2005

Dental values as a factor affecting attendance among patients with high dental fear

Suzanne M. Lawrence
West Virginia University

Dental Values as a Factor Affecting Attendance among Patients with High Dental Fear

Suzanne M. Lawrence

Thesis submitted to the Eberly
College of Arts and Sciences at
West Virginia University in partial
fulfillment of the requirements
for the degree of

Master of Science
In
Adult Clinical Psychology

Daniel W. McNeil, Ph.D., chair
William Fremouw, Ph.D.
Richard Crout, D.D.S., Ph.D.

Department of Psychology/School of Dentistry

Morgantown, WV
2005

ABSTRACT

Dental Values as a Factor Affecting Attendance among Patients with High Dental Fear

Suzanne Lawrence

The purpose of this study was to assess the degree to which oral health values affect attendance patterns in a group of West Virginia patients with high dental fear. Participants were selected from 585 patients who presented to an oral diagnosis clinic at the West Virginia University School of Dentistry for either emergency services or to be screened for regular patient status. Participants completed a battery of self-report instruments. Those who were identified as having high dental fear (i.e., were in the top 50% of a same-sex distribution on the Dental Fear Survey) were contacted by telephone approximately one year later to complete measures of oral health values. Attendance over the past year was assessed through self-report and the patients' dental charts. The high dental fear patients who presented for screening appointments reported greater value associated with oral health, and attended significantly more often for dental appointments than the equally fearful patients who presented for emergency care.

Acknowledgements

Completion of this thesis would have been an insurmountable task without the help and support of many people. I would first and foremost like to thank my advisor and committee chair, Dr. Dan McNeil, who has shown extreme patience and understanding, and whose belief in my ability to get this done has been invaluable. My gratitude goes also to Drs. Crout and Fremouw, for their valuable input and suggestions; to Paulomi Shah and Nicole Rupert for their assistance in the long process of data collection; to Dr. Chris Martin for his assistance in analyzing panograms; to the WVU School of Dentistry for their assistance and support; and to the WVU Department of Psychology Alumni Fund.

Table of Contents

Dental Values as a Factor Affecting Attendance among Patients with High Dental Fear

The field of behavioral dentistry is relatively young, with the first use of the term "behavioral dentistry" appearing in the mid 1970s (West Virginia University, 1977). Since its inception, research in the area has focused on factors such as fear and anxiety, response to pain, as well as oral hygiene, treatment compliance, oral health related quality of life, and attendance behaviors. In a paper touting the importance of the behavioral sciences in dentistry, Schou (2000) stated, " . . . the success of dental practice is not only dependent on the technique applied or the technical skills of dental professionals, but also on patients, their attitudes and behaviour and the interactions between dental professionals and patients . . . In order to treat patients successfully, dental professionals must understand and change or modify patient behaviour, and the knowledge necessary for this is provided by the behavioral sciences. (p.1)" One area that has begun to gain attention is the area of patient decision-making and the values patients place on dental health.

The literature on dental health values is relatively small, but it is clear that individuals vary in the importance they place on oral health. The oral health values of highly dentally fearful patients have not yet been thoroughly examined. It is well documented that individuals with high dental fear have lower attendance rates than non-fearful patients (Abrahamsson, Berggren, Hakeberg, & Carlson, 2001). The present study assessed the importance of oral health values on the attendance of highly fearful dental patients.

Oral Health in West Virginia

In his 2000 Report on Oral Health, the U.S. Surgeon General wrote: “There are

profound and consequential oral health disparities within the U.S. Population" (p. 11). Sadly, the oral health statistics in West Virginia attest to that proclamation. The state's population is extremely high in edentulism (complete toothlessness), with 44.2% of adults over 65 retaining none of their natural teeth, compared to the national average of 23.7% (United States Department of Health and Human Services [U.S. DHHS], 1999). Even more startling is that in the younger 35-44 age group, 14% of West Virginians had lost all or most of their teeth. The Behavioral Risk Factor Surveillance System (BRFSS) is a nation-wide study conducted by the Centers for Disease Control and Prevention. According to the BRFSS, in 2002, 34% of adult West Virginians had lost 6 or more teeth due to decay, compared to 17.6% nationwide. West Virginians also report attending the dentist less frequently than their counterparts in the rest of the country. In 2002, 60.1% of West Virginians had visited the dentist for any reason, whereas the number for the rest of the country was 69.2% (U.S. DHHS, 2002). In an area that clearly needs improved dental care, West Virginia ranks 42 out of fifty states in terms of dentists per capita. As of 2000, the state had 36.8 dentists per 100,000 residents, versus the national average of 48.4 (U.S. DHHS, 2000).

