they are expected to master as new graduates in order to perform independently as general dentists. Furthermore, there have been no studies comparing the confidence levels of undergraduate senior dental students to dental interns. Therefore, the aims of this study were to evaluate and investigate the confidence levels of dental undergraduates and interns at the University of Hail when performing prosthodontic treatment and to assess their perception of the quality of prosthodontic education.

2. METHODS

This study took place at the College of Dentistry in Hail, Saudi Arabia, which is affiliated with the University of Hail. The present work was granted approval by the Research Ethics Committee (REC) at the University of Hail, with the reference number H-2024-219. The survey was done voluntarily, with participants needing to give a signed agreement. The information was kept private and only used for the purposes of this research.

The research took place in June 2024, at the end of the academic year, using a self-administered questionnaire. Seventy-nine graduating dental students and 39 dental interns who completed their rotations at the College of Dentistry and who completed the survey with no missing data were included in the study. Situated in Hail, Saudi Arabia, this university is renowned for its effective administration and top-notch amenities. The free dental care being provided has led to a notable increase in the number of people coming to dental clinics for dental

services. These dental procedures are performed by students studying for their bachelor's degree and interns who are being supervised by instructional staff. The patient population includes those who primarily live in Hail City and the nearby areas. With a population exceeding one million residents, this city is the biggest in the Northern Region of Saudi Arabia.

Upon reviewing the literature, the questionnaires utilized in this research were created. The questionnaire form's validity was confirmed through pilot testing with 10 interns. College members from the Department of Restorative Dental Science at the College of Dentistry, University of Hail, Saudi Arabia, along with subject matter experts, validated the questionnaire's applicability to the survey's theme. Before starting the study, the participants were told that they were not obligated to fill out and turn in the forms. Moreover, they were guaranteed that taking part in the survey would not impact their academic achievements or grades. The participants were asked to evaluate their levels of confidence regarding the number of prosthodontic diagnoses and treatments, the stages of prosthodontic treatment, and the different classes of teeth. The study participants indicated their confidence levels using Lickert's scoring method, which uses a scale from one to five. The numerical scale is utilized to depict different degrees of certainty. More precisely, a score of 1 shows little confidence, 2 indicates a medium level of confidence, 3 represents a neutral position, 4 defines a significant amount of confidence, and 5 indicates a strong level of confidence.

The participants in the study were also questioned about their opinions on whether the required number of prosthodontic cases during training was sufficient. The participants were asked about their views on the level of difficulty of prosthodontics and their interest in specializing in this field. The individuals were also asked about their future plans for starting their own prosthodontic practice, including whether they planned to perform all procedures themselves or refer patients to specialists as needed.

Descriptive statistical approaches were employed to conduct data analysis using SPSS 21.0 for Windows (SPSS Inc., Chicago, IL, USA). Descriptive statistics were utilized to summarize the mean, standard deviation, and frequency. The statistical significance of the differences between senior dental students and new interns, as well as between males and females, were evaluated using the Mann-Whitney U test and the chi-squared test. The significance level was set as 5%.

3. RESULTS

79 out of 118 participants (66.9%) were senior undergraduate students, while the other 39 participants (33.1%) were interns. The research revealed that 50.8% of participants were male, while 49.2% were female.

Table 1. Mean self-confidence levels of senior year students *vs* interns in performing different stages of fixed prostheses.

Procedure	Study Level	Mean	Std. Deviation	*p*-value
History taking	Senior year	4.16	1.29	0.360
	Interns	4.07	1.17	
Diagnosis and treatment planning	Senior year	3.84	1.16	0.703
	Interns	3.74	1.06	
Radiograph taking	Senior year	4.06	1.21	0.152
	Interns	4.15	0.98	
Injecting local anesthesia	Senior year	3.86	1.23	0.748
	Interns	4.23	1.22	
Rubber dam placement	Senior year	3.96	1.20	0.784
	Interns	4.05	1.14	
Tooth preparation	Senior year	3.40	1.26	0.960
	Interns	3.43	1.23	
Evaluation of tooth reduction	Senior year	3.40	1.26	0.962
	Interns	3.38	1.26	
Impression taking	Senior year	3.86	1.33	0.899
	Interns	3.69	1.28	
Temporary restoration	Senior year	3.69	1.29	0.568
	Interns	3.58	1.31	
Try in stage	Senior year	3.77	1.22	0.670
	Interns	3.30	1.28	
Cementation	Senior year	3.72	1.32	0.507
	Interns	3.53	1.37	
Finishing and polishing	Senior year	3.91	1.24	0.736
	Interns	3.79	1.30	
Follow up appointment	Senior year	4.05	1.25	0.940
	Interns	3.84	1.20	

Overall, females showed lower self-confidence levels in various prosthodontic procedures compared to males. Nevertheless, there were no differences between interns and senior students, as shown in Tables 1 and 2. There were no significant differences between males and females in most areas, except for rubber dam placement, impression taking, and prosthesis follow-up, where males were more confident than females. Additionally, the results of this research showed that participants had the lowest level of confidence in tooth preparation, assessment of the reduction amount, and try-in phases of prosthodontic care.

