

Self-reported dental fear among oral healthcare students at a university in South Africa

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Background. Odontophobia (also known as dental fear) is an extreme version of fear experienced when a patient is about to receive dental treatment. Dental fear is a prevalent issue that affects not only patients but also oral healthcare students.

Objective. To investigate the prevalence and severity of dental fear among undergraduate oral healthcare students at a university in South Africa. Understanding dental fear in this population is essential, as it can influence both the students' own dental experiences and their future professional interactions with fearful patients.

Methods. A descriptive cross-sectional study was conducted using the Dental Fear Survey (DFS) questionnaire, which assesses dental fear across three domains: avoidance, physiological arousal, and fear of specific stimuli. The study included 135 participants, of whom 126 completed the survey. Participants were divided into preclinical and clinical groups to determine if the level of education and clinical experience affected their dental fear.

Results. The results showed that 16.7% of participants had low dental fear, 52.4% had moderate dental fear, and 30.9% had high dental fear. Preclinical students reported significantly higher fear of stimuli such as seeing and hearing the drill compared with clinical students. Female students consistently reported higher fear scores than male students across various dental fear measures.

Conclusions. Dental fear remains a concern among oral healthcare students, particularly in the earlier stages of their education. Clinical experience appears to mitigate fear associated with specific dental stimuli. The findings highlight the importance of addressing dental fear during dental education to improve students' comfort and confidence, which could positively impact their future interactions with fearful patients.

Keywords. Dental fear, odontophobia, Dental Fear Survey

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Odontophobia (dental fear) is a widespread phenomenon that affects individuals of all ages and backgrounds globally. It is defined as an intense fear or anxiety associated with dental visits, often leading to the avoidance of necessary dental care.^[1] Odontophobia can result in a patient refusing dental treatment or avoiding the dentist because of severe fear of the dentist or dental treatment.^[2] The implications of dental fear are significant, as it can result in poor oral health,^[3] and increased risk of dental diseases.^[4] Individuals with dental fear often have more extensive oral health problems owing to delayed dental visits, which can exacerbate their fear and create a vicious cycle.^[5]

An individual with dental fear experiences a threatening stimulus that is a persistent, unrealistic and intense fear when in the dental environment.^[6] Dental fear is accompanied by the feelings of 'terror, trepidation, and unease.'^[6] Dental fear is not limited to patients alone; it is also present among oral healthcare professionals. Studies conducted in Malaysia,^[7] Brazil^[8] and Palestine^[9] used the Dental Fear Survey (DFS) to evaluate the degree of dental fear in undergraduate dental students compared with undergraduate students in different fields. This is particularly concerning when considering oral healthcare students, who are training to become dental professionals. The presence of dental fear among dental students can reduce their confidence in performing clinical tasks^[10] and impact their ability to effectively manage patients with dental fear in their future practices.

Previous research has shown that dental fear tends to diminish with

increased exposure to clinical practice.^[11,12] However, this may not be universally true for all students, as individual differences in fear responses can persist despite clinical experience. Factors such as gender, prior dental experiences, and level of clinical exposure can influence the severity of dental fear among students. Moreover, the prevalence and impact of dental fear among oral healthcare students in South Africa (SA) remain underexplored.

This study aims to fill this gap by investigating the prevalence and severity of dental fear among undergraduate oral healthcare students at a university in Cape Town, SA. By identifying the extent of dental fear in this population, the study seeks to provide insights into the factors contributing to dental fear and inform strategies to address this issue in dental education.

Methodology

A questionnaire-based descriptive cross-sectional study was conducted.

The sample population consisted of all undergraduate oral healthcare students enrolled in the year 2023 at a university in Cape Town, SA. It included students from all years of study, divided into two groups: preclinical and clinical. Preclinical included all students of Bachelor of Dental Surgery (BDS) years 1 and 2, and Bachelor of Oral Hygiene (BOH) year 1, while BDS years 3, 4 and 5, as well as BOH years 2 and 3, were considered the clinical group. The sample was stratified by clinical exposure, as dental students may be desensitised to dental fear once they are exposed to clinical settings.

Non-probability convenience sampling was used because it was a practical, cheap, and efficient way of accessing the undergraduate oral healthcare students at the university. The data were collected quickly from a readily available sample.

Using this calculator, <https://www.benchmarksixsigma.com/calculators/sample-size-calculator-for-2-sample-t-test/>, with a predicted mean of 1.33 in preclinical and 1.65 in clinical, with a 5% certainty and a power of 80%, and a population standard deviation (SD) of 0.93, we propose the sample size to be 133.

