

PREVALENCE OF DENTAL ANXIETY
IN ACTIVE DUTY SERVICE MEMBERS

by

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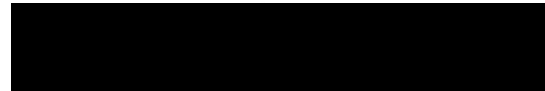
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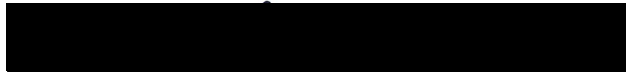
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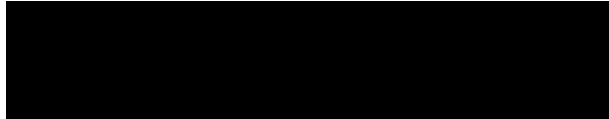


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ABSTRACT

PREVALENCE OF DENTAL ANXIETY IN ACTIVE DUTY SERVICE MEMBERS
HOAN B. NGHIEM
M.S., COMPREHENSIVE DENTISTRY, 2019

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Introduction: Dental anxiety is a major barrier for both patients and dentists that diminishes the effectiveness of dental care, resulting in poor oral health and lower quality of life. Currently, there is limited knowledge concerning the prevalence of dental anxiety in the active duty military service population.

Purpose: To assess the prevalence of dental anxiety in active duty military service members seen at the Dental and Readiness clinics of Walter Reed National Military Medical Center (WRNMMC).

Methods: Study participants (n=289) voluntarily completed an anonymous survey comprised of a demographics questionnaire and the Index of Dental Anxiety and Dental Fear (IDAF-4C+).

Results: Moderate to high dental anxiety was detected in 10.4% (n=30) of the study participants with 9% respondents reporting avoidance of dental visit due to dental anxiety. The prevalence of dental anxiety in this study is lower than other studies from the general non-military population. These participants also reported pain, needles or injections, unkind dentist, feeling embarrassed or ashamed, and not being in control as at least somewhat anxiety-provoking. There was no statistically significant gender (male vs. female) or rank (enlisted vs. officer) differences in the prevalence of dental anxiety.

However, there was a positive correlation between dental anxiety and increasing age ($p < 0.05$).

Conclusions: These results suggest the need for additional research on prevalence of dental anxiety in the United States military populations. Understanding dental anxiety and applying appropriate interventions for those experiencing this distressing issue will help patients follow through with needed dental care and may improve mission readiness. Screening for dental anxiety and dental anxiety management should be an integral part of comprehensive oral care.

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LIST OF ABBREVIATIONS

1. APA American Psychiatric Association
2. CI Confidence Interval
3. DC Dental Corp
4. IDAF Index of Dental Anxiety and Dental Fear
5. SD Standard Deviation
6. SPSS Statistical Package of Social Sciences
7. TX Texas
8. US United States
9. USN United States Navy
10. WRNMMC Walter Reed National Military Medical Center

CHAPTER I: REVIEW OF THE LITERATURE

Dental anxiety is a common issue known to negatively impact and interfere with consistent and effective dental care. Dental anxiety is a physical and emotional response to an anticipated event that the individual perceives as threatening. It can be acquired from personal experience or learned from others' experiences. It can be generalized and have a poorly defined focus. When exacerbated, it may significantly limit the individual's functional capabilities in daily life (Armfield and Marek, 2017).

Dental fear is a response when the individual perceived immediate threat or danger at the dental office. Its four components include emotional, cognitive, behavioral, and physiologic. Dental phobia is defined as persistent dental fear that results in impaired social and functioning abilities, and often leads to avoidance of dental treatment (Armfield and Marek, 2017).

Etiologies of Dental Anxiety and Phobia

Multiple factors can attribute to dental anxiety and phobia. Inherited genetic vulnerability may predispose individual to anxiety in general or dental phobia specifically. Cognitive conditioning through past painful dental experience may lead to the conditioned association between dentist and the individual's dental anxiety. Individuals may also acquire fear responses through observing or hearing stories about others' fearful experience (Carter et al., 2014).

Another common factor contributing to dental fear is the perception of a lack of personal control. During the dental appointment, patients could not speak and were

situated in the supine position below the dentist, potentiating their feeling of helplessness. Researchers suggested that patients were more vulnerable to dental stress and pain when this helpless feeling was coupled with the heightened desire for control (Armfield and Marek, 2017).

