CORRELATION OF DENTAL ANXIETY, DENTAL PHOBIA, AND PSYCHOLOGICAL CONSTRUCTS IN A SAMPLE OF PATIENTS RECEIVING DENTAL CARE AT TEMPLE UNIVERSITY KORNBERG SCHOOL OF DENTISTRY

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ABSTRACT

Introduction: Dental anxiety, fear, and phobia are common factors that prevent individuals from seeking dental care by delaying dental care or terminating the visit entirely, which may cause a decline in oral health-related quality of life. Dental anxiety often has a correlation with other psychological constructs. There is a significant prevalence of dental anxiety among various ethnic groups, which highlights the importance of understanding and addressing these issues to improve oral health outcomes and access to care.

Aim: To examine the associations between psychological constructs, dental anxiety, and phobia, as well as the associations between key demographics and dental anxiety and phobia among patients seeking dental care at TUKSoD.

Methods: Baseline data from 499 patients who participated in a randomized clinical trial that evaluated the efficacy of an online intervention in managing dental anxiety (National Institute of Health U01DE027328) was used. Subjects completed a semi-structured interview according to the Diagnostic Schedule Manual-IV (DSM-IV) criteria and self-reported measures on dental anxiety (Modified Dental Anxiety Scale (MDAS)), fear or avoidance of dental care, sensitivity to pain (PSI), ability to tolerate distress (DTS), blood-injection-injury (BII) phobia, and other psychological factors. Bivariate analysis was done using paired sample t-tests and analysis of variance to evaluate differences in mean scores for MDAS by sex, race, gender, and ethnicity. Multivariable Regression Models were used to explore the association between MDAS, selected demographic variables and psychological constructs while controlling for potential confounders, likewise for clinical severity rating (CSR). These analyses were performed using R 4.3.2 and statistical significance was set at two-sided p-value < 0.05.

Results: Mean age of subjects was 48.9±14.7 years old, most were female (71.6%), non-Hispanic (88.6%) with an income lower than $30,000 (40.0%) and most had completed a high school diploma /GED (26%). The majority (63.3%) reported high dental anxiety (MDAS≥19) and 64.57 % met criteria for specific phobia (CSR≥4), with mean scores of 19.53 ± 3.62 and 4.49 ± 1.69 respectively. Mean scores for FQBII, PSI, DTS, and ASI were 15.51 ± 10.15, 68.02±22.9, 44.73±13.2, and 31.0 ± 16.87 respectively. Significant differences in Clinical Severity Rating were observed by age ($p< 0.01$), sex ($p = 0.02$), and race ($p<0.01$), while the psychological constructs FQBII, DTS and PSI varied significantly across age, race, and ethnicity ($p<0.05$). The Hispanic group had clinical severity ratings that were approximately 10.1% higher than the non-Hispanic group. This was not statistically significant ($p=0.07$).

Conclusion: Dental anxiety scores were higher among African American low-income women compared to Caucasians. Age, sex, income, and race demonstrated to have a strong association with Dental anxiety. Having high pain sensitivity and fear of blood/injections seem to increase dental anxiety.

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CHAPTER 1

INTRODUCTION

Dental anxiety involves an increased level of nervousness and concern about visiting the dentist and receiving dental care (Dou et al., 2018). Dental fear is considered as a negative response to peculiar threatening stimuli related to dental treatment (Stein et al., 2022), and dental phobia refers to an irrational fear of dental visits or procedures, which can significantly impact individuals if they exhibit severe avoidance behavior (Kılıç et al., 2014). This emotional state can have several detrimental effects, such as poor oral health, a predisposition to postpone important dental procedures, and in certain situations, a decline in oral health-related quality of life. Individuals experiencing dental anxiety may find it challenging to maintain regular dental check-ups and may delay essential treatments, ultimately impacting their overall oral health and well-being. It is important to identify and treat dental anxiety to ensure people receive the care they require for a healthy mouth and improved quality of life (Dou et al., 2018).

Dental fear or anxiety is a common factor that makes individuals seeking dental care prolong the date of presentation in the dental clinic or terminating the visit entirely. This fear can make it challenging to proceed with preventive or conservative dental procedures, potentially leading patients to seek emergency care for treatment in the future (Tellez et al., 2015). Patients experiencing dental anxiety commonly express negative thoughts and emotions, heightened reliance on medication, disrupted sleep patterns, increased somatic complaints, and diminished social and occupational functioning compared to individuals without dental anxiety (Tellez et al., 2015).

1.1. Epidemiology of Dental Anxiety

Approximately 10% to 20% of adults in the United States experience dental anxiety. Despite advancements in modern dentistry, the levels of dental anxiety seem to have remained unchanged since the mid-1900s (Tellez et al., 2015). The prevalence of co-morbid phobias such as agoraphobia and social phobias is about 45%, while co-morbid anxiety and mood disorders such as generalized anxiety disorder and social anxiety disorder range from 30% to 43%. A noticeable pattern emerges as the degree of dental anxiety rises, so does the probability of experiencing co-occurring phobias and disorders (Halonen et al., 2012). Approximately 3% of adults revealed that their last dental appointment was marked by intense fear and nervousness, which made dental treatment difficult to execute or led to its failure (CareQuest, 2023).

Compared to white adults, Hispanic adults had more than double the likelihood of expressing dental anxiety. Similarly, African American, and Asian adults also had higher tendencies to report dental fear in comparison to their white counterparts. Furthermore, about 60% of adults who recorded experiencing dental fear during their most recent dental visit were females (CareQuest, 2023). Further dental anxiety measurements among various racial populations would aid better epidemiological studies and proper evaluation of dental fear among these populations. However, various anxiety disorders, including dental phobia, might have cultural variances, so it is critical to understand factors associated to variations in prevalence estimates including cultural aspects. Researchers have pointed out that this would be important as a more significant effort to improve oral health inequalities among various racial groups (Coolidge et al., 2008).

In the context of dental anxiety, several key psychological constructs have been examined, shedding light on the complex interplay between emotional states and oral health. These psychological constructs include oral health-related quality of life, emotion regulation, distress tolerance, mindfulness, and blood-injection-injury (BII) fears. Researchers hypothesized these constructs to be associated with anxiety, phobia severity, and avoidance (Kinner, 2014). Pain (both real and perceived) emerges as a significant factor, with dental anxiety exacerbating the experience of pain and fostering a cycle of avoidance behavior. Distress tolerance has also garnered attention, suggesting that individuals with dental anxiety may possess lower distress tolerance, potentially intensifying their anxiety during dental procedures. Furthermore, the close association between dental anxiety and the fear of blood-injection-injury (BII) is evident, with studies consistently revealing a strong link between the two (Kinner, 2014). This fear extends beyond dental procedures to encompass elements such as needles and injections, contributing to treatment avoidance. Understanding these psychological constructs is paramount for devising effective interventions to alleviate dental anxiety and promote oral health (Kinner, 2014).

Specific phobia, such as dental phobia is described in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V), which helps create a standardized framework to diagnose, evaluate and treat patients presenting with dental anxiety. Health professionals can benefit from a more in-depth understanding of the diagnostic criteria and severity thresholds for dental phobia, enabling them to accurately identify patients requiring targeted interventions to alleviate their anxiety through the DSM-5 guidelines (American Psychiatric Association, 2013).

An initial study conducted at Temple University Kornberg School of Dentistry in 2014, focused on a pool of patients attending regular and emergency dental care. A sample of 120 dental patients were recruited for the study and self-report assessments and interviews were used to assess the presence or absence and severity of specific phobia to dental procedures. The study aimed to examine the connections between dental anxiety, phobia, dental treatment avoidance, and the influence of psychological factors like experiential avoidance and optimism on seeking dental care, and the impact of past traumatic dental experiences on treatment avoidance. The outcome of the study showed that 21.7% of patients had a specific phobia related to dental procedures, while dental anxiety varied, with 22.5% reporting high levels of anxiety. However, there were significant links between dental anxiety, specific phobias related to dental procedures, and a higher likelihood of avoiding dental care. Furthermore, the study revealed that experiential avoidance played a role in the relationship between dental anxiety and avoiding dental appointments, especially among individuals with higher levels of experiential avoidance (Kinner, 2014).

Currently there are limited studies on the correlations between dental anxiety and other psychological factors among adult patients seeking dental care in an urban dental setting.

CHAPTER 2

LITERATURE REVIEW

2.1. Dental Anxiety and Its Impact on Dental Care

Dental anxiety can lead to refraining from dental treatment (Tellez et. al., 2015) and overall can lead to dilapidating oral health. In addition to health related and psychological outcomes, this can lead to heightened dissatisfaction of dental and facial aesthetics (Alharbi et. al., 2023). Diminished satisfaction with the appearance of teeth may give rise to feelings of embarrassment and tension, contributing to a lowered sense of self-esteem (Moore et. al., 2004; Alharbi et. al., 2023). Dental anxiety continues to be a major obstacle to receiving dental care, and avoiding the dentist for an extended period of time can also result in serious general health issues like pneumonia, infections of the urinary tract, fever, septicemia, mediastinitis, intracranial extension of periapical abscess, facial osteomyelitis, sinusitis, and sepsis (Mehrstedt et. al., 2007).

Dental anxiety is a common experience among adults, with a substantial number of individuals ranging from mild to severe anxiety levels. Statistics show that an estimated 3% to 20% of adults in the developed nations suffer from dental phobia; at least part of this variation can be attributed to variations in the scales that have been employed (Locker et. al., 2001). Individuals who have dental anxiety typically have higher rates of tooth loss, untreated dental caries, and lower oral health-related quality of life (Halonen et. al., 2012). Additionally, it feeds into a vicious cycle of dental avoidance, whereby those with dental anxiety miss more appointments and have lower dental attendance, thus leading to poorer dental health. This effect is most noticeable in female and younger people. Various factors may contribute to the development of dental anxiety (Locker et. al., 2001; Halonen et. al., 2012, Sukumaran et. al., 2021).