While assessing self-confidence levels of different teeth requiring prosthodontic treatment, it was noted that undergraduate students displayed comparable confidence levels to dental interns. No significant differences were noted between undergraduate students and interns ($p > 0.05$) based on the results displayed in Table 3. Males

Table 2. Mean self-confidence levels of males *vs* females in performing different stages of fixed prostheses.

Procedure	Gender	Mean	Std. Deviation	*p*-value
History taking	Male	4.30	1.16	0.319
	Female	3.96	1.32	
Diagnosis and treatment planning	Male	4.10	1.10	0.702
	Female	3.51	1.09	
Radiograph taking	Male	4.28	1.10	0.562
	Female	3.89	1.14	
Injecting local anesthesia	Male	4.25	1.11	0.054
	Female	3.70	1.31	
Rubber dam placement	Male	4.36	0.90	0.000
	Female	3.60	1.31	
Tooth preparation	Male	3.73	1.20	0.913
	Female	3.08	1.21	
Evaluation of tooth reduction	Male	3.65	1.20	0.663
	Female	3.13	1.27	
Impression taking	Male	4.05	1.18	0.016
	Female	3.55	1.40	
Temporary restoration	Male	3.90	1.20	0.087
	Female	3.41	1.35	
Try in stage	Male	3.88	1.16	0.179
	Female	3.34	1.30	
Cementation	Male	4.00	1.22	0.084
	Female	3.31	1.37	
Finishing and polishing	Male	4.05	1.15	0.064
	Female	3.68	1.34	
Follow up appointment	Male	4.25	1.06	0.012
	Female	3.70	1.35	

Table 3. Mean self-confidence levels of senior year students *vs* interns in prosthodontic treatment performed on different teeth.

Procedure	Study level	Mean	Std. Deviation	*p*-value
Maxillary anterior teeth	Senior year	3.72	1.29	0.814
	Interns	3.71	1.25	
Maxillary premolars	Senior year	3.70	1.22	0.854
	Interns	3.74	1.20	
Maxillary molars	Senior year	3.40	1.24	0.641
	Interns	3.38	1.28	
Mandibular anterior teeth	Senior year	3.68	1.22	0.895
	Interns	3.35	1.24	
Mandibular premolars	Senior year	3.75	1.25	0.482
	Interns	3.58	1.31	
Mandibular molars	Senior year	3.77	1.18	0.337
	Interns	3.43	1.29	

showed slightly more confidence than females in the study. However, the examination indicated that there were no significant differences between the two groups ($p > 0.05$), as outlined in Table **4**. The findings showed that undergraduates and interns had the least number confidence in treating maxillary molars, followed by mandibular molars.

Table **5** displays the self-confidence scores for different prosthodontic procedures. Undergraduate students had similar levels of self-confidence as interns. Furthermore, the research found no statistically significant disparities between males and females ($p > 0.05$). Male participants slightly exceeded female participants in terms of confidence levels. However, the examination showed no significant differences between the two groups, as shown in Table **6** ($p > 0.05$). Both undergraduate dental students and interns felt the least confident in managing veneers, full mouth rehabilitation, and over-dentures.

A large number of the participants, specifically 93.2%, stated they would consult with a specialist when dealing with complex prosthodontic cases beyond their expertise. Around half of the participants, about 49.2%, were content with the number of teeth required for their clinical training, while roughly 49.5% felt their prosthodontic practice was average. A large number of participants (89.8%) stated that they feel their confidence in prosthodontics will improve by gaining more experience in treating a variety of prosthodontic cases. Around 49.5% of the individuals indicated that they intend to specialize in prosthodontics at some point down the line.

Table 4. Mean self-confidence levels of males *vs* females in prosthodontic treatment performed on different teeth.

Procedure	Gender	Mean	Std. Deviation	*p*-value
Maxillary anterior teeth	Male	4.00	1.20	0.161
	Female	3.43	1.28	
Maxillary premolars	Male	4.01	1.17	0.371
	Female	3.41	1.18	
Maxillary molars	Male	3.75	1.14	0.593
	Female	3.03	1.26	
Mandibular anterior teeth	Male	3.86	1.18	0.771
	Female	3.27	1.22	
Mandibular premolars	Male	3.98	1.21	0.161
	Female	3.41	1.27	
Mandibular molars	Male	3.95	1.12	0.088
	Female	3.36	1.26	

Table 5. Mean self-confidence levels of senior year students *vs* interns in performing different indications for prosthodontic treatment.

