Analysis of Dental Anxiety and Avoidance Behaviors in Young Adults

by
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Dedication

I would like to dedicate this study to Renata Mottola. 12/11/1938 – 12/24/2020 I love you Nonna and thank you for believing in me and being my source of inspiration. I will always keep trying to make you proud.

To my family and friends who have always been my support through anything I have decided to do. Thank you for the endless encouragement and love. I could not have done any of this without you.

To my classmates and colleagues who replied to my survey and allowed me to complete my thesis that I have worked so hard for.

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Abstract

The aim of this thesis was to analyze dental anxieties in young adults to account for the role these anxieties play in avoidance behaviors in patients. Fifty-eight young adults participated in an online survey about dental fears and behaviors related to dental experiences. We assessed gender differences in dental anxiety as well as the relationship between dental anxiety and avoidant behaviors in the sample. Results indicated that males reported fewer specific dental fears than females; although, males and females reported similar levels of overall dental anxiety. Regarding the relationship between dental anxiety and avoidant behaviors, results indicated that participants with higher dental anxiety practiced more dental avoidance behaviors than those with lower dental anxiety. Lastly, we challenged the prediction that those with high and low dental anxiety would report similar physiological response in dental situations; this hypothesis was not supported. Implications of these findings are discussed.

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Chapter I

Introduction and Literature Review

Dental anxiety is defined as having intense fear and apprehension towards having any oral procedure performed, which could be as minimal as basic dental hygiene examinations or as major as complex dental surgeries (Cohen et al., 2000). When presented with extreme conditions, dental anxiety more than often results in total abstinence and complete avoidance from receiving any form of dental consultations (Cohen et al., 2000). This in turn affects patient care negatively because failure to attend dental health check-ups and examinations with hopes of then postponed and held in abeyance (Skaret et al., 1999). It is no coincidence that individuals that miss/cancel appointments have high fear of the dental atmosphere and procedure (Skaret et al., 1999). It can be assumed that coping with these insecurities and anxieties can take a negative toll on one's oral/mental health (Berggren & Linde, 1984). Dental anxieties are most commonly associated with young children and adolescents yet continue to be an issue for some into adulthood (Skaret et al., 1999).

Dental Anxiety and Effects

A research study was held by Skaret, et al (1999) to determine how frequently dental prophylaxis is evaded by young adults in Norway. They recruited 1,119 18-year-old individuals, 754 of whom participated in the study (Skaret et al., 1999). The randomly selected sample was chosen from two different counties in Norway, Akershus and Hordaland, and male to female ratio of the sample remained fairly uniform (Skaret et al., 1999). All participants chosen had been part of the Norwegian Public Dental Service

since they were born, which provided them adequate dental care with all expenses covered. They also collected data questionnaire they manipulated to assess dental anxieties when the participants reached the age of 20-years old and sent to the sum total of the 968 sample (1999). The questionnaire covered the topics of demographics, occupation, and various treatment experiences, which mainly focused on but was not limited to dental experiences. Paired with the research-controlled questionnaire, all participants completed the Dental Fear Scale (DFS), Dental Belief Survey (DBS), and Geer Fear Scale (GFS) (Skaret et al., 1999). Of the 968 questionnaires distributed, 762 were returned and analyzed. The 206 individuals who did not answer and return the questionnaire were not included in the overall analysis data but were interestingly found to have a higher frequency of missed/cancelled dental appointments when looking over their dental records (Skaret et al., 1999).

The dental records of all active subjects were retrieved from the clinic and examined as well. The dental record allowed the researchers to distinguish how many known appointments had been scheduled in total and how many they actually attended from ages 12 to 18. They were able to dissect even further if out of the appointments they scheduled but missed were due to prior cancellation or simply not showing up to the scheduled date and time all together (Skaret et al., 1999). The DMFT index was also recorded at ages 12, 16, 18, which allies their individual caries experience. With all information included, the researchers were able to separate the avoidance group from the sum total of subjects involved in their study (Skaret et al., 1999). All individuals in the avoidance group met the criteria with a score greater than 59 on the DFS and greater than

47 on the DBS, alongside a 20% or greater in frequency of missed or cancelled appointments, which assumed their absence from scheduled dental appointments were due to dental anxieties (Skaret et al., 1999). They concluded that 47 individuals had high levels of dental anxiety and were also the ones with more frequently missed appointments. Although they received a high rate of responses, the individuals who failed to report back with interpretable data induced researchers to come to the conclusion that although dental anxiety can be reported, it often is not so reported (Skaret et al., 1999).

