Have No Fear, the Dentist is Here: 
The Effect of Dental Anxiety on Oral Health Behaviors

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Abstract

A positive relationship between a dentist and patient is paramount in promoting good oral health practices. Dentists rely on patients to maintain good oral hygiene for successful dental care, while patients rely on dentists to provide adequate and appropriate treatment. Specifically, research has found that dental anxiety leads to poor oral health due to insufficient dental self-care practices and infrequent visits to the dentist (Halvari, 2010). The current study sought to expand on these findings by exposing participants to the consequences of both good and poor oral health care practices in an effort to induce changes in participants’ dental anxiety. The study found exposure to positive consequences of oral health reduced dental anxiety and exposure to negative consequences of oral health heightened dental anxiety in participants. From these manipulations, dentists may be able to improve patient adherence by approaching patients in a manner that effectively reduces dental anxiety.
Have No Fear, the Dentist is Here: The Effect of Dental Anxiety on Oral Health Behaviors

Origins of Dental Anxiety

Anxiety manifests in individuals in a variety of ways. Individuals can be generally anxious, or their anxiety can stem from a specific source. For instance, anxiety may increase specifically when an individual is exposed to a social situation, which is known as social anxiety disorder (Scott, 2001). No matter the cause, anxiety can be detrimental to an individual’s health. Anxiety is often characterized by “chronic, uncontrollable worry compounded by physiologic symptoms such as restlessness, muscle tension, and impaired concentration” (Hoge, 2004). Other physiologic symptoms include hyperventilation and gastrointestinal problems that cause the sufferer discomfort (Culpepper, 2004). The situations that induce anxiety lead to discomfort in individuals that can interfere with normal functioning. This is especially problematic as anxiety disorders are prevalent in the population today with upwards of 26 million people aged 15-54 years suffering from anxiety disorders in the United States alone (Kessler, 1994). This can have significant financial repercussions as anxiety disorders cost billions of dollars every year, including medical costs and lost workplace productivity (Greenberg, 1999). Anxiety is clearly a problem for many people and the specificity of anxiety disorders can produce increased anxiety in certain situations and settings. Anxiety can become severe enough that people will avoid situations that cause them to experience high levels of anxiety. Typically, anxiety disorders develop during childhood or adolescence and come to fruition in an individual in their 20’s and 30’s, with both genetics and environment playing a role (Culpepper, 2004). As anxiety disorders develop, heightened anxiety promotes avoidance of the situations that induce anxiety. If this is the case, it is necessary to reduce anxiety and work toward making an individual comfortable with these anxiety triggering situations.
Significance of Dental Anxiety

Anxiety can originate from a variety of sources, but the dentist has become one of the most common and frequent sources of anxiety. Sigmund Freud, who many consider to be one of the fathers of modern psychology, used his fundamental theory of psychoanalysis to pioneer the study of anxiety and neurosis. Isador Coriat, a psychiatrist and early follower of Freud’s psychoanalytical theory, was one of the first to approach dental anxiety from a psychological perspective and acknowledge the prevalence of anxiety stemming from the dentist in the general population (Capps, 2011). Coriat observed that a fear of going to the dentist was the most prevalent fear in everyday life and believed that this fear, to some extent, existed in everyone. He went on to say that a psychological understanding of this fear and anxiety was necessary in helping patients experiencing high levels of dental anxiety (Coriat, 1946). Further, he explains that dental anxiety “may be so prominent and exaggerated that any dental surgery, no matter how minor, may be so postponed or procrastinated that the inroads of disease may affect the entire dental apparatus” (Coriat, 1946). That is, dental anxiety may inhibit individuals from visiting the dentist, leading to the development and spread of disease due to poor oral health that compounds from not visiting the dentist. Coriat also describes dental anxiety as a form of anxiety that arises from the anticipation of dental procedures, void of a fear of pain, as anesthesia is often used. Thus, dental anxiety can be attributed specifically to the dentist and dental procedures, separate from that of pain (Capps, 2011). As Coriat suggests, dental anxiety “is purely a psychological reaction that has nothing to do with pain or extraction but is purely emotional, an anxiety signal unrelated to pain or extraction” (Coriat, 1946). Again, the dentist is the root of the anxiety. Otherwise, it would be a more general anxiety developing from a fear of pain and manipulation. Anxiety serves as a protective mechanism for an individual and is the result of a reaction to a
specific situation. In this case, anxiety is caused by the anticipation of visiting the dentist and undergoing a dental procedure.

