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DENTAL ANXIETY PREVALENCE AND SURGERY ENVIRONMENT FACTORS: A QUESTIONNAIRE-BASED SURVEY OF ATTENDERS IN IRELAND

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Abstract

Aim: To identify and quantify anxious dental patients and dental office environment factors that may influence anxiety.

Objective: To develop and implement a questionnaire to investigate dental anxiety and identify factors that enhance or lessen dental anxiety in the surgery setting.

Methods: Data was collected from patients by a self-completed questionnaire when attending dentists at a general dental practice and hospital clinics.

Results:
The estimated prevalence of dental anxiety in the total sample was 17.0%. A higher proportion of females were highly anxious. Those attending the Dental Hospital were less likely to be anxious than those who were attending the Dental Practice. An inverse relationship between frequency of dental attendance and dental anxiety was found. Anxiety was significantly higher for those respondents that indicated that a delay in their appointment would make them more anxious. Of the reported fears regarding their dental visit, 60% of respondents claimed that they were "afraid it's going to hurt". When compared to non-anxious patients, more anxious patients feared "feeling out of control", a "negative experience", the needle, the drill, and being bothered by the smell associated with dental materials. The majority of respondents had a preference for a dentist that was young, friendly, talkative and native English speaking. In general, patients preferred the surgery temperature to be slightly cool. Regardless of anxiety level, 31.0% of patients said that they would prefer the chairside mouth rinse to be plain water with 49.1% not having a preference.

Conclusions:
This study demonstrates that a significant proportion of patients experience anxiety about visiting the dentist. Many of them have preferences about dentists and the surgery environment which may be modulators of their anxiety. Awareness by the dental profession of the causes of dental anxiety and measures taken by dentists to

minimise these trigger factors could have a substantial impact on anxious patients.

Keywords: Dental anxiety, patient preferences, regularity of attendance.

Introduction

Epidemiological studies suggest between 3% and 20% of the population have levels of fear and anxiety about dental treatment that is considered to be problematic. In a recent national survey in Ireland 20% of a representative random sample of 16-4 and 35-44 year-old adults reported that they felt worried (or worse) while waiting for their turn in the dental chair [1]. Avoidance of dental care due to anxiety appears to be strongly associated with deterioration of oral and dental health and poses a significant problem for the dental profession [2]. The aim of this study was to identify anxious dental patients, and to develop a questionnaire to investigate patient anxiety and identify factors that may enhance or lessen their perceived anxiety in the dental surgery.

Despite formidable challenges arising from patients' dental anxiety, we have only limited knowledge about what causes and abates this significant problem facing the dental profession. While dentists employ a number of different techniques to allay dental anxiety, many unanswered questions remain about patient preferences, including personality and appearance of the practitioner as well as attributes of the dental surgery, particularly those of patients most anxious about their visit. Awareness of the causes of dental anxiety and management strategies to help alleviate this problem could have a substantial impact on an anxious dental patient. Although the literature includes suggestions for combating dental anxiety (appropriate attire and making pharmacological support available),[3,4] the bulk of the research on this subject documents anxiety rather than the modulating factors and how best to reduce them.

Past studies on dental anxiety and the factors that stimulate such anxieties have been based on relatively small non-random samples many of which were college students in the classroom setting. In this study we took the most opportune time to gather data on dental anxiety; when a patient was waiting to go into a dentist for an appointment.

Methodology

Ethical approval for the survey was obtained from the Clinical Research Ethics Committee of the Cork Teaching Hospitals. During a 3-week period a total sample of 395 patients were invited to complete a 5-page anonymous questionnaire (see appendix one) evaluating the extent of their dental anxiety and preferences in a dental setting. Consecutive patients completed the questionnaire while waiting to see the dentist. The questionnaire was piloted prior to use to test its functionality and allow modifications prior to implementation. Two patient samples were recruited by the principle investigator who worked at two locations. 200 patients were sampled from a general dental practice and 195 attending the Cork University Dental School and Hospital. The target sample size was arrived at after consideration of previous dental anxiety surveys. Patients completed the questionnaires in the waiting areas while waiting to see the dentists. The general practice was located in a market town. There were 3 dentists in the practice, two male and one female. At the dental hospital, students and staff saw the patients for treatments and consultations. To aid in the development of our questionnaire previous surveys were reviewed, in particular a similar study carried out on college students by Bare[7] in the USA.

