

5-5-2018

Dental Anxiety Among Patients Attending a University Dental Clinic

Maria Vallejos
vallejos@uchc.edu

Recommended Citation

Vallejos, Maria, "Dental Anxiety Among Patients Attending a University Dental Clinic" (2018). *Master's Theses*. 1208.
https://opencommons.uconn.edu/gs_theses/1208

This work is brought to you for free and open access by the University of Connecticut Graduate School at OpenCommons@UConn. It has been accepted for inclusion in Master's Theses by an authorized administrator of OpenCommons@UConn. For more information, please contact opencommons@uconn.edu.

Dental Anxiety Among Patients Attending a University Dental Clinic

Maria Veronica Vallejos Castillo

D.D.S., Peruvian University Cayetano Heredia, 2014

A Thesis

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Master of Public Health

At the

University of Connecticut

2018

APPROVAL PAGE

Master of Public Health Thesis

Dental Anxiety Among Patients Attending a University Dental Clinic

Presented by

Maria Veronica Vallejos Castillo, DDS

Major Advisor _____
Angela Bermudez- Millan, PhD, MPH

Associate Advisor _____
Jane Ungemack, DrPH

Associate Advisor _____
Geraldine Weinstein, DDS

University of Connecticut

2018

Acknowledgments

I would like to express my sincere thanks and appreciation to everyone who has helped me complete my thesis.

Foremost, I would like to express my sincere gratitude to my major advisor Angela Bermudez-Millan for the continuous support during my post graduate education and encouraging me to explore ways to connect my dental education with public health. Whether it was in class discussing interprofessional collaboration or during an independent study in the summer which led to an American Dental Education Association annual meeting, poster presentation. She was always there with patience, motivation, enthusiasm, and immense knowledge. Her constant guidance helped me in multiple ways, especially during the research and writing of this thesis. I could not have imagined having a better advisor and mentor for my post graduate education.

A special thanks to my dental residency advisor, Dr. Geraldine Weinstein, for providing me with an abundance of guidance throughout this process. I am extremely appreciative of her friendship and unconditional support. Her enthusiasm towards my education and her genuine desire to see me succeed has been very motivational. Her understanding and passion of dentistry has contributed significantly to my thesis.

I would like to thank Dr. Jane Ungemack for being my advisor. She has taught me the basic foundations of research and has taught me how to articulate my ideas into a formal thesis. Her love for writing was truly admirable and her constructive feedback has allowed my writing to develop and grow.

I would not forget to remember Dr. Sergio Sanchez, director of the Advance Education of General Dentistry Program for his encouragement and giving me the time flexibility to complete this thesis project. Dr. Chia Ling Kuo who provided enormous assistance with the data analysis.

Last but not the least, I would like to thank my family: my parents Milagros and Ricardo, for inspiring me every step of the way and my sister Maria Grazia, for being the best cheerleader anyone could ask for.

Table of Contents:

Acknowledgements	iii
Abstract	iv
Introduction	1-2
Specific Aims	2
Background	3-8
Methods	8-10
Results	10- 14
Discussion	14-18
Limitations	18
Conclusion	19-20
Recommendations	20
Appendix	21-26
References	27- 29

Abstract:

Visiting the dentist may generate anxiety for many individuals. Some suffer from severe dental anxiety, and consequently avoid dental appointments. Despite the advances made in modern dentistry, anxiety about dental treatments remain prevalent. Health care professionals should attempt to identify these individuals to provide better care and improve access to dental care.

Objectives: (a) examine the prevalence of dental anxiety and its association with the type of dental care sought (routine care/ emergency care); (b) explore when the patient suffers more anxiety, and (c) examine the possible relation between dental anxiety and sociodemographic factors. **Methods:**

120 Eligible participants from the Dental Screening Clinic (n=60) and the Dental Emergency Clinic (n=60) were invited to participate in this cross-sectional study. Patients were given a self-administered survey: The survey instrument included five short multiple choice questions related to dental anxiety (Modified Dental Anxiety Scale) and ten sociodemographic questions. **Results:**

Prevalence rates of dental anxiety was compared between both dental clinics, emergency dental n 17% respectively (p=0.005). Income level was significantly associated with anxiety status (p=0.028). **Conclusions:** Dental anxiety was significantly associated with patients attending the emergency dental clinic. Patients suffered more anxiety when thinking of getting “tooth drilled” and “local anesthetic injection” although it was not statistically significant. Finally, rates of high anxiety generally increased with higher income level.

Introduction

Dental anxiety is a relatively common problem affecting 10-20% of the adult population in the United States as reported in a literature review of studies (1). Similarly, studies from around the world report a prevalence of severe dental anxiety ranging from 5- 25% of dental patients (2). In spite of the advances in dental practice, dental anxiety values have continued to be stable since the mid-1900s (3). Dental anxiety is considered a barrier for dental treatment, resulting in avoidance of dental care which leads to poor oral health and oral health-related quality of life (4).

Anxiety disorders are the most common psychiatric problem in the general population. The most common anxiety disorders are phobias, panic attack, generalized anxiety disorders, post-traumatic stress disorder and acute stress disorder.(5) To provide effective dental care, the dentist must be able to identify anxious patients and deal with their anxiety at every visit. (6) (7)

According to Stinson (2007), from a psychological aspect, anxiety can be defined as an emotional pain or a feeling that is not well, a sense of impending disaster. The source of the problem usually is often not apparent to the person with anxiety. Patients with fear experience a similar feeling but they are aware of the problem and why it affects them. From a physiological perspective, both anxiety and fear react the same. They are both mediated through the autonomic nervous system and may involve both sympathetic and parasympathetic components. Symptoms may include: increased heart rate, sweating, dilated pupils and muscle tension. In some extreme cases, vomiting, urination and diarrhea.(8) The study of dental anxiety has been further complicated by the imprecise use of the terms fear and anxiety, resulting in conflicting findings. (5)

The Healthy People 2020 oral health recommendations include “*Increase the proportion of children, adolescents, and adults who used the oral health care system in the past year*”(9). Despite these recommendations, there is a low attendance of oral health preventive treatment, which can be attributed to dental anxiety. Dental anxiety is defined as anxiety associated with the thought of visiting the dentist for preventive care and over dental procedures (10). Dental anxiety is considered one of the most important barriers with regard to dental attendance (11). People who suffer from dental anxiety frequently avoid dental appointments and routine dental evaluations (12). Diagnosis and proper treatment of dental anxiety will have a direct effect in our population by encouraging individuals to seek professional dental care. Additionally, it is very important for faculty, residents and students who provide treatment daily, to understand their population, recognize dental anxiety, promote evidence-based therapies and improve dental care (13).

In the context of our research some questions are set to be answered. First of all, in an attempt to address dental anxiety in patients attending a University Dental Clinic, the proposed study aimed to examine the prevalence of dental anxiety and its association with the type of dental care sought (routine care/ emergency care). Secondly, this study will explore when the patient suffers more anxiety: is it the night before, while sitting in the waiting room, when the tooth is being drilled, when the patient is receiving scaling and polishing (cleaning), or before a local anesthesia injection. Finally, this study will examine the possible relation between dental anxiety and sociodemographic factors such as: race, income, language, education, job status, and others.