Prevalence of Dental Anxiety

In a telephone survey using a random digit dialing procedure with the Dallas, TX telephone directory as the major sampling frame, researchers found that 30 of 105 respondents (29%) reported moderate to high dental anxiety. Of those, 62.5% reported fear as the primary reason that they did not seek regular dental care (Gatchell et al., 1983). In another research study, 204 of 400 (51%) participants admitted that they felt nervous about going to the dentist, with 14.8% reporting dental anxiety as their reason for avoiding or postponing dental visits. The number of adults in the United States avoiding dental care due to dental fear is estimated to be as high as 23 million which amount to approximately 9.5% of the US population (Dionne et al., 1998).

Dental anxiety is also observed and documented in multiple countries around the world, with higher prevalence in females than in males (Liddell & Locker, 1997; Peretz & Efrat, 2000; Settineri et al., 2005). In a survey of 3041 Japanese adolescents and adults conducted by Weinstein et al. (1992), 1280 subjects (42.1%) reported high levels of dental anxiety, with over 50% of this subgroup experiencing a resultant delay in dental treatment. In a cross-culture study, 264 of 881 Chinese subjects (30%) and 47 of 313 Danish subjects (15%) exhibited moderate to high dental anxiety (Schwarz & Birn, 1995). The authors stated that the prevalence was much lower in the Danish sample due to variation in the dental behavioral norm. In their study, Danes visits the dentists on a

regular basis. On the contrary, due to the behavioral norm in the Chinese population of not seeing the dentists until they had dental problems, most of the Chinese respondents may have had their first dental visits with traumatic painful experience.

Similar to the general population, Eitner et al. (2006) found that 49 of 374 male German Army soldiers (13%) experienced moderate to high dental anxiety. The majority (89.2%) of less anxious soldiers regularly attended dental exams, while only 79.6% of anxious soldiers enrolled in a continuous recall program. A study by Cohen, demonstrated that 342 of 933 male United States Navy recruits (36%) reported a moderate or high level of dental anxiety (Cohen, 1985).

Impact of Dental Anxiety

Patients with dental anxiety have a tendency to avoid dental treatment. These individuals exhibit irregular attendance at routine dental visits and are more likely to visit their dentists only when symptoms and dental issues are significantly advanced (Taani, 2002). This delay in receiving proper and consistent treatment often results in more complicated dental care which may further exacerbate and reinforce existing dental anxiety. In a survey of a random sample of 6112 Australian residents aged 16 years and older, 1785 (29.2%) of respondents who were very afraid of going to the dentist reported that they delayed dental visits. This resulted in poor oral health and symptom-driven treatment seeking (Armfield et al., 2007).

Several studies have reported a significant association between dental anxiety, poor oral health, and lower quality of life. Anxious dental patients experience higher caries risk and increased social and functional impairment (Reisine et al., 1989; Hagglin

et al., 1996; Schuller et al., 2003). As reported by Cohen et al. (2000), poor dental appearance lowered both self-esteem and self-confidence, resulting in negative impression at interview and had a detrimental effect on developing close personal relationships. Further, parents with high dental anxiety avoided taking their children to a dental office out of concern for potentially transferring dental anxiety to the children.

The research studies described above demonstrate that dental anxiety may hinder a patient's ability to make proper decisions regarding their dental treatment needs, and may result in reduced compliance with dental treatment recommendations. In addition to the impact on the patient, dental anxiety is a major challenge and a source of stress for dental practitioners. O'Shea et al. (1984) analyzed 977 dentists' responses to a survey on dentists' stressors. A high majority of respondents (889, 91%) said that perceived anxiety in patients was a source of significant stress impacting their practice.

Study Aims

The primary aim of this study is to assess the prevalence of dental anxiety in active duty military service members seen at the Dental Primary Care and Readiness Clinic of WRNMMC. In addition, characteristics of dental anxiety will be explored within the following domains: cognitive, emotional, behavioral, and physiological. Further, associations among demographic characteristics and dental anxiety will be explored.

CHAPTER II: MATERIALS AND METHODS

The data for this study was collected at the Walter Reed National Military Medical Center (WRNMMC) Dental Primary Care and Readiness clinics between September and December, 2018. Potential participants included all American male and female active duty military personnel. Study participants were invited to participate in this study while waiting for appointments at the WRNMMC Dental Primary Care and Readiness clinics. Total of 289 participants voluntarily completed an anonymous survey. The survey included a demographics section which asked for the participants sex (male or female), age (in years), and rank (enlisted or officer). This section was followed by the Index of Dental Anxiety and Dental Fear (IDAF-4C+), which is a self-report measure of dental anxiety and fear.