**Prevalence of Dental Anxiety**

Dental anxiety is prevalent in the general population. When anxiety manifests in individuals in a dental setting, it can result in individuals avoiding dental treatment, leading to poor oral health. Nearly 80% of the population experiences dental anxiety to some extent, with an estimated 10% of the population being highly anxious (Scott, 1984). The individuals that are highly anxious are likely to avoid dental treatment, which can lead to problems concerning their oral health. The exact causes of dental anxiety are complex and vary from person to person, but studies show that injections and drilling, drilling being unique to dentistry, produce the most anxiety in patients (Kleinknecht, 1973). Also, a great deal of dental anxiety develops throughout a patient’s dental treatment history. This can be the result of dental traumas experienced by patients or exposure to dentally anxious friends or family members (Kleinknecht, 1973). One study found a significant correlation between parental dental anxiety and child dental anxiety. As such, the upbringing of a child by parents with dental anxiety may influence the child’s level of dental anxiety (Blomqvist, 2013). Nonetheless, many dentally anxious individuals undergo dental treatment regardless of the unpleasant experiences they have, including feelings of pain, helplessness, and confinement. Because of these negative feelings, it is extremely important for dental professionals to reduce the anxiety felt by patients, to ease current anxiety and prevent future anxiety from developing. In fact, studies have found that patients often hold their dentist in high regard and have appreciated the care and treatment they received from their dentist (Scott, 1984). But, many patients have difficulty discussing their anxiety with their dentist and fear criticism from their dentist pertaining to their oral health behaviors. An open dentist-patient
relationship would allow patients to voice their concerns, enabling the dentist to approach the patient in a way that would prevent feelings of anxiety (Scott, 1984). Dentists must be sensitive to patients’ needs to keep them from avoiding the dentist, reduce present and future anxiety, and promote positive oral health behaviors.

Dental anxiety is not only a common phenomenon, but the causes of anxiety frequently stem from past dental experience. Consistent with other findings, upwards of 70% of the population is uncomfortable and uneasy when attending the dentist, with 15% avoiding the dentist because of their anxiety (Gatchell, 1983). Dental anxiety results from conditioning events as most anxiety can be attributed to previously painful or traumatic dental treatment. It is important to note the distinction between painful and traumatic experiences, as studies have found that many conditioning events are traumatic, but not painful. This indicates that pain is not necessarily the source of anxiety (De Jongh, 1995). However, there are some instances when patients will have a painful or traumatic experience, but not develop any significant anxiety. This phenomenon has been coined latent inhibition and predicts that individuals will be less likely to develop dental anxiety if they have had many painless procedures prior to a painful or traumatic conditioning experience (De Jongh, 1995). Nonetheless, once anxiety has developed from a traumatic event, cognitive factors are responsible for maintaining this anxiety. Any subsequent dental visits will produce negative thoughts and attitudes about treatment that reinforce and maintain anxiety (Beck, 1985). These negative expectations can result in uncomfortable dental visits for the patient or an avoidance of dental clinics altogether. Once anxiety has been established, it is likely to persist. This can result in avoidance of treatment, leading to poor oral health behaviors.
Dental Anxiety and Oral Health

Dental anxiety is thought to lead to poor oral health practices and infrequent visits to the dentist. However, one might argue that if people are scared to visit the dentist, they may have good oral health practices to prevent complications that require the need to visit the dentist. What often happens is that patients will acquire poor oral health habits from not visiting the dentist frequently because of their dental anxiety (Halvari, 2010). This leads to serious dental complications in which the patient is more likely to have a painful or traumatic dental experience. This only adds to the anxiety and fear when thinking about returning to the dentist again. There is also limited research looking at whether people with dental anxiety are just people with higher levels of general anxiety (Woodmansey, 2005). Regardless, anxiety still manifests in these individuals in a dental setting, meaning dental professionals must approach them in the same manner as those who are dentally anxious. Whether generally anxious or dentally anxious, the anxiety may reduce the frequency in which patients visit the dentist.