Procedure	Study Level	Mean	Std. Deviation	*p*-value
Single crown	Senior year	3.54	1.22	0.606
	Interns	3.56	1.14	
Fixed bridge	Senior year	3.25	1.27	0.972
	Interns	3.57	1.24	
Veneers	Senior year	2.88	1.27	0.300
	Interns	2.92	1.38	
Post and core	Senior year	3.10	1.29	0.905
	Interns	3.32	1.27	
Removable partial denture	Senior year	3.70	1.30	0.450
	Interns	3.30	1.37	
Over denture	Senior year	3.27	1.16	0.110
	Interns	3.10	1.37	
Full mouth rehabilitation	Senior year	3.08	1.15	0.115
	Interns	3.00	1.37	
Fracture management	Senior year	3.11	1.19	0.857
	Interns	3.74	1.16	

Table 6. Mean self-confidence levels of males *vs* females in performing different indications for prosthodontic treatment.

Procedure	Study level	Mean	Std. Deviation	*p*-value
Single crown	Male	3.91	1.07	0.190
	Female	3.17	1.20	
Fixed bridge	Male	3.83	1.13	0.742
	Female	2.85	1.21	
Veneers	Male	3.23	1.29	0.828
	Female	2.54	1.24	
Post and core	Male	3.50	1.29	0.318
	Female	2.82	1.19	
Removable partial denture	Male	3.65	1.42	0.208
	Female	3.49	1.24	
Over denture	Male	3.45	1.22	0.601
	Female	2.96	1.20	
Full mouth rehabilitation	Male	3.28	1.27	0.207
	Female	2.82	1.14	
Fracture management	Male	3.61	1.16	0.709
	Female	3.01	1.20	

4. DISCUSSION

Dental students' degree of confidence is largely dependent on the caliber of their education and clinical requirements [15]. As a result, the inclusion of competencies in undergraduate dentistry students' curriculum served as both a tool for updating and developing curricula and a means of assisting students in developing the capacity to become safe practitioners [12, 17-20]. One of the fundamental areas of dentistry is prosthodontics, and upon graduation, general practitioners typically deal with both straightforward and challenging cases involving tooth replacement and restoration. As a result, general dentists should be able to assess and diagnose patients appropriately based on their knowledge and comprehension and be qualified to carry out appropriate procedures, particularly in straightforward cases. Surveys are thought to be a crucial tool for assessing students' perspectives and gathering data in a way that enables us, as educators, to discuss the advantages and disadvantages of the educational process [21-23].

The findings of this questionnaire-based study represent the dental undergraduates' subjective perception of their confidence in performing clinical procedures rather than their level of skill. With regard to certain clinical abilities, it was noted that students' confidence increased overall as they advanced toward internship. Additionally, by comparing the means of confidence level of the different tasks, students and interns showed neutral confidence levels in doing various prosthodontic procedures on different teeth. The present findings are in line with previous studies [24-27]. Murray and Chandler [27] found that 68.4% of final-year New Zealand students were extremely confident or confident when it came to giving patients removable partial dentures, while only 59.6% were confident when it came to giving full-arch complete dentures, 47.4% when it came to conventional bridge preparation, and 87.8% for single crown preparation. The same holds true in this study, where a lower degree of confidence was mostly found in procedures typically considered more complex, such as giving the patient an implant-retained prosthesis and immediate or over-dentures [28]. According to Youngson *et al*. [29], many dental schools do not require their undergraduate students to have completed a significant number of cases involving prosthodontics. Given this, the authors concluded that it is improbable that many undergraduates will graduate with competence in these clinical domains. As previously stated, this study evaluated confidence rather than competence. Therefore, a lack of confidence in this area may be attributed to a lack of exposure to broad clinical experience, yet the extent of experience gained in a simulated environment may be limited.