Study Measure

Index of Dental Anxiety and Dental Fear (IDAF-4C+): The IDAF-4C+ (Armfield, 2010) is a 23-item measure that contains three modules assessing presence and severity of dental anxiety (module 4C: 8-items), presence of dental phobia (module P: 5-items), and severity of fear towards specific dental stimuli (module S: 10-items). All the 4C items are rated on a 5-point Likert scale; the P items as yes/no; and the S items on a 5-point Likert scale. The 4C items provides a total score and four subscale scores measuring the different components of dental anxiety (cognitive, physiological, behavioral, and emotional). The component items of the four subscales are shown in Table 1. To meet

criteria for dental anxiety, the respondent must have an average score of ≥ 2.5 on the module 4C items (Armfield, 2010).

Table 1. Four components of dental anxiety and fear (Module 4C of the IDAF-4C+)

Component	Questionnaire Item (items 1a-h)
Physiological	I feel anxious shortly before going to the dentist.
Physiological	My heart beats faster when I go to the dentist.
Behavioral	I generally avoid going to the dentist because I find the experience unpleasant or distressing.
Behavioral	I delay making appointments to go to the dentist.
Cognitive	I think that something really bad would happen to me if I were to visit a dentist.
Cognitive	I often think about all the things that might go wrong prior to going to the dentist.
Emotional	I get nervous or edgy about upcoming dental visits.
Emotional	I feel afraid or fearful when visiting the dentist.

The P module assesses the presence of dental phobia as based on the specific phobia criteria from the DSM-5 (APA, 2013). This module has five questions. To meet criteria for a dental phobia, the respondent must first meet criteria for dental anxiety on the 4C module (average score of ≥ 2.5), then must answer the five P module items as shown in Table 2.

Table 2. Module P items of the IDAF-4C+ (dental phobia module)

Do the following statements apply to you?	To meet criteria for dental phobia
1. Going to the dentist is actively avoided or endured with intense fear or anxiety.	YES
2. My fear of going to the dentist has been present for at least 6 months.	YES
3. My fear, anxiety or avoidance of going to the dentist significantly affects my life in some way (dental pain, avoiding eating some foods, embarrassed or self-conscious about appearance of teeth or mouth, etc.)	YES
4. I am afraid of going to the dentist because I am concerned I may have a panic attack (abrupt fear with sweating, pounding heart, fear of dying or losing control, chest pain, etc.)	NO
5. I am afraid of going to the dentist because I am generally highly self-conscious or concerned about being watched or judged in social situations.	NO

The S module consists of 10 items that the respondent rates on a 5-point Likert scale from ‘not at all’ to ‘very much.’ These items are based on a variety of fear and anxiety inducing dental stimuli. The items are listed in Table 3. Module S is designed to provide depth and context to the overall measure, allowing the clinician to better identify triggers specific to the patient.

Table 3. Module S items of the IDAF-4C+ (dental fear and anxiety stimuli)

To what extent are you anxious about the following things when you go to the dentist?

1. Painful or uncomfortable procedures
 2. Feeling embarrassed or ashamed
 3. Not being in control of what is happening
 4. Feeling sick, queasy or disgusted
 5. Numbness caused by the anesthetic
 6. Not knowing what the dentist is going to do
 7. The cost of dental treatment
 8. Needles or injections
 9. Gagging or choking
 10. Having an unsympathetic or unkind dentist
-

The IDAF-4C+ has demonstrated good internal consistency, validity, and test-retest reliability (Armfield, 2010; Tolvanen et al., 2017).

Sample Size Estimation

This study's primary aim is to assess the prevalence of dental anxiety in active duty military service members seen at the WRNMMC Dental and Readiness clinics. To identify the likely proportion of individuals that will report dental anxiety in the study population, a meta-analysis was conducted using one study of Navy active duty service members (Cohen, 1985) and several previous studies with civilian populations (Gatchell et al., 1983; Dionne et al., 1998; Heyman et al., 2016; Weinstein et al., 1992).