Hypothesis:

1. It is estimated that dental anxiety will be associated with the type of dental care sought.
2. It is also expected that dental clinic environment factors and treatment undergone will increase mean anxiety levels
3. It is assumed that there will be an association between dental anxiety and socio-demographic factors/characteristics.

Background

Prevalence

Epidemiological studies of the general population show prevalence rates of dental anxiety ranging from 10-20% in the general population World Wide. (5). Some of these studies include a study conducted in Sweden, which selected a random sample of residents (n=830) for a telephone survey, demonstrated a high prevalence of dental anxiety at 5.4%, using the Corah Dental Anxiety Scale (DAS) (14). Similar results were found in a study in Canada, which randomly chose 1420 adults aged 18 and over to participate in a two-stage mail survey, and found 16.4% of the sample presented high levels of dental anxiety (15). More recent studies, carried out in Philadelphia, USA which included 120 participants showed a prevalence of 22.5% (1), and a study carried out in Massachusetts, USA evaluated four dental private offices and included 300 patients, found a dental anxiety prevalence of 6.8% (16).

Alternatively, studies conducted in university dental clinics are limited. Woodmansey (2005), evaluated 100 patients attending a university dental clinic using DAS and concluded that 4% of patients suffered from severe dental anxiety (17). Additionally, Ofori, Adu-Ababio, Nyako,

& Ndanu (2009) studied 276 patients using the Modified Dental Anxiety Scale (MDAS) attending 4 different dental clinics and found a prevalence of 13.6% (19).

Etiology

Dental anxiety can arise at any point in life due to multiple factors, such as previous experience in childhood, learning from anxious family and friends, individual personality characteristics, lack of information, exposure of scary dentist portrays in the media and the vulnerability of lying on one's back in a dental chair. (20)(21)

Anxiety can be triggered by sensory stimuli such as sounds of drilling and screaming, the smell of certain dental materials or body fluids (blood or pus), sights of needles and air-turbine drills, and others. (22) Dental anxiety is greatly related to a patient's behavior in a sense of conduct, experiences and overall mental health. Oosterink et al (2009) discusses how dental phobia is usually related to 10 other common fears or phobias such as injections, flying, snakes, spiders, enclosed spaces and others.

Reviewing the social determinants related to dental anxiety, Oosterink et al (2009) observed that the prevalence of dental anxiety is slightly higher among women although not statistically different. In Osterink's study, people 21-25 years old presented with the highest prevalence. Hawley (1974) related dental anxiety to poor access to dental care and the fear of unknown that begins in middle and older childhood. Moreover, research shows that people with a lower income are less likely to visit the dentist and get dental treatment and are more likely to experience anxiety at their first appointment (23).

Evidence-based intervention

Literature on dental anxiety is very limited and is a frequent problem for dentists. Formulating therapies for such patients is essential. However, we need to comprehend our population and identify the dimensions of this problem for future evidence-based interventions. Although this study does not aim to generate an intervention, efforts are being made to diagnose and contribute on this scientific journey to decrease prevalence of dental anxiety and improve access to dental care. Furthermore, alleviate the anxiety and fear in such a way that these patients are positively motivated on a long-term basis for future dental visits (24,25) .

Currently, dental clinics do not assess the level of anxiety in their patient at the patients'' first appointment. According to Appukuttan (2016) the dentist must have a calm, uninterrupted conversation with the patient and try to identify which of the dental situations give rise to fear and anxiety. First, one should begin by asking open-ended questions to guide the conversation in the right direction: chief complaint, past dental experiences, current mood, main objective of the visit and expectations. (20) An objective assessment should be done, such as blood pressure, pulse rate, pulse oximetry, finger temperature, and galvanic skin response. This evaluation would help identify and classify each patient as mildly, moderate or highly anxious. (28)

Multiple anxiety questionnaires have been developed for adults. Corah's (1969) Dental Anxiety Scale (CDAS) is a widely used instrument that is brief to administer and has good psychometric properties. The scale asks about four different dental scenarios with each question scored from 1 (no anxiety) to 5 (extremely anxious). The range of possible scores is 4 to 20, with score of 15 or higher indicating high anxiety levels. Reliability of the test was estimated for both internal consistency and stability over time, a Kuder-Richardson formula coefficient of 0.86 was obtained for a sample of 313 students. (26) Humphris, Morrison and Lindsay (1995) developed

Modified Dental Anxiety Scale (MDAS), a short, well-validated 5 item questionnaire with 5-point Likert scale responses. The scores range from a minimum of 5 to 25 with the cutoff point for high dental anxiety of 19. This scale was tested across 4 samples and presented an internal consistency coefficients (Cronbach alphas) that ranged from 0.86 to 0.90 and the overall reliability was 0.89. (27) Despite other efforts to develop dental anxiety scales, there is still no gold standard, as they all have their own limitations. According to Crofts-Barnes (2010), only 20% of dentists in the UK used a standardized assessment for anxiety during their routine clinical practice.

Gordon (2013) mentions that occasionally, the dentist might find that dental anxiety is part of a wider psychological disorder. In such cases, it is recommended that the patient is referred to a psychologist or psychiatrist. They can help analyze the psychological diagnosis, and decide what kind of further treatment the patient needs. Sometimes, the psychologist will work in conjunction with the dentist to decide on the treatment plan concerning anxiety and achieve more appropriate results. (23)

Anxiety Management

Dental anxiety has multiple etiologies, therefore there is no monotherapy for management. It is helpful to attempt to identify where the anxiety is coming from and address it directly. Appakuttan (2016) classifies dental anxiety interventions by psychotherapeutic interventions, pharmacological interventions or a combination of both depending on the dentist's expertise and experience, patient's characteristics, degree of dental anxiety and clinical situation. (2,20)

Psychotherapeutic interventions include a broad range of activities. Appakuttan (2016), in a literature review of such interventions, suggested that interventions should begin with intraprofessional collaboration, working in junction with other specialists, followed by rapport,

and trust building therapy. This should be combined with other therapies once trust has been gained and the patient's anxiety can be better identified. Other therapies include: behavior-management techniques, relaxation techniques, guided imagery, biofeedback, hypnotherapy, acupuncture, distraction, enhancing control (tell-show-do), systematic desensitization or exposure therapy, positive reinforcement, cognitive therapy and cognitive behavioral therapy. (20)

Gordon (2013) and Kristsidima (2010) advocated that dental anxiety management be managed using both an individualized and personalized approach. For patients who experience dental anxiety, they felt it is better to conduct learning sessions to introduce the patients to the dentists and dental hygienists to the patient to identify the dentist's role and expectations during their appointments. They suggested that "Tell-show-do" is best for children and relaxation techniques, including deep breathing, muscle relaxation, works best with adults.