Cohen et al (2000) conducted a study to assess the impact of living with dental anxiety on an individual. The focus of their study was based around adult patients admitted to the Dental Sedation Unit within the Department of Sedation and Special Care Dentistry at Guy's, King's, and St. Thomas' Dental Institute of King's College London (GTK). They chose 20 individuals, more specifically 14 women and 6 men, who had been recommended by professionals to seek better management over their dental anxieties (Cohen et al., 2000). They used the Modified Dental Anxiety Scale (MDAS) to evaluate the level of anxiety each participant held and to address the highest potential anxiety levels each individual could achieve when encountering dental scenarios (Cohen et al., 2000). It was assumed that a score or 19 or higher on the MDAS was considered highly dental-phobic (Cohen et al., 2000). They then addressed each participant's dental anxieties on a more personal level with private, in-depth interviews to see how their anxieties affect their daily living routines (Cohen et al., 2000). In the interviews they addressed any concerns the participant may have related to dental anxiety and assessed their perceptual abilities to talk about their anxiety by asking questions directly related to

the origin of their fear, how they make going to the dentist a priority despite their fear, how dental visits make them feel, why oral care is important, how their anxiety affects their lives and the lives around them, their diets, and lastly how their anxieties affect them socially. They found that 75% score higher than a 19, and almost 25% scored 14-18 respectively (Cohen et al., 2000). They also found that patients showed worsening in their physiological traits, such as health. The physical traits to what their dental anxieties correlate is similar to that affected by anxiety in general (Cohen et al., 2000). This, of course, is in addition to psychological effects dental anxiety had on the participation pool. They found that majority of the individuals who expressed major anxiety associated with dental situations avoid dental visits all together (Cohen et al., 2000).

Locker (2003) conducted a psychological assessment on a sample of 3,055 people selected to determine if their anxious-like tendencies were related to dental anxiety. A sample of individuals 18-years old and older were randomly selected from Toronto to fill out a paper survey sent out via mail every 4 years. In addition, a sub-survey of 1,420 individuals completed a survey related to general anxieties using scale to measure overall anxiety and fearfulness. The study began in 1998; all original participants agreed to take part in the study for the 5-year duration and were sent additional surveys about the evolutionary changes in their dental anxieties over the time span (Locker, 2003). The final survey sent out to all participants was manually manipulated to try and get people to respond who had been ignoring all other surveys, as well as addressing the general fear of the participants compared to the dental anxiety aspect. The Dental Anxiety Scale (DAS) was used to measure participants' beginning and ending fears during the study, and it was

assumed that participants scoring a 12 or above out of 20 had the more intense dental anxieties out of the sample (Locker, 2003). The single item Visual Analogue Scale (VAS) was also used to assess similar anxieties related to dental anxiety and fear just from a different perspective to really get an accurate reading; it was assumed that an 8 or above out of 10 on the VAS was heightened levels of dental anxiety. General fears and anxieties were measured using FSS II questionnaire. It was found that 31.1% were severely dentally anxious, and 68.9% were moderately dentally anxious. Out of the participants who measured to be dentally anxious, additional more broad fears were also reported by 72.9%. The dental anxieties affected the participants differently based on their psychosocial interaction resulting with 93.1% reported psychosocial consequences, 83.8% had psychologically related issues, 60.4% issues with social relationships, and 20.7% admitted to avoidance in situations such as dental (Locker, 2003).

Ihara et al (2017) conducted a study on dental anxiety in patients in Tokyo. Three hundred twenty-one patients who were referred to the Relaxation Dental Outpatient Clinic for Dental Phobia and had long-term dental fear participated in their study. An initial examination was given to measure how intense their dental anxieties were so they would know how to approach their study methods. This was done by using a tool such as the State-Trait Anxiety Inventor (STAI) and the Dental Anxiety Scale (DAS). Demographics such as age, gender, and ethnicity were gathered to compare different aspects in the studies and see if there were any trends in their results. Dentists and dental hygienists worked with all the 321 patients and measured how difficult they were to work with based on their dental anxieties and rated if they would be avoidant if at all. Ihara et

al. found that males and individuals who had started out with increased anxiety were more involved with dental fears and difficulty in the office. The dentists and hygienists had a more difficult time controlling and diagnosing patients with dental fear than those without. These results back with the patient's initial answers to the questionnaires used to measure anxiety (Ihara et al., 2017).

Dental Anxiety Interventions

Berggren and Linde (1984) conducted a study on how to approach patients with intense dental anxiety in Sweden. It involved a total of 99 patients who had been referred by professionals to receive clinical help due to their high levels of paranoia and anxiety related to dental visits and had postponed dental visits all together. They separated the experimental factors and sample of patients into two different treatment methods: general anesthesia and behavioral therapy. When assessing the general anesthesia (GA) treatment, they used barbiturate sedation and endonasal intubation on the GA group. Using the behavioral therapy (BT) treatment method, the BT patients were brought to a specialized clinic that was familiar with dental anxiety patients. They used conventional dentistry as well as progressive relaxation, desensitization, and biofeedback training. The Corah Dental Scale was used to measure each patient's level of dental anxieties, and the Dental Anxiety Scale (DAS) was given to each patient one year prior to treatments as well as after the conclusion of the treatments (Berggren & Linde, 1984). They found that mainly the behavioral therapy patients had the more successful decrease in anxiety level, as opposed to general anesthesia (Berggren & Linde, 1984).