Table 4. Dental Anxiety Prevalence in Previous Studies

Study	Sample Size	Prevalence of Dental Anxiety
Cohen	933	30%
Dionne	400	51%
Gatchell	105	29%
Heyman	1070	21%
Weinstein	3041	42%

A random effects meta-analysis using logit transformed proportions yields an estimate of 34.1% [95% CI: 24.4% - 45.3%]. The prevalence of dental anxiety in the potential study population is best estimated by calculating the proportion and confidence interval. To estimate prevalence in the population, at least 260 evaluable surveys will be collected, which will yield a confidence interval range of +/- 6% at the upper bound of the estimated proportion (45.3%), a range of +/- 5.2% at the lower bound (24.4%), and +/- 5.7% at the estimated proportion (34.1%). This 6% range will yield an acceptably precise estimate of dental anxiety in this population. To account for the possibility of incomplete surveys, an additional 10% of surveys will be collected, bringing the total sample size to 289 surveys.

Statistical Analyses

Data analysis was conducted using IBM Statistical Package of Social Sciences Version 24 (SPSS) and R Core Team, Vienna, Austria. The mean for averaged IDAF-4C+ scores and four subscale scores were calculated. The prevalence of dental anxiety was estimated using the recommended IDAF-4C+ score of 2.5 as the threshold, suggesting moderate to high dental anxiety (Tolvanen et al, 2017). To evaluate the relationship between demographic covariates such as age, sex, and rank and dental anxiety threshold, binomial

logistic regression was used when the outcome was binary, and cumulative link models were used when the outcome was evaluated on the response scale. Univariate Analysis of Variance and *F* tests were performed to compare the response scores for the anxiety-eliciting dental stimuli between the dental anxiety and no dental anxiety group, as determined by the mean of IDAF-4C+ threshold score.

CHAPTER III: RESULTS

The mean age of the 289 study participants was 31.05 years (SD=8.3). There were more male than female (Chi-Square = 25.00, $p < 0.001$), and more enlisted than officer in this study population (Chi-Square = 5.26, $p = 0.022$). Demographic data are presented in Table 5 and Figure 1. This study population had a range on the 4C module score of 1.00-4.75. The mean of average 4C module total and subscale scores are summarized in Table 6.