Pharmacological management of anxiety can be achieved by the use of sedation and general anesthesia. Sedation is the use of a drug or combination of drugs to depress the Central Nervous System (CNS), consequently reducing the patient's awareness of their surroundings. This can be conscious sedation, deep or general. However, sedation does not control pain and does not eliminate the use of local anesthesia. (6) Folayan et al (2002) suggests that this type approach should only be carried out when the patient is not able to respond and cooperate well with psychotherapeutic interventions.

Synthesis and critical analysis

After evaluating the prevalence of dental anxiety among different populations, it is evident that dental anxiety is a frequently occurring disorder that affects both children and adults. Tellez et al, (2015) reported that it affects the patient population in two ways avoidance of dental care,

and unpleasant or high stress situations during dental care. In both instances, the most appropriate solution is to educate the population to increase access to dental care and build patient-dentist rapport and trust.(29) The dentist must try a psychotherapeutic intervention before deciding to take a pharmacological approach. Behavioral and cognitive intervention is not immediate and multiple sessions are usually needed to maintain an initial treatment response. Sedatives and general anesthesia involve a high cost for the patient and health risks in an operating room scenario. Some authors suggest that this type of intervention is only effective on a short-term basis (emergency extractions) and behavioral and cognitive intervention should be practiced for less invasive dentistry such as exams, cleanings and monitoring. (30) Which leads to the need for this descriptive study to compare rates and predictors.

Methods

This study was conducted at the University of Connecticut Health Center (UConn Health), an academic dental institution in Farmington, CT. The study took place in two dental clinics: the Dental Screening Clinic and the Dental Emergency Clinic, which are both located at the same building and on the same floor. The Dental Screening Clinic welcomes people who are new to the Health Center and are there to receive routine care such as exams, cleanings, fillings and 6-month recalls. Patients wait an average of three months to be seen for their first dental exam. Their dental screening appointment counts as their first visit for routine care. The Dental Emergency Clinic, on the other hand, is a walk-in clinic for patients suffering acute dental symptoms such as infection, inflammation and overall pain. These patients usually present to the Emergency Clinic after neglecting dental care for a long time and are in need of more invasive and painful interventions, such as root canals or extractions.

Eligible participants within the study included patients who presented to their dental appointment for routine care or emergency care. Inclusion criteria included: men and women age 18-65 years of any race or ethnicity who had ability to speak, read, write and understand English. Exclusion criteria included: men and women age <18 and >65 years, those unable to speak and understand English, and those with apparent cognitive difficulties. The 10-minute self-administered survey was anonymous, voluntary and confidential.

Participant recruitment occurred in the waiting room, where the investigator invited eligible patients to participate when they registered for their visit at both clinics. After briefly describing the study and asking if they were willing to participate, the investigator handed a cover letter with the study details and the survey to willing patients, allowing the patients to review the information while waiting for their appointment. The investigator remained on site to answer any participant questions. Participants who wished to participate in the study returned their paperwork to the front desk once the survey was completed. Participation in the study was voluntary and had no impact on services received at the University of Connecticut Dental Clinic. The study protocol was reviewed and approved by the UConn Health Institutional Review Board (18X-118-2).

Upon completion of the survey, the participant had an opportunity to ask questions regarding the information provided. Once the participant returned survey, the research participation ended. A total of 120 participants were recruited into the study over the course of two months through convenience sampling, with targeted samples of 60 patients from the Dental Screening Clinic and 60 patients from the Dental Emergency Clinic. Only the investigators had access to the completed surveys and the data remained in the clinic at all times. No potential identifiers were collected.

The survey instrument included five short multiple choice questions related to dental anxiety and ten sociodemographic questions. Other studies have shown that the MDAS does not affect the patient's health and does not raise dental anxiety. A copy of the survey is found in the Appendix.

The results were recorded and uploaded directly into Microsoft Excel. The data were then imported and analyzed using SPSS software (version 21) using descriptive and inferential statistics. Data were recorded and analyzed with no patient identifiers. Each demographic or anxiety question was summarized by mean and standard deviation or frequencies and percentages. According to the Humphris (2000) analysis of the MDAS, a score of 19 or over as the cut-off score for classifying a patient under as high dental anxiety. (27) The prevalence of high dental anxiety was reported for each subgroup and was compared across subgroups using the generalized Fisher's exact test. Participants with and without anxiety were compared with respect to each continuous or discrete variable such as age using a Wilcoxon rank-sum test (Mann-Whitney test). The p-value was set at 5% for statistical significant.

Results

The survey was completed by a total of 120 patients, including 62 patients from the Dental Emergency Clinic and 58 patients from the Dental Screening Clinic. The age of the participants ranged from 18 to 65, with a mean age of 41. More than half (51.6%) (n=62) of the participants identified themselves as White, 31.7% (n=38) identified themselves as Hispanic or Latino, 12.5% (n=15) as Black and, 4% (n=5) as Asian. One third of the participants, 33.3% (n=40) of the patients had a household income less than \$20,000. 80.3% (n=97) of the patients chose English as their

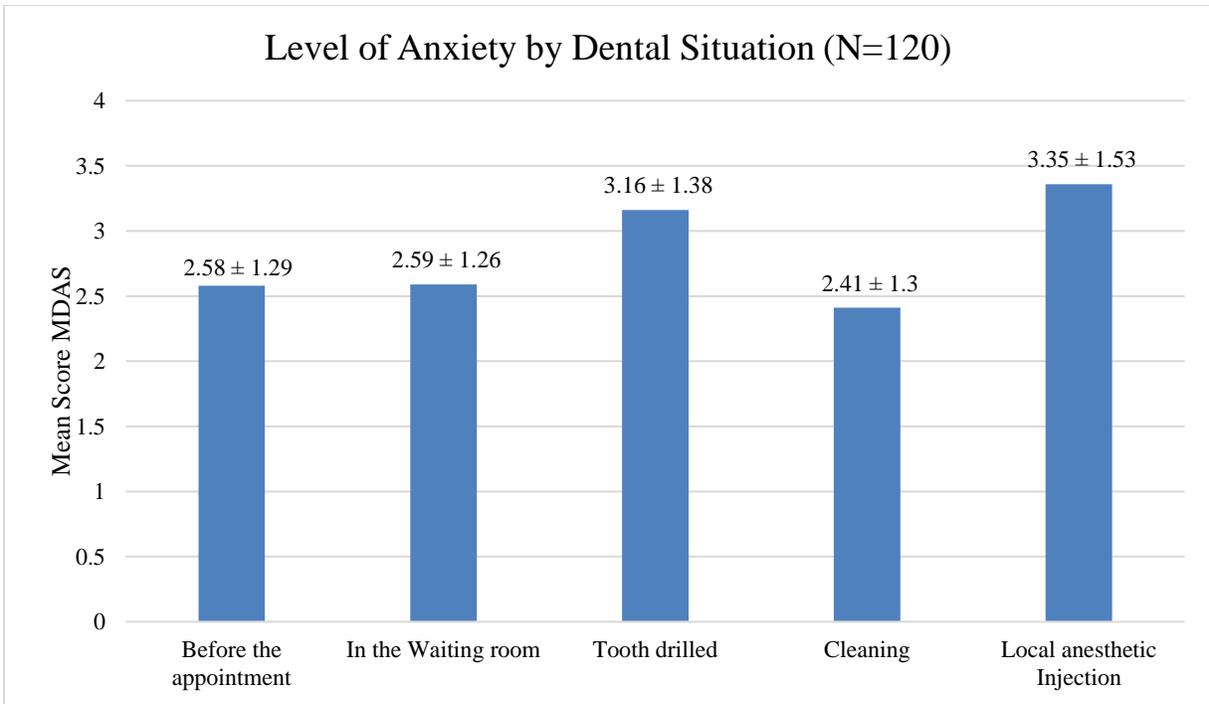
primary language at home, compared to 11.2% (n=14) who spoke Spanish at home. Approximately half (47.5%) (n=57) of the participants currently had a full-time job. With respect to marital status, 41.2% (n=50) were single and 41.7% (n=51) were married or partnered. The demographic characteristics of participants can be seen in Table 1.