The degree of student confidence in dental procedures was compared between students and interns in order to evaluate the impact of competency implementation in dental student courses. There was no discernible variation in the confidence levels of the various prosthodontic procedures. According to Kaufman *et al*., students should be able to evaluate and examine their own work as well as provide fresh ideas and viewpoints [30]. The approaches taken in evaluating the competencies and the arrangement of the competencies, in addition to the prerequisites that senior year students must meet in order to graduate effectively may help explain the study's findings. A variety of techniques, both modern and traditional, can be used to assess competencies [31]. The dental school at the University of Hail uses traditional methods of evaluation: students are allowed to complete competencies during their clinical training; the task needs to be completed independently in a set amount of time; two evaluators subjectively assess the task; and the evaluation includes a brief viva question regarding the same procedure to gauge

the students' knowledge. One of the main shortcomings of this somewhat traditional method is that it is subjective and often rigid, whereas the newer standards analyze the student objectively. One example is the use of longitudinal student evaluation, in which the evaluator observes the student's performance over several patient encounters rather than a single occurrence. Another would include the use of oral structured clinical examinations with "standardized" patients and/or fixed evaluation criteria, reducing the chance of bias [32]. Moreover, to attain the desired learning results, competencies incorporated into students' curricula need to be evaluated and updated regularly.

When it came to prosthodontic procedures, males showed more confidence than females. Male students may be better at self-expression, actively participate in practical experiences and classes, and have more success in communicating with patients, their families, and faculty members because they were raised in a patriarchal Saudi society. This phenomenon possesses the capacity to augment an individual's general self-assurance. There is a gender difference in self-reported confidence, according to several earlier studies [15, 22, 25]. According to a cross-sectional research of undergraduate prosthodontic students in Portugal, female students relied more on instructors and clinical teachers than male students did, and female students were significantly less confident than male students [15]. A comparable result was found in a UK study that looked at students' confidence in their ability to conduct prosthodontic tasks involving crowns and bridges [22]. It was interesting to see how different genders felt while performing prosthodontic procedures, and this suggested more thought should go into dental education when promoting confidence and self-esteem. Males may have scored better because they are more confident in their ability to learn clinical skills and feel more self-efficacious. A student's subjective assessment of his or her ability to finish assignments and meet goals is known as self-efficacy belief. Pupils who have a high sense of their abilities take on challenging tasks with greater ease than those who do not. Students' self-efficacy views also impact how they assess their performance and how much effort they will put into finishing an assignment [26]. An additional plausible explanation could be that females are more fearful of dental operations than males are, which could be a potential factor [33]. Males may be more likely than females to hide their concerns as a result of gender perceptions [27]. Moreover, Macluskey *et al*. [34] similarly observed a perceived gender difference in their study, with males expressing higher levels of confidence in all exodontia-related areas. According to Blanch *et al*. [35], female students were either generally less confident as a result of their personality or as a result of a real decrease in the exposure of female students to these procedures. Given the complicated relationship between perceived confidence and gender, it is most likely the case that men scored higher on the confidence scale. According to Bartlett *et al*.'s study [26], there was a statistically significant difference in trainees' confidence between males and females, with males reporting greater confidence in their ability to make crowns and basic bridges, endodontics, and surgical extractions. This particular topic demonstrates a high degree of curiosity and needs further research in subsequent academic studies.

While the study's overall goals were achieved, there are several limitations. As the study evaluated the degree of confidence, it is expected that individuals occasionally overestimate compared to their actual competence. Nonetheless, practice requires expertise as well as a fair level of confidence. Second, it is challenging to generalize the results of a study that involved a single batch of interns and students from a single institution and institute, which resulted in a low participant count. Therefore, care must be taken while interpreting the outcomes.

CONCLUSION

Based on the limitations of the research, it could be concluded that the participants' degree of confidence with prosthodontic treatment is considered neutral. The male students and interns were more confident than the female and senior students.

Since experience and confidence appear to be correlated, more clinical time should be allotted to students so they can gain more exposure to and experience in the areas in which they are least confident. Upon graduation, dental professionals must possess the ability to identify and address their areas of weakness through the use of portfolios, reflection, and personal development plans. Education providers should be aware of the possibility of gender variations in self-perceived confidence and help needs. The relationship between competency, clinical experience, and students' perceived confidence is complicated. This relationship highlights the consequences that confidence may have on undergraduate programs and underlines issues for future studies.

AUTHORS' CONTRIBUTION

R.K.A.: Study conception and design; G.D.A.: Analysis and interpretation of results; S.A.A.: Methodology; A.A.M.: Draft manuscript. All authors reviewed the results and approved the final version of the manuscript.

ABBREVIATION

REC = Research Ethics Committee

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The present work was granted approval by the Research Ethics Committee (REC) at the University of Hail, Saudi Arabia with the reference number H-2024-219.

HUMAN AND ANIMAL RIGHTS

All human research procedures followed were in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2013.

CONSENT FOR PUBLICATION

Written informed consent was obtained from the participants.

STANDARDS OF REPORTING

STROBE guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

The data and supportive information are available within the article.

FUNDING

None.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

ACKNOWLEDGEMENTS

Declared none.

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