The self-completed questionnaire was divided into sections and incorporated the Corah Dental Anxiety Scale (DAS), which is a recognised measure designed to identify patients who are dentally anxious.

DAS contains four multiple-choice questions dealing with the patient's subjective reaction to the dental situation:

- Anticipating a visit to the dental clinic.
- Waiting in the dentist's office for treatment.
- Waiting in the dental chair for drilling of teeth.
- Waiting in the dental chair for scaling the teeth.

There are five possible answers to each of the four questions comprising scores in ascending order, from 1 to 5. Each question carries a possible minimum score of 1 and a maximum score of 5, resulting in a total possible minimum score of 4 and a total possible maximum score of 20 for the entire scale.

The survey which consisted of 16 questions in yes/no, fill in the blank, and multiple-choice formats, began with the consent form which had a brief description of dental

anxiety and the study's purpose. Questions were designed to identify the subject's age, gender and whether they were a regular or irregular attendee. The four questions of the Corah Dental Anxiety Scale were incorporated into the early part of the questionnaire to identify anxious patients. The survey also included questions in which patients rated reasons for their anxiety (such as afraid it's going to hurt, feeling out of control, unpleasant stories heard from others, and a negative experience such as gagging). Questions regarding patients fears were included, e.g. the treatment, the needle, the drill and would a delay in a patient's appointment time affect anxiety? In addition, they were asked to elucidate their preferences for the dentist; friendly or aloof, younger or older than age forty-five, native or foreign, female or male, and talkative or silent. Additional questions asked the respondent to indicate what might enhance their comfort in the surgery setting; such as preferred temperature and music in the background. The principal author also included several questions about factors that had been mentioned to him by patients, such as the smell of dentistry (dental cements), the flavour of the chairside rinse and lying back in the chair.

Statistical Analysis

The data was entered in to and analysed using the SPSS® statistical package (version 14.0). Anxiety scores (DAS) of 13 or more have been used in the literature to indicate that a person is highly anxious.[5] This cut-off point was used in the analyses presented here to indicate whether a person is anxious or not. A binary variable was constructed with the two levels indicating that a person has a low anxiety level (DAS $<$ 13) or high anxiety level (DAS $\geqslant$ 13). Cross tabulations of this binary variable against the levels of selected questions are presented. Statistical significance of observed differences in mean DAS scores for different levels of selected questions and to evaluate any association between the binary anxiety variable and the questionnaire variables were carried out using two-sided, 2-sample t-tests and chi-squared tests respectively both with a 5% level of significance.

Results

Table 1 – Sample demographics

The total number of patients available for statistical analysis was 388. Of the 388 patients in the sample, 197 (50.8%) were from the dental practice setting and 191 (49.2%) were from the dental hospital setting. The age of participants assessed in the general sample ranged from 16-83 years. The proportion of regular attenders in the sample was 72.5%. A higher proportion of females (21.7%) than males (11.2%) were highly anxious.

Sample Demographics	Total % (n)
Dentalractice	50.8% (197)
Dental Hospital	49.2% (191)
Male	44.3% (172)
Female	55.7% (216)
Regular attendee	72.5% (280)
Irregular attendee	27.5% (106)
Anxious	17.0% (65)
No anxiety	83.0% (317)
Proportion of males who are anxious	11.2% (19)
Proportion of females who are anxious	21.7% (46)
Total	**388 (100%)**

Table 2 – Cross tabulation of dental attendance against anxiety level

While only 12.9% of regular attenders were anxious (DAS $\geqslant$ 13), 27.5% of irregular attenders were anxious (Table 2). Using the chi-squared test with Yates' continuity correction, there is an association between whether a subject is a regular/irregular attendee and whether that subject is anxious or not anxious ($p < 0.005$).