In the 1985 report on the status of dental health in West Virginia, Wilson (1985) reported that the number of decayed/missing/filled (DMF) teeth per child in three rural northern counties was 3.11 teeth, compared to 1.96 nationwide. The discrepancy grows larger with respect to repairing the decay: only 54.67% of the decay had been repaired in any way. In the most remote of the three counties, only 38.7% of 11 year old children who had experienced tooth decay had that decay repaired. had repaired teeth The national repair rate is 78.7%. That same county also had nine times more missing teeth per child

than the national average (27.0 per 100 children versus 3 per 100 children). Two other counties had 6 times the national average of missing teeth per child. It would, however, be unfair not to mention that these conditions do not exist everywhere in West Virginia, and that these data are dated. Other areas of the state have repair rates nearly identical to the national average. Nonetheless, the severe dental neglect experienced by much of the state's population is still so profound as to make the state's overall statistics reflective of poor oral health.

Some of this disparity may be due to the economic conditions in much of the state. The median income in West Virginia between 2001 and 2003 was $31,210.00, the lowest in the country, much lower than the national average of $43,527.00. Statistically, this figure was significantly lower than all states except for Mississippi, whose median income was only slightly higher (U.S. Census Bureau, 2003). Although many would likely attribute the relatively poor oral health of West Virginia to economic factors alone, few phenomena can be explained by a single factor, and data such as these highlight the importance of identifying variables such as dental health values that may contribute to the problem as a first step in devising interventions.

Relation of Dental Attendance to Oral Health

There is a large body of literature that consistently reports a strong negative relationship between regular dental attendance and tooth decay and other oral disease. Murray (1996) found that between the ages of 25 and 34, regular attenders (i.e., those who had been to the dentist at least once in the past year) had retained one more tooth on average than non-attenders; those aged 45-54 who were regular attenders had retained an average of three more teeth than their non-attending counterparts. Similarly, Nuttal

(2001) found that those patients who only attend when there is some problem (i.e., symptomatic attendance for problems such as pain) not only had one less tooth on average, but also were six times more likely to have unrestorable caries. Because of this well-established relation between dental attendance and oral health, it is important to understand the variables that affect attendance, particularly for asymptomatic or preventive appointments.

Over the past several decades, many factors have been found to predict attendance in various samples, such as education, socioeconomic status (SES), gender, and age. In summary, higher levels of education, higher SES, and being female seem to be related to more regular dental attendance (Liddell & May, 1984). The results for age vary; some data suggest that young people attend more often, while other studies report the opposite (Liddell & May; Nuttal et al., 2001). There is considerable evidence that financial factors have an impact on asymptomatic attendance. Recent work by Syrjälä, Knuuttila, and Syrjälä (1992) sought to determine factors that impede preventive dental attendance in a sample of Finnish men and women attending an occupational health center. Looking at variables such as inconvenience, fear, and expense, the perspective that “dental care is expensive” emerged as a major reason for nonattendance for 46.8 percent of the sample, and was cited more often than any other single reason. Results from adult dental health surveys in the United Kingdom revealed that in both 1988 and 1998, 24 percent of adults endorsed the item, “It will cost me less in the long run if I only go when I’m having trouble” (Nuttall et al., 2001). In a poll conducted by the British Dental Association, only 50 percent of the participant group stated that they would visit the dentist regularly if dental check-ups were offered free of charge (Murray, 1996). If finances only explain

50% of non-attenders, what can be said to account for the rest? This group of non-attenders has been referred to as “the missing 50 percent” (p. 339) (Murray). Considerable efforts have been made to identify those variables that contribute to their utilization of oral health services.

Relation of Oral Health to Systemic Health

In addition to the negative consequences generally associated with poor oral health, there has been a recent rise in research examining a possible causal link between oral health and systemic illness. Specifically, periodontal disease has been connected with both cardiovascular disease and low birth weight, premature births (Fowler, Breault, & Cuenin, 2001). Although an irrefutable causal link has yet to be firmly established, many such researchers believe that infections in general, including common periodontal infections, may contribute to systemic disease through the introduction of gram-negative bacteria into the bloodstream, which can lead to intravascular coagulation, vascular fatty degeneration and inflammatory cell infiltration into major blood vessels (Beck & Offenbacher, 1996). This theory of infection was first described in 1891, when many diseases, such as pneumonia, tuberculosis, syphilis, meningitis, tonsilitis, and middle ear infections were thought to be the result of "oral sepsis.” Many teeth were extracted to alleviate diseases, until it was noted that this procedure rarely seemed to lead to improvement (Fowler et al.). In recent years, however, the connection between oral infection and systemic disease has been revisited using sound research methods. It has been posited that: "Epidemiologic studies supported the concept that periodontal disease may be a separate risk factor for cardiovascular disease and premature low birth weight infants” (p. 86; Fowler et al.).