The literature provides sufficient evidence showing traumatic dental experiences translate to higher levels of dental anxiety (Abrahamsson, 2002). It was found that dental fear was related to individual vulnerability and traumatic dental care experiences. In these cases, it was found that dentist behavior played a major role. The fears persisted due to negative perceptions of future dental treatment and interaction with dental professionals (Abrahamsson, 2002). This illustrates the importance of dentist-patient relationships. It appears that the ability of a dentist to reduce traumatic dental experiences may lead to reduced dental anxiety. This can be difficult, however, if patients come in with complications related to their dental health due to poor oral health practices. If a patient does develop dental anxiety, however, it is likely that this anxiety will follow them through their life. People who experience a traumatic dental procedure will
have a negative perception of future dental treatment (Beck, 1985). A patient’s dental anxiety will be reinforced through negative cognitions about dental treatment and negative attitudes associated with dental treatment (De Jongh, 1995). These patients will then have low expectations for their next dental visit, and become more likely to engage in dental avoidance practices. These findings continue to illustrate the importance of dental professionals’ relationship and treatment of patients.

A poor dentist-patient relationship will lead to higher levels of dental anxiety, and therefore, infrequent visits to the dentist (Halvari, 2010). Researchers have found that dentists who take an autonomy supportive approach with patients tend to have higher levels of treatment satisfaction (Halvari, 2010). An autonomy supportive approach can be described as, “one in which significant others offer choice, provide a meaningful rationale, minimize pressure, and acknowledge the target individual’s feelings and perspectives” (Halvari, 2010). This approach helps to satisfy individuals’ psychological needs, which promotes self-motivation. In a study by Halvari (2010), an autonomy supportive approach to dental treatment was found to be positively associated with dental self-care and dental clinic attendance, whereas dental anxiety was negatively associated with dental clinic attendance. That is, patients visited the dentist regularly and took proper care of their own teeth. Also, heightened levels of dental anxiety in patients resulted in avoidance of dental care (Halvari, 2010). This is very important, because for dental treatment to be effective, dentists must often rely on patients to do their part in maintaining good oral hygiene. If patients are not responsible, long-term dental care can be extremely difficult. If dentists can approach patients in a positive way, it may be beneficial in reducing dental anxiety and improving dental self-care and dental clinic attendance in patients.
The literature shows that low-income individuals do not have adequate access to dental care due to the high cost (Sohn, 2005). However, many adults with dental insurance still do not regularly visit the dentist. In these cases, the research found that dental anxiety had a significant influence on dental visit behavior. With the high cost of dental and medical care, many associate cost as a major factor of irregular dental visits. But, the study found that dental anxiety had a significant influence on dental attendance (Sohn, 2005). This was especially evident in adults who had private dental insurance. Nonetheless, it is important to be aware of the affordability of dental care as a reason for irregular dental visits. Anxiety, then, may be a more severe hindrance to dental attendance. A recent study found that the average dental patient has mild anxiety, while 5% of patients have severe dental anxiety (Woodmansey, 2005). In this case, dental anxiety was prevalent in patients who were receiving dental treatment. This suggests people who are not receiving dental treatment are likely to have higher levels of dental anxiety, keeping them from regularly visiting the dentist.