Ethical approval was sought from the university's Biomedical Research Committee (ref. no. BM22_8_10). The participants were not identifiable during the data collection phase as their identifying data were not collected. The students also had the right to withdraw from the study at any time. The students were advised to contact the student wellness centre if they experienced any untoward distress during the distribution or completion of the survey.

The questionnaire used in this study is the DFS. The questionnaire was self-administered and contained 20 (closed-ended) questions and statements based on undergraduate oral healthcare students' dental fear. The answers were in the format of a Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The DFS includes three components: avoidance of dental treatment, physiological reactions to the dental treatment, and fear aroused by different dental procedures. Summation of the answers constructed a score for the level of dental fear that ranged from 20 to 100. The DFS score was categorised as low (DFS <35), moderate (DFS 36 - 52) and high (DFS ≥53). The participants were only allowed to choose one option per question.

The data were collected in the form of a self-administered online questionnaire using REDcap®. All data will be stored on the Kikapu server. The questionnaire was conducted in English as the study population's medium of education is English. Data were collected from 23 February 2023 to 5 April 2023.

Microsoft Excel (Microsoft, USA) was used for data cleaning, editing, sorting, and coding. The Excel file was then imported into STATA software (Release 16, StataCorp, USA). Descriptive statistics (i.e. frequencies, percentages, means, SDs) and first-order analysis (i.e. χ^2 tests and Fishers' exact tests) were performed. A multiple linear regression model was run to determine strength of association between dental fear scores and gender. All tests were deemed statistically significant at $p < 0.05$.

Results

Of the 128 participants who completed the DFS questionnaire, 66.4% ($n=85$) were preclinical and 33.6% ($n=43$) were clinical students. Regarding gender, 28.9% ($n=37$) were male, 69.5% ($n=89$) female, and 1.6% ($n=2$) did not wish to disclose their gender.

The DFS scored on three domains, with the following mean (SD) total scores: avoidance 18.24 (6.3), physiological arousal 9.17 (3.9), and stimuli 21.91 (6.5).

The components of the avoidance score consisted of fear of dental work causing you to put off making an appointment, fear of dental work causing you to cancel or not appear for an appointment, making a dental appointment, approaching the dentist's office, sitting in the waiting room, being seated in the dental chair, the smell of the dentist's office, and seeing the dentist walk in. There was no statistically significant difference between preclinical and clinical responses in the avoidance domain ($p=0.121$) (Table 1).

The different components of the physiological score consisted of physiological responses when having dental work done: muscles becoming tense, increase in breathing rate, perspiration, feeling nauseous and heart beating faster. The DFS results of physiological per clinical status of preclinical and clinical responses showed there was no statistically significant association between the physiological domain and the clinical setting ($p=0.718$) (Table 1).

The stimuli score components consisted of seeing the anaesthetic needle, feeling the needle when being injected, seeing the drill, hearing the drill, feeling the vibrations of the drill, having your teeth cleaned and how fearful you are of having dental work done. There was a statistically significant difference between the clinical and preclinical groups in two stimuli-involved cases, with the preclinical group scoring higher (mean (SD) for hearing the drill (3.35 (1.3)) ($p=0.007$) and overall being fearful of having dental work done (2.78 (1.1)) than the clinical group (2.30 (0.9)) ($p=0.019$). The DFS results of stimuli per clinical status showed there was no statistically significant association between the stimuli domain and clinical setting ($p=0.06$) (Table 1).

There was a statistically significant difference in avoidance domain scores between genders (Table 2). There was excellent validity, ranging from 0.723 to 0.8595 for avoidance, physiological and stimuli.

In the avoidance domain, females had a higher score for fear causing you to put off making an appointment (1.64 (0.9)) compared with males (1.21 (0.5)) ($p=0.028$), 'making an appointment for dentistry' (2.71 (1.2)) ($p=0.012$), 'approaching the dentist's office' (2.75 (1.2)) ($p=0.042$), 'being seated in the dental chair' (3.09 (1.2)) ($p=0.0002$), 'smell of the dentist's office' (2.57 (1.0)) ($p=0.012$) and 'seeing the dentist walk in' (2.75 (1.3)) ($p=0.014$) (Table 2).