A different approach aimed at dissipating dental anxiety was completed by Karst et al (2007). They approached dental anxiety from a quite different approach by using auricular acupuncture as a treatment method. Auricular acupuncture has been used in past studies to be a viable treatment against general anxiety. Their targeted group was ages 18-65 and needed to meet their extended criteria. They focused on 67 patients who received and will be receiving dental extractions and general treatment in waves over 16 months. The participants were separated into three different experimental groups: auricular acupuncture group, placebo auricular acupuncture group, and midazolam group. The auricular acupuncture group had acupuncture done focusing on the relaxing, anxiety reducing pressure points in the ear. The placebo acupuncture group received acupuncture with a dull needle point to mimic the real thing and focused on points that were not associated with anti-anxiety relief. The midazolam group took 0.675mg of the active drug through nasal inhalation, with patients believing they had some sort of sedation type release to help their dental anxiety (Karst et al., 2007). To measure the participants anxiety levels before and after the experiment, the visual analog scale (VAS) was given to each individual. A sedation scale was used to rate drowsiness in the midazolam experimental group, since this drug is commonly used before general anesthetics. After all treatments and dental extractions and overall treatments concluded, the quality of dental treatment conditions was recorded by each patient. Karst et al. (2007) discovered that anxiety and sedation scores all remained equal across all the groups before the experimental trial. In the auricular acupuncture group, sedation and relaxing sensation started as early as 30 minutes after insertion; however, effects did not last as long as the

midazolam group). The placebo group also has lowered in anxiety to an extent, but not as aggressively as the other experimental group). To conclude, Karst et al. (2007) have found auricular acupuncture to be a valid supplement to lowering dental anxiety that is easy and effective.

Summary and Purpose of the Current Study

This literature review indicates that dental anxieties among young adults are common, and that various methods of intervening have been evaluated. When attempting to find a treatment for extreme cases of anxieties and phobias, a dentist has to understand the anxiety he or she is interacting with and how this affects daily living. The research done by Skaret et al (1999), Cohen et al (2000), and Locker (2003) address this and allow dental anxiety to be explored and understood by those who have not been closely involved with this issue. Their research all yielded similar results by going in depth with participants and their fears anxieties, and really pursuing the idea of trying to get inside their minds and understand why they feel how they feel and the tolls this specific anxiety has not only on their mental health but their physical health as well. The research showed that dental anxiety goes beyond what we can see and has deep psychological roots within each person. Each dental-phobic individual is affected differently by this anxiety and has acquired this fear with different experiences and stories. When understanding this, research can take that next step to understanding the process(es) that could be done to lessen or potentially cease the anxiety. Treatment methods are mainly run by trial and error until a treatment method presents itself to be successful in lowering the rates of anxiety shown by factual evidence in tests, evaluations, and personal testimonies.

Berggren and Linde represented research on, but not limited to, two potential forms of dental anxiety treatments. It is important to assess the level of anxiety of participants before and after the research takes place and maybe even during. It was shown that a psychological approach provided individuals with more closure and ease of mind when facing their fears as opposed to general anesthesia (1984). Karst et al (2007) researched yet another form of potential dental anxiety treatment.

It has been brought to my attention with all these research studies, it is common that dental anxieties heavily affect people physically and psychologically, which can lead to detrimental oral health due to newfound avoidance in dental care. In my personal research it is important to have the base understanding of dental anxiety and address what is done in everyday living and in the dental setting to try and assess these issues to produce optimal patient care. Due to previous research, once my data is collected it can be assumed that men will yield higher levels in both the Dental Fear Scale and Modified Dental Anxiety Scale. Individuals who score higher on the Modified Dental Anxiety Scale will score higher on the avoidance portion of the Dental Fear Scale; comparing the score from individuals who scored low on the MDAS and those who scored high on the MDAS will score just about even scores on the physiological portion of the of the DFS.

Chapter II

Method

Participants

Participants in this study included 58 individuals between the ages of 18 – 31 years of age (M = 21.79; SD = 2.71). Participants were recruited through social medial, requesting young adults between the ages of 18 and 35 follow a link to participate in an anonymous online study about fears and worries associated with dental experiences. All 58 participants completed the full survey. Included in the sample were individuals who are college students and also those from the community. Table 1 provides the demographics of the full sample.

Based on identified gaps from the literature review, we also sought to gather information about dental anxiety not only from young adults, but also how it is approached from dentists' perspectives. Participants in this second part of the study were to include 5-10 certified dentists within the middle Tennessee area. Dentists in the area were contacted via phone and/or email (n = 6), requesting their assistance in answering questions about how they handle dental fears and anxieties in their office work. Due to Covid restrictions, no dentists agreed to an in-person interview; also, none of the contacted dentists responded to the email questions.