	Not anxious	*Anxious*	*Total*
Regular attendee	242 (87.1%)	36 (12.9%)	278
Irregular attendee	74 (72.5%)	28 (27.5%)	102
Total	316 (83.2%)	64 (16.8%)	380

Table 3 – Mean Dental Anxiety Scores (DAS) by location

Location	*Mean DAS score*	*n*	*Standard Deviation*
Dental Practice	9.43	192	3.660
Dental Hospital	8.24	190	3.377
Total	8.84	382	3.567

The anxiety scores were higher for patients attending the dental practice (DAS 9.43) while the mean anxiety score for the patients who attended the dental hospital was lower at 8.24 (Table 3). There was a significant difference ($p = 0.001$) between the mean DAS scores for those who attended the dental hospital and for those who attended the dental practice.

Table 4 – Cross tabulation of reasons for fear and dental anxiety level

With regard to what patients were afraid of regarding their dental visit, over half of all patients who responded (60.6%) claimed that they were "afraid it's going to hurt" while the corresponding percentages for anxious and non-anxious subjects were quite similar at 64.6% and 58.6% respectively.
Approximately 15.6% of all patients who responded to these questions stated that they feared "feeling out of control" while the corresponding percentages for anxious and non-anxious patients were 30.8% and 11.6% respectively.
Also 40.0% of all patients indicated that they were afraid of the "drill" while the corresponding percentages for anxious and non-anxious patients were 55.4% and 36.0% respectively. Using the chi-squared test with Yates' continuity correction there is an association between selection/non-selection of this category ("the drill") and anxiety level ($p < 0.01$).

	Not anxious n = 250	*Anxious n= 65*	*Total n = 315*
Afraid it's going to hurt	59.6% (149)	64.6% (42)	60.6% (191)
Feeling out of control	11.6% (29)	30.8% (20)	15.6% (49)
Needle	38.0% (95)	58.5% (38)	42.2% (133)
The drill	36.0% (90)	55.4% (36)	44.0% (126)

Table 5 – Cross tabulation of opinion of smell from chemicals and cements against anxiety level

The smell from the chemicals and cements bothers 18.5% of the anxious patients and only bothers 7.4% of the non-anxious patients.

Q11. Does this smell bother you?	*Not anxious*	*Anxious*	*Total*
Yes	23 (7.4%)	12 (18.5%)	35 (9.3%)
No	289 (92.6%)	53 (81.5%)	342 (90.7%)
Total	312	65	377

Table 6 – Cross tabulation of effect of a delay in appointment against anxiety level

Over half of the anxious patients (53.8%) stated that a delay in their appointment would make them feel "more anxious". Only 23.7% of non-anxious patients indicated that a delay in their appointment would make them more anxious. There was a statistically significant association between effect of a delay in dental appointment time and anxiety level at the $p < 0.001$ level.

	Not anxious	*Anxious*	*Total*
Less anxious	9 (2.9%)	0 (0.0%)	9 (2.4%)
More anxious	74 (23.7%)	35 (53.8%)	109 (28.9%)
No change	229 (73.4%)	30 (46.2%)	259 (68.7%)
Total	312	65	377

Table 7 – Cross tabulation of preference for dentist traits against anxiety level

With regard to preferences for dentist traits, anxious and non-anxious patients indicated similar preferences for all dentist traits (Table 6). For example 70.0% of anxious and 71.8% of non anxious patients indicated a preference for a "young" dentist (aged ≤ 45 years). Of the general sample irrespective of anxiety, respondents had a preference for a dentist that was young (71.5%), friendly (97.1%), talkative (87.8%) and native English speaking (90.8%).

Dentist Traits	*Not anxious* *Percent (Number)*	*Anxious* *Percent (Number)*	*Total* *Percent (Number)*
Young (< 45 years)	71.8% (173)	70.0% (35)	71.5% (208)
Old (> 45 years)	17.4% (42)	8.0% (4)	15.8% (46)
No preference	10.8% (26)	22.0% (11)	12.7% (37)
Female	39.2% (96)	30.8% (16)	37.7% (112)
	43.7% (107)	40.4% (21)	43.1% (128)
Male	17.1% (42)	28.8% (15)	19.2% (57)
No preference			
Friendly	97.2% (278)	96.8% (61)	97.1% (339)
Aloof	0.3% (1)	0.0% (0)	0.3% (1)
No preference	2.4% (7)	3.2% (2)	2.6% (9)
Talkative	87.4% (215)	89.5% (51)	87.8% (266)
Silent	8.9% (22)	7.0% (4)	8.6% (26)
No preference	3.7% (9)	3.5% (2)	3.6% (11)
Native English speaking	91.3% (219)	89.1% (49)	90.8% (268)
Foreign	0.8% (2)	0.0% (0)	0.7% (2)
No preference	7.9% (19)	10.9% (6)	8.5% (25)

Discussion

The DAS allows identification of anxious patients based on their score for the four items using the following rating as a guideline.