In one longitudinal study, Destefano and colleagues (1993) found that males under 50 with significant periodontitis were 1.72 times more likely to develop coronary heart disease (CHD), after adjusting for known risk factors such as smoking, diet and family history of CHD. In a case control study of 124 mothers, Offenbacher et al. (1996) found, after adjusting for age and alcohol and tobacco use, a strong significant association between periodontal disease and low birth weight premature deliveries, with an adjusted odds ratio of 7.5 - 7.9. Overall, data from studies in the area suggest that the presence of periodontal infection doubles the likelihood of cardiovascular disease, and causes women to be seven times more likely to give birth to premature, low birth weight infants.

Some studies have looked deeper into the association between oral health and cardiovascular disease, finding evidence for mediators of the relationship. Based on the observation that individuals differ in their response to bacterial challenges (i.e., infections), Beck et al. (1996) developed a hypothetical model in which certain genetic immune phenotypes as well as environmental factors such as diet and stress could combine to make an individual more likely to develop cardiovascular disease from a periodontal infection. A Japanese study conducted by Saito, Shimazaki, Koga, Tsuzuki, and Ohshima (2001) established a link between upper body obesity and periodontitis, finding that individuals with a high waist-hip ratio and a high body mass index were at significantly higher risk for periodontitis (after adjusting for known risk factors) than those with a low waist-hip ratio and low body mass index.

Clearly, more research into the possible connections between oral health and systemic health is needed in order to establish any type of causal link. Even the

preliminary data, however, underscore the importance of regular dental attendance to help prevent infection and disease.

Dental Fear

Fear can be defined as, “An emotional state involving verbal reports, physiological arousal, overt behavior, and/or cognitive disruption similar to anxiety. Fear, however, involves greater mobilization for physical action. Typically, it is triggered by specific objects or situations” (p.151) (McNeil, Turk, & Ries; 1994). Fear serves a protective purpose. A healthy dose of fear can keep a person from engaging in overly hazardous situations, and readies them for action in the face of danger. People vary in their levels of fear along a continuum, ranging from complete fearlessness to pathological phobias and anxiety disorders, with most individuals falling somewhere in the middle (McNeil et al.).

High levels of dental fear or phobia can be harmful to the overall well-being of the individual. Someone who is dentally fearful and avoids treatment is at greater risk of suffering from oral disease and its consequences. The treatment of dental fear poses a challenge to the clinician in that dental visits can produce very real discomfort, and a patient who is successfully desensitized is likely to experience the same pairing of neutral stimuli and pain or discomfort upon their next visit to the dentist. "The dentist represents one of the few socially sanctioned inflictors of noxious stimulation in our culture, and his/her operatory provides a natural laboratory for the study of fear and pain tolerance " (p. 172; Melamed, 1979). Dental fear has many possible components, such as fears of: (a) pain, (b) criticism for poor oral hygiene, (c) loss of control, (d) the anesthetic injection, and (e) the sound and sensation of the drill (McNeil & Berryman, 1989; Melamed, 1979).

These specific fears may generalize, making the entire dental situation fear-evoking.

Etiology of dental fear. Social learning may play a role in the development of dental fear, particularly in children. Children can learn to fear the dentist from hearing negative stories from parents or friends (Melamed, 1991). Although direct conditioning likely plays a role in the onset of some dental fears, other studies show that it is not the objective experience alone that causes the fear, but the patient's interpretation of it. Ten Berge, Veerkamp, and Hoogstraten, (2002) employed a regression analysis to determine predictors of dental fear and found only a weak relation with the number of extractions, and no relation with the number of restorations (i.e., “fillings”). Another study with adults found similar results; participants in the fearful group did not report a significantly higher number of frightening dental experiences than the control group, but significantly more participants in fearful group reported suffering from memories of these events. Furthermore, about half of the fearful participants suffered from posttraumatic stress disorder (PTSD) symptoms, and the severity of their fear correlated highly with both the frequency of intrusive memories ($r = 0.64$, $p < 0.001$) and avoidance of those memories ($r = 0.62$, $p < 0.001$) (de Jongh, Aartman, & Brand, 2003). In an attempt to define variables that may be related to the development of dental fear, Milgrom, Fiset, Melnick, and Weinstein (2003) found that dentally anxious children were likely to be: (a) irregular attenders, (b) have anxious parents, and (c) have undergone past extractions. Locker, Poulton, and Thomson (2001) found that adults with severe dental anxiety were much more likely to have a comorbid diagnosis of conduct disorder, agoraphobia, social phobia, simple phobia, or alcohol dependence than normal controls or minimally anxious patients. They also found that highly fearful adults were more likely to maintain their

anxiety over time.