Measures

Demographics. Participants reported their age, gender, ethnicity, and year in school. These data were used to describe the sample.

Table 1

Demographics for the Full Sample

Variable	*N*	*%*
Gender		
Male	17	29.3
Female	39	67.2
Non-Binary/Third Gender	0	0
Prefer Not to Say	0	0
Ethnicity		
Asian/Asian American	1	1.70
Black/African American	6	10.30
Hispanic	3	5.2
White	45	77.6
American Indian/Alaska Native	0	0
Other	1	1.7
Year in College		
Freshman	3	5.2
Sophomore	11	19.0
Junior	8	13.8
Senior	16	27.6
Other	18	31.0

Modified Dental Anxiety Scale. Humphris et al (1995) developed the Modified Dental Anxiety Scale (MDAS) to assess the extent to which an individual possessed dental anxiety. This questionnaire was constructed to place individuals into two categories of having dental anxiety or not having dental anxiety (Humphris et al., 1995). The MDAS is a 5-item survey where participants rate their anxieties from "not anxious" to "extremely anxious" based on different scenarios involving the dentist. Each item is rated on a 5 item Likert scale, where 1 = *not anxious*; 2 = *slightly anxious*; 3 = *fairly anxious*; 4 = *very anxious*; 5 = *extremely anxious*. A total score is then calculated by totaling the item scores, with possible scores ranging from 5-25. Total scores above 19 are indicative of dental anxiety (Humphris et al., 1995). Appendix B includes the items from the MDAS.

Dental Fear Scale. Kleinknecht et al (1984) developed the Dental Fear Scale (DFS) to measure anxieties people may have in relation to dental offices and visits. This questionnaire was constructed to assess concerns that individuals have about visiting a dentist and about the procedures used (Kleinknecht et al., 1984). The DFS is a 20-item, 5-point Likert survey with subsets involving avoidance, physiological arousal, and fears relating to specific situations (Kleinknecht et al., 1984). The first 7 questions are rated on a 5-point scale with 1 = *never occurs* and 5 = *occurs nearly every time*; the remaining items are also rated on a 5-point scale, with 1 = *very relaxed* and 5 = *so anxious you feel ill*. A total dental fear score is calculated by summing all item scores with a possible range of scores from 13 – 65. Items 1 – 7 are totaled to calculate an Avoidance score

(possible range 7 – 35); items 8 – 20 are totaled for a Physiological Arousal score (possible range 13 – 65). Appendix C includes the DFS.

Dentist Management of Patient Behavior Questionnaire. The dentist participants were to be a 5-item questionnaire that consisted of more patient-related questions. The questions were designed to yield results that would show subsets of dental anxiety in their offices, avoidance approaches, and potential treatment to provide maximum patient comfort and care. They included:

1. What does dental anxiety mean to you? What percentage of patients are you currently helping that have dental fears?
2. How frequently do you receive patients that have high levels of dental anxiety? How do you know that they are clearly anxious?
3. How common is it that these same patients miss/cancel appointments?
4. How do you first approach patients with intense dental anxiety? How does this approach change overtime as you and your patient get more comfortable around one another?
5. What treatment approaches have you tried in the past on patients with dental anxiety? What method has yielded the best results?

Procedure

The research proposal was submitted to the Middle Tennessee State University Institutional Review Board as an exempt project and received approval (see Appendix D). Once approval was obtained, the online Qualtrics survey including the demographics, the DFS, and the MDAS was made active. A link to the survey was posted on the social

media accounts of the primary researcher and advisor advertising an anonymous brief online survey about dental fears and worries. The link took the participants to the consent form (see Appendix E) for the study. Once they agreed to the consent, the survey was visible. They then completed the demographics, the DFS, and the MDAS (in random order to control for potential order effects). Participants then were provided an open-ended item to note any dental fears or worries that were not addressed in the questionnaires.

For the dentists, I emailed each dentist individually with the 5-item questionnaire described above.

Chapter III

Results

Table 2 provides the descriptive statistics for the full sample and by gender group for each dependent variable. As evident by the MDAS and DFS scores, participants reported, on average, a mild level of fear and worry associated with dental experiences.

Table 2

Means and Standard Deviations for Each Dependent Variable by Full Sample and by Gender Group

Variable	Full Sample		Gender			
			Males		females	
	N	*M(SD)*	*N*	*M(SD)*	*N*	*M(SD)*
DFS Total Score	50	44.62 (16.44)	15	37.00 (10.77)	35	47.88 (17.46)
DFS Avoidance Score	52	31.44 (11.12)				
DFS Physiological Score	51	12.73 (6.18)				
MDAS Total Score	55	11.78 (4.51)	17	10.18 (3.61)	38	12.50 (4.72)

Note. Ranges of possible scores for each scale: DFS Total 13 - 65; DFS Avoidance 7 - 35; DFS Physiological 13 - 65; MDAS Total: 1-25.