Table 5. Demographic characteristics

	Officer	Enlisted	Total
Male	78	109	187
Female	47	55	102
Total	125	164	289

Fig. 1. Demographic distribution

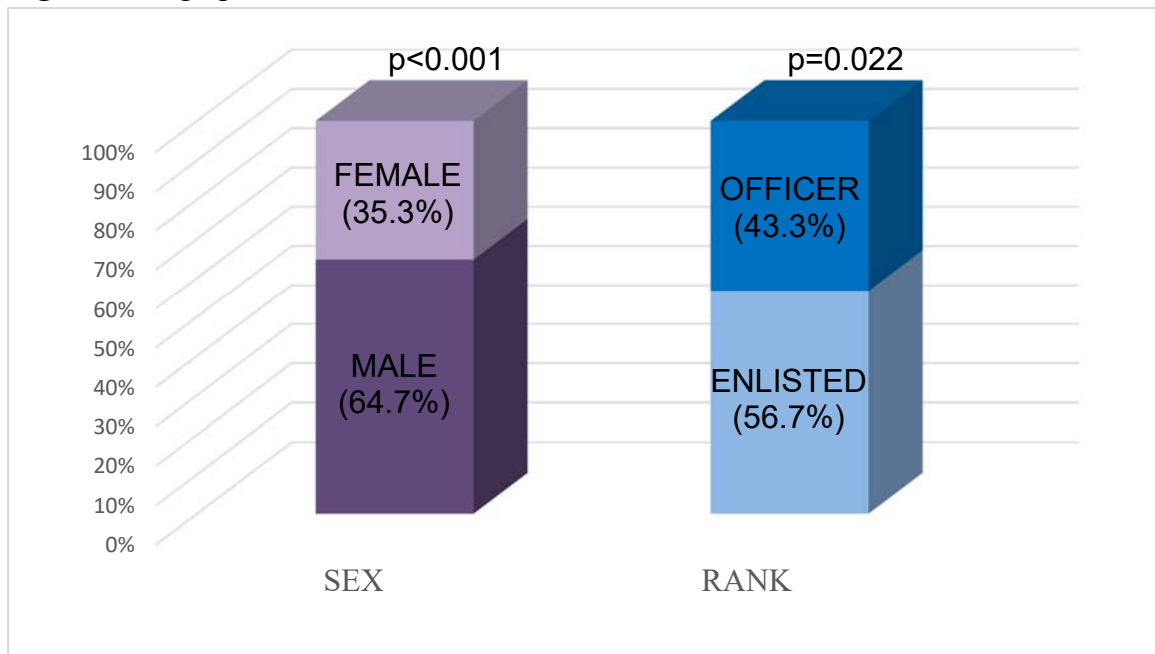


Table 6. Descriptive statistics for the 4C module scores

4C Score (n=289)	Mean	SD	Range
Total score	1.46	0.76	1.00-4.75
Physiological	1.63	0.97	1.00-5.00
Behavioral	1.53	0.94	1.00-5.00
Emotional	1.42	0.86	1.00-5.00
Cognitive	1.26	0.68	1.00-5.00

Adopting the mean 4C total score ≥ 2.5 as threshold based on published norms (Armfield, 2010), 10.4% (n=30) of this study population exhibited moderate to high dental