There was a statistically significant difference between the total score for the stimuli domain and gender. In addition, females had higher scores for each of the subdomains than males and higher fear for 'seeing the needle' (3.80 (1.2)) ($p=0.01$), 'feeling the needle' (4.03 (1.0)) ($p=0.0095$), 'seeing the drill' (3.38 (1.3)) ($p=0.0123$), 'hearing the drill' (3.40 (1.2)) ($p=0.0178$), and for 'how fearful are you about having dental work done?' (2.78 (1.2)) ($p=0.0421$) (Table 2). There were no significant differences in the subdomains for physiological scores between the genders, except that females had a higher score for 'my muscles become tense' (2.24 (1.1)) ($p=0.016$) (Table 2). When running a multiple linear regression, dental fear score was no different between clinical status, (3.91 (95% confidence interval (CI) -1.73 to 8.12) ($p=0.201$)) or gender ($p > 0.05$).

Overall, the mean (SD) DFS score was 49.3 (13.99) which implies that as a group, they did not have high dental fear; however, when categorised, 17.9% ($n=23$) had low dental fear, 40.6% ($n=52$) had moderate dental fear and 41.4% ($n=53$) had high dental fear. There was a statistically significant association between gender and dental fear as a category ($p=0.004$). There was a statistically significant association between dental fear as a category and gender (Table 3).

Discussion

This study explored the prevalence and severity of dental fear among undergraduate oral healthcare students at an SA university, specifically comparing preclinical and clinical students. The DFS was used to assess dental fear across three subscales: avoidance, physiological arousal and fear of specific stimuli. The findings indicated that while the majority of students reported moderate levels of dental fear, significant differences were observed

Table 1. The avoidance, physiological and stimuli domains by preclinical and clinical groups

	Combined mean (SD)	Clinical mean (SD), (n=43)	Preclinical mean (SD), (n=85)	p-value
Avoidance				
Has fear of dental work ever caused you to put off making an appointment?	1.51 (0.9)	1.33 (0.7)	1.6 (0.9)	0.088
Has fear of dental work ever caused you to cancel or not appear for an appointment?	1.18 (0.6)	1.09 (0.3)	1.22 (0.7)	0.242
Making an appointment for dentistry	2.51 (1.2)	2.35 (1.2)	2.59 (1.2)	0.282
Approaching the dentist's office	2.58 (1.2)	2.42 (1.1)	2.7 (1.2)	0.284
Sitting in the waiting room	2.71 (1.2)	2.53 (1.0)	2.8 (1.4)	0.233
Being seated in the dental chair	2.84 (1.2)	2.67 (1.3)	2.86 (1.2)	0.428
The smell of the dentist's office	2.40 (1.0)	2.23 (0.9)	2.48 (1.1)	0.189
Seeing the dentist walk-in	2.56 (1.1)	2.4 (1.1)	2.65 (1.1)	0.232
Total score	18.24 (6.3)	17.02 (5.6)	18.85 (6.6)	0.121
Physiological				
My muscles become tense	2.14 (1.1)	2.2 (1.1)	2.13 (1.0)	0.867
My breathing rate increases	1.95 (0.9)	1.86 (1.0)	2.0 (0.9)	0.452
I perspire	1.66 (1.0)	1.74 (1.1)	1.62 (0.9)	0.524
I feel nauseous to my stomach	1.41 (0.8)	1.58 (1.2)	1.33 (0.6)	0.112
My heart beats faster	2.0 (1.8)	2.0 (1.3)	2.0 (1.0)	1.000
Total score	9.17 (3.9)	9.35 (4.8)	9.08 (3.4)	0.718
Stimuli				
Seeing the needle	3.6 (1.2)	3.33 (1.1)	3.72 (1.2)	0.09
Feeling the needle	3.85 (1.1)	3.72 (1.0)	3.92 (1.1)	0.326
Seeing the drill	3.2 (1.2)	2.91 (1.0)	3.32 (1.3)	0.076
Hearing the drill	3.21 (1.2)	2.93 (1.0)	3.35 (1.3)	0.007
Feeling the vibrations of the drill	3.27 (1.2)	3.2 (1.0)	3.32 (1.2)	0.478
Having your teeth cleaned	2.20 (1.0)	2.05 (0.9)	2.27 (1.1)	0.253
How fearful are you about having dental work done?	2.62 (1.1)	2.30 (0.9)	2.78 (1.1)	0.019*
Total score	21.91 (6.5)	20.4 (5.3)	22.7 (6.9)	0.06

* Statistically significant.

in specific fear stimuli between preclinical and clinical students. Additionally, gender differences in dental fear were evident, with female students reporting higher fear levels than their male counterparts across various measures.