After I examined the research done by Ihara et al (2017), they found in Tokyo that males scored higher on dental anxiety related questionnaires or examinations. It was then predicted that males would reports higher levels of fear and worry as indicated on both the DFS and MDAS. Total scores for each of these measures were compared across males and females using t-tests for independent samples (see Table 2). On the DFS total, males reported significantly less dental fear than females, $t(48) = -2.23$, $p = .03$. Males

and females reported similar levels of dental anxiety (as measured by the MDAS total score), $t(53) = -1.80$, $p = .077$.

It was further predicted that individuals who score high on dental anxiety (as indicated by total score on the MDAS) would report more avoidance of dental situations than those who report low dental anxiety (as indicated by total score on the MDAS). To test this hypothesis, participants were divided into high and low dental anxiety groups based on a median split using total MDAS scores. The median cutoff score for this sample was 11, so the low dental anxiety group were those participants scoring between 1 and 11 ($n = 28$; 50.9%) and those in the high dental anxiety group scored 12 or above ($n = 27$; 49.1%). High and low dental anxiety groups were then compared on the DFS Avoidance scale score (see Table 3 for group descriptive). An independent samples t-test indicated that those with high dental anxiety reported more dental fear avoidance, $t(50) = -5.42$, $p < .0001$.

Table 3
Means and Standard Deviations for Each Dependent Variable by MDAS high and low groups

Variable	Dental Anxiety (MDAS) Group			
	High		Low	
	N	*M(SD)*	*N*	*M(SD)*
DFS Avoidance Score	25	38.40 (10.02	27	25.00 (7.76)
DFS Physiological Score	25	16.24 (6.88)	26	9.35 (2.60)

Finally, it was predicted that those with high and low dental anxiety would report similar levels of physiological arousal about dental events. To test this hypothesis, participants were divided into high and low dental anxiety groups based on a median split

using total MDAS scores. The median cutoff score for this sample was 11, so the low dental anxiety group were those participants scoring between 1 and 11 (n = 25; 49.0%) and those in the high dental anxiety group scored 12 or above (n = 26; 51.0%). High and low dental anxiety groups were then compared on the DFS Physiological scale score (see Table 3 for group descriptive). An independent samples t-test indicated that those with high dental anxiety reported more physiological dental fear compared to those with low dental anxiety reported, $t(49) = -4.770$, $p < .0001$.

Chapter IV

Discussion

I found through research of literatures that dental anxiety affects more than just physical fear but deep psychological anxieties within individuals. Dental anxiety is developed by different experiences and stories and affect each person differently based on severity. It has been suggested that those with dental anxieties can also develop avoidance toward maintaining oral hygiene (list references here who suggest that). In my personal research it is important to have the base understanding of dental anxiety and address what is done in everyday living and in the dental setting to try and assess these issues to produce optimal patient care. To do this I surveyed young adults via an online survey composed of consent, demographics, MDAS, and DFS questions. In addition, I sent a survey to local dentists that I developed to assess how these professionals see patients show dental anxiety and avoidance in their offices, and potential treatments they provide to manage these behaviors to provide maximum patient comfort and care.

It was predicted that males would report higher levels of fear and worry compared to females as indicated on both the DFS and MDAS. On the DFS total, males reported significantly less dental fear than females, $t(48) = -2.23$, $p = .03$. Males and females reported similar levels of dental anxiety (as measured by the MDAS total score), $t(53) = -1.80$, $p = .077$. These findings do not support the hypothesis and can be assumed that this sample of females are more dentally anxious than the males as a result of the DFS and MDAS scores. Ihara et al (2017) found males and individuals who already acquired anxiety to experience more dental anxiety in dental situations. In my study we compared

males and female scores for the MDAS and DFS and the results yielded females showing significantly higher scores on the DFS in comparison to males, but both males and females yield similar results of the MDAS. This could be due to females being more avoidant when acquiring dental anxiety. I believe the uneven male to female response ratio also may play an effect to these results.

It was further predicted that individuals who score high on dental anxiety (as indicated by total score on the MDAS) would report more avoidance of dental situations than those who report low dental anxiety (as indicated by total score on the MDAS). An independent samples t-test indicated that those with high dental anxiety reported more dental fear avoidance, $t(50) = -5.42$, $p < .0001$. The findings provide support to the hypothesis and are consistent with previous literature. For example, Cohen at al. found that majority of the individuals with severe dental anxiety show greater signs of avoidance to dental visits and neglecting oral hygiene. We also found that individuals who scored higher on the MDAS and were considered "dentally anxious" scores higher of the DFS avoidance portion of the survey. Due to previous research and my own findings, it can be assumed that individuals who show anxiety are more likely to let these anxieties cause a barrier between fear and oral health. For example, these individuals with dental anxiety will likely be the same individuals who avoid dental visits out of fear. They also may delay treatments as basic as teeth cleanings to avoid experiencing the anxiety associated with dental procedures. This avoidance can negatively affect oral health and other aspects of health affected by oral health.