anxiety. Dental anxiety characterized by sex and rank are presented in Table 7 and Figure 2. There was no statistically significant sex (Chi-Square = 0.817, p = 0.37) or rank (Chi-Square = 3.648, p = 0.056) differences in the prevalence of dental anxiety.

Table 7. Dental anxiety characterized by demographics

	Dental Anxiety	No Dental Anxiety
Male	18	169
Female	12	90
Officer	10	115
Enlisted	20	144

Dental anxiety as defined by IDAF-4C+ score threshold =2.5.

Fig. 2. The prevalence of dental anxiety by demographic characteristics

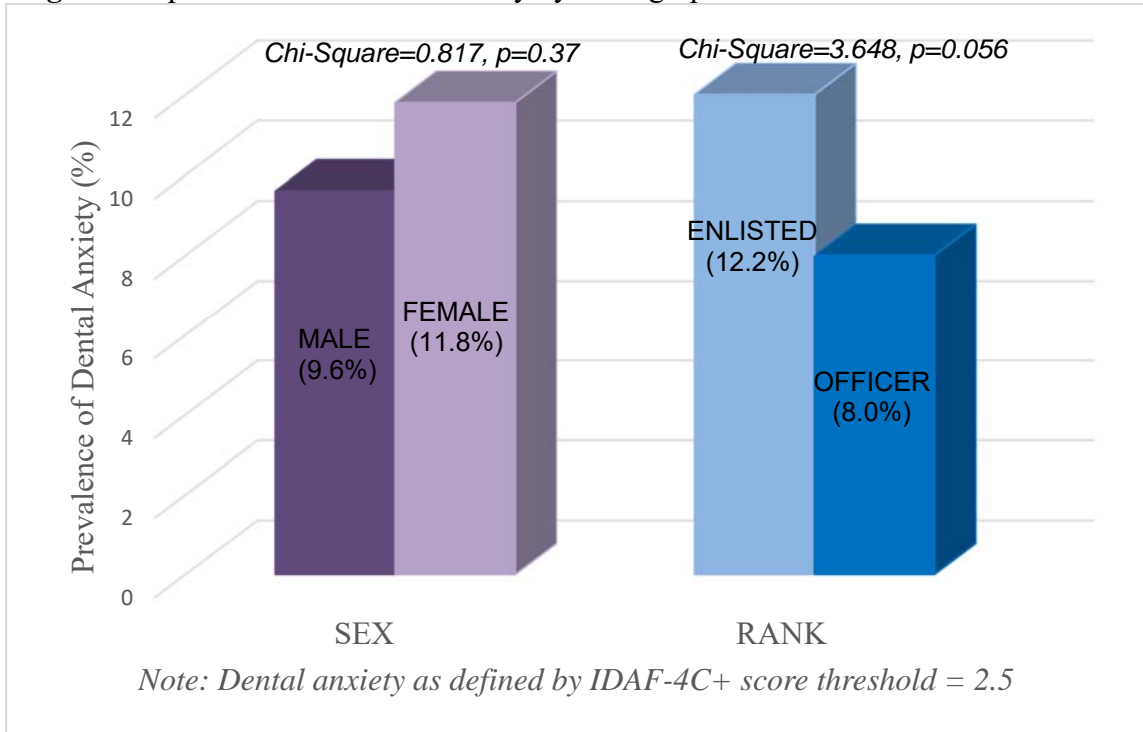
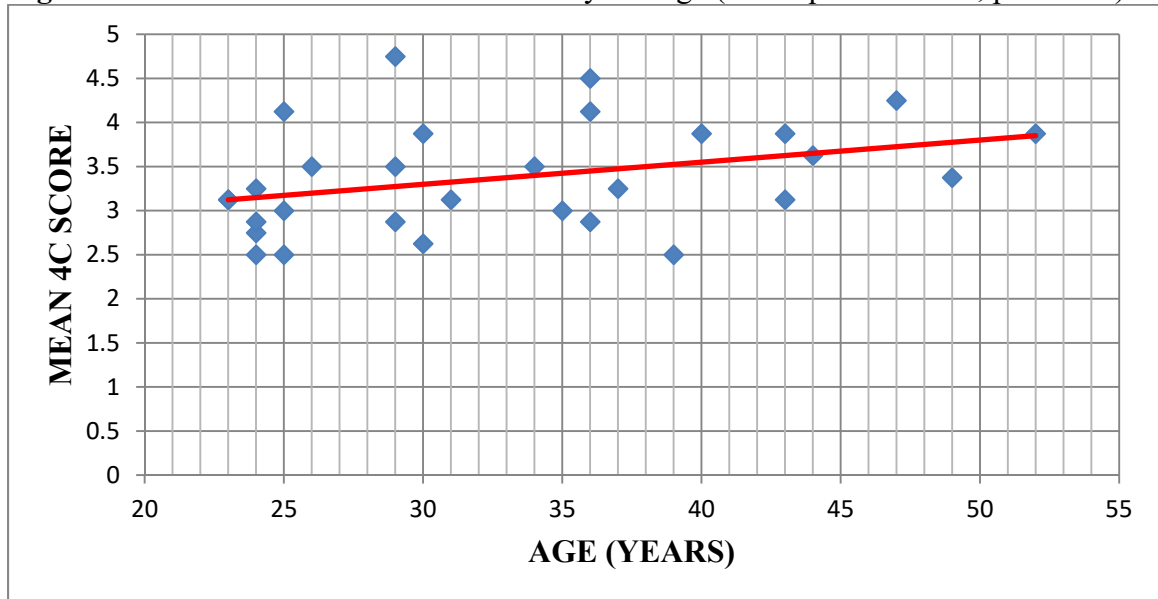