Prevalence of dental fear. Estimates of the prevalence of dental fear encompass a wide range. In a telephone survey, Gatchel and colleagues (1983) found that 29.2% of those surveyed reported a moderate or high level of fear related to dentistry. Of those who reported significant fear, 54% were dental avoiders, and of these, 62.5% gave fear as their primary reason for non-attendance. In a study of 3,670 Norwegian adults (Vassend, 1992), between 4 and 7 percent of those surveyed reported significant dental fear. In a 5-year longitudinal study of adults, Magirias and Locker (2002) tracked 1,226 originally nonanxious participants and found an overall incidence of dental fear of 5.8%, ranging from 12.2% for those aged 18-24, to 1.7% in those 65 and over. Most studies report that 5-20% of individuals report significant dental fear (Gatchel, 1989; Hakeberg, Berggren, & Carlsson, 1992; Milgrom et al., 1988; Scott & Hirshman, 1982). An interesting finding reported in an article by Smith and Heaton (2003) is that the incidence of dental fear appears to have remained steady over the past 50 or so years, despite rising incidence of anxiety overall. The authors reviewed 128 articles published from 1955 to 2000 that measured dental fear in college samples, and found no significant differences in dental fear across that time span.

Another consistent finding is that females generally have higher levels of dental fear and males lower levels, although estimates of the degree of difference vary (Frazer & Hampson, 1988; Hakeberg, Berggren, & Gröndahl, 1993; Peretz & Moshonov, 1998; Scott, Hirshman & Schroder, 1984). In a study devised to assess differing levels of fear prior to different dental treatments, Stabholz and Peretz (1999) found that females had higher levels of fear, and males reported lower levels, regardless of anticipated treatment.

Vassend (1992) also reported higher levels of dental fear in females than males. Using the Dental Fear Survey (DFS) as a measure of dental fear, Milgrom, Weinstein and Getz (1995) detailed their findings regarding gender as a factor in dental fear. In response to the omnibus DFS item, "All things considered, how fearful are you of having dental work done?", women were more likely than men to respond "much" or "very much", and more men than women endorsed the responses indicating lower levels of fear-related avoidance. Females also comprise between 75 percent to 86 percent of patients seeking care in dental fear clinics (Milgrom et al., 1995). As a possible expanation for the gender difference in dental fear, Watkins, Logan, and Kirchner (2002) compared levels of anticipated pain versus levels of actual experienced pain during endodontic therapy (root canal) and found that women were more likely to anticipate higher pain levels than men, but did not actually experience higher levels of pain.

Measurement of Dental Fear

Self-report, physiological indices, and behavioral observation all have been used to assess levels of dental fear. A Norwegian study of twenty adults obtained data on 20 dentally anxious patients' heart rate, heart rate variability, and reaction times while seated in a dental chair, in a dental operatory while being exposed to scenes of dental treatment, and a Stroop attentional task (Johnsen et al., 2003). Their results showed an attentional bias as well as longer manual reaction times to both the incongruent versus the congruent color words as well as the threat compared to the neutral words. These longer reaction times were particularly found in the patients with the highest heart rate variability in response to the exposure scene (Johnsen et al.).

Due to their ease of use and ability to identify categories of dental fear, self-report

measures are used far more often than any physiological or behavioral measure. Self-report measures have been shown to be useful in assessing levels of dental fear in adults, but children's self-reported ratings are less valid indications of their individual level of fear (Melamed, 1991). Because the present study focuses on an adult population, two of the measures most commonly used for adults will be reviewed.