Anxiety rating:
- 9–12 = moderate anxiety
- 13–14 = high anxiety
- 15–20 = severe anxiety (or phobia).

Corah considered most highly anxious patients to score 13 or higher on the scale.[6]

In this study, the percentage of highly anxious patients was 17.0% (DAS > 13) which correlates with the recent national survey in Ireland in which 20% of a representative random sample of 16–24 and 35–44 year-old adults reported that they felt worried (or worse) while waiting for their turn in the dental chair[1]. One difficulty with comparing anxiety prevalence between different studies is that many different forms of anxiety assessment have been used. Although the DAS is often used, there are many studies that have used other recognised scales such as the dental fear scale and some studies, such as Bare [7] used custom-made scales for dental anxiety. Even when DAS is used, studies differ in the cut-off scores, for example, the prevalence of dental anxiety in an adult population in Sweden was found to be 5.4% (DAS ≥ 15 = high anxiety), while the prevalence in an adult population in Denmark was 10.2% (DAS ≥ 12 = high anxiety). We used a DAS ≥ 13 = high anxiety for the present study, as Corah considered most highly anxious patients to score 13 or higher on the scale.[10] However a DAS of less than 13 does not necessarily denote no anxiety.

It was interesting that there was a significant difference between the mean DAS scores for those who attended the dental hospital compared to those who attended the dental practice. There were more females in the dental practice sample and as females were found to be more anxious than males it is likely that the mean DAS scores would be higher for those attending the general practice. The finding in this study that females had a significantly higher mean DAS score (9.50) than males (8.01) is in agreement with many other reports.[8, 9] It has been suggested that women are more likely to report anxiety, whereas men may not express their fears as openly.

In this study a subject was considered to be a regular attenders if self-reported dental visits were at least one to two times per year. While in the case of an irregular attendee the subject reported not to have had a dental visit for over a year or reported to visit the dentist in an emergency only. While only 12.9% of regular attenders were anxious (DAS ≥ 13), 27.5% of irregular attenders were anxious. This inverse relationship between frequency of dental attendance and anxiety has been reported by many previous studies because regular attenders have less anxiety than irregular attenders.[11] Dental patients seeking regular treatment often report lower levels of dental anxiety than other patients; this may be because highly anxious people tend to seek dental care less frequently and, thus, are not often included in study samples.

Regarding patient fears about their dental visit, 60% of all patients who responded to this survey claimed that they were "afraid it's going to hurt". In this study fear of the needle was reported by highly anxious respondents to be the most anxiety-provoking stimulus followed by fear of the drill. This supports findings by other studies where fear of injections was found to lead the anxiety-provoking stimuli in the dental situation followed by the drill.[12, 13]

A significant percentage of anxious patients feared "feeling out of control" and "a negative experience" about their dental visit. Dickinson and Fiske[14] demonstrated a "traffic light system" of hand controls that allowed patients to have some control over the progress of their treatment. By explaining to a patient that they can signal to the dentist to stop at any time by raising their hand, the patient is likely to feel more in control of the situation and therefore able to better manage their anxiety.

With regard to the surgery environment and its effects on dental anxiety, a number of interesting findings were made. A statistically significant ($p < 0.001$) number of anxious patients were bothered by the smell of cements and chemicals used by the dentist thus supporting a study by Hakeberg et al.[15] in which dental odour was rated with high scores by a majority of patients with dental phobia. The odour of eugenol could evoke memories of unpleasant dental experiences and, therefore, negative feelings such as anxiety and fear. The smell of eugenates (cements containing eugenol) are often associated with dentistry. In a study by Robin et al.[16] eugenol was shown to evoke negative basic emotions, especially fear, in anxious dental patients, thus confirming the potential role of odours as elicitors of emotional memories. This study also supports the possible influence of the ambient odour, due to eugenol, impregnating the dental office in strengthening negative conditioning towards dental care. This could be avoided by eliminating the odour of eugenol in the dental office. The possibility of masking it by a pleasant and relaxing odour, such as lavender, should be considered especially in areas such as the waiting room.