Self-efficacy has been found to be a predictor of dental attendance and oral health. Self-efficacy in patients is important and can lead to improved oral health behaviors and successful dental treatment. Self-efficacy was first defined as “the confidence of an individual that determines how well he/she can take the actions necessary for producing certain results” (Bandura, 1977). In a clinical setting, it can be described as an individual’s ability to take the necessary steps to improve and preserve health (Kakudate, 2008). This is very important as patients must follow the recommendations of dental professionals to improve their oral health. This means that the individual must do their part in practicing behaviors that are adequate and sufficient for good oral health. For dentists, finding a way to improve patients’ self-efficacy would be paramount in improving patient adherence and health. However, it can be difficult to
change an individual’s attitude and behavior. Research has found that self-efficacy beliefs and a greater perceived severity of oral diseases were related to increased tooth brushing frequency (Anagnostopoulos, 2011). Therefore, if patients know of the possible repercussions of poor oral health, they will seek to improve their oral health habits to avoid any negative effects. These findings have been reproduced as it was also found “that people are more likely to have regular dental checkups and engage in other health-protective behaviors if they feel susceptible to the various health problems that might stem from failure to do so” (Deshpande, 2009). That is, a fear of potentially serious health problems will positively influence health behaviors. Again, dentists who target self-efficacy may see better oral hygiene in their patients, but it may also be beneficial for dentists to inform patients of the negative consequences of poor dental habits (Anagnostopoulos, 2011). This approach may not work for everyone, however, as knowledge of the negative consequences may evoke anxiety and fear of the dentist. To improve oral health habits, it may be necessary to inform patients of the consequences of poor oral health behaviors and the importance of good oral hygiene.

Current Research Project

The goal of the present research project was to determine the relationship between dental anxiety and oral health behaviors. To begin, it was necessary to determine if participants with dental anxiety are likely to have general anxiety that affects them in a variety of situations. Next, participants’ oral health practices and dental clinic attendance patterns were assessed. This will enable the examination of possible correlations that exist between dental anxiety and general anxiety, as well as dental anxiety and oral health behaviors. Participants will then be assigned to groups exposing them to the consequences of good oral health, the consequences of poor oral health, or a neutral condition, after which their dental anxiety will be assessed. It was
hypothesized that those with dental anxiety are generally anxious and that a negative correlation exists between dental anxiety and oral health behaviors. It was also hypothesized that those exposed to consequences of good oral health would see a decrease in dental anxiety scores and those exposed to consequences of poor oral health would see an increase in dental anxiety scores.

Method

Participants

All participants were randomly selected from a pool of PSY 100 students at North Central College. There were a total of 54 participants used in the experiment. Of these 54 participants, 11 were male and 43 were female. The average age of the participants was 18.6 years old.

Materials

Participants in all conditions (positive, negative, and neutral) were given the Taylor Manifest Anxiety Scale (Taylor, 1953), the Modified Dental Anxiety Scale (Humphris, 1995), and the Self-Efficacy Scale for Self-Care (Kakudate, 2008) to determine participants’ scores for the dependent variables measured in the experiment (See Appendix A for the surveys used to assess these variables).

The Taylor Manifest Anxiety Scale is composed of 38 statements which assess participants’ general degree of anxiety. Participants indicate whether the statements are true or false based on their typical behaviors and emotions, with scores ranging from 0-38, with 0 being not at all anxious and 38 being very anxious.

The Modified Dental Anxiety Scale consists of five questions relating to anxiety felt by participants during a dental visit. Participants respond to each question by indicating whether
they are not anxious, slightly anxious, fairly anxious, very anxious, or extremely anxious. Responses are scored from 1-5, with a score of 1 being assigned to a response of not anxious and a score of 5 being assigned to a response of extremely anxious. Scores range from 5-25, with higher scores pertaining to higher levels of anxiety experienced during a dental visit.

The Self-Efficacy Scale for Self-Care is a questionnaire composed of 15 statements, and participants respond to these statements based on their confidence in the statements. The questionnaire is divided into three subscales with five statements each. The subscales include: self-efficacy for dentist consultations, self-efficacy for brushing of the teeth, and self-efficacy for dietary habits. Participants indicate whether they are not confident, somewhat confident, confident, very confident, or completely confident in the statements, and these responses are scored from 1-5, with 1 being not confident and 5 being completely confident. Overall scores range from 15-75, and subscales range from 5-25, with higher scores indicating better oral health behaviors in participants.