Finally, it was predicted that those with high and low dental anxiety would report similar levels of physiological arousal about dental events. An independent samples t-test indicated that those with high dental anxiety reported more physiological dental fear compared to those with low dental anxiety reported, $t(49) = -4.770$, $p < .0001$. Individuals who were experiencing more dental anxiety when answering the MDAS portion of the survey also showed greater signs of anxiety on the physiological portion of the DFS. The hypothesis was not supported, and it can be assumed that individuals who experienced less dental anxiety found the physiological portions of the DFS less anxious and did not experience as much discomfort. I believe this is because those who score high are considered dentally anxious and thus experience their anxiety on the physiological events that occur.

When analyzing the findings of my survey I noted some limitations of my study. The sample I had to analyze ended at 58 participants. I believe this held back adequate data that may have been used to support my hypotheses. Skaret et al. (1999) found a lack of responses in their research which could be assumed is due to individuals with dental anxiety fail to report their anxieties. I believe this could be a reason I did not receive as many responses. In addition to a low pool of young adults completing the survey, the male to female ratio varied greatly with 67.2% of participants identifying as female and 32.8% of participants identifying as male. This unequal proportion could yield results that address female anxieties more so than male anxieties. This was unbeneficial to my study because hypotheses comparing males and females could be persuaded by the high female concentration.

Another limitation I found in my study was the lack of diversity, with 77.6% of participants classifying themselves as white. In order to address dental anxieties in a community, it is important to receive feedback from everyone equally in said communities. I believe the lack of diversity held back my research from addressing the population as a whole and my finding pertained more towards the white community. Due to the survey being online also yield all self-report measures so there were no actual measure of the participants' anxiety behaviors. Consequently, because I was completing my research in the midst of a pandemic, it was difficult to recruit participants as opposed to not being in a pandemic. I find this to have been an issue in survey participants, and without the obstacle of COVID-19 restriction, I think this could have yield a larger sum of individual responses. In addition, I was unable to visit dental offices and interview local dentists, so instead I emailed my survey through their representatives in their practices. This did not yield results, so I was unable to analyze dentist's response to my survey on dental anxiety within a practice. Consequently, I also did not receive much, if any, response to the open ended question from the survey. It was not enough to analyze.

For future direction, I believe it is important to explore this concept of dental anxiety and how to maintain oral health from both perspectives: the patient and the dentist. To follow this study, research could continue to gather responses and generate a greater pool of results and analyze dental anxiety in a community. I think research could definitely explore more on the side of the dentist's approach to dental anxieties and how they aid in patient care and reversal of oral hygiene avoidance. I think the additive of past

dental experiences could have provided support to those individuals who did experience dental anxiety.

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Appendices

Appendix A

Demographic Items

1. How old are you?

2. What is your gender?
    a. Male
    b. Female
    c. Non-Binary / third gender
    d. Prefer Not to Say

3. What is your ethnicity?
    a. Asian/Asian American
    b. Black / African American
    c. Hispanic
    d. White
    e. American Indian / Alaska Native
    f. Pacific Islander
    g. Other
    h. Prefer Not to Say

4. What is your year in school?
    a. Freshman
    b. Sophomore
    c. Junior
    d. Senior
    e. Other

Appendix B

Modified Dental Anxiety Scale

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

Appendix C

Dental Fear Survey

1. Fear of dental work has caused me to put off making an appointment with my dentist or dental hygienist.
2. Fear of dental work has caused me to cancel or not appear for an appointment with my dentist or dental hygienist.
3. When having dental work done, my muscles become tense.
4. When having dental work done, my breathing rate increases.
5. When having dental work done, I perspire.
6. When having dental work done, I feel nauseated and sick to my stomach.
7. When having dental work done, my heart beats faster than usual.
8. Making an appointment for dentistry
9. Approaching the dentist's office
10. Sitting in the waiting room
11. Being seated in the dental chair
12. The smell of the dentist's office
13. Seeing the dentist walk in
14. Seeing the anesthetic needle
15. Feeling the anesthetic needle injected
16. Seeing the drill
17. Hearing the drill
18. Feeling the vibrations of the drill

19. Having your teeth cleaned

20. All things considered, how fearful are you of having dental work done?

Appendix D

MTSU IRB Approval Form

IRBN007 – EXEMPTION DETERMINATION NOTICE

Monday, March 15, 2021

Protocol Title	***Analysis of Dental Anxiety and Avoidance Behaviors in Adults***
Protocol ID	**21-1129 2q**
Principal Investigator	**Renata DeLucia** (Student)
Faculty Advisor	Kimberly Ward
Co-Investigators	NONE
Investigator Email(s)	*rbd2v@mtmail.mtsu.edu; kimberly.ward@mtsu.edu*
Department/Affiliation	Psychology