Table 1: Demographic Characteristics of Dental Clinic Participants.

	Number of Participants (N=120)	Percentage of Participants %
<i>Race/ Ethnicity</i>		
<i>White/Caucasian</i>	62	51.6
<i>Black/ African American</i>	15	12.5
<i>Hispanic/ Latino</i>	38	31.7
<i>Asian</i>	5	4.2
<i>Household income</i>		
<i>Less than \$20,000</i>	40	33.3
<i>\$20,000- \$39, 999</i>	37	30.8
<i>\$40,000- \$59,999</i>	15	12.5
<i>\$60,000- \$80,000</i>	11	9.2
<i>\$80,000- \$100,000</i>	17	14.2
<i>No response</i>	1	0.8
<i>First Language</i>		
<i>English</i>	97	80.3
<i>Spanish</i>	14	11.2
<i>Italian</i>	2	1.7
<i>Other</i>	7	5.8
<i>Level of education</i>		
<i>Less Than High School</i>	10	8.3
<i>High School Diploma</i>	35	29.2
<i>Partial College</i>	36	30
<i>Bachelor's Degree</i>	18	13
<i>Graduate</i>	21	17.5
<i>Job Status</i>		
<i>No</i>	35	29.2
<i>Part time</i>	22	18.3
<i>Full time</i>	57	47.5
<i>Independent</i>	6	5
<i>Marital Status</i>		
<i>Single</i>	50	41.2
<i>Partnered</i>	15	12.5
<i>Married</i>	35	29.2
<i>Divorced</i>	16	13.3
<i>Widowed</i>	3	2.5
<i>No response</i>	1	0.8

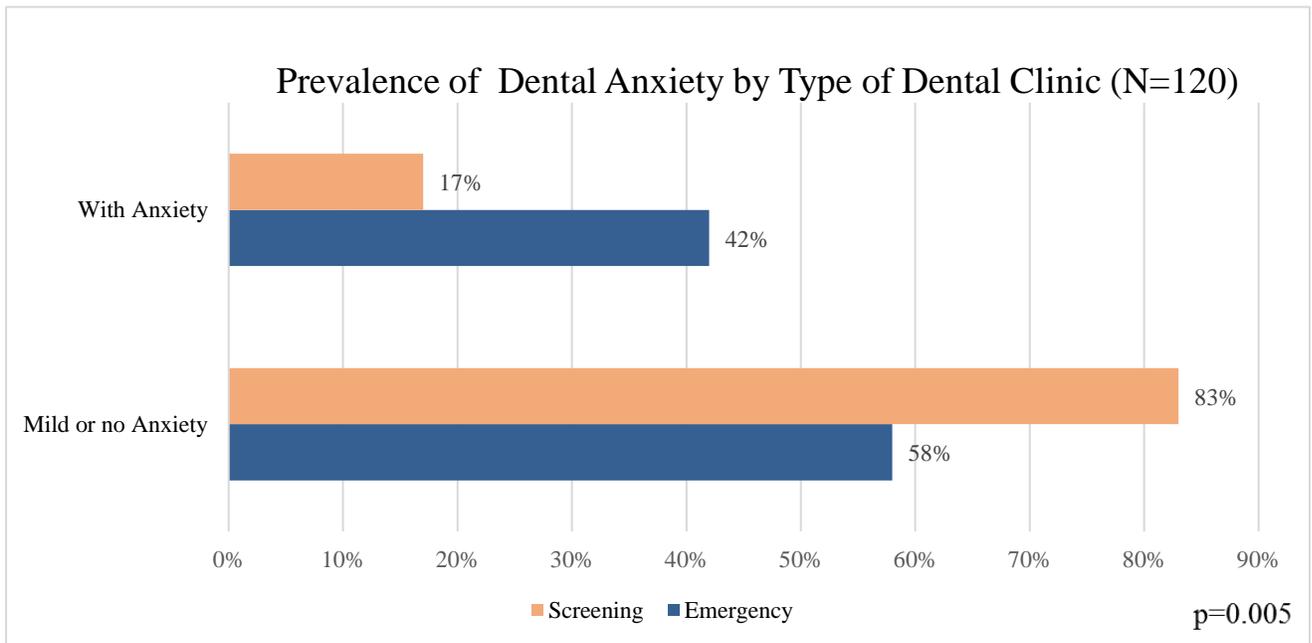
All 120 participants answered all five questions of the MDAS and 30% (N=36) scored 19 or higher which qualified them as patients with severe dental anxiety. (27) Each question was individually evaluated to determine what procedure caused more anxiety. Question #1: How anxious do get if at all, “if you went to the dentist for treatment tomorrow? scored a mean of 2.58 ± 1.29 . Question #2: “if you were sitting in the waiting room” scored a mean of 2.59 ± 1.26 . Question #4: “if you were about to have your teeth scaled and polished (teeth cleaning)” scored a mean of 2.41 ± 1.3 . Questions #3 and #5 received the highest averages in regards to causing dental anxiety. “if you were about to have a tooth drilled” and “if you were about to have local anesthetic injection” with a mean of 3.16 ± 1.38 and 3.35 ± 1.53 respectively (Figure 1).

Figure 1. Level of Anxiety by Dental Situation



When the anxiety levels of patient's in the two dental clinics was compared, 42% (n=26) of patients attending the Dental Emergency Clinic were identified as highly dentally anxious compared to 17% (n=10) of patients attending the Dental Screening Clinic (Figure2).