There is a shortage of information on the direct impact of dental anxiety on oral health and oral health related quality of life in individuals seeking dental care. However, there are numerous studies that highlight that oral diseases are common with individuals experiencing dental fear (Cohen et. al., 2000; McGrath et. al., 2004). A percentage of patients who had been referred to a dental anxiety clinic stated that their dental anxiety interfered with their ability to travel on vacation (46%), engage in social activities (dining out, meeting friends), or maintain connections with family members (41%). Work (37%) and recreational activities (sports, hobbies) (25%) as well as household chores (cooking, cleaning) (14%), were less affected (Cohen et. al., 2000).

2.1.1. Impact of Dental Anxiety on Seeking Dental Care

Dental anxiety often leads to a problematic cycle in which individuals avoid or delay dental treatment due to their fear, resulting in dental issues that require more invasive or emergency procedures (Hittner et. al.,2009; Kinner, 2014). This, in turn, perpetuates and worsens their dental anxiety. The cycle is further influenced by feelings of guilt, shame, and inferiority, which contribute to increased levels of anxiety and avoidance behaviors (Kinner, 2014). The impact of dental anxiety on patients' oral health is significant and has been extensively researched. Two prominent consequences of dental anxiety are the avoidance of dental treatment and a decreased quality of life related to oral health. This cycle of anxiety and treatment avoidance has profound implications for public health due to its detrimental effects on dental well-being (Kinner, 2014).

In a qualitative research study performed by Cohen et. al. in 2000, the effect of dental anxiety on the life of an individual was grouped into themes, which were physiological, cognitive, behavioral, impact on health, and social impacts. Physiologically most of the participants reported experiencing effects of fear such as dry mouth, increased heart rate and sweatiness (Cohen et. al., 2000). These symptoms were recorded to occur a day before, on the day of an appointment, in the process of finding a dentist over the phone or in the waiting room to see a dentist (Cohen et. al., 2000). On the cognitive impact, a significant number of participants reported that anxiety related to dentistry frequently shows up as changes in cognitive patterns or content. The commonly reported thoughts were fear of teeth loss and fear of complication during dental procedures and death. A number of the reported negative thoughts were attributed to a past traumatic dental experience (Cohen et. al., 2000). In line with findings of cognitive impact by Cohen et. al. in 2000, Mehrstedt et. al. in 2007 highlighted that dental anxiety is a major cause of insecurity and declining self-esteem. Declining dental health can also increase social isolation, which can trigger or worsen depression and other severe psychiatric and psychosomatic conditions that are frequently already present in this population (Cohen et. al., 2000; Mehrstedt et. al., 2007). On the behavioral impact, Cohen et. al. found that the majority of participants mentioned avoiding specific foods, especially those that were hard (due to a decreased ability to chew or to avoid dental issues) or cold (due to sensitivity) (Cohen et. al., 2000). Strong dental anxieties are also associated with above-average alcohol and illegal drug usage as well as a high frequency of sick days, which can have a significant financial impact on society (Mehrstedt et. al., 2007).

Modification of behaviors related to dental care included aspects of oral hygiene and avoidance of dental treatment and dental settings. Most participants indicated that dental anxiety positively influenced their adherence to oral hygiene practices. Their primary motivation was to prevent the necessity for dental treatment by maintaining good oral health and preventing oral diseases (Cohen et. al., 2000). The health impact of dental anxiety is the occurrence of sleep disturbance which can either be caused by nightmares or by difficulty falling asleep. Dental or facial pain has been reported to cause sleep disturbance as well.

As for the social impact of dental anxiety, Cohen et al. in 2000 showed that dental phobia can affect an individual's life in an array of ways. The impact of dental anxiety on oral health led to oral pain and infection, which impeded one's capacity to work. In a similar manner, a bad dental appearance affects one's chances of landing a job by making a bad impression during interviews and causing one to lose confidence and self-worth. Personal relationships that have been established can also become strained. People reported getting angry or agitated before dental visits and feeling that their partners didn't understand or could not handle their nervousness. Parents with dental anxiety often transfer their fears to their children, thus unable to take them to see a dentist (Cohen et. al., 2000).

There has been evidence that behavioral treatment for dental anxiety such as cognitive behavioral therapy significantly reduces the incidence of oral diseases, overall health problems, and these behaviors (Mehrstedt et. al., 2007).

2.2. Psychological Constructs Related to Dental Anxiety

Several key psychological constructs have been studied to better understand the intricate relationship between emotional states and oral health. These constructs encompass various aspects such as oral health-related quality of life, emotion regulation, distress tolerance, mindfulness, experiential avoidance, social appearance anxiety, pessimism, dental-related physical pain, re-experiencing symptoms related to past traumatic dental events, and fears related to blood-injection-injury (BII) (Locker et. al., 2003; Mehrstedt et. al., 2007; Kinner, 2014). In terms of dental anxiety, there is a gap in studying its association with crucial constructs that are believed to contribute to the development and maintenance of different anxiety disorders, such as poor distress tolerance, experiential avoidance, and low levels of mindfulness (Tellez et al., 2014; Kinner, 2014). Distress tolerance is the capacity of an individual to withstand and endure negative emotional states. Experiential avoidance pertains to the unwillingness to engage in personal experiences, including bodily sensation, thoughts, emotions, and the attempt to alter the nature of these experiences. Mindfulness, however, is characterized by a nonjudgmental awareness of the present moment, encompassing one's thoughts, physical sensations, and environment, experienced with curiosity, awareness, and openness (Tellez et al., 2014; Kinner, 2014). Connections of these constructs to other anxiety disorders based on these studies suggests that individuals with dental anxiety may exhibit characteristics such as low distress tolerance, engagement in experiential avoidance (sometimes termed psychological inflexibility), and challenges with mindfulness.

Researchers have hypothesized that these constructs are linked to anxiety severity, phobia levels, and avoidance behaviors (Kinner, 2014).

2.2.1. Concurrent Conditions of Dental Anxiety

Individuals experiencing dental anxiety and dental treatment avoidance usually show connections with various psychological disorders (Kinner, 2014). Researchers have shown that dental anxiety has a correlation with behavioral and conduct disorders, mood disorders, and alcohol dependence. Furthermore, it is associated with anxiety disorders, encompassing generalized anxiety disorder (GAD), agoraphobia, specific phobias like fear of injections and blood, and social anxiety disorder (Locker et. al., 2001; Pohjola et. al., 2011, Kinner, 2014). These correlations show the intricate relationship between dental anxiety and more general psychological concepts, despite some inconsistent results between dental anxiety and social phobias (Kinner, 2014).

In 2001, Locker et. al. demonstrated that in a sample of 1139 participants, about 44% were diagnosed with one or more psychological disorders and over 20% of participants with two or more diagnosis of psychological disorder. The more common diagnosis were major depressive episodes (16.8%), alcohol dependence (16.4%), and social phobia (13.3%). A dental anxiety scale was used to group the participants into highly, moderately, and not anxious. These groups were compared to access various anxiety levels and diagnosed psychological disorders. The comparison between not anxious and highly anxious, participants with high levels of anxiety were more likely to have diagnoses of conduct disorder, agoraphobia, social phobia, simple phobia, or alcohol dependence ($P<0.05$ in all comparisons) (Locker et. al., 2001).

A study by Pohjola et. al. in 2011 demonstrated that individuals diagnosed of generalized anxiety disorder (GAD), social anxiety disorder, major depressive disorder, and dysthymic disorder were more likely to show higher levels of dental anxiety compared to participants free from these comorbidities. Furthermore, among those individuals recorded as highly anxious, 17% reported having no less than one anxiety disorder with absence of any depressive disorders, 21% reported a major depressive disorder without anxiety disorders, and 60% reported concurrence of both anxiety and depressive disorders. These findings suggest that dental anxiety may be associated with psychological disorders (Pohjola et. al., 2011).

Concerning the connection between dental anxiety and related psychiatric disorders, specifically the blood-injection-injury (BII) type of specific phobia, earlier studies indicated that there is a significant association between dental anxiety, avoidance of dental treatment, and both subtypes of BII phobia (Kinner, 2014). A longitudinal study by Poulton et al. in 1998 was carried out to explore the relationship between BII, dental anxiety and oral health. A total of 936 18-year-olds in New Zealand were recruited and examined. 10% of participants reported dental anxiety, 1 in 10 participants reported a fear of blood, and 53% had a co-morbid fear of injections. The result of their findings was that participants with dental fear alone or co-morbid dental and blood or injection fear demonstrated significantly worse oral health (characterized by greater caries experience) compared to a no anxiety group or participants with blood-injection fear only. Furthermore, participants with both dental and blood or injection fear showed a significantly higher level of recent tooth decay than those with dental fear alone (Poulton et al., 1998).

There is a gap in the published literature that calls for interpretation of the nature of the relationship between these two specific phobias. Specifically, research aims to determine if BII phobia is merely a related condition, if dental anxiety falls under the larger grouping of the BII phobia type, if the diagnosis of BII phobia indicates a clinical level of dental anxiety, or whether BII phobia is one specific aspect of dental anxiety, such as in cases where patients fear nothing but needles in terms of Dental care (Kinner, 2014).

CHAPTER 3

AIM OF THE STUDY

The current study aims to examine the associations between psychological constructs and dental anxiety and phobia as well as the associations between demographics (age, gender, race, level of education, and income) and dental anxiety and phobia among patients seeking dental care at TUKSoD.

3.1. Hypothesis to Be Tested

Null Hypothesis (H_0): There is no correlation between dental anxiety and the selected psychological constructs.

Alternative Hypothesis (H_1): There is a correlation between dental anxiety and specific psychological constructs.

Null Hypothesis (H_0): There is no correlation between dental anxiety and the selected demographic factors.