Separate PowerPoint presentations were prepared containing images shown to participants in the positive and negative conditions. Both PowerPoint presentations contained a total of 12 images, each shown for two seconds, with a blank image at the beginning. A variety of images were used to depict consequences of good and poor oral health care practices, respectively (See Appendix B for the images used). For the positive condition, the PowerPoint contained images of healthy teeth and smiles, confident dentists and happy patients, and an overall positive theme with respect to the dentist and dental care. For the negative condition, the PowerPoint contained images of unhealthy teeth and tooth decay, dental instrumentation, patients receiving anesthesia injections, and an overall negative theme of fear and anxiety.
Procedure

This study required that participants be present at two separate sessions separated by one week. In the first session, participants were given a packet of questionnaires including the Taylor Manifest Anxiety Scale, the Modified Dental Anxiety Scale, and the Self-Efficacy Scale for Self-Care. After this initial data collection, participants returned one week later and were randomly assigned to one of the three experimental conditions. For each condition, participants were exposed to the appropriate PowerPoint slides. There were 16 participants in the positive condition, 20 participants in the neutral condition, and 18 participants in the negative condition. For the positive and negative groups, participants viewed the PowerPoint slideshow consistent with their condition, and were subsequently prompted to fill out another Modified Dental Anxiety Scale. For the neutral group, participants simply filled out another Modified Dental Anxiety Scale. All participants were required to write the last four digits of their student ID numbers on the questionnaires given for both weeks to allow individual responses to be tracked from part one to part two of data collection.

Design

The independent variable was the condition to which participants were assigned. That is, participants were randomly assigned to a positive, neutral, or negative group. Participants in the positive group were exposed to the slide show of images indicative of the consequences of good oral health care practices. Conversely, participants in the negative group were exposed to the slide show of images indicative of the consequences of poor oral health care practices. Participants in the neutral group were not exposed to any images and did not view a slide show. The dependent variable measured following the treatment was the participant scores on the re-administered dental anxiety scale.
Results

Descriptive

Table 1 (below) shows the descriptive statistics for participants’ responses to the scales given in the experiment. The Taylor Manifest Anxiety Scale, Modified Dental Anxiety Scale, and Self-Efficacy Scale for Self-Care were given to participants prior to being exposed to one of the conditions. The overall score for the Self-Efficacy Scale for Self-Care corresponds to participants’ oral health behaviors. The subscales for the Self-Efficacy Scale for Self-Care are indicated by the dental attendance, brushing of teeth, and dietary habits scores. General anxiety was determined from the Taylor Manifest Anxiety Scale, and the pre- and post- dental anxiety scores correspond to the Modified Dental Anxiety Scale given to participants before and after exposure to the PowerPoint slides.

Table 1: Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taylor Manifest Anxiety Scale</td>
<td>54</td>
<td>17.56</td>
<td>7.837</td>
</tr>
<tr>
<td>Modified Dental Anxiety Scale - *Pre</td>
<td>54</td>
<td>13.91</td>
<td>3.852</td>
</tr>
<tr>
<td>Modified Dental Anxiety Scale - *Post</td>
<td>54</td>
<td>14.06</td>
<td>4.021</td>
</tr>
<tr>
<td>Self-Efficacy Scale for Self-Care</td>
<td>54</td>
<td>49.80</td>
<td>9.494</td>
</tr>
<tr>
<td>*Dental Attendance</td>
<td>54</td>
<td>17.54</td>
<td>5.020</td>
</tr>
<tr>
<td>*Brushing of Teeth</td>
<td>54</td>
<td>19.89</td>
<td>4.259</td>
</tr>
<tr>
<td>*Dietary Habits</td>
<td>54</td>
<td>12.50</td>
<td>3.805</td>
</tr>
</tbody>
</table>
Correlation