The results showed no statistically significant differences between preclinical and clinical students for avoidance ($p=0.121$) or physiological ($p=0.718$) scores. The finding that preclinical students experience higher levels of fear related to specific dental stimuli, such as seeing the drill, aligns with previous research.^[13, 14] This suggests that clinical exposure and hands-on experience can help reduce fear by familiarising students with the dental environment and procedures. Clinical students, who have had more practical experience, showed a lower fear response to these stimuli, implying that increased exposure to dental procedures might desensitise students to these common fear triggers.

The significant gender differences observed in this study, with female students reporting higher levels of dental fear than male students, are consistent with previous research indicating that women are more likely to experience dental fear and anxiety.^[11,13,15-17] This could be linked to broader patterns of anxiety disorders, which tend to be more prevalent in women.^[18] The higher reported fear among female students, particularly related to specific stimuli such as needles and drills, suggests that gender-specific support mechanisms may be needed within dental training programmes to

ensure that all students are adequately prepared to manage their own fears, as well as those of their future patients.

The overall prevalence of dental fear in this study is consistent with global patterns, indicating that dental fear is a widespread issue, even among those training to become oral healthcare professionals. This underscores the importance of integrating dental fear management strategies into dental education curricula. Such strategies could include desensitisation techniques, cognitive-behavioural therapy, and stress management programmes aimed at reducing anxiety related to dental procedures.

The mean (SD) fear of specific stimuli domain score was 21.94 (6.5) for the whole sample, which was much higher than scores for the dental (12.52 (0.23)), psychology (18.87 (0.33)) and mathematics (16.14 (0.40)) students in Brazil.^[19] Physiological arousal domain score was 9.17 (3.9) for this sample, which was much higher than those for the dentistry (7.24 (0.11)), psychology (8.86 (0.18)) or mathematics (8.02 (0.18)) students in Brazil.^[19] The avoidance domain score was 18.24 (6.3) for the sample in this study, which was much higher than those for the dentistry (9.85 (0.13)), psychology (12.43(0.26)) and mathematics (11.57 (0.27)) students in Brazil.^[19] One of the reasons the various domains for the DFS scale were higher in Brazil could be because Brazil has a higher dentist:population ratio (1:735)^[20] compared with SA (1:8 900).^[21]

In this student sample, the DFS showed good internal reliability and validity. The high Cronbach's alpha scores for the avoidance, physiological,

Table 2. The avoidance, physiological and stimuli domains by gender

	Male, (n=37) Mean (SD)	Female, (n=89) Mean (SD)	I do not wish to answer, (n=2) Mean (SD)	p-value
Avoidance				
Has fear of dental work ever caused you to put off making an appointment?	1.21 (0.5)	1.64 (0.9)	1.0 (0)	0.028*
Has fear of dental work ever caused you to cancel or not appear for an appointment?	1.08 (0.3)	1.22 (0.7)	1.0 (0)	0.428
Making an appointment for dentistry	2.03 (0.99)	2.71 (1.2)	2.5 (2.1)	0.012*
Approaching the dentist's office	2.2 (1.0)	2.75 (1.2)	2.0 (1.4)	0.042*
Sitting in the waiting room	2.16 (1.1)	2.96 (1.2)	2.0 (1.4)	0.0016*
Being seated in the dental chair	2.11 (1.2)	3.09 (1.2)	2.5 (0.7)	0.0002*
The smell of the dentist's office	2.0 (0.9)	2.57 (1.0)	2.0 (1.4)	0.012*
Seeing the dentist walk in	2.14 (0.98)	2.75 (1.3)	2.0 (1.4)	0.014*
Total score	14.92 (4.7)	19.7 (6.4)	15.5 (8.9)	0.0003*
Physiological				
My muscles become tense	2.22 (1.1)	2.24 (1.1)	1.0 (0.0)	0.016*
My breathing rate increases	1.99 (1.0)	1.98 (1.0)	1.0 (0.0)	0.366
I perspire	1.75 (1.1)	1.75 (1.1)	1.0 (0.0)	0.259
I feel nauseous to my stomach	1.46 (0.9)	1.46 (0.9)	1.0 (0.0)	0.563
My heart beats faster	2.09 (0.9)	2.09 (1.2)	1.5 (0.7)	0.367
Total score	9.52 (4.1)	9.52 (4.1)	5.5 (0.7)	0.184
Stimuli				
Seeing the needle	3.08 (1.2)	3.80 (1.2)	3.5 (0.7)	0.01*
Feeling the needle	3.41 (1.2)	4.03 (1.0)	4.0 (0.0)	0.0095*
Seeing the drill	2.68 (1.1)	3.38 (1.3)	3.5 (0.7)	0.0123*
Hearing the drill	2.73 (1.1)	3.40 (1.2)	3.5 (0.7)	0.0178*
Feeling the vibrations of the drill	2.97 (1.1)	3.38 (1.2)	3.5 (0.7)	0.1899
Having my teeth cleaned	1.95 (0.9)	2.31 (1.1)	1.5 (0.7)	0.1242
How fearful are you about having dental work done	2.24 (0.8)	2.78 (1.2)	2.5 (0.7)	0.0421*
Total score	19.05 (6.1)	23.09 (6.4)	22 (2.8)	0.0054*