Alternative Hypothesis (H_1): There is a correlation between dental anxiety and the selected demographic factors.

CHAPTER 4

MATERALS AND METHODS

4.1. Enrollment, Inclusion, and Exclusion Criteria

Participants enrolled were patients of TUKSoD scheduled for a dental appointment for any non-emergent care and were recruited via Axium and contacted. All persons who indicated interest to research staff were contacted by telephone and asked if they were willing to be screened for dental anxiety, and if so, if they would be interested in the possibility of participating in a study of the treatment of dental anxiety.

Inclusion criteria:

- Age: 18 to 75 years
- Modified dental anxiety scale score: ≥ 19 or a score of 4 to 5 on at least 2 of the 5 items.
- Sufficiently fluent in written and spoken English.

Exclusion criteria:

- A self-reported current medical condition (e.g., cardiopulmonary disease, seizure disorder)
- Current suicidal/homicidal ideation/intent or other condition that would take priority over an intervention focused on dental anxiety.
- Current psychosis, diminished mental capacity, or other conditions that may significantly diminish the patient's ability to adequately focus attention adaptively on the current protocol.

- Inability to give written informed consent.

A description of the study was offered, and the prospective participants were given the opportunity to have their questions about the study answered at that time. Eligible patients who enrolled in the study were compensated for their participation when all assessments for each time points were conducted. Payments were made to patients for their baseline assessments ($75), assessments conducted one month and three months after intervention day ($50 per occasion, totaling $175). Payments were made in amazon gift cards, which were sent to them via email. Baseline data from 499 patients who participated in a randomized clinical trial that evaluated the efficacy of an online intervention in managing dental anxiety was used. The protocol of this study was reviewed and approved by the Institutional Review Board of Temple University. This research was funded by the National Institute of Dental and Craniofacial Research (NIDCR U01DE027328).

4.2. Patient Consent and Confidentiality

All participants provided both verbal and written consent. The written consent documents were signed on the day of the intervention. The participant's confidentiality was protected, information collected was stored in an encrypted file on a passworded computer.

4.3. Data Source and Study Design

The study design for this research is a randomized controlled trial (RCT) characterized by parallel groups. Participants are randomly assigned to one of three parallel groups: Treatment condition 1 (Tr1) involves the dental anxiety intervention administered by cognitive-behavioral therapy (CBT) personnel; Treatment condition 2 (Tr2) features the same intervention but administered by dental staff; and the Active Control (AC) group, where participants receive feedback on their dental anxiety scale scores before their dental treatment appointments and view a nature video. The allocation ratio for randomization is 1:1:1, ensuring an equal distribution of participants across the three groups. Control group participants may have the opportunity to receive the dental anxiety intervention after completing the 3-month follow-up assessment. This longitudinal study design enables a rigorous assessment of the intervention's effectiveness in addressing dental anxiety, while also allowing for the exploration of potential moderating factors and secondary outcomes throughout a 12- to 13-month follow-up period. Only cross-sectional data from the baseline assessments was used for the purpose of this thesis work.

4.4. Measurements

Participant’s information was collected using a semi-structured diagnostic interview conducted by telephone to evaluate the presence and intensity of specific phobias related to dental procedures. MDAS and CSR are the main outcome of the study. The self -report questionnaire comprised of the following measures.

1. Dental Anxiety: Dental anxiety was assessed using the Modified Dental Anxiety Scale (MDAS), a 5-item scale that evaluates fear related to dental procedures such as cleaning, drilling, and local anesthetic injections.
2. Dental phobia: Ratings of dental fear and degree of avoidance were assessed with the aid of Anxiety Disorders Interview Schedule for DSM-IV (ADIS). Clinical

severity rating (CSR) was extracted from ADIS and a score of ≥ 4 suggests that participants meet criteria for a specific phobia (1 to 8).

3. Pain: Pain intensity experienced during the last dental visit was measured using the Pain Intensity Numeric Rating Scale (PI-NRS), an 11-point scale ranging from 0 (no pain) to 10 (worst possible pain). Pain Sensitivity Index (PSI) was also measured, and it is a 16-item self-report measure that assesses the fearful appraisal of pain and its expected physical, psychological, and social consequences. It measures pain sensitivity and is administered at baseline and the one- and three-month follow-ups.
4. Blood-Injection-Injury (BII) Phobia: This was measured using the 5-item subscale of the Fear Questionnaire (FQ-BII). It assesses an individual's avoidance of situations involving blood, injury, and injections due to anxiety or fear. Cronbach's alpha for this subscale in the study sample was 0.78.
5. Distress Tolerance: Distress tolerance was evaluated using the Distress Tolerance Scale (DTS), a 15-item measure assessing an individual's perceived ability to experience and tolerate negative emotional states. The scale contains four subscales: tolerance, appraisal, absorption, and regulation, with Cronbach's alpha of 0.89 in the study sample.

6. Anxiety and Related Disorders Interview Schedule for DSM-5 (ADIS-5): This semi-structured interview assesses DSM-5 anxiety disorders, including dental phobia. It includes ratings of fear, avoidance of dental procedures, and resultant interference. The interview was conducted at baseline assessment and at one- and three-month follow-ups.
7. Client Satisfaction Questionnaire-8 (CSQ-8): This questionnaire assesses participant satisfaction with services and clinical care. It consists of 8 items rated on a 1-to-4 scale and was administered after dental care appointments and at the one- and three-month follow-ups for participants in the intervention group but was not administered to the control group of participants.

4.5. Statistical Analysis

Descriptive analyses were first performed to summarize the characteristics of the study population. Following this, univariate and bivariate analyses were done to explore both the characteristics of individual variables and correlations between two study outcomes (MDAS, CSR) and key psychological constructs, and demographic factors (using paired sample t-test and ANOVA). A sub-group comparison of MDAS and CSR by demographics using Tukey HSD test was also conducted. Subsequently, multivariable linear regression was used to assess associations between dental anxiety/dental phobia and selected demographics and psychological constructs, while controlling for other variables in the model. These analyses were performed using R 4.3.2. The predetermined threshold for statistical significance were set at two-sided p-values < 0.05.

CHAPTER 5

RESULTS

5.1. Demographic Characteristics

A total of 499 subjects were recruited for the study and demographic data were collected. Table 1 shows the demographic characteristics of the participants. The patients' ages ranged from 18 to 75 years (48.9±14.9). The participants were grouped into 18 to 39 years defined as young adults (30%), 40 to 60 years as middle age (43.3%) and >60 years as older adults (26.7%). The study sample consisted of 71.7% females, 28.3% males and 1% transgender. The distribution of participants by race was as follows: Black or African American (62.45%), White or Caucasian (26.76%), Asian (4.56%), and Others (9.4%).

Regarding ethnicity, the Hispanic/Latinos accounted for 11.4% of the total sample. Thirty nine percent of the sample were employed, 20% were unemployed, and 17% were retired. In addition, in reference to educational level, 26% completed high school, 20% completed college, 11% completed graduate school, and 42.1% were in other categories. Annual income declared by 37% of the sample was less than $30,000, followed by 34% in the $30,000 to $59,999 range, 14% in the $60,000 to $99,999 range, and 8% in the $100,000 and above category. More than half (55.5%) of the subjects were single, followed by 22.5% married, and 2% in a relationship (not married).

Table 1. Demographic Characteristics of The Study Participants (N = 499).

	Frequency (N)	%
Age		
Young Adults	148	30.0
Middle age	214	43.3
Older Adults	132	26.7
Sex		
Males	140	28.3
Females	354	71.7
Race		
White	129	25.9
Black	301	60.3
Asian	22	4.4
Others	47	9.4
Education Completed		
Complete high school	129	26.0
Complete college	100	20.0
Complete graduate	57	11.0
Others	208	42.1
Employment status		
Employed	195	39.0
Retired	86	17.0
Unemployed	102	20.0
Annual family income		
<$30,000	186	40.0
$30 000–59 999	170	36.6
$60 000–99 999	71	15.3
≥$100 000	38	8.2

Table 1. Continued.

Marital status	**Frequency (N)**	**%**
Married	111	22.5
In relationship (not married)	10	2.0
Single (never married)	274	55.5
Others	99	20.0
Ethnicity		
Hispanic	56	11.4
Non-Hispanic	434	88.6

Table 2 shows the descriptive statistics for variables representing the clinical characteristics of the study participants. The Modified Dental Anxiety Scale (MDAS) of all participants showed a mean score and standard deviation of 19.53 ± 3.62, with a range 8 to 25. A score of ≥ 19 = high anxiety, and 63.30% of participants were highly anxious. The Clinical Severity Rating (CSR) mean was 4.49 ± 1.69, with a range of 1 to 8. A score of ≥ 4 suggests that participants met criteria for a dental phobia, and 64.57% of participants met the criteria for dental phobia. The mean scores and standard deviation of the psychological constructs, Fear Questionnaire Blood- Injection-Injury (FQBII) were 15.51 ± 10.15 (0 to 40), higher scores indicate higher levels of Fear of Blood Injection-Injury; Pain Sensitivity Index (PSI) was 68.02 ± 22.92 (0 to 112), higher scores indicate higher levels of Pain Sensitivity Index; Distress Tolerance Scale (DTS) was 44.73 ± 13.17 (15 to 75), higher score on DTS indicates greater levels of distress tolerance; The Anxiety Sensitivity Index (ASI) was 31.0 ± 16.87 (0 to 72). A score of ≥ 23 means high anxiety to sensitivity (Allen et al., 2014), and 50.00 % of participants were highly sensitive to anxiety.

Table 2. Descriptive Statistics for Clinical Scales (Mean ± sd).