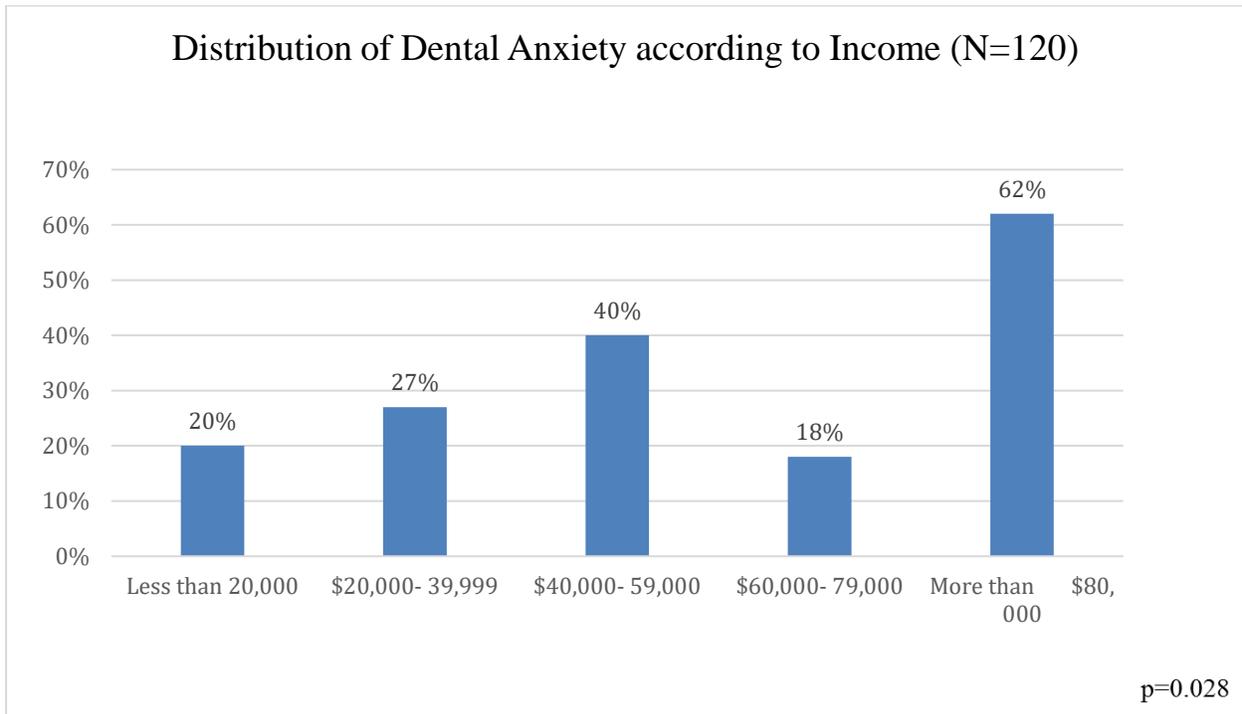
Figure 2. Prevalence of Dental Anxiety by Type of Dental Clinic



The prevalence of dental anxiety was compared between both dental clinics. Emergency dental clinic participants were more likely to have dental anxiety than dental screening clinic participants 42% and 17% respectively (p=0.005).

When the predictors of dental anxiety were examined, only income level was significantly associated with anxiety status (p=0.028). The prevalence of dental anxiety increased with an increase in the annual household income (Figure 3).

Figure 3. Percent of Patients with High Dental Anxiety According to Income.



All the other variables such as age, race, language, level of education, job status, marital status and insurance were analyzed but did not present statistical significance in relation to dental anxiety.

Discussion

Visiting the dentist generates different levels of anxiety for many individuals. Most patients learn to manage their anxiety levels and some improve their emotions and behaviors through

routine dental care and a minority still experience high anxiety. (31) This study targeted patients who suffer from high dental anxiety, who are potentially at risk of avoiding dental treatment and may subsequently suffer from poor oral health. Patients who delay or avoid routine care are often in need of emergency treatment including invasive and surgical procedures which could exacerbate their anxiety levels. Despite the advances made in modern dentistry, anxiety about dental treatments remain prevalent. The effect of dental anxiety on individuals can have a direct impact on their life, starting from their overall well-being and satisfaction to self-esteem and daily masticatory function. (6)(28) Health care professionals should attempt to identify these individuals to provide better care and improve access to dental care.

This study indeed found that dental anxiety was higher among individuals looking for emergency dental treatment (42%) compared to patients seeking routine dental care (17%). The rate of high dental anxiety in the emergency population in this study was higher than Kanegane et al (2003) who found in his study of 252 patients attending an emergency dental clinic in a dental school in Sao Paulo, Brazil (28.2%). (32) On the other hand, the dental anxiety rates in the Dental Screening Clinic was comparable to the 15.5% found by Gisler et al (2013) among patients of a university dental clinic in Switzerland. (33) No studies were found that directly compared the prevalence of dental anxiety between the two levels of dental clinic. Tellez et al (2015) examined dental anxiety and its association with pain and other psychological variables among patients seeking dental treatments in a “regular clinic” and an “emergency clinic”. The mean MDAS score was used and reported a mean score was 12.9 ± 5.4 for patients in the regular clinic and 14.0 ± 6.0 for those in the emergency clinic. These values were analyzed using mean differences (not severe dental anxiety prevalence, score <19) and no differences difference in MDAS scores between regular and emergency patients were observed. (1)

This study took place in a university dental clinic at UConn Health. Some studies suggest that patients who suffer from dental anxiety tend to seek treatment in hospital settings rather than in private offices in part because they believe that they could be treated in an operating room modality with sedation. (29) A similar study that took place in a university dental clinic in Montana, among new patients presenting dental school clinic for routine care found a severe dental anxiety prevalence of 4%. (17) Conversely, the result of a study conducted by a group of registered dental hygienists who surveyed a total of 308 patients from three different types of private dental offices (general dentistry, oral surgery and periodontal treatments). Indicated there was no statistically significant prevalence of high dental anxiety among the different types of dental offices with a total population prevalence of high dental anxiety of 6.8% in private dental offices. (16)

An equivalent study was also found in an Indian dental school. This study surveyed 340 patients from the regular dental area in the Visakhapatnam Hospital. They also evaluated the prevalence of severe dental anxiety, among their population, they found a total of 22.6% within their sample group using the MDAS. Additional findings include: mean anxiety score reduced with increasing age. (34).

Other international studies include Nicolas (2007) who surveyed a large convenience sample of 2725 adults in France and found an overall prevalence of severe dental anxiety of 7.3%. (35) Thomson (1996) found a prevalence of 14.9% among 250 Australian patients; Omoigberai (2016) surveyed 390 patients and found a prevalence of 8.7% in Nigeria. (36); Hakeberg (1992) surveyed 830 individuals over the phone in Sweden and found a prevalence of 5.4%. Lastly, Humphris (2011) studied in the UK 1000 dental patients and reported severe dental anxiety prevalence of 11.2%. (37)

The findings of this study are consistent with those reported by Sohn and Ismail (2005) who investigated factors associated with regular dental visits. In their study, of a representative sample of 630 adults, they found that 72% of respondents had dental insurance (excluding Medicaid), 63% reported that they visited a dentist regularly and 12% percent of adults had high dental anxiety. They reported that, as well as dental anxiety, dental insurance status and perceived oral health was significantly associated negatively with visiting the dentist regularly. These data suggests that dental anxiety is an influencing factor in regular visit behavior, especially among adults. (38)

Tellez et al (2015) examined the prevalence of dental anxiety and its associations with other psychological variables among patients seeking dental treatment. They found that patients with some college or technical degree had a higher MDAS scores than those with less or more education ($p=0.002$) and all other demographic characteristics were unrelated to the MDAS. (1) However, this study did not find any association between the level of education and anxiety level ($p=0.500$). Nonetheless, our study found a significant association between the dental anxiety status and the patients' annual household income, where rates of high anxiety generally increased with higher income levels ($p=0.028$).