There was a significant positive correlation between participants’ general anxiety and dental anxiety ($r = 0.446, N = 54, p < 0.01$), indicating that those who are dentally anxious are also anxious in general. However, there was no correlation between participants dental anxiety and their oral health behaviors ($r = 0.025, N = 54, p > 0.05$), suggesting no effect of anxiety on participants’ overall oral health behaviors. There were also no correlations found between dental anxiety and any of the three subscales of the Self-Efficacy Scale for Self-Care, which included dental anxiety and dental attendance ($r = 0.057, N = 54, p > 0.05$), dental anxiety and tooth brushing ($r = -0.013, N = 54, p > 0.05$), and dental anxiety and dietary habits ($r = -0.008, N = 54, p > 0.05$). Each of these subscales contribute to an overall representation of oral health, but it was found that dental anxiety was not correlated with any of these specific representations of oral health.

Manipulation

There was a significant interaction between the pre- and post- dental anxiety scores and the positive, negative, and neutral conditions $F(2, 51) = 3.569, p < 0.05$. As can be seen in Figure 1, there was an effect of the condition on the pre- and post- dental anxiety scores. Prior to the manipulation, anxiety scores across the three conditions were comparable, while following the manipulation, the groups exhibited decidedly different anxiety scores.
There was not a significant difference between dental anxiety before and after the neutral condition $F(1, 51) = 0.122$, n.s. This means that participants’ feelings of dental anxiety did not change from the first to the second test session. There was a significant difference between dental anxiety before and after the positive condition $F(1,51) = 3.092$, $p < 0.10$. Participants’ reported feelings of dental anxiety decreased after being exposed to the positive condition. Also, there was a significant difference between dental anxiety before and after the negative condition $F(1, 51) = 4.030$, $p < 0.05$. Participants’ reported feelings of dental anxiety increased after being exposed to the negative condition.

**Discussion**

Based on the results, it was determined that those who are dentally anxious are also generally anxious, but there was no relationship between dental anxiety and oral health behaviors. Specifically, there was not a relationship between dental anxiety and dental

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**Figure 1**: Effect of Condition on Dental Anxiety Scores

![Chart showing effect of condition on dental anxiety scores](chart.png)
EFFECT OF DENTAL ANXIETY

attendance, tooth brushing, and dietary habits. Not only was there no effect of dental anxiety on overall oral health behaviors, but there was no effect on any of the defined subscales for oral health. This suggests that dental anxiety does not influence oral health behaviors.

However, it was found that efforts to manipulate dental anxiety by exposure to positive and negative consequences of oral health were successful. Participants who viewed the positive images reported lower levels of anxiety, while participants who viewed the negative images reported higher levels of anxiety. These results show that anxiety can be manipulated in patients by exposing them to either positive or negative consequences of oral health. Therefore, dentists should approach patients in a positive manner prior to treatment as it may help to reduce their anxiety. Using scare tactics and reminding patients of possible complications and problems will only heighten their anxiety.

From this study, it was not possible to determine whether the conditions had an effect on oral health behaviors. There was no relationship between pre-dental anxiety scores and oral health behaviors, but there was no attempt to manipulate oral health behaviors by exposing participants to the same conditions. That is, one could speculate that the negative condition may have led to increased oral health behavior scores as individuals would want to improve their oral health habits to avoid any negative consequences. The positive condition may have also led to increased oral health behavior scores as individuals would see the benefit of maintaining and improving their oral hygiene. However, participants’ oral health behaviors would have had to be assessed weeks after being exposed to the condition to determine if a change in the behaviors persisted. Also, obvious demand characteristics may have presented problems in collecting reliable data. In conclusion, while dental anxiety was not related to participants’ oral health
behaviors, it was found that anxiety could be manipulated using positive and negative depictions of dentistry and oral health.

For future studies, it would be useful to determine whether certain conditions could be used to manipulate not only anxiety, but also oral health behaviors. Regardless, it is still extremely important for dental professionals to reduce patient anxiety to make for a more comfortable, relaxed dental experience. Research has found that a greater perceived severity of oral diseases was related to increased tooth brushing frequency (Anagnostopoulos, 2011). Also, heightened levels of dental anxiety in patients were found to result in avoidance of dental care (Halvari, 2010). Although the current study was unable to examine these findings, the research shows that anxiety plays a role in dental attendance, and oral health behaviors are related to patient perception. As the study showed, anxiety can be manipulated, and it is likely that dentists could also manipulate patient perceptions and attitudes in a way that would improve oral health behaviors.