Clinical variables	Mean ± sd	Range
MDAS	19.53 ± 3.62	8 to 25
CSR	4.49 ± 1.69	1 to 8
FQBII	15.51 ± 10.15	0 to 40
PSI	68.02 ± 22.92	0 to 112
DTS	44.73 ± 13.17	15 to 75
ASI	31.0 ± 16.87	0 to 72

MDAS= Modified Dental Anxiety Scale, CSR= Clinical Severity Rating, FQBII= Fear Questionnaire Blood-Injury-Injection, DTS= Distress Tolerance Scale, PSI= Psychological Index, ASI= Anxiety Sensitivity Index, SD= Standard Deviation

5.2. Bivariate Analysis

Study outcomes (MDAS, CSR), and psychological constructs (FQBII, DTS, PSI, ASI)) were stratified by selected demographic variables (Tables 3 and 4).

Table 3 shows the mean MDAS and CSR stratified by Age categories, Gender, Race, Income, and Ethnicity. In terms of age categories (Young adults, Middle-age, and Older adults), there were no significant differences in the mean MDAS (p= 0.06). However, there were statistically significant differences in the mean CSR scores across the different age groups (p< 0.01), with the Middle-aged individual showing a CSR mean score of 4.73 ± 1.65. This suggests middle-aged individuals have a higher level of avoidance compared to the other age groups.

There were statistically significant differences in the mean MDAS and CSR scores by gender (p < 0.01 and 0.03 respectively). Furthermore, there were statistically significant differences in the mean CSR scores across the different racial groups (p< 0.01), with the white or Caucasian individuals having a CSR mean score of 4.73 ± 1.65. Socioeconomic factors showed statistically significant differences in the MDAS with a $p = 0.04$.

Table 3. Mean And Standard Deviation of MDAS And CSR Stratified by Selected Demographics.

		MDAS (mean ± sd)	*p* Value	CSR (mean ± sd)	*p* Value
Age					
	Young adults	19.33 ± 3.40	0.064	4.50 ± 1.79	**0.002****
	Middle age	19.95 ± 3.70		4.73 ± 1.65	
	Older adults	19.07 ± 3.70		4.04 ± 1.57	
Sex					
	Male	18.77 ± 3.51	**0.003****	4.19 ± 1.62	**0.016***
	Female	19.83 ± 3.63		4.60 ± 1.71	
Race					
	White	19.10 ± 3.61	0.314	4.73 ± 1.65	**0.003****
	Black	19.67 ± 3.70		4.31 ± 1.70	
	Asian	19.09 ± 3.62		4.09 ± 1.80	
	Others	20.04 ± 3.18		5.13 ± 1.48	
Income					
	<$30,000	19.55 ± 3.86	**0.044***	4.54 ± 1.70	0.096
	$30 000–59 999	20.00 ± 3.48		4.60 ± 1.79	
	$60 000–99 999	18.66 ± 3.69		4.33 ± 1.57	
	≥$100 000	18.82 ± 3.18		3.86 ± 1.40	
Ethnicity					
	Hispanic	20.02 ± 3.50	0.273	4.87 ± 1.71	0.073
	Non-Hispanic	19.47 ± 3.65		4.43 ± 1.69	

Note: MDAS= Modified Dental Anxiety Scale, CSR= Clinical Severity Rating, SD= Standard Deviation. Significance codes: '***' 0.001 '**' 0.01 '*' 0.05. P values come from T-tests and ANOVA.

Table 4 shows the mean and standard deviation of psychological constructs stratified by key demographics. There were statistically significant differences in the mean score of FQBII, with young adults showing the highest mean score of 18.36 ± 9.83 (p< 0.01). Also, there were statistically significant differences in the mean Distress Tolerance Scale (DTS), with the older adults showing the highest mean score of 48.09 ± 13.20 (p value< 0.01). Furthermore, there were statistically significant differences in the mean Psychological Index (PSI), the young adults showed the highest score of 71.36 ± 20.35 with a p< 0.01.

Considering race, there were statistically significant differences in the mean FQBII, with Asians showing a higher mean FQBII of 21.73 ± 10.05 compared with Other racial group (p < 0.01). Black or African Americans showed the highest DTS mean of 46.44 ± 12.66 (p < 0.01). Furthermore, there was statistically significant difference in the PSI, with the Asians showing the greatest PSI of 80.05 ± 18.61 (p < 0.01).

There were no statistically significant differences in mean FQBII, DTS, PSI, and ASI across the Income categories. Considering ethnicity, there were statistically significant differences in the mean FQBII, with the Hispanics showing a higher Mean FQBII of 19.27 ± 11.27 than the other ethnic groups (p = 0.01). Mean DTS was statistically significant different by ethnicity, with the non-Hispanics showing the highest mean 45.58 ± 2.97 (p < 0.01). In addition, mean PSI varied by ethnicity. For example, Hispanics had the highest PSI and ASI mean scores than the other ethnic groups (p< 0.01).

Table 4. Mean And Standard Deviation of Psychological Constructs Stratified by Selected Demographics.

Variables	Categories	FQBII (mean ± sd)	*P*-value	DTS (mean ± sd)	*P*-value	PSI (mean ± sd)	*P* value	ASI (mean ± sd)	*P*-value
Age	Young adults	18.36 ± 9.83	**<0.01**	42.65 ± 11.81	**<0.01**	71.36 ± 20.35	**<0.01**	32.41 ± 15.61	0.06
	Middle age	15.03 ± 10.56		43.97 ± 13.65		69.97 ± 23.31		32.11 ± 18.09	
	Older adults	13.11 ± 9.13		48.09 ± 13.20		61.29 ± 23.64		27.92 ± 16.02	
Race	White or Caucasian	14.92 ± 9.66	**<0.01**	43.19 ± 14.07	**<0.01**	65.68 ± 22.93	**<0.01**	30.97 ± 16.70	0.20
	Black or African American	14.71 ± 10.16		46.44 ± 12.66		66.57 ± 23.26		30.00 ± 16.74	
	Asians	21.73 ± 10.05		41.54 ± 11.27		80.05 ± 18.61		35.05 ± 16.01	
	others	18.70 ± 10.07		40.34 ± 13.04		77.10 ± 19.25		35.18 ± 18.26	
Sex	Male	15.30 ± 9.35	0.14	45.35 ± 12.37	0.25	65.17 ± 22.11	0.11	34.04 ± 16.63	0.06
	female	15.34 ± 10.46		44.71 ± 13.41		68.56 ± 23.29		29.69 ± 16.87	
Income	<$30,000	15.99 ± 10.60	0.47	44.50 ± 13.70	0.52	70.30 ± 23.30	0.17	33.46 ± 18.43	0.09
	$30 000–59 999	15.13 ± 10.09		44.55 ± 12.57		67.83 ± 22.89		29.17 ± 15.72	
	$60 000–99 999	13.54 ± 9.92		47.29 ± 13.06		63.40 ± 22.39		28.53 ± 14.82	
	≥$100 000	14.71 ± 9.27		44.14 ± 13.87		63.74 ± 22.91		29.28 ± 16.52	
Ethnicity	Hispanic	19.27 ± 11.27	**0.01**	39.33 ± 13.88	**<0.01**	77.34 ±21.07	**<0.01**	38.17 ± 6.95	**<0.01**
	Non-Hispanic	14.88 ± 9.89		45.58 ± 2.97		66.51 ± 22.91		29.99 ± 6.71	

FQBII= Fear Questionnaire Blood-Injury-Injection, DTS= Distress Tolerance Scale, PSI= Psychological Index, ASI= Anxiety Sensitivity Index; DF= Degree of freedom, SD= Standard Deviation. Sex and Ethnicity = T-test, Age, Race, Income = ANOVA.

5.3. Multiple Comparison Test.

Table 5. Tukey multiple comparisons of MDAS and CSR by demographic variables.

Variables	**Difference**	**Confidence Interval**	***P* value**
Age (CSR)			
Middle-Aged-Older adults	0.69	0.24 – 1.14	**<0.01**
Young Adults-Older adults	0.46	-0.02 – 0.94	0.06
Young Adults-Middle-Aged	-0.23	-0.66 – 0.20	0.41
Race (CSR)			
Black-Asian	0.22	-0.73 – 1.17	0.93
Others-Asian	1.04	-0.08 – 2.15	0.08
White-Asian	0.65	-0.36 – 1.65	0.34
Others-Black	0.82	0.14 – 1.49	**0.01**
White-Black	0.43	-0.04 – 0.90	0.09
White-Others	-0.39	-1.13 – 0.35	0.53
Income (MDAS)			
2 – 1	0.44	-0.56 – 1.44	0.67
3 – 1	-0.89	-2.20 – 0.42	0.30
4 – 1	-0.73	-2.41– 0.94	0.67
3 – 2	-1.33	-2.66 – 0.003	0.05
4 – 2	-1.17	-2.86 – 0.52	0.28
4 - 3	0.15	-1.74 – 2.04	0.10

Note:1= <$30,000, 2= $30 000–59 999, 3= $60 000–99 999, 4= ≥$100 000, MDAS= Modified Dental Anxiety Scale, CSR= Clinical Severity Rating. Sex and Ethnicity = T-test, Age, Race, Income = ANOVA

Table 5 shows a sub-group comparison of MDAS and CSR by various demographic variables of interest using Tukey HSD test. We found a statistically significant difference in the mean CSR of 0.69 between the middle-aged adults and the older adults (CI = 0.24 –

1.14; p = <0.01). In addition, there were statistically significant differences found with a mean CSR of 0.82 between the Black race and other races (95% CI 0.14, 1.49; p = 0.01).

Table 6 shows a sub-group comparison of various psychological constructs by various demographic variables that had more than 2 categories using Tukey HSD test. A sub-group comparison of FQBII by age categories demonstrated statistically significant differences in the mean FQBII of 5.24 between the young adults and the older adults (95% CI of 2.23, 8.25; p= <0.01). Furthermore, there were statistically significant differences in FQBII between young adults and middle-aged adults with a difference of 3.33 (95%CI of 0.55, - 6.10; p = 0.01). There was also a significant difference in DTS by the age category (-4.12) between the middle-aged adults and the older adults (95% CI of -7.69, 0.54; p = 0.02). Furthermore, the young adults and older adults showed a statistically significant difference in DTS, with a difference of -5.44 (95% CI of -9.39, -1.49; p = <0.01).