In the general sample, a higher percentage (56%) of patients said that they would prefer a slightly cool temperature in the surgery; this supports a similar result found in Bare's study[7]. Based on these results, to enhance patient comfort, further work could be carried out to identify the ideal surgery temperature (range). Interestingly, regardless of anxiety 32% of patients said that they would prefer the chairside mouth rinse to be plain water with 49% not having a preference. Flavoured mouth rinses are commonly used in dental practice, and it is interesting to note from this study that only 20% of the patients in this sample preferred a flavoured rinse. There appears to be very little in the literature regarding patient preference for the chairside mouth rinse and indeed one would wonder if plain water might be better, as the flavoured rinse can perhaps contribute to the smell of the dental environment which some patients dislike.

In this study irrespective of anxiety, respondents had a preference for a dentist that was young, talkative and native English speaking. Approximately 70% of anxious patients had a preference for a young dentist (aged < 45). This is in contrast to Bare's[7] study in which the anxious patients preferred a male dentist older than age forty-five. Because of the small sample size and convenience sampling, Bare[7] acknowledged that confidence in the results regarding anxious patient's preference for a male or female dentist was limited and felt the results required replication. Although convenience sampling was a feature of the present study, the results are likely to have greater validity as the sample size was larger and the two samples were not largely from a student population as in Bare's study.

This study had a number of shortcomings. There was no distinction between patients who were waiting for an operative procedure to those waiting for a check up or consultation. It is likely that those awaiting a procedure were more anxious. Also some of the questions in the questionnaire could be considered emotive.

Suggestions for future research are for more in-depth development of the questionnaire especially for validity and reliability and qualitative patient interviews in an attempt to understand the issues surrounding anxiety during a dental visit from the patient's point of view. These interviews can be carried out in a number of ways, individually or in a group setting, face to face or via telephone for example.

Conclusion

This study supports a number of other studies suggesting that the causes and triggers of dental anxiety are similar wherever they occur. Just over half of the anxious patients indicated that a delay in the waiting time for their dental appointment would make them more anxious. Developing time management strategies and organisation systems that reduce waiting times will help this.

Interestingly in contrast to a previous study[7] anxious patients in the present study had a preference for a young dentist. Anxious patients in this study were bothered by the smell of dental materials in the dental surgery. Although many patients indicated that they had no preference for the chairside mouth rinse, a higher proportion of patients indicated a preference for a plain

mouth rinse than a flavoured mouth rinse. Future research should aim to use consistent measurements of dental anxiety to allow more comparisons across sample groups. It is possible that self-reported dental anxiety measures can provide valuable information to dentists interested in evaluating and reducing their patients' anxiety levels. Dentists who address these issues with their patients demonstrate concern and increase patients' confidence. By screening the very anxious patients, it should be possible to instigate a management plan for them. Some may even require referral to a more specialised centre to enable them to have dental treatment.

Good communication between the dental profession and the patient is essential and beneficial to both parties. Allowing patients to express their anxieties enables the dental team to prevent and reduce many of the factors responsible for dental anxiety. This study demonstrates that patients do indeed have preferences about dentists and the surgery environment and therefore it is important that dentists are aware that they need to address these issues which are unrelated to the individual dentist's expertise and skill. Awareness of the causes of dental anxiety and measures taken by dentists to minimise these trigger factors could have a substantial positive impact on anxious patients, and indeed make the working environment more pleasant for dentists and their staff. By developing strategies to combat dental anxiety, the regularity of dental visits should increase with a corresponding improvement in oral health, which indeed is one of the goals of the dental profession.

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Appendix 1 Questionnaire

Dental Anxiety Survey

Please work through this short questionnaire ticking the relevant boxes as you go. For some questions you may be asked to tick more than one box. Remember that your name does not appear anywhere on this questionnaire.