For dental professionals to be successful in creating a comfortable dental atmosphere for patients, they must be sensitive to their patients’ needs. Dentists must be able to detect pain and anxiety in patients and respond appropriately. However, it can be difficult to detect patient distress while simultaneously treating a patient and carrying out a procedure (Baron, 1990). This is why nonverbal communication skills are vital to understanding patients’ needs. Verbal communication is not always effective and may not even be possible, thus understanding and responding to body language and nonverbal signs are absolutely necessary skills to have (Baron, 1990). This is especially important in interpreting patients’ anxiety, as it can be far more difficult to estimate anxiety than it is to estimate pain. Because these skills are invaluable and an integral part of clinical success, it has been found that nonverbal communication skills lead to
higher patient satisfaction (Baron, 1990). Again, whether verbal or nonverbal, dentist-patient communication was found to be a key element in reducing anxiety in a dental setting (Hamilton, 1994). Communication was found to reduce dental anxiety in patients and enhance the perceived competence of the dentist in the eyes of the patient. This resulted in more frequent dental visits (Hamilton, 1994). Further, the reduction of anxiety through communication often trumped the anxiety caused by a painful experience (Hamilton, 1994). If dental professionals can effectively reduce pain and stress in patients during treatment, they may be able to lower levels of anxiety associated with present and future treatments. Dental professionals must educate people on the importance of dental care and ways to prevent serious complications from arising. By doing this, patients are less likely to experience a painful or traumatic dental procedure which can lead to a cycle of negative cognitions and anxiety. Enhanced dentist-patient communication is paramount in helping patients cope with their anxiety.

Anxiety can be a major hindrance on adherence to treatment. Patient adherence is important for all dental professionals, as it can prevent complications from arising and result in successful treatment if complications do arise. Adherence is characterized by patients following the advice and suggestion of their health care provider (Straub, 2011). Adherence stems from both the attitude and behavior of patients. Patients must agree and be willing to follow the advice of their dentist, and must sufficiently perform the instructions and recommendations given to them by their dentist (Straub, 2011). However, anxiety is a huge barrier to adherence which can result in significant costs to both the patient and provider. This is why dentist-patient communication is vital, as it can ease anxiety in patients, resulting in improved oral health behaviors and more frequent dental visits. If patients adhere to a dental regimen, they will be
less likely to develop a serious health problem, which could reduce anxiety in patients. Adherence is key to successful treatment and the maintenance of good oral health in patients.

Dentists must learn the skills necessary to reduce anxiety in their patients. From the current study, it was clear that anxiety could be manipulated for better or worse, so strategies must be developed to prevent anxiety from developing in patients. It may be useful to design, develop, and implement beneficial strategies in dental schools, or address them in continuing dental education. This will require more research into successful strategies that could reduce patient anxiety and improve oral health habits. For example, a recent study looked at the relationship between emotional intelligence and dental student clinic performance (Victoroff, 2013). The study found that emotional intelligence, which can be defined as an individual’s ability to interpret and understand the moods of others, was a significant predictor of dental student clinical performance. That is, a dental student’s “emotional self-control, initiative, trustworthiness, conscientiousness, adaptability, and optimism” were related to their clinical performance, which includes a student’s “diagnostic and treatment planning skills, time utilization, preparation and organization, self-evaluation, professionalism, and patient management” (Victoroff, 2013). This is important as clinical education in dental school is a direct reflection of what practicing dentists experience in the profession. Therefore, improving students’ emotional intelligence in dental school may improve their ability to reduce anxiety and improve oral health behaviors in patients.