A study by Lockett et al (1999) in addition to finding the prevalence of dental anxiety, categorized selected patients and found that dentally anxious included the following categories: simple conditioned phobia -49.6%, fear of catastrophe-7.8%, generalized anxiety-19.4% and distrust of dentist -9.9%. They also found that younger individuals were more likely to be categorized as simple conditioned phobia, while older subjects were more likely to be categorized as generalized anxiety.(15)

Caltabiano et al (2018) investigated dental procedures that could be anxiety provoking using the MDAS survey in an adult population in Australia. In their survey of 102 new patients the mean MDAS score was 10.76. The mean score for each question were: anxiety day before their appointment: 1.88; in the waiting room: 1.92, having a tooth drilled: 2.61, scaled and polished: 1.89 and local anesthesia: 2.46. (39) Similarly, our study had higher mean values when the patient thought of having their tooth drilled (3.16) and local anesthesia injection (3.35) compared to before the appointment (2.58), in the waiting room (2.59) and having their teeth scaled and polished (2.41).

Limitations

This descriptive study will serve as a baseline and starting point for future research regarding dental anxiety. However, some limitations were found. First, this study is based on self-reported data, the MDAS survey was completed by each participant, it may lack of objective measures and the answers may not be completely accurate. Second, the dental anxiety diagnosis cannot be confirmed with more specific measures. Third, there are no standard protocols in place and different measures are used in studies. Fourth, the wording of the scale reflects the present rather than presence tense, for example: the participants' responses to the some of the questions on the MDAS may be affected the some of the wording in the questions. Especially in the first question: "If you went to your dentist for TREATMENT TOMORROW, how would you feel?" since patients are already waiting in the waiting room.

Furthermore, the results of this study are not applicable to all academic dental clinics because this study only focused on specific dental clinic during a limited time period and the study sample was small.

Finally, patients with severe dental anxiety may not come for dental care overall and will avoid dental treatment even when they are in extreme dental pain, therefore, this study is missing this significant population.

Conclusion

The prevalence of severe dental anxiety in this patient sample was high compared to other studies. Dental anxiety was significantly associated with patients attending the emergency dental clinic. Although it may be helpful to assess the prevalence of dental anxiety among a more representative sample of the population as in previous studies, academic institutions, dental professionals, dental students, residents and other health care workers such as dental hygienists and dental assistants may directly benefit from assessing the prevalence of anxiety among their patient population. Dental anxiety surveys are an easy and reliable way to assess dental anxiety so that care can be more personalized and patient-centered. (40) Patients who suffer from severe dental anxiety are often more difficult to treat. In these scenarios, interprofessional collaboration could be beneficial for the patient. Lastly, if dentists become more aware about the level of dental anxiety among their patients, they can anticipate patients' behavior and can be better prepared to take behavioral/pharmacological measures to reduce their anxiety levels.

Recommendations

Additional research is needed in different dental clinic settings to determine if there is a larger dental anxiety population and whether the academic clinic is different from those served in other dental practices. If there are more patients with dental anxiety seeking care at academic dental

clinics, then a standard risk assessment protocol should be considered to address the issue of dental anxiety. Considering that academic dental institutions are centers for learning, it is a good environment for future dental providers to learn the different techniques to treat dental anxiety, along with their indications, risks and recommendations. Once dental anxiety is properly managed by future dental practitioners, the next step would be to encourage all dental providers, regardless of the practice setting (hospital or private) to recognize the signs of dental anxiety and provide the proper management. By reducing dental anxiety, more individuals are likely to participate in routine oral care and avoid dental emergencies. Finally, promote dental health care workers to manage severe dental anxiety cases through interprofessional collaboration.

Appendix

1. IRB Letter



Institutional Review Board
Human Subjects Protection Program



To: Geraldine M. Weinstein, Principal Investigator

From: IRB Office

Date: January 25, 2018

Re: **Final Approval of Exempt Research**

IRB Number: 18X-118-2

IRB Panel: Panel 2

Project Title: Dental Anxiety among Patients Attending a University Dental Clinic.

Submission Reference#: 011193

Sponsor / Funding Agency: Principal Investigator

Approved Key Study Personnel: Angela Bermudez Millan, Maria V. Vallejos Castillo

Expected Completion Date: 04/30/2018

IRB Expiration Date: 01/24/2019

PLEASE NOTE ADDITIONAL COMMENTS FROM THE IRB RELATED TO THIS SUBMISISON:
Please submit a study closure notice to the IRB upon completion of this project.

The study referenced above has received final approval from the IRB. The study was approved on 01/25/2018. The study was determined to qualify for exempt status as follows:

Category 2: Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior unless, the information is obtained in an identifiable manner and any disclosure of the subjects responses outside of research could reasonably place the subject at risk.

Please note that this study is subject to review by the Research Compliance Monitor. The IRB will keep the exemption active for one year from the date of approval or through the expected completion date, whichever is longer and then will administratively close the study. The closure does not invalidate the exemption and the research can continue as planned. If you would like the IRB to keep the exemption active and therefore also subject to the audit program, a request for modification to extend the expiration date should be submitted.

It is the responsibility of the PI to ensure that all investigators and staff associated with this study follow the approved protocol and use the approved forms in order to maintain compliance with the exemption that has been granted.

If any changes to the design of the study or data collection instruments are contemplated, the PI should submit a request for modification to the IRB to ensure that the change will not impact the exempt status of the study.

If the IRB imposed a requirement of consent, the IRB stamped and dated informed consent form must be used when obtaining consent. If signatures are required, the consent form must be signed and dated by both the participant and the individual obtaining consent.

If applicable, PI's are also responsible for ensuring that IRB approval has been obtained and maintained at any collaborating sites involved in the research.

As a reminder, if you are going to recruit subjects through any type of advertising (fliers, newspaper ads, radio ads, web advertising, Billboards, etc), all materials must be reviewed and approved by the Health Marketing and Multimedia Services Department. You may contact that Department by calling 860-679-4864.

263 Farmington Avenue
Farmington CT 06030-1511
Telephone: 860-679-3054 Fax: 860-679-1005

2. Information Sheet



01/17/2018

Dear _____,

I am a dental resident at the University Of Connecticut School of Dental Medicine doing research as part of a project required for my Masters in Public Health degree. The principal investigator for this study is: Dr. Geraldine Weinstein.

The title of this study is Dental Anxiety among Patients Attending a University Dental Clinic. I am studying the prevalence of dental anxiety of patients seeking dental care at UConn Health.

You are invited to participate in this study. Your participation is anonymous, voluntary and will be maintained in strict confidence. If you choose to participate, please complete the enclosed questionnaire. While complete questionnaires will provide better data, you may skip questions that you do not feel comfortable answering. Your response to these questions should take between 5-10 minutes to complete. If you choose to complete the questionnaire, place the questionnaire in the attached envelope and seal it, and then return the questionnaire to the front desk at the dental clinic. Completion and return of this questionnaire signifies your consent to participate in the study. Please do not place your name on any of the sheets or envelope.