Fig. 3. The correlation between dental anxiety and age (Chi-Square = 4.295, p = 0.038)



Dental anxiety as defined by IDAF-4C+ score threshold =2.5

There was a positive association (Figure 3) between the presence of dental anxiety and increasing age (Chi-Square = 4.295, $p = 0.038$). In addition, 26 of 289 respondents (9%) indicated that they actively avoided going to the dentist or else endured intense anxiety. However, only 1% of the study sample met criteria for a dental phobia using the Module P items from the IDAF-4C+.

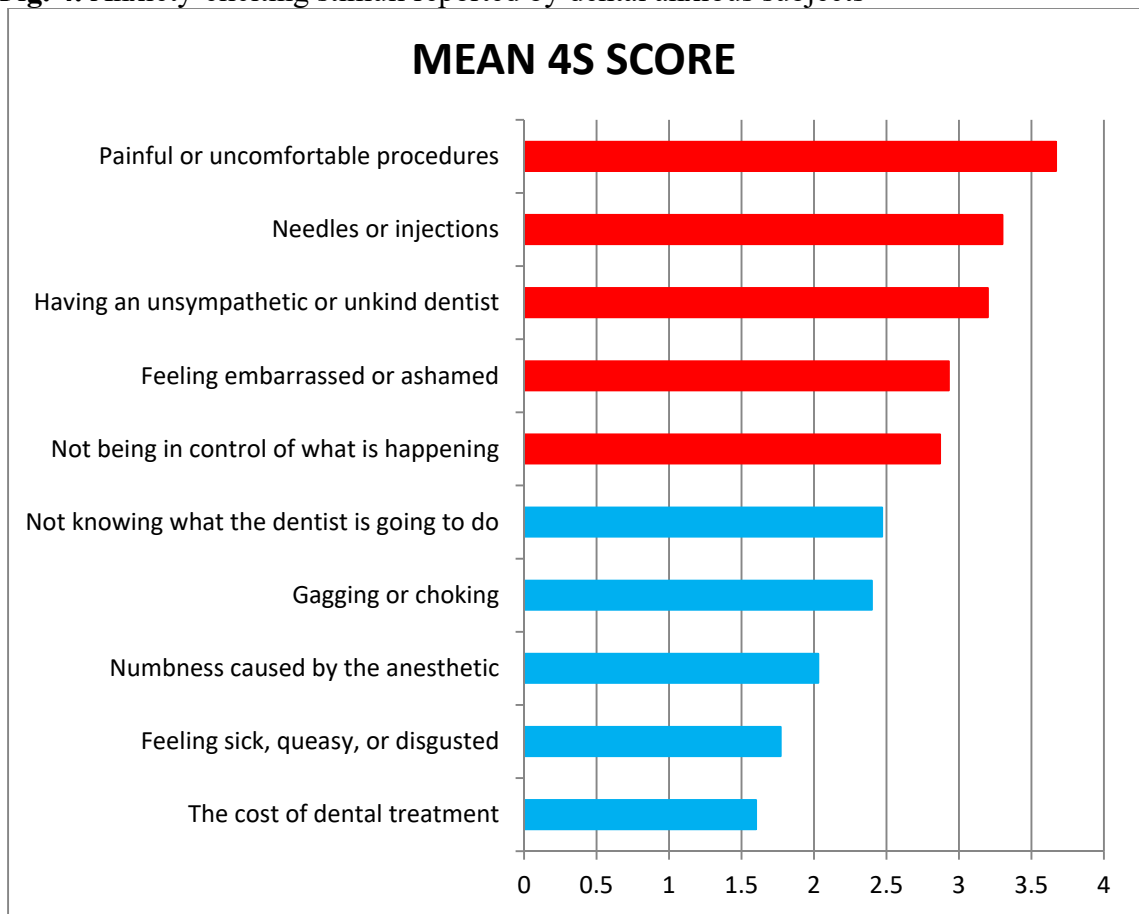
Table 8. Descriptive statistics, mean (SD), for possible dental anxiety-eliciting stimuli

	Dental Anxiety (n=30)	No Dental Anxiety (n=259)	F	p
Painful or uncomfortable procedures	3.67 (1.4)	2.0 (1.1)	54.47	<.001
Feeling embarrassed or ashamed	2.93 (1.6)	1.25 (0.7)	117.07	<.001
Not being in control of what is happening	2.87 (1.4)	1.36 (0.8)	86.70	<.001
Feeling sick, queasy, or disgusted	1.77 (1.0)	1.10 (0.4)	49.54	<.001
Numbness caused by the anesthetic	2.03 (1.4)	1.27 (0.7)	25.78	<.001
Not knowing what the dentist is going to do	2.47 (1.3)	1.37 (0.8)	45.09	<.001
The cost of dental treatment	1.60 (1.2)	1.18 (0.6)	9.28	<.001
Needles or injections	3.30 (1.6)	1.62 (1.0)	64.71	<.001
Gagging or choking	2.40 (1.5)	1.36 (0.8)	35.91	<.001
Having an unsympathetic or unkind dentist	3.20 (1.6)	1.46 (0.9)	79.21	<.001

Dental anxiety as defined by IDAF-4C+ score threshold =2.5.

Table 8 compared the responses for the dental anxiety-eliciting stimuli (Module S) between the dental anxiety and no dental anxiety group using Univariate Analyses of Variance. The dental anxious subjects in this study endorsed “painful or uncomfortable procedures,” “needles or injections,” “having an unsympathetic or unkind dentist,” “feeling embarrassed or ashamed,” and “not being in control of what is happening,” as at least somewhat anxiety-provoking (Figure 4).

Fig. 4. Anxiety-eliciting stimuli reported by dental anxious subjects



CHAPTER IV: DISCUSSION

Dental anxiety is a known issue that has been documented in many countries and various cultures. The prevalence of dental anxiety for United States active duty service members in this study (10.4%) is lower comparing to those populations reported in previous studies (21-51%, Table 4). This is possibly due to the study population at Walter Reed National Military Medical Center, which is likely comprised of high percent of medical and dental professionals. Thus, this study population may not be the best representative of the entire United States active duty military service members.

However, in conformity with Dionne's estimate (1998), 9% of this study population admitted that they would avoid going to the dentist due to dental fear. Evidently, dental anxiety is a real problem faced by active duty service members which impedes early diagnosis and delays timely treatment of potential detrimental diseases.