* Statistically significant.

Table 3. Dental fear levels by gender and clinical status

	I do not wish to state, n (%)	Female, n (%)	Male, n (%)	Total, n (%)	p-value	Clinical, n (%)	Preclinical, n (%)	Total, n (%)	p-value
Low dental fear	1 (4.4)	11 (47.8)	11 (47.8)	23 (17.9)		8 (34.8)	15 (65.2)	23 (17.9)	
Moderate dental fear	1 (1.9)	33 (63.5)	18 (34.6)	52 (40.6)		21 (40.4)	31 (59.6)	52 (40.6)	
High dental fear	0 (0)	45 (84.9)	8 (15.1)	53 (41.4)	0.014*	14 (26.4)	39 (73.6)	53 (41.4)	0.314

and stimuli subscales ranged from 0.74 to 0.86. This shows that the DFS is a reliable psychometric tool for measuring dental fear among dental students.

Desensitisation of dental students to dental stimuli could improve their dental anxiety which in turn could improve their relationship with dental patients.

Sampling bias may be of particular interest in this study as participants who chose to be part of the study may have different dental anxiety levels compared with students who did not take part in the study. The dental anxiety levels could be different from other institutions because of the varying curricula taught at various dental schools.

Limitations of research and recommendations for further research

The findings might not apply to dental students in other universities or countries owing to its limited sample size. More representative data should

come from a larger, randomised sample. A longitudinal approach that tracks changes in people over time would provide more insight into how dental fear changes with clinical training than the cross-sectional study design. Self-reporting, which can introduce biases like social desirability, was used to measure dental fear. More unbiased tests might be used to verify the results. Interpretation and analysis may benefit from additional context regarding variables like prior dental experiences and anxiety levels. If graduate or undergraduate students from other fields are included, it may be possible to determine whether dental students' fear levels are lower than those of the general public.

Associations between dental fear in undergraduate oral healthcare providers and treatment outcomes in patients have not yet been fully measured or established. The ultimate goal is to enhance providers' confidence and clinical experience to ensure the highest standard of care is delivered to patients. It would be useful to tie dental fear levels to

tangible dental education outcomes. A deeper understanding of dental fear experiences might be obtained by including interviews or open-ended questions.

Conclusion

This study sheds light on the prevalence and severity of dental fear among undergraduate oral healthcare students at an SA university. The findings revealed that dental fear is present among both preclinical and clinical students, with preclinical students exhibiting higher fear levels for certain stimuli, such as seeing and hearing the drill. Clinical experience appears to mitigate some aspects of dental fear, yet it does not eliminate it entirely. Gender differences were also notable, with female students reporting higher levels of dental fear compared with their male counterparts.

These results underscore the need for dental education programmes to address dental fear among students, both for their personal wellbeing and for their future roles as healthcare providers. By implementing strategies such as desensitisation techniques, cognitive-behavioural interventions, and stress management programmes, dental schools can better equip their students to handle dental fear effectively. Addressing this issue during dental education is crucial, as it not only impacts the students' learning experiences but also their ability to empathise with and manage patients who suffer from dental fear.

In conclusion, this study highlights the persistent nature of dental fear among oral healthcare students and the need for dental education programmes to address this issue proactively. By incorporating psychological support and fear management strategies into the curriculum, dental schools can better prepare their students to manage both their own fears and those of their patients, ultimately improving the quality of care provided by future dental professionals.

Recommendations. Future research should explore the long-term effects of clinical exposure on dental fear and investigate more personalised approaches to managing fear among dental students. Expanding this research to include a more diverse sample across multiple institutions could further illuminate the complex factors that contribute to dental fear in oral healthcare education.

Declaration. AI (ChatGPT) has been used to construct the outline of this work.

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