I appreciate your participation in this research study. For any questions regarding the study, please feel free to e-mail me at vallejos@uchc.edu, or call me at 860-679-2325, or call the Principal investigator at 860-679-6367.

Thank you.

Sincerely,

Maria Veronica Vallejos Castillo, D.D.S.
Dental Resident & Masters of Public Health Student
University of Connecticut

Geraldine Weinstein, D.D.S.
Associate Professor, Clinical instructor – General Dentistry
University of Connecticut

Version # 2.0 (Date 01/18/2018)

3. Questionnaire

Title: Dental Anxiety among Patients Attending a University Dental Clinic.

Part I: Demographic Data

Please **circle** the most appropriate response.

1. Please **write** your AGE: _____.

2. With what ethnicity do you most closely identify?
 - a. White / Caucasian
 - b. Black / African American
 - c. Hispanic / Latina
 - d. Puerto Rican
 - e. Asian
 - f. Native American
 - g. Native Hawaiian / Pacific Islander

3. Which range best describes your annual household income?
 - a. Less than \$20,000
 - b. \$20,000-\$40,000
 - c. \$40,000-\$60,000
 - d. \$60,000-\$80,000
 - e. \$80,000-\$100,000
 - f. More than \$100,000

4. What is the primary language spoken at home?
 - a. English
 - b. Spanish
 - c. Italian
 - d. French
 - e. Polish
 - f. German
 - g. Other: _____

5. What is your highest level of education completed:
 - a. Less than High School
 - b. High School Graduate or equivalent (GED)
 - c. Some College
 - d. College Graduate
 - e. Grad School

6. Are you currently working?
 - a. No
 - b. Part-time
 - c. Full-time
 - d. Independent Contractor

7. What is your current marital status?
 - a. Single
 - b. Partnered
 - c. Married
 - d. Divorced
 - e. Widowed

8. What type of health insurance do you have?
 - a. Public (Medicaid/ Medicare)
 - b. Obamacare (Affordable Healthcare Act/ ACA)
 - c. Employer Sponsored Insurance
 - d. Uninsured

9. If uninsured, for how long?
 - a. Less than 6 months
 - b. Less than 1 year
 - c. Less than 2 years
 - d. Between 2-5 years
 - e. Between 5-10 years
 - f. More than 10 years

10. How do you get to and from appointments?
 - a. Car
 - b. Rides from family/friends
 - c. Bus
 - d. Shuttle
 - e. Taxi
 - f. Bicycle/ Motorcycle
 - g. Walk

Part II: Modified Dental Anxiety Scale

CAN YOU TELL US - HOW ANXIOUS YOU GET, IF AT ALL, WITH YOUR DENTAL VISIT?

Please indicate by inserting "X" in the appropriate box

1. If you went to the dentist for TREATMENT TOMORROW, how would you feel?
 - Not Anxious
 - Slightly Anxious
 - Fairly Anxious
 - Very Anxious
 - Extremely Anxious

2. If you were sitting in the WAITING ROOM (waiting for treatment), how would you feel?
 - Not Anxious
 - Slightly Anxious
 - Fairly Anxious
 - Very Anxious
 - Extremely Anxious

3. If you were about to have a TOOTH DRILLED, how would you feel?
 - Not Anxious
 - Slightly Anxious
 - Fairly Anxious
 - Very Anxious
 - Extremely Anxious

4. If you were about to have your teeth SCALED AND POLISHED (teeth cleaning) , how would you feel?
 - Not Anxious
 - Slightly Anxious
 - Fairly Anxious
 - Very Anxious
 - Extremely Anxious

5. If you were to about to have LOCAL ANAESTHETIC INJECTION in your gum, above an upper back tooth, how would you feel?
 - Not Anxious
 - Slightly Anxious
 - Fairly Anxious
 - Very Anxious
 - Extremely Anxious

References

1. Tellez M, Kinner DG, Heimberg RG, Lim S, Ismail AI. Prevalence and correlates of dental anxiety in patients seeking dental care. *Community Dent Oral Epidemiol*. 2015;43(2):135–42.
2. Gordon D, Heimberg RG, Tellez M, Ismail AI. A critical review of approaches to the treatment of dental anxiety in adults [Internet]. Vol. 27, *Journal of Anxiety Disorders*. Pergamon; 2013 [cited 2017 Oct 13]. p. 365–78. Available from: <http://www.sciencedirect.com/science/article/pii/S088761851300056X>
3. Woodmansey KF. The prevalence of dental anxiety in patients of a university dental clinic. *J Am Coll Heal*. 2005;54(1):59–61.
4. Vermaire JH, De Jongh A, Aartman IHA. Dental anxiety and quality of life: The effect of dental treatment. *Community Dent Oral Epidemiol*. 2008;36(5):409–16.
5. Stinson FS, Dawson DA, Patricia Chou S, Smith S, Goldstein RB, June Ruan W, et al. The epidemiology of DSM-IV specific phobia in the USA: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Psychol Med* [Internet]. 2007;37(7):1047. Available from: http://www.journals.cambridge.org/abstract_S0033291707000086
6. Armfield JM, Stewart JF, Spencer AJ. The vicious cycle of dental fear: Exploring the interplay between oral health, service utilization and dental fear. *BMC Oral Health* [Internet]. 2007;7(1):1. Available from: <http://bmcoralhealth.biomedcentral.com/articles/10.1186/1472-6831-7-1>
7. Kakkar M, Wahi A, Thakkar R, Vohra I, Shukla AK. Prevalence of dental anxiety in 10-14 years old children and its implications. *J Dent Anesth pain Med* [Internet]. 2016 Sep [cited 2017 Sep 11];16(3):199–202. Available from: <https://synapse.koreamed.org/DOIx.php?id=10.17245/jdapm.2016.16.3.199>
8. Raocharernporn S, Boonsiriseth K, Khanijou M, Wongsirichat N. Hemodynamic changes and pain perception-related anxiety after experiencing an impacted-tooth removal: clinical practice outcome. *J Dent Anesth pain Med* [Internet]. 2017 Jun [cited 2017 Sep 11];17(2):105–11. Available from: <https://synapse.koreamed.org/DOIx.php?id=10.17245/jdapm.2017.17.2.105>
9. Healthy People 2020 [Internet]. Washington, DC: U.S. Department of Health and Human Services O of DP and HP [cited [Date U was accessed]]. A from: [Specific U. Oral health [Internet]. 2017. p. 2018–21. Available from: http://www.towerhamlets.gov.uk/lgnl/health_social_care/public_health/oral_health.aspx
10. Agras S, Sylvester D, Oliveau D. The epidemiology of common fears and phobia. *Compr Psychiatry*. 1969;10(2):151–6.
11. Freeman R. Barriers to accessing dental care: Patient factors. *Br Dent J*. 1999;187(3):141–4.
12. Pohjola V, Lahti S, Tolvanen M, Hausen H. Dental fear and oral health habits among adults in Finland. *Acta Odontol Scand*. 2008;66(3):148–53.
13. Hägglin C, Hakeberg M, Ahlqwist M, Sullivan M, Berggren U. Factors associated with dental anxiety and attendance in middle-aged and elderly women. *Community Dent Oral Epidemiol*. 2000;28(6):451–60.
14. Kvale G, Berggren U, Milgrom P. Dental fear in adults: A meta-analysis of behavioral interventions. *Community Dent Oral Epidemiol*. 2004;32(4):250–64.