This study also revealed a statistically significant trend between dental anxiety and increasing age. This result was in contrast to the previous finding which suggested the decrease of dental anxiety with age because older patients had more time for good experiences to neutralize aversive ones (Liddell & Locker, 1997). A rationale for this difference is possibly due to the dramatic changes in modern dentistry with the emphasis in preventative care and advance in adjunctive anesthesia which could contribute to the reduction in aversive events experienced by younger subjects.

In agreement with previous studies (Dionne et al., 1998), "painful or uncomfortable procedures" and "needles or injections" were also reported as dental-anxiety triggers by the dental anxious subjects in this study population. Additional focus

on pain management and improvement of local anesthetic techniques may alleviate dental anxiety.

These results suggest the need for additional research on prevalence of dental anxiety in the United States military populations. Understanding dental anxiety and applying appropriate interventions for those experiencing this distressing issue will help patients follow through with necessary dental care and may improve mission readiness. Screening for dental anxiety and dental anxiety management should be an integral part of comprehensive oral care.

CHAPTER V: CONCLUSIONS

Dental anxiety and avoiding dental visit were reported for the United States active duty military service members in this study. The prevalence of dental anxiety for the US active duty service members in this study was 10.4% with 9% respondents reporting avoidance of dental visit due to dental anxiety. Dental anxiety had a positive correlation with increasing age in this study population.

The most likely dental anxiety-inducing stimuli for this study population included pain, needles or injections, unkind dentist, feeling embarrassed, and not being in control. These results were significant to warrant the need for additional research on prevalence of dental anxiety in the US military populations and to search for better anesthesia and pain management modalities in dental care. Screening for dental anxiety and dental anxiety management are recommended to be an integral part of comprehensive oral care.

APPENDIX A: DEMOGRAPHICS QUESTIONNAIRE

Demographics Questionnaire

Study ID __HNCOMP19__

Date _____

1. What is your sex? Male Female

2. What is your current age? _____

3. What is your rank? Enlisted Officer

APPENDIX B: THE INDEX OF DENTAL ANXIETY AND DENTAL FEAR

The following questions relate to how you feel about going to the dentist.

1. How much do you agree with the following statements?	Disagree	Agree a little	Somewhat agree	Moderately agree	Strongly agree
(a) I feel anxious shortly before going to the dentist.	1	2	3	4	5
(b) I generally avoid going to the dentist because I find the experience unpleasant or distressing.	1	2	3	4	5
(c) I get nervous or edgy about upcoming dental visits.	1	2	3	4	5
(d) I think that something really bad would happen to me if I were to visit a dentist.	1	2	3	4	5
(e) I feel afraid or fearful when visiting the dentist.	1	2	3	4	5
(f) My heart beats faster when I go to the dentist.	1	2	3	4	5
(g) I delay making appointments to go to the dentist.	1	2	3	4	5
(h) I often think about all the things that might go wrong prior to going to the dentist.	1	2	3	4	5

2. Do the following statements apply to you?	Yes	No
(a) Going to the dentist is actively avoided or else endured with intense fear or anxiety.	1	2
(b) My fear of going to the dentist has been present for at least 6 months.	1	2
(c) My fear, anxiety or avoidance of going to the dentist significantly affects my life in some way (dental pain, avoiding eating some foods, embarrassed or self-conscious about appearance of teeth or mouth, etc.).	1	2
(d) I am afraid of going to the dentist because I am concerned I may have a panic attack (abrupt fear with sweating, pounding heart, fear of dying or losing control, chest pain etc.).	1	2
(e) I am afraid of going to the dentist because I am generally highly self-conscious or concerned about being watched or judged in social situations.	1	2

3. To what extent are you anxious about the following things when you go to the dentist?	Not at all	A little	Somewhat	Moderately	Very much
(a) Painful or uncomfortable procedures.....	1	2	3	4	5
(b) Feeling embarrassed or ashamed.....	1	2	3	4	5
(c) Not being in control of what is happening.....	1	2	3	4	5
(d) Feeling sick, queasy or disgusted.....	1	2	3	4	5
(e) Numbness caused by the anesthetic.....	1	2	3	4	5
(f) Not knowing what the dentist is going to do.....	1	2	3	4	5
(g) The cost of dental treatment.....	1	2	3	4	5
(h) Needles or injections.....	1	2	3	4	5
(i) Gagging or choking.....	1	2	3	4	5
(j) Having an unsympathetic or unkind dentist.....	1	2	3	4	5

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