Comparison of PSI by age categories showed a statistically significant difference of 8.67 between the middle-aged adults and the older adults, (95% CI of 2.44, 14.90; p= <0.01). In addition, the young adults and older adults showed a statistically significant difference in PSI, with a difference of 10.06 (95% CI of 3.21, 16.92; p= <0.01).

Considering FQBII by race, there was a statistically significant differences of -7.01 between the Blacks and Asians (95% CI of -12.76, -1.27; p= <0.01). In addition, FQBII was significantly different between the Whites and Asians (-6.81, 95% CI = -12.83, -0.79; p = 0.02). According to the comparison of DTS by race, there was difference of -6.10 between the other races and the Blacks (95% CI = -11.77, -0.44; p = 0.03). Considering difference in PSI by race, there were statistically significant differences of -13.48 between the Blacks and Asians (95% CI = -26.45, -0.50; p = 0.04). In addition, there was a statistically significant difference of -14.37 and 95% CI of -27.95, -0.79 (p = 0.03) between the White and Asian, and difference of 10.53 between the other races and Blacks (95% CI = 0.59, 20.47; p = 0.03). Furthermore, there was a statistically significant difference of -11.42 between the Whtie and other races (95% CI of -22.14, - 0.71; p = 0.03).

Table 6. Tukey Multiple Comparisons of Psychological Construct by Demographic Variables.

	Difference	Confidence Interval	*P* value
Age (FQBII)			
Middle-Aged Adults-Older adults	1.92	-0.82 – 4.65	0.23
Young Adults-Older adults	5.24	2.23 – 8.25	**<0.01**
Young Adults-Middle-Aged	3.33	0.55 – 6.10	**0.01**
Age (DTS)			
Middle-Aged Adults-Older adults	-4.12	-7.69 – -0.54	**0.01**
Young Adults-Older adults	-5.44	-9.39 – -1.49	**<0.01**
Young Adults-Middle-Aged	-1.32	-4.94 – 2.30	0.67
Age (PSI)			
Middle-Aged Adults-Older adults	8.67	2.44 –14.90	**<0.01**
Young Adults-Older adults	10.06	3.21 – 16.92	**<0.01**
Young Adults-Middle-Aged	1.39	-4.92 – 7.70	0.86
Race (FQBII)			
Black-Asian	-7.01	-12.76 – -1.27	**0.01**
Others-Asian	-3.03	-9.89 – 3.83	0.67
White-Asian	-6.81	-12.83 – -0.79	**0.02**
Others-Black	3.98	-0.42 – 8.38	0.09
White-Black	0.20	-2.72 – 3.13	0.10
White-Others	-3.78	-8.53 – 0.97	0.17
Race (DTS)			
Black-Asian	4.90	-2.58 – 12.37	0.33
Others-Asian	-1.20	-10.09 – 7.68	0.99
White-Asian	1.66	-6.18 – 9.47	0.95
Others-Black	-6.10	-11.77 – -0.44	**0.03**

Table 6. continued.

Race (DTS)	**Difference**	**Confidence Interval**	***P* value**
White-Black	-3.25	-7.04 – 0.53	0.12
White-Others	2.85	-3.26 – 8.96	0.63
Race (PSI)			
Black-Asian	-13.48	-26.45 – -0.50	**0.04**
Others-Asian	-2.95	-18.43 – 12.54	0.96
White-Asian	-14.37	-27.95 – -0.79	**0.03**
Others-Black	10.53	0.59 – 20.47	**0.03**
White-Black	-0.89	-7.49 – 5.70	0.99
White-Others	-11.42	-22.14 – - 0.71	**0.03**

FQBII= Fear Questionnaire Blood-Injury-Injection, DTS= Distress Tolerance Scale, PSI= Psychological Index, ASI= Anxiety Sensitivity Index.

Table 7 shows that MDAS and the psychological constructs (FQBII, DTS and ASI) had a positive correlation, while PSI showed a negative correlation. Considering CSR and the psychological constructs, FQBII and DTS showed a positive correlation to CSR, while PSI and ASI had negative correlations to CSR. However, none of the findings were significant.

Table 7. Pearson correlation matrix between MDAS, CSR and the Psychological constructs.

	FQBII	***P* value**	**DTS**	***P* value**	**PSI**	***P* value**	**ASI**	***P* value**
MDAS	0.158	0.272	0.088	0.542	-0.258	0.070	0.072	0.62
CSR	0.192	0.182	0.207	0.149	-0.230	0.108	-0.167	0.25

MDAS= Modified Dental Anxiety Scale, CSR= Clinical Severity Rating. FQBII= Fear Questionnaire Blood-Injury-Injection, DTS= Distress Tolerance Scale, PSI= Psychological Index, ASI= Anxiety Sensitivity Index.

5.4. Regression Models

Model 1

Table 8. Multivariable Linear Regression Model with MDAS as a Dependent Variable and Selected Demographics as Independent Variables.

		β-Estimate	Std. Error	t value	*P*-value
Age					
	Young Adult	0.07	0.46	0.16	0.88
	Middle-Aged	0.69	0.42	1.64	0.10
	Older adults	-	-	-	-
Sex					
	Female	0.96	0.38	2.54	**0.01**
	Male	-	-	-	-
Race					
	Black	0.59	0.43	0.39	0.17
	Asians	0.15	0.89	0.17	0.87
	White	-	-	-	-
	Others	0.45	0.70	0.64	0.52
Income					
	<$30,000	-	-	-	-
	$30 000–59 999	0.40	0.39	1.02	0.31
	$60 000–99 999	-0.74	0.52	-1.42	0.16
	≥$100 000	-0.46	0.67	-0.69	0.49
Ethnicity					
	Non-Hispanic	-0.58	0.60	-0.97	0.33
	Hispanic	-	-	-	-

Adjusted R^2 = 0.019, F-statistic = 2.015

Table 8 shows the result from the multivariable linear regression analysis with MDAS as an outcome and demographic variables of interest. Females had a 0.96 increase in mean MDAS when compared to males after adjusting for other key demographics (*p*-value = 0.01). However, after accounting for potential confounding, age, race, income, and ethnicity were not significantly associated with MDAS. The model only explained 1.9% of the variability in MDAS scores.

Model 2

Table 9. Multivariable Linear Regression Model of MDAS, Demographics and Psychological Constructs.

		β-Estimate	Std. Error	t value	*P*-value
Age					
	Young Adults	-0.41	0.44	-0.91	0.36
	Middle-Aged	0.48	0.40	1.21	0.23
	Older adults	-	-	-	-
Sex					
	Female	0.55	0.38	1.45	0.15
	Male	-	-	-	-
Race					
	Black	0.64	0.40	1.59	0.11
	White	-	-	-	-
	Asians	-1.01	0.80	-1.26	0.21
	Others	-.01	0.67	-0.01	0.99
Income					
	<$30,000	-	-	-	-
	$30 000–59 999	0.40	0.37	1.06	0.29
	$60 000–99 999	-0.31	0.50	-0.62	0.54

Table 6. continued.

		β-Estimate	Std. Error	t value	*P*-value
Income					
	≥$100 000	-0.63	0.62	-1.02	0.31
Ethnicity					
	Non-Hispanic	-0.08344	0.59	-0.14	0.89
	Hispanic	-	-	-	-
FQBII		0.06	0.02	3.277	<**0.01**
PSI		0.06	0.01	5.612	<**0.01**
DTS		-0.02	0.02	-1.48	0.14
ASI		-0.03	0.02	-1.95	0.05

Adjusted R^2 = 0.22, F-statistic = 8.87

Table 9 shows the result from the multivariable linear regression model with MDAS as a dependent variable and demographics and psychological constructs as independent variables. We found that black individuals had a 0.64 increase in MDAS when compared to Whites after adjusting for other demographic and clinical variables in the model.

For every one unit increase in FQBII, there was a 0.06 increase in MDAS after adjusting for other variables in the model ($p<0.01$). In addition, PSI was also found to be significantly correlated to dental anxiety. For every one unit increase in PSI, there was a 0.06 increase in MDAS after adjusting for other variables in the model ($p<0.01$). In contrast, both DTS and ASI seemed to decrease MDAS scores but did not reach statistical significance. The model explained 22% variability in MDAS scores.

Model 3

Table 10. Final Multivariable Linear Regression Model of MDAS and Significant Variables.

		β-Estimate	**Std. Error**	**t value**	***P*-value**
Sex					
	Female	0.66	0.35	1.88	0.06
	Male	-	-	-	-
Race					
	Black	0.70	0.36	1.96	0.05
	White	-	-	-	-
	Asians	-1.17	0.74	-1.59	0.11
	Others	0.72	0.95	0.76	0.14
FQBII		0.06	0.018	3.18	**0.00**
PSI		0.05	0.01	6.89	**0.00**

Adjusted R^2 = 0.22, F-statistic = 20.02

Table 10 shows the final multivariable linear regression model of significant variables for MDAS. Among Black participants, there was a 0.70 increase in MDAS compared to whites after adjusting for other key demographic and clinical variables (p-value= 0.05). Furthermore, for every one unit increase in FQBII and PSI, there was a 0.06 and 0.05 increase in MDAS respectively, after adjusting for other variables in the model. However, the model only explained 22% of variability in MDAS scores.

Model 4

Table 11. Multivariable Linear Regression Model with CSR as a Dependent Variable and Demographics as Independent Variables.