15. Locker D, Liddell A, Shapiro D. Diagnostic categories of dental anxiety: A population-based study. *Behav Res Ther.* 1999;37(1):25–37.
16. White AM, Giblin L, Boyd LD. The prevalence of dental anxiety in dental practice settings. *J Dent Hyg JDH [Internet].* 2017;91(1):30–4. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/29118148>
17. Woodmansey KF. The prevalence of dental anxiety in patients of a university dental clinic. *J Am Coll Heal.* 2005;54(1):59–61.
18. Ofori M a, Adu-Ababio F, Nyako E a., Ndanu T a. Prevalence of dental fear and anxiety amongst patients in selected dental clinics in Ghana. *Health Educ J.* 2009;68(2):130–9.
19. Ofori MA, Adu-Ababio F, Nyako EA, Ndanu TA. Prevalence of dental fear and anxiety amongst patients in selected dental clinics in Ghana. *Health Educ J.* 2009;68(2):130–9.
20. Appukuttan DP. Strategies to manage patients with dental anxiety and dental phobia: Literature review. *Clin Cosmet Investig Dent.* 2016;8:35–50.
21. Wang MC, Vinall-Collier K, Csikar J, Douglas G. A qualitative study of patients' views of techniques to reduce dental anxiety. *J Dent [Internet].* 2017 Aug 31 [cited 2017 Oct 13];66:45–51. Available from: <http://www.sciencedirect.com/science/article/pii/S0300571217302087>
22. Rosiak J, Szymańska J. Dental anxiety – causes, characteristics and occurrence in the Polish population. *Curr Probl Psychiatry [Internet].* 2016;17(4):275–81. Available from: <http://www.degruyter.com/view/j/cpp.2016.17.issue-4/cpp-2016-0027/cpp-2016-0027.xml>
23. Oosterink FMD, De Jongh A, Hoogstraten J. Prevalence of dental fear and phobia relative to other fear and phobia subtypes. *Eur J Oral Sci.* 2009;117(2):135–43.
24. Milgrom P, Newton JT, Boyle C, Heaton LJ, Donaldson N. The effects of dental anxiety and irregular attendance on referral for dental treatment under sedation within the National Health Service in London. *Community Dent Oral Epidemiol.* 2010;38(5):453–9.
25. Newton JT, Buck DJ. Anxiety and pain measures in dentistry: A guide to their quality and application. *J Am Dent Assoc [Internet].* 2000;131(10):1449–57. Available from: <http://linkinghub.elsevier.com/retrieve/pii/S0002817714651527>
26. Corah N. Development of a dental anxiety scale. *J Dent Res [Internet].* 1969;48:1421–4. Available from: <http://jdr.sagepub.com/content/48/4/596.extract>
27. Humphris GM, Freeman R, Campbell J, Tuutti H, D'Souza V. Further evidence for the reliability and validity of the Modified Dental Anxiety Scale. *Int Dent J.* 2000;50(5):367–70.
28. Crofts-Barnes NP, Brough E, Wilson KE, Beddis AJ, Girdler NM. Anxiety and quality of life in phobic dental patients. *J Dent Res [Internet].* 2010;89(3):302–6. Available from: <http://jdr.sagepub.com/cgi/doi/10.1177/0022034509360189>
29. Lim M, Borromeo GL. The use of general anesthesia to facilitate dental treatment in adult patients with special needs. *J Dent Anesth pain Med [Internet].* 2017 Jun [cited 2017 Sep 11];17(2):91–103. Available from: <https://synapse.koreamed.org/DOIx.php?id=10.17245/jdapm.2017.17.2.91>
30. Cianetti S, Paglia L, Gatto R, Montedori A, Lupatelli E. Evidence of pharmacological and non-pharmacological interventions for the management of dental fear in paediatric dentistry: a systematic review protocol. *BMJ Open [Internet].* 2017 Aug 18 [cited 2017 Sep 11];7(8):e016043. Available from: <http://bmjopen.bmj.com/lookup/doi/10.1136/bmjopen-2017-016043>
31. Addicks SH, McNeil DW, Randall CL, Goddard A, Romito LM, Sirbu C, et al. Dental

- care-related fear and anxiety: distress tolerance as a possible mechanism. *JDR Clin Transl Res* [Internet]. 2017 Jul 9 [cited 2017 Sep 11];2(3):304–11. Available from: <http://journals.sagepub.com/doi/10.1177/2380084417691962>
32. Kanegane K, Penha SS, Borsatti MA, Rocha RG. Dental anxiety in an emergency dental service. *Rev Saude Publica*. 2003;37(6):786–92.
 33. Gisler V, Bassetti R, Mericske-Stern R, Bayer S, Enkling N. A cross-sectional analysis of the prevalence of dental anxiety and its relation to the oral health-related quality of life in patients with dental treatment needs at a university clinic in Switzerland. *Gerodontology*. 2012;29(2):290–6.
 34. Mohammed R, Lalithamma T, Varma D, Sudhakar KN, Srinivas B, Krishnamraju P, et al. Prevalence of dental anxiety and its relation to age and gender in coastal Andhra (Visakhapatnam) population, India. *J Nat Sci Biol Med* [Internet]. 2014;5(2):409. Available from: <http://www.jnsbm.org/text.asp?2014/5/2/409/136210>
 35. Nicolas E, Collado V, Faulks D, Bullier B, Hennequin M. A national cross-sectional survey of dental anxiety in the French adult population. *BMC Oral Health*. 2007;7:1–7.
 36. Bashiru B, Omotola O. Prevalence and determinants of dental anxiety among adult population in Benin City, Nigeria. *Eur J Gen Dent* [Internet]. 2016;5(3):99. Available from: <http://www.ejgd.org/text.asp?2016/5/3/99/189252>
 37. Humphris G, King K. The prevalence of dental anxiety across previous distressing experiences. *J Anxiety Disord* [Internet]. 2011;25(2):232–6. Available from: <http://dx.doi.org/10.1016/j.janxdis.2010.09.007>
 38. Sohn W, Ismail AI. Regular dental visits and dental anxiety in an adult dentate population. *J Am Dent Assoc* [Internet]. 2005;136(1):58–66. Available from: <http://dx.doi.org/10.14219/jada.archive.2005.0027>
 39. Caltabiano ML, Croker F, Page L, Sklavos A, Spiteri J, Hanrahan L, et al. Dental anxiety in patients attending a student dental clinic. 2018;1–8.
 40. Al-Namankany A, de Souza M, Ashley P. Evidence-based dentistry: Analysis of dental anxiety scales for children. *Bdj* [Internet]. 2012;212(5):219–22. Available from: <http://www.nature.com/doi/10.1038/sj.bdj.2012.174>