It may also be useful for dentists to emphasize dental health’s relation to overall health in promoting patients’ oral health behaviors. For instance, one study found that an association exists between pneumonia and oral health, and that improved oral hygiene and frequent dental care can reduce the progression and occurrence of respiratory diseases (Azarpazhooh, 2006).
Also, a study done by Locker (2002) found that oral health is significantly associated with quality of life, and a study done by Meurman (2004) found a possible link between periodontal disease and the pathogenesis of cardiovascular disease. By explaining the benefits of dental health on overall health, dentists may be able to improve patients’ oral health behaviors. In conclusion, developing strategies based upon this research may be beneficial in reducing anxiety, promoting patient adherence, improving oral health behaviors, and increasing dental visits. This would result in improved oral hygiene in patients and more successful patient treatment, leading to less pain and distress in the patient population, which is the primary goal of the dental profession.
References


Appendix A: Surveys used to Assess Variables

*Self-Efficacy Scale for Self-Care*

Instructions: Circle the number that corresponds with your confidence in the following statements.
1 = Not Confident  2 = Somewhat Confident  3 = Confident  4 = Very Confident  5 = Completely Confident

<table>
<thead>
<tr>
<th>Statement</th>
<th>Not Confident</th>
<th>Somewhat confident</th>
<th>Confident</th>
<th>Very Confident</th>
<th>Completely Confident</th>
</tr>
</thead>
<tbody>
<tr>
<td>I go to the dentist for treatment of periodontal disease.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I cooperate with my dentist and hygienist for treatment of periodontal disease.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I visit my dentist regularly, even after treatment is completed, to prevent recurrence.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I have regular checkups even when I am busy with work or housework.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I have regular checkups even when my mind is not relaxed.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I brush my teeth as instructed.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I brush my teeth carefully and thoroughly.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I brush the border between the teeth and gums.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I move the toothbrush with a short, quick motion.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I take time to brush my teeth carefully.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I try not to spend too much time eating.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I eat my meals at fixed times during the day.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I try to eat a well-balanced diet.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I try not to drink right before bed.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
### Taylor Manifest Anxiety Scale

Instructions: The statements below inquire about your behavior and emotions. Consider each statement carefully. Then indicate whether the statements are generally true or false for you. Record your response (check true or false) in the spaces provided.

1. I do not tire quickly
2. I believe I am no more nervous than others
3. I have very few headaches
4. I work under a great deal of tension
5. I frequently notice my hand shakes when I try to do something
6. I blush no more often than others
7. I have diarrhea one a month or more
8. I worry quite a bit over possible misfortunes
9. I practically never blush
10. I am often afraid that I am going to blush
11. My hands and feet are usually warm enough
12. I sweat very easily even on cool days
13. Sometimes when embarrassed, I break out in a sweat
14. I hardly ever notice my heart pounding, and I am seldom short of breath
15. I feel hungry almost all of the time
16. I am very seldom troubled by constipation
17. I have a great deal of stomach trouble
18. I have had periods in which I lost sleep over worry
19. I am easily embarrassed
20. I am more sensitive than most other people
21. I frequently find myself worrying about something
22. I wish I could be as happy as others seem to be
23. I am usually calm and not easily upset
24. I feel anxiety about something or someone almost all of the time
25. I am happy most of the time
26. It makes me nervous to have to wait
27. Sometimes I become so excited I find it hard to get to sleep
28. I have sometimes felt that difficulties piling up so high I couldn't get over them
29. I admit I have felt worried beyond reason over small things
30. I have very few fears compared to my friends
31. I certainly feel useless at times
32. I find it hard to keep my mind on a task or job
33. I am usually self-conscious
34. I am inclined to take things hard
35. At times I think I am no good at all
36. I am certainly lacking in self-confidence
37. I sometimes feel that I am about to go to pieces
38. I am entirely self-confident
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 □

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

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

4. If you were about to have your TEETH SCALED AND POLISHED, how would you feel?
   
   Not Anxious □ Slightly Anxious □ Fairly Anxious □ Very Anxious □ Extremely Anxious □

5. 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 □
Appendix B: PowerPoint Presentations

*Images used in Positive Condition*
Images used in Negative Condition