		β-Estimate	Std. Error	t value	*P*-value
Age					
	Young Adults	0.45	0.22	2.07	**0.03**
	Middle-Aged	0.71	0.20	3.52	**0.00**
	Older adults	-	-	-	-
Sex					
	Female	0.29	0.18	1.66	0.10
	Male	-	-	-	-
Race					
	Black	-0.54	0.20	-2.64	**<0.01**
	White	-	-	-	-
	Asians	-0.73	0.41	-1.80	0.07
	Others	0.25	0.32	0.76	0.45
Income					
	<$30,000	-	-	-	-
	$30 000–59 999	0.04	0.18	0.21	0.84
	$60 000–99 999	-0.21	0.25	-0.83	0.41
	≥$100 000	-0.67	0.31	-2.18	**0.03**
Ethnicity					
	Non-Hispanic	0.17	0.28	0.62	0.53
	Hispanic	-	-	-	-

Adjusted R^2 = 0.06, F-statistic = 3.59

Table 11 shows the multivariable linear regression model with CSR as a dependent variable and the demographic variables of interest as independent variables. We found that both the young adults and the middle-aged adults had a 0.45 and 0.71 increase in mean CSR when compared to the older adults after adjusting for other key demographics in the model (*p*-value = 0.04 and < 0.01 resp.).

Furthermore, the Blacks had a 0.54 decrease in mean CSR when compared to Whites after adjusting for other key demographics in the model (*p*-value <0.01). In addition, individuals with income ≥$100,000 showed a 0.67 decrease in mean CSR compared to individuals with an income <30,000 after adjusting for other key demographics in the model (*p*-value = 0.03). However, sex was not significantly associated with CSR. The model only explained 6 % of the variability in CSR scores.

Model 5

Table 12. Multivariable Linear Regression Model of CSR as a dependent variable, Demographics and Psychological Constructs as Independent Variables.

		β-Estimate	Std. Error	t value	*P*-value
Age					
	Young	0.18	0.22	0.79	0.43
	Middle-Aged	0.43	0.20	2.13	**0.03**
	Older adults	-	-	-	-
Sex					
	Female	0.18	0.19	0.91	0.36
	Male	-	-	-	-
Race					
	Black	-0.47	0.21	-2.26	**0.02**
	White	-	-	-	-
	Asians	-1.08	0.39	-2.74	<**0.01**
	Others	0.51	0.35	1.52	**0.128**
Income					
	<$30,000	-	-	-	-
	$30 000–59 999	0.12	0.19	0.64	0.52
	$60 000–99 999	-0.08	0.26	-0.29	0.77
	≥$100 000	-0.49	0.31	-1.58	0.12
Ethnicity					
	Non-Hispanic	0.53	0.29	1.80	0.07
	Hispanic	-	-	-	-
FQBII		0.03	0.01	3.48	<**0.01**
PSI		0.01	0.01	2.26	**0.02**
DTS		-0.01	0.01	-1.02	0.31
ASI		0.00	0.01	0.55	0.59

Adjusted R-squared = 0.171, F-statistic = 6.33

Table 12 shows the multivariable linear regression model with CSR as a dependent variable and demographics and clinical scales as independent variables. As seen in table 12, middle-aged adults had a 0.43 increase in CSR when compared to the older adults after adjusting for other key demographics and clinical variables in the model (*p*-value = 0.03).

Furthermore, Black individuals and Asians had a 0.47 and 1.08 decrease in CSR respectively when compared to Whites after adjusting for other key demographics in the model (*p*-value = 0.02 and <0.01 resp.). Sex and income were not statistically significant.

For every one unit increase in FQBII, there was a 0.03 increase CSR after adjusting for other variables in the model (*p*-value = 0.00), and for every one unit increase in PSI, there was a 0.01 increase in of CSR after adjusting for other variables in the model (*p*-value = 0.02). In contrast, DTS seemed to decrease CSR scores but did not reach statistical significance. The model explained 17% of variability in CSR scores.

Model 6

Table 13. Final Multivariable Linear Regression Model of CSR and Significant Variables.

		β-Estimate	Std. Error	t value	*P*-value
Age					
	Young Adults	0.18	0.21	0.88	0.38
	Middle-Aged	0.41	0.19	2.14	**0.03**
	Older adults	-	-	-	-
Race					
	Black	-0.33	0.18	-1.82	0.07
	White	-	-	-	-
	Asians	-1.04	0.37	-2.85	<**0.01**
	Others	0.42	0.30	1.38	0.17
FQBII		0.03	0.01	3.81	<**0.01**
PSI		0.02	<0.01	4.49	<**0.01**

Adjusted R-squared = 0.179, F-statistic = 13.33

Table 13 showed the multivariable linear regression model of significant variable for CSR. For age, the middle-aged adults showed a 0.41 increase in mean CSR when compared to the older adults after adjusting for other key demographics and clinical variables in the model (*p*-value= 0.04).

For race, Black and Asians individuals indicated a 0.33 and 1.04 decrease in CSR respectively, compared to Whites after adjusting for other key demographics and clinical variables (*p*-value= 0.07 and <0.01 resp.). In addition, the other races showed a 0.42 increase in CSR compared to Asians after adjusting for other key demographic variables (*p*-value= 0.17).

Clinical scales, for every one unit increase in FQBII and PSI, there was a 0.03 and 0.02 increase in CSR respectively, after adjusting for other variables in the model (*p*-value= 0.00 and 0.00 resp.). However, the model only explained 17.9% of variability in CSR scores.

We tested for potential effect modifiers while performing the multivariable regression model. However, our findings revealed that none of these modifiers exerted a statistically significant influence on the outcome of interest. and there was no significant influence found in the outcome of the model. In addition, we intentionally omitted variables like income and ethnicity to streamline the interpretability of our models. Despite their inclusion, these variables did not significantly contribute to our understanding of the outcome. This deliberate refinement ensures a more concentrated and insightful analysis, ultimately strengthening the rigor and clarity of our findings. The adjusted R^2 went from 0.019 in model 1 to 0.22 in model 3 for MDAS and 0.060 in model 4 to 0.179 in model 6 for CSR. This shows the improvement of the models in explaining the 22% and 17.9% variability of the in MDAS and CSR scores respectively.

CHAPTER 6

DISCUSSION

Dental anxiety and dental phobia are common conditions that can lead to refraining from dental treatment (Tellez et. al., 2015; Locker, D. et al., 2003) and overall can lead to a decreased oral health status and quality of life-related to oral health. These conditions often result in the need for more complex and costly dental care. Additionally, they are associated with various psychological symptoms (Kinner, 2014) such as palpitations, dry mouth, sweatiness, syncope, signs of panic etc. About 10 to 20% of American adults experience dental anxiety and fear, and despite advances in the field of dentistry, there have been no significant improvements in effective non-pharmacological interventions that could be delivered in dental settings (Tellez et. al., 2015). A few studies have highlighted an intricate interplay between dental anxiety and key psychological constructs such as blood-injection-injury (BII) fear, distress tolerance, pain sensitivity, anxiety sensitivity, social appearance, oral health-related quality of life, emotional regulation, and mindfulness symptoms (Locker et. al., 2003; Mehrstedt et. al., 2007; Kinner, 2014). Researchers have hypothesized that these constructs are linked to anxiety severity, phobia levels, and avoidance behaviors. We have examined four key psychological constructs which are blood-injection-injury (BII) fears, distress tolerance, pain sensitivity, anxiety sensitivity in relation to dental anxiety (MDAS), and anxiety-related disorder (ADIS).

In the current study, we hypothesized that there are correlations between dental anxiety and psychological constructs and correlations between dental anxiety and demographic factors. The main aim of this study was to examine the associations between psychological constructs and dental anxiety and phobia and explore variations in those associations by demographics (age, gender, race, level of education, income, and ethnicity) of patients seeking dental care at TUKSoD.

In terms of correlations of demographics/ psychological constructs and dental anxiety, our hypothesis was upheld by our findings. Dental anxiety among age groups revealed that middle-aged individuals were more anxious compared to other age groups; however, this was not statistically significant (p= 0.064). This finding was similar to studies by Alansaari et al, 2023, Stabholz et al, 1999, Thomson et al. 1996, and Vassend, 1993. However, Malvania et al., in 2023 found that young adults showed higher levels of dental anxiety compared to other groups. Furthermore, the middle-aged adults demonstrated a significantly higher level of dental phobia (CSR) than the other age groups (p< 0.01). Moreover, Doerr et al in 1998 found no correlation between age and dental anxiety. Females exhibited higher levels of dental anxiety and dental phobia compared to males. This finding was consistent with prior studies (Malvania et al., 2023; Alansaari et al., 2023; Doer et al. 1998), but it was not statistically significant in their studies.

Considering of race, The Blacks exhibited higher levels of dental anxiety compared to other races. This was in keeping with findings by (Alansaari et al., 2023); however, Doerr et al in 1998 found no correlation between race and dental anxiety. Regarding income, individuals who earned $30,000 – $59,999 showed the highest level of dental anxiety compared to other income groups. However, Alansaari et al. in 2023 did not find any significant differences by income.

Significant demographics that correlate to dental anxiety (sex and income), and CSR (age and race) were consistent with a previous study (Alansaari et al., 2023).

In addition, age, race, FQBII, and PSI were found to be significantly correlated to both MDAS and CSR. However, the findings of this study were similar to that of previous studies (Tellez et. al., 2015). However, the amount of variability unexplained by the models is still substantial. Furthermore, we found a positive correlation between dental anxiety and FQBII/ PSI. This was similar to findings suggested by previous studies (Vika et al., 2008; Vassend, 1993)

In the present study, ASI was not significantly correlated to dental anxiety nor phobia, this is consistent with findings previous studies (De Jongh et al., 1995).