1. **Your Age _____ Years.**

2. **Are you:**
   - ☐ Male
   - ☐ Female

3. **How do you feel about this dental visit?**
   (Please tick one box):
   - ☐ I look forward to it as a reasonably enjoyable experience.
   - ☐ I don't care one way or the other.
   - ☐ I am a little uneasy about it.
   - ☐ I am afraid that it will be unpleasant and painful.
   - ☐ So anxious, that I sometimes break out in a sweat or almost feel physically sick.

4. **When you are waiting in the dentist's office for your turn in the chair, how do you feel?**
   (Please tick one box):
   - ☐ Relaxed.
   - ☐ A little uneasy.
   - ☐ Tense.
   - ☐ Anxious.
   - ☐ So anxious, that I sometimes break out in a sweat or almost feel physically sick.

5. **When you are in the dentist's chair waiting while he gets his drill ready to begin work on your teeth, how do you feel?**
   (Please tick one box):
   - ☐ Relaxed.
   - ☐ A little uneasy.
   - ☐ Tense.
   - ☐ Anxious.
   - ☐ So anxious, that I sometimes break out in a sweat or almost feel physically sick.

6. You are in the dentist's chair to have your teeth cleaned. While you are waiting and the dentist is getting out the instruments which he will use to scrape your teeth around the gums, how do you feel? (Please tick one box):

- ☐ Relaxed.
- ☐ A little uneasy.
- ☐ Tense.
- ☐ Anxious.
- ☐ So anxious, that I sometimes break out in a sweat or almost feel physically sick.

7. If you are afraid of visiting the dentist, what things are you afraid of? (Please tick all that apply):

- ☐ Afraid it's going to hurt.
- ☐ Feeling out of control.
- ☐ Unpleasant stories heard from others.
- ☐ A negative experience.
- ☐ Choking or gagging.
- ☐ A previous medical experience unrelated to dentistry.
- ☐ Other:

Please specify if you ticked other: _____

8. Sometimes in the dentists surgery there is a smell from the cements and chemicals used by the dentist. Does this smell bother you?

- ☐ Yes.
- ☐ No.

9. While waiting in the waiting area to see the dentist, would a delay in your appointment time make you feel (Please tick one box):

- ☐ Less anxious.
- ☐ More anxious.
- ☐ No change.

10. If you fear your dental visit, what are you afraid of? (Please tick one box):

- ☐ The treatment.
- ☐ Needle.
- ☐ Dislike of cotton rolls placed in your mouth by the dentist when he is treating you.
- ☐ The drill.
- ☐ Other:

Please specify if you ticked other: _____

11. When having dental treatment, would you prefer to have your treatment (Please tick one box):

- ☐ Sitting upright in the chair.
- ☐ Lying back in the chair.
- ☐ No preference.

12. Would you prefer the chair-side mouth rinse to be: (Please tick one box):

- ☐ Plain water.
- ☐ Flavored water.
- ☐ No preference.

13. Dentists have different personalities and approaches to their patients. Which of the following of each pair of traits about the dentist would you prefer? A dentist who is:
(Please tick one of each pair (i) to (v))

(i)	☐	Young	**OR**	☐	Old (>45 yrs old)
(ii)	☐	Female	**OR**	☐	Male
(iii)	☐	Friendly	**OR**	☐	Aloof
(iv)	☐	Talkative	**OR**	☐	Silent
(v)	☐	Native English speaking	**OR**	☐	Foreign

14. Would you find the following helpful at your dental appointment to help you relax in the surgery (Please tick all that apply):

- ☐ Music in the background.
- ☐ Televisions (with headphones).
- ☐ Acupuncture.
- ☐ Having taken a relaxation drug.
- ☐ Hypnosis.
- ☐ Nitrous oxide (laughing gas).

15. Would prefer the temperature of the dental office to be:

- ☐ Slightly warm.
- ☐ Slightly cool.

16. The last time you were waiting at the dentist for your turn in the chair, how did you feel? (Please tick one box):

- ☐ Relaxed.
- ☐ A little worried.
- ☐ Worried.
- ☐ Frightened.
- ☐ So frightened I perspired or felt sick.
- ☐ Cannot remember / never attended dentist.

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