Corah (1969) developed a 4-item scale that yields a general score indicating an individuals level of fear related to dentistry. The Dental Anxiety Scale (DAS) was found to be both reliable and valid and succesfully assesses levels of dental fear. Because of its accuracy and brevity, it remains one of the most commonly used measures of dental fear. However, the single score resulting from such a measure gives little information about the specific situations and stimuli in the dental situation that may elicit fear, or the different manifestations that anxiety may take in a given individual. To provide such information, Klienknecht, Klepac, and Alexander (1973) developed the Dental Fear Survey (DFS). The DFS as it stands today is a valid, reliable 20-item scale that identifies a patient’s individual reactions to a variety of stimuli that one would be confronted by during a dental visit. The specificity of the measure led to the finding that the most commonly fear-producing aspects of the dental situation are the sights, sounds, and sensations associated with the anesthetic needle and the drill (Klienknecht, Klepac, & Alexander, 1973; McGlynn, McNeil, Gallagher, & Vrana, 1987).

Relation of Dental Fear to Attendance

Many studies have reported that dental fear is negatively associated with dental attendance (i.e., the more fear the person reports, the less likely it is s/he will go for asymptomatic care). Liddell and May (1984) found that when asked for reasons for not

attending the dentist regularly, 22.6% cited fear as their primary reason. Dental fear has been found to be significantly higher among dental avoiders than regular attenders (Abrahamsson et al., 2001). As a theoretical basis for the phenomena, Berggren (1993) proposed a circular model in which dental fear leads to avoidance, leading to worsening oral health, resulting in negative psychological psychosocial consequences which reinforces and exacerbates the fear, leading to more avoidance, and so on.

Surprisingly, there are reports of patient groups that attend the dentist regularly, despite high levels of fear. Interviews with highly fearful Norwegian adults revealed that many dentally fearful adults attend on a routine basis despite their fear (Vassend, 1992). The authors concluded that dental fear negatively affects attendance, but having a high degree of dental fear does not automatically prevent the individual from attending regular dental visits. Other data were obtained through structured interviews. They found that factors such as high anticipatory anxiety, negative oral health effects, and negative life consequences successfully predicted non-attendance among patients with dental fear. Similarly, Vassend found that both dental fear and pain were poor predictors of dental attendance, reporting that many anxious individuals attend the dentist despite their emotional and physical discomfort. In the realm of self-care, a qualitative study conducted by Cohen, Fiske and Newton (2000) found that many individuals with high dental fear actually had better oral hygiene practices than non-anxious attenders (presumably in order to avoid dental visits). Milgrom and colleagues (1995) reported that although women are generally more dentally fearful, they also attend dental appointments more often than males. While it seems that fear motivates some to avoid dental treatment, for others it functions to prompt good oral hygiene and dental appointment attendance for

preventive reasons.

Relation of Dental Fear to Oral Health

Because level of dental fear is negatively related to attendance, it would naturally follow that people with high levels of dental fear would have poor dental health compared to less fearful individuals. In general, the literature seems to be in concordance with this view. In a study of U.S. Navy recruits, Cohen (1985) found an association between high scores on a measure of dental fear and numbers of decayed, missing, or filled tooth surfaces. In a study of Swedish adults, patients identified as having "severe dental fear" had more missing teeth, more decayed surfaces, and fewer filled surfaces, indicating that avoidance of regular treatment leads to more severe disease and more extreme treatments such as extraction (Berggren et al., 1993).

Oral Health Values

One possible explanation for the discrepancy between fearful patients who regularly attend and those who do not, is a difference in the value placed on the importance of oral health. Oral health values can be conceptualized as the importance placed by an individual on the care and maintenance of their teeth and supporting structures. It can be assumed that people vary in the degree of importance they assign to their oral health just as people vary in any other quality (e.g., intelligence, height, interest in sports). Nuttal (2001) found that among those who only go to the dentist when they are experiencing problems, the most common reason cited for not attending was that they did not see the point in visiting unless absolutely necessary. Similarly, a 2001 study (McGrath & Bedi) found that individuals who see dental health as impacting their quality of life are more likely to be regular attenders. In a previously mentioned study (Liddell &

May, 1984) which reported that 22.6% of people named anxiety as their main reason for non-attendance, 42.1% of the total sample endorsed one of the following three reasons; “Don’t need to”, “not found suitable dentist”, or “no time”. All of these responses indicate a potential devaluing of the importance of dental health, which presumably would be associated with lower attendance frequency. One study conducted in Finland asked adults to indicate reasons for not attending the dentist regularly. Each participant was able to choose as many reasons as applied. Sixty percent of respondents indicated laziness, lack of symptoms, or the belief that dental diseases are not very serious, as primary factors in their non-attendance (Syrjälä et al., 1992), compared to the 48% of respondents indicating finances as a main reason for nonattendance. These negative dental values, termed “dental indifference” by Nuttal (1996), are similar