Dear Investigator(s),

The above identified research proposal has been reviewed by the MTSU Institutional Review Board (IRB) through the **EXEMPT** review mechanism under 45 CFR 46.101(b)(2) within the research category ***(2) Educational Tests, surveys, interviews or observations of public behavior*** *(Aualtrics Survey).* A summary of the IRB action and other particulars of this protocol are shown below:

IRB Action	**EXEMPT from further IRB Review** Exempt from further continuing review but other oversight requirements apply
Date of Expiration	**6/30/2022** *Date of Approval:* **3/12/21** *Recent Amendment:* NON
Sample Size	TWO HUNDRED (200)
Participant Pool	**Healthy adults (18 or older) - MTSU SONA Students**
Exceptions	Online consent followed by internet-based survey using Qualtrics is permitted (Qualtrics links on file).
Type of Interaction	☐ Non-interventional or Data Analysis ☐ Virtual/Remote/Online Interview/survey ☐ In person or physical– Mandatory COVID-19 Management (refer next page)
Mandatory Restrictions	**1. All restrictions for exemption apply.** **2. The participants must be 18 years or older.** **3. Mandatory ACTIVE informed consent. Identifiable information including, names, addresses, voice/video data, must not be obtained.** **4. NOT approved for in-person data collection.**
Approved IRB Templates	*IRB Templates:* SONA Recruitment Script and Informed Consent *Non-MTSU Templates:* NONE
Research Inducement	Class credit for MTSU SONA Students and NONE for others
Comments	NONE

Summary of the Post-approval Requirements: The PI and FA must read and abide by the post-approval conditions (Refer "*Quick Links*" in the bottom):

- ***Final Report:*** The Faculty Advisor (FA) is responsible for submitting a final report to close-out this protocol before **6/30/2022**; if more time is needed to complete the data collection, the FA must request an extension by email. REMINDERS WILL NOT BE SENT. **Failure to close-out (or request extension) may result in penalties** including cancellation of the data collected using this protocol or withholding student diploma.
- ***Protocol Amendments***: IRB approval must be obtained for all types of amendments, such as:
  - Addition/removal of subject population and sample size.
  - Change in investigators.
  - Changes to the research sites – appropriate permission letter(s) from may be needed.
  - Alternation to funding.
  - Amendments must be clearly described in an addendum request form submitted by the FA.
  - The proposed change must be consistent with the approved protocol and they must comply with exemption requirements.
- ***Reporting Adverse Events:*** Research-related injuries to the participants and other events , such as, deviations & misconduct, must be reported within 48 hours of such events to compliance@mtsu.edu.
- ***Research Participant Compensation:*** Compensation for research participation must be awarded as proposed in Chapter 6 of the Exempt protocol. The documentation of the monetary compensation must Appendix J and MUST NOT include protocol details when reporting to the MTSU Business Office.
- ***COVID-19:*** Regardless whether this study poses a threat to the participants or not, refer to the COVID-19 Management section for important information for the FA.

COVID-19 Management**:**

The FA must enforce social distancing guidelines and other practices to avoid viral exposure to the participants and other workers when physical contact with the subjects is made during the study.

- The study must be stopped if a participant or an investigator should test positive for COVID-19 within 14 days of the research interaction. This must be reported to the IRB as an "adverse event."
- The FA must enforce the MTSU's "Return-to-work" questionnaire found in Pipeline must be filled and signed by the investigators on the day of the research interaction prior to physical contact.
- PPE must be worn if the participant would be within 6 feet from the each other or with an investigator.
- Physical surfaces that will come in contact with the participants must be sanitized between use
- **FA's Responsibility:** The FA is given the administrative authority to make emergency changes to protect the wellbeing of the participants and student researchers during the COVID-19 pandemic. However, the FA must notify the IRB after such changes have been made. The IRB will audit the changes at a later date and the PI will be instructed to carryout remedial measures if needed.

Post-approval Protocol Amendments:

The current MTSU IRB policies allow the investigators to implement minor and significant amendments that would
not result in the cancellation of the protocol's eligibility for exemption. ***Only THREE procedural amendments wi***
be entertained per year *(changes like addition/removal of research personnel are not restrict ed by this rule).*

Date	Amendment(s)	IRB Comments
NONE	NONE.	NONE

Post-approval IRB Actions:

The following actions are done subsequent to the approval of this protocol on request by the PI or on recommendation by the IRB or by both.