Studies have revealed that different assessments of dental anxiety and specific phobia of dental procedures may lead to inconsistent findings regarding the relationship between dental anxiety and other psychological disorders. Inconsistent results could be due to varying diagnostic instruments used, such as self-report measures versus clinician-administered interviews, and differences in sample populations, such as individuals seeking treatment at dental clinics versus community samples. Most of the studies investigating the correlations of dental anxiety have employed self-report measures, rather than clinician-administered interviews, which may not accurately assess specific phobia of dental procedures across the literature. However, we employed the use of both self-reported measures and clinical interviews to acquire more accurate baseline information and the relationship between dental anxiety and psychological constructs. The cross-sectional nature of pain data should be interpreted cautiously, as more anxious patients could perceive aversive situations as more traumatic than non-anxious patients.

Future direction

1. Further research is needed to refine our comprehension of these relationships and to develop tailored strategies for managing distress, pain sensitivity, and BII-related fears in individuals with dental anxiety.
2. To prioritize the development of targeted interventions to improve dental anxiety and phobia, especially among non-white, low-income women, while also assessing the effectiveness of culturally sensitive approaches.

Limitations

1. It is important to highlight that the individuals recruited for this study were patients actively seeking care in the dental school, and their responses may differ from those in the general population. This might consequently limit the generalization of the research findings.

CHAPTER 7

CONCLUSION

This study showed that dental anxiety and phobia were significantly associated with key demographics and psychological constructs. Dental anxiety and phobia were highly prevalent in this clinic sample, being more prevalent among non-white low-income women. Age, sex, income, and race were found to have a positive correlation with dental anxiety. Furthermore, psychological constructs such as FQBII and PSI were also found to be predictors of dental anxiety. However, having high pain sensitivity and fear of blood/injections seemed to increase dental anxiety.

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APPENDIX A

ASSESSMENTS

Modified Dental Anxiety Scale
Medical Screening Interview
Anxiety Disorders Interview Schedule-5 Specific Phobia Module
Pain Intensity Numeric Rating Scale
Anxiety Sensitivity Index-3
Distress Tolerance Scale
Fear Questionnaire Blood-Injury-Injection Subscale
Client Satisfaction Questionnarie-8

APPENDIX B

MODIFIED DENTAL ANXIETY SCALE

We are interested in how anxious you get, if at all, with your dental visit. By anxious, we mean *nervous* or *scared*. For each item, please answer using the following scale:

1		2		3		4		5
Not anxious	____________	**Slightly anxious**	____________	**Fairly anxious**	____________	**Very anxious**	____________	**Extremely anxious**

_____ 1. If you went to your dentist for treatment tomorrow, how would you feel?

_____ 2. If you were sitting in the waiting room, waiting for dental treatment, how would you feel?

_____ 3. If you were about to have a tooth drilled, how would you feel?

_____ 4. If you were about to have your teeth scaled and polished, how would you feel?

_____ 5. If you were about to have a local anesthetic injection in your gum, above an upper back tooth, how would you feel?

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 your Dentist for TREATMENT TOMORROW, how would you feel?**

   Not Anxious ☐ *Slightly Anxious* ☐ *Fairly Anxious* ☐ *Very Anxious* ☐ *Extremely Anxious* ☐

1. **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* ☐

1. **If you were about to have a TOOTH DRILLED, how would you feel?**

   Not Anxious ☐ *Slightly Anxious* ☐ *Fairly Anxious* ☐ *Very Anxious* ☐ *Extremely Anxious* ☐

1. **If you were about to have your TEETH SCALED AND POLISHED, how would you feel?**

   Not Anxious ☐ *Slightly Anxious* ☐ *Fairly Anxious* ☐ *Very Anxious* ☐ *Extremely Anxious* ☐

1. **If you were about to have a 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* ☐

Instructions for scoring **(remove this section below before copying for use with patients)**

The Modified Dental Anxiety Scale. Each item scored as follows:

Not anxious	=	1
Slightly anxious	=	2
Fairly anxious	=	3
Very anxious	=	4
Extremely anxious	=	5

Total score is a sum of all five items, range 5 to 25: Cut off is 19 or above which indicates a highly dentally anxious patient, possibly dentally phobic

APPENDIX C

MEDICAL SCREENING QUESTIONNAIRE

MEDICAL HISTORY

FAMILY HISTORY: (Please fill all that apply)

○ Diabetes	○ Tuberculosis	○ Asthma
○ High Blood Pressure	○ Mental or Emotional Disorders	○ Cancer
○ Alcoholism		

PERSONAL HISTORY: (Please check all those that apply)

○ Chicken Pox	○ History of Heart Attack	○ Asthma
○ Measles	○ Hypertension♠	○ Eczema
○ German Measles (Rubella)	○ History of Stroke	○ Hives
○ Mumps	○ Positive Stress Test	○ Hay Fever
○ Scarlet Fever	○ History of Angina/ Chest Pain	○ Bulimia
○ Chronic Ear Infection	○ Congenital or other Heart Problems	○ Anorexia
○ Pneumonia	○ Mental or Emotional Disorders*	○ Cancer
○ Orthopedic Problems	○ Seizure Disorder	○ Diabetes Mellitus
○ Tuberculosis	○ Kidney Disease	○ Blood Disorders
○ Stomach/Intestinal Problems (chronic)	○ Liver Disease/Hepatitis	○ Lung Disease
○ Urinary Tract Infection/ Kidney Infection	○ Glaucoma	○ Thyroid Disorders
○ Anemia	○ Tested HIV Positive	○ Alcohol Abuse
○ Arthritis	○ Migraine Headaches	○ Drug Abuse

♠, * : See following page for related question.

Operations - Include dates:

____

Female Patients Only: Are you currently taking oral contraceptives? Yes ○ No ○

Number of days absent from work last year? [ ][ ][ ]

⓪ ⓪ ⓪
① ① ①
② ② ②
③ ③ ③
④ ④
⑤ ⑤
⑥ ⑥
⑦ ⑦
⑧ ⑧
⑨ ⑨

Any known allergy to medicine: Yes ○ No ○

If yes, describe:____

____

Do you require daily medication of any nature? Yes ○ No ○

If yes, describe:____

____

*Have you ever had psychotherapy? Yes ○ No ○

Therapist's name____

If yes, for what were you receiving treatment?______________________________

For how long a period of time?____________________________________

Type of treatment received_______________________________________

Have you ever been hospitalized for a mental disorder? Yes ○ No ○

If Yes, please explain and give dates_________________________________

Are you **currently** taking medication for a mental disorder? Yes ○ No ○

If yes, what medication(s) are you taking?____________________________

Please give dosage of medication(s)_________________________________

____

Have you **ever in the past** received medication(s) for a mental disorder? Yes ○ No ○

Please give dosage of medication(s)

____

Are you currently taking medication for high blood pressure? Yes ○ No ○

If yes, what medication(s)____

For how long?____

Does the medication bring your blood pressure to within normal limits?______________

If not, do you have diet restrictions to control your blood pressure?_______________

APPENDIX D

ANXIETY DISORDERS INTERVIEW SCHEDULE FOR DSM-5, SPECIFIC PHOBIA MODULE

SPECIFIC PHOBIA

I. INITIAL INQUIRY

For each situation, make separate ratings for level of fear and degree of avoidance using the following scale:

0	2	4	6	8
No fear/ Never avoids	Mild fear/ Rarely avoids	Moderate fear/ Sometimes avoids	Severe fear/ Often avoids	Very severe fear/ Always avoids

0------------1------------2------------3------------4------------5------------6------------7------------8

For each situation, inquire for both current and past episodes:

Currently, do you fear or do you avoid such things as:

Use space for comments to record other clinically useful information (e.g., frequency with which feared situation arises).

	FEAR	AVOID	COMMENTS
Animals			
1. Dogs	___	___	________________
2. Snakes	___	___	________________
3. Spiders	___	___	________________
4. Bees/insects	___	___	________________
5. Other ____________	___	___	________________
Natural Environment			
6. Heights	___	___	________________
7. Storms	___	___	________________
8. Water	___	___	________________
Blood-Injury-Injection (self or others)			
9. Blood from minor cut	___	___	________________
10. Receiving injections	___	___	________________
11. Having blood drawn	___	___	________________
12. Invasive dental/medical procedures	___	___	________________
Situational			
13. Air travel	___	___	________________
14. Elevators/enclosed places	___	___	________________
15. Driving	___	___	________________
Other			
16. Choking	___	___	________________
17. Vomiting	___	___	________________
18. Contracting an illness	___	___	________________
19. Childhood fears (e.g., loud sounds, costumed characters)	___	___	________________
20. Other ____________	___	___	________________

****

If no evidence is found for fear/avoidance,
Skip to **POSTTRAUMATIC STRESS DISORDER** (p. 39).

****

II. CURRENT EPISODES

Complete for each specific fear that is potentially of clinical severity:

Now I want to ask you a series of questions about your <u>current</u> specific fears.

A. Specific Fear #1: ____

1. **What are you concerned will happen in this situation?** ____________________________

   ____

2. **Do you feel anxious nearly every time you enter this situation or when you are faced with the possibility of having to enter this situation?**

   YES ___ NO ___

3. **Does the anxiety occur as soon as you enter the situation or are about to enter the situation, or is the anxiety sometimes delayed or unexpected?**

   IMMEDIATE ____ DELAYED ___

4a. **Are you anxious about these situations because you are afraid that you will have a panic attack?**

   YES ____ NO ___

   If YES,

b. **Other than times when you are exposed to** ______________ (specify phobic situation), **have you experienced an unexpected rush of fear/anxiety?**

   YES ____ NO ___

   If YES, **Where has this occurred?** ____________________________________

   If YES to 4a. or 4b., consider whether fear could be subsumed under Panic Disorder/Agoraphobia. Also consider whether the "with panic attacks" specifier should be assigned with a diagnosis of Specific Phobia (i.e., administer panic attack symptom ratings in Panic Disorder section for Other Disorder, p. 8).