Date	IRB Action(s)	IRB Comment
NONE	NONE.	NONE

Mandatory Data Storage Requirement**:**

All research-related records (signed consent forms, investigator training and etc.) must be retained by the PI or the faculty advisor (if the PI is a student) at the secure location mentioned in the protocol application. The data must be stored for at least three (3) years after the study is closed. Additionally, the Tennessee state data retention requirement may apply (*refer "Quick Links" below for policy 129*). Subsequently, the data may be destroyed in a manner that maintains confidentiality and anonymity of the research subjects. **The IRB reserves the right to modify/update the approval criteria or change/cancel the terms listed in this notice**. Be advised that IRB also reserves the right to inspect or audit your records if needed.

Sincerely,

Institutional Review Board
Middle Tennessee State University

Quick Links:

- Post-approval Responsibilities: http://www.mtsu.edu/irb/FAQ/PostApprovalResponsibilities.php
- Exemption Procedures: https://mtsu.edu/irb/ExemptPaperWork.php
- MTSU Policy 129: Records retention & Disposal: https://www.mtsu.edu/policies/general/129.php

Appendix E
Consent Form

Information and Disclosure Section

1. **Purpose**: This research project is designed to help us evaluate dental anxieties and behaviors that may impact dental practices and overall oral health.
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2. **Description**: Participants will be asked to complete a short survey that includes brief demographic information and questions about their oral health practices and perceptions. This online survey is anonymous and will not include any identifying information. Your honest responding will help us to better understand how one's feelings about oral health practices might impact dental services that are provided.

3. **IRB Details**
    - Primary Investigator: Renata De Lucia
    - PI Department & College: University Honors College
    - Faculty Advisor (if PI is a student): Dr. Kim Ujcich Ward
    - Protocol Titl:Analysis of Dental Anxiety and Avoidance Behaviors in Adults
    - Protocol ID:21-1129 2q Approval Date:03/12/2021 Expiration Date:06/30/2022

4. **Duration**: The whole activity should take about 15-20 minutes to complete. Participants will not be compensated for their participation, however, MTSU psychology students will receive one (1) research credit for their class research participation.

5. **Here are your rights as a participant: (MANDATORY)**

    - Your participation in this research is voluntary.
    - You may skip any item that you don't want to answer, and you may stop the experiment at any time (but see the note below)
    - If you leave an item blank by either not clicking or entering a response, you may be warned that you missed one, just in case it was an accident. But you can continue the study without entering a response if you didn't want to answer any questions.
    - Some items may require a response to accurately present the survey.

6. **Risks & Discomforts:**
    - There are no anticipated risks to participants of this study. Participants might experience slight worry when answering questions about oral health practices if you have dental anxieties. This slight discomfort is expected to be similar to what one might experience when thinking about or talking with anyone about your dental experiences.

7. **Benefits:**
    - There are no direct benefits to participants of this study. Your responses, however, will help us to better understand what clients of dental services may experience and may help us better understand how to provide client-centered dental services during check-ups and dental procedures.

8. Identifiable Information: You will NOT be asked to provide identifiable personal information in this study.

9. **Compensation: There is no compensation for participating in this study**. MTSU psychology students will receive ONE (1) class credit for research participation

Compensation Requirements:

a) The qualifications to participate in this research are: to complete the questionnaire to the best of your capabilities and be 100% honest in your responses. If you do not meet these qualifications, you will not be included in the research and you will not be compensated.

b) After you complete this consent form you will answer screening questions. If you fail to qualify for the research based on these questions, the research will end and you will not be compensated.

c) Please do not participate in this research more than once. Multiple attempts to participate will not be credited.

d) Attention checks are embedded in the research. If you fail to complete the questionnaire or do not answer honestly, then you will not be compensated.

e) To be compensated, you must receive a completion code. That requires clicking on the final screen of the study. If you choose to stop for any reason, you will still need to click through until the end to receive compensation (just leave the items blank and click through until the end.

10. Confidentiality. All efforts, within reason, will be made to keep your personal information private but total privacy cannot be promised. Your information may be shared with MTSU or the government, such as the Middle Tennessee State University Institutional Review Board, Federal Government Office for Human Research Protections, *if* you or someone else is in danger or if we are required to do so by law.

11. **Contact Information.** If you should have any questions about this research study or possibly injury, please feel free to contact Renata DeLucia by email rbd2v@mtmail.mtsu.edu OR my faculty advisor, Dr. Ujcich Ward at kimberly.ward@mtsu.edu. You can also contact the MTSU Office of compliance via telephone (615 494 8918) or by email (compliance@mtsu.edu). This contact information will be presented again at the end of the experiment.

Participant Response Section

☐No ☐Yes I have read this informed consent document pertaining to the above identified research

☐No ☐Yes The research procedures to be conducted are clear to me

☐No ☐Yes I confirm I am 18 years or older

☐No ☐Yes I am aware of the potential risks of the study

By clicking below, I affirm that I freely and voluntarily choose to participate in this study. I understand I can withdraw from this study at any time without facing any consequences.

☐ NO I do not consent
☐ Yes I consent