5. **In what ways has this fear interfered with your life** (e.g., daily routine, job, social activities)?; **How much are you bothered by this fear?**

   ____

   ____

   Rate interference: ______________ distress: ______________

   0-----------1-----------2-----------3-----------4-----------5-----------6-----------7-----------8

   None Mild Moderate Severe Very severe

6a. **When did your fear and avoidance of** ________ **become a problem?** (Determine when the Specific Phobia met *DSM-5* threshold; i.e., when the fear/avoidance of the object/situation became sufficiently prominent to cause clinically significant interference and distress.)

   ____

   Date of Disorder Onset: ______________ Month ______________ Year

b. **Can you recall anything that might have led to this fear?**

YES ____ NO ____

____

____

7a. **Besides this current period, have there been other, separate periods of time before this when you were bothered by this same fear** (inquire about discrete, previous episodes of Specific Phobia for this object/situation that were followed by periods of remission)**?**

YES ____ NO ____

b. If YES, **When did this/these past period(s) of fears and avoidance occur?**

____

If YES, the clinician should consider inquiring about past episodes, particularly if the clinician determines that this information may be important for clinical or diagnostic reasons.

B. Specific Fear #2: ____

1. **What are you concerned will happen in this situation?** ____

____

2. **Do you feel anxious nearly every time you enter this situation or when you are faced with the possibility of having to enter this situation?**

YES ____ NO ____

3. **Does the anxiety occur as soon as you enter the situation or are about to enter the situation, or is the anxiety sometimes delayed or unexpected?**

IMMEDIATE ____ DELAYED ____

4a. **Are you anxious about these situations because you are afraid that you will have a panic attack?**

YES ____ NO ____

If YES,

b. **Other than times when you are exposed to** ______________ (specify phobic situation)**, have you experienced an unexpected rush of fear/anxiety?**

YES ____ NO ____

If YES, **Where has this occurred?** ____

If YES to 4a. or 4b., consider whether fear could be subsumed under Panic Disorder/Agoraphobia. Also consider whether the "with panic attacks" specifier should be assigned with a diagnosis of Specific Phobia (i.e., administer panic attack symptom ratings in Panic Disorder section for Other Disorder, p. 8).

5. **In what ways has this fear interfered with your life** (e.g., daily routine, job, social activities)**?; How much are you bothered by this fear?**

____

____

Rate interference: ______________ distress: ______________

0------------1------------2------------3------------4------------5------------6------------7------------8

None Mild Moderate Severe Very severe

38 SPECIFIC PHOBIA

6a. **When did your fear and avoidance of ________ become a problem?** (Determine when the Specific Phobia met *DSM-5* threshold; i.e., when the fear/avoidance of the object/situation became sufficiently prominent to cause clinically significant interference and distress.)

____

Date of Disorder Onset: ______________ Month ______________ Year

b. **Can you recall anything that might have led to this fear?**

____

____

7a. **Besides this current period, have there been other, separate periods of time before this when you were bothered by this same fear** (inquire about discrete, previous episodes of Specific Phobia for this object/situation that were followed by periods of remission)**?**

YES ____ NO ____

b. If YES, **When did this/these past period(s) of fears and avoidance occur?**

____

If YES, the clinician should consider inquiring about past episodes, particularly if the clinician determines that this information may be important for clinical or diagnostic reasons.

7c. CSR (clinical severity rating) of diagnosis (0-8 scale): __________

7d. Rate whether this patient meets criteria for a diagnosis of specific phobia of dental procedures (CSR of 4 or above): ______ YES ______ NO

APPENDIX E

PAIN INTENSITY NUMERIC RATING SCALE

How much pain did you experience during your dental procedure today?

0	1	2	3	4	5	6	7	8	9	10
No pain		Mild Pain		Moderate Pain		Severe pain		Very severe pain		Worst possible pain

How much pain do you expect to experience during your next dental procedure?

0	1	2	3	4	5	6	7	8	9	10
No pain		Mild Pain		Moderate Pain		Severe pain		Very severe pain		Worst possible pain

APPENDIX F

ANXIETY SENSITIVITY INDEX-3

Please circle the number that best corresponds to how much you agree with each item. If any items concern something that you have never experienced (e.g., fainting in public), then answer on the basis of how you think you might feel *if you had* such an experience. Otherwise, answer all items on the basis of your own experience. Be careful to circle only one number for each item and please answer all items.

		Very Little	**A little**	**Some**	**Much**	**Very much**
1.	It is important for me not to appear nervous.	1	2	3	4	5
2.	When I cannot keep my mind on a task, I worry that I might be going crazy.	1	2	3	4	5
3.	It scares me when my heart beats rapidly.	1	2	3	4	5
4.	When my stomach is upset, I worry that I might be seriously ill.	1	2	3	4	5
5.	It scares me when I am unable to keep my mind on a task.	1	2	3	4	5
6.	When I tremble in the presence of others, I fear what people might think of me.	1	2	3	4	5
7.	When my chest feels tight, I get scared that I won't be able to breathe properly.	1	2	3	4	5
8.	When I feel pain in my chest, I worry that I'm going to have a heart attack.	1	2	3	4	5
9.	I worry that other people will notice my anxiety.	1	2	3	4	5
10.	When I feel "spacey" or spaced out, I worry that I may be mentally ill.	1	2	3	4	5
11.	It scares me when I blush in front of people.	1	2	3	4	5

Table Continued.

12.	When I notice my heart skipping a beat, I worry that there is something seriously wrong with me.	**1**	**2**	**3**	**4**	**5**
13.	When I begin to sweat in a social situation, I fear people will think negatively of me.	1	2	3	4	5
		Very Little	**A little**	**Some**	**Much**	**Very much**
14.	When my thoughts seem to speed up, I worry that I might be going crazy.	1	2	3	4	5
15.	When my throat feels tight, I worry that I could choke to death.	1	2	3	4	5
16.	When I have trouble thinking clearly, I worry that there is something wrong with me.	1	2	3	4	5
17.	I think it would be horrible for me to faint in public.	1	2	3	4	5
18.	When my mind goes blank, I worry that there is something terribly wrong with me.	1	2	3	4	5

APPENDIX G

DISTRESS TOLERANCE SCALE

Think of times that you feel distressed or upset. Select the item from the menu that best describes your beliefs about feeling distressed or upset.

1= Strongly agree
2= Mildly agree
3= Agree and disagree equally
4= Mildly disagree
5= Strongly disagree

	STRONGLY AGREE	MILDLY AGREE	AGREE AND DISAGREE EQUALLY	MILDLY DISAGREE	STRONGLY DISAGREE
1. Feeling distressed or upset is unbearable to me.	1	2	3	4	5
2. When I feel distressed or upset, all I can think about is how bad I feel.	1	2	3	4	5
3. I can't handle feeling distressed or upset.	1	2	3	4	5
4. My feelings of distress are so intense that they completely take over.	1	2	3	4	5
5. There's nothing worse than feeling distressed or upset.	1	2	3	4	5
6. I can tolerate being distressed or upset as well as most people.	1	2	3	4	5
7. My feelings of distress or being upset are not acceptable.	1	2	3	4	5

Table continued.

8. I'll do anything to avoid feeling distressed or upset.	1	2	3	4	5
9. Other people seem to be able to tolerate feeling distressed or upset better than I can.	1	2	3	4	5
10. Being distressed or upset is always a major ordeal for me.	1	2	3	4	5
11. I am ashamed of myself when I feel distressed or upset.	1	2	3	4	5
12. My feelings of distress or being upset scare me.	1	2	3	4	5
13. I'll do anything to stop feeling distressed or upset.	1	2	3	4	5
14. When I feel distressed or upset, I must do something about it immediately.	1	2	3	4	5
15. When I feel distressed or upset, I cannot help but concentrate on how bad the distress actually feels.	1	2	3	4	5

APPENDIX H

FEAR QUESTIONNAIRE-BLOOD INJECTION INJURY SUBSCALE

Choose a number from the scale below to show how much you would avoid each of the situations listed below because of fear or other unpleasant feelings. Then write the number you choose on the line by the situation. You may use any number between 0 and 8.

0	1	2	3	4	5	6	7	8
Would not avoid it		**Slightly avoid it**		**Definitely avoid it**		**Markedly avoid it**		**Always avoid it**

1. ____ Injections or minor surgery
2. ____ Hospitals
3. ____ Sight of blood
4. ____ Thought of injury or illness
5. ____ Going to the dentist

APPENDIX I

CLIENT SATISFACTION QUESTIONNARIE-8

Please help us improve our dental anxiety treatment program by answering some questions about it. We are interested in your honest opinions, whether they are positive or negative. Please answer all of the questions. We also welcome your comments and suggestions. Thank you very much.

1. How would you rate the quality of treatment you received?

   - ○ Excellent
   - ○ Good
   - ○ Fair
   - ○ Poor

2. Did you get the kind of treatment you wanted?

   - ○ No, definitely not
   - ○ No, not really
   - ○ Yes, generally
   - ○ Yes, definitely

3. To what extent has our dental anxiety treatment program met your needs?

   - ○ Almost all of my needs have been met
   - ○ Most of my needs have been met
   - ○ Only a few of my needs have been met
   - ○ None of my needs have been met

4. If a friend were in need of similar help, would you recommend our dental anxiety treatment program to him or her?

   - ○ No, definitely not
   - ○ No, not really

- Yes, generally
- Yes, definitely

5. How satisfied are you with the amount of help you have received?

- Quite dissatisfied
- Indifferent or mildly dissatisfied
- Mostly satisfied
- Very satisfied

6. Have the services you received helped you to deal more effectively with your dental anxiety?

- Yes, they helped a great deal
- Yes, they helped somewhat
- No, they really didn't help
- No, they seemed to make things worse

7. In an overall, general sense, how satisfied are you with the dental anxiety treatment you have received?

- Very satisfied
- Mostly satisfied
- Indifferent or mildly dissatisfied
- Quite dissatisfied

8. If you were to seek help again, would you come back to our dental anxiety treatment program?

- No, definitely not
- No, not really
- Yes, generally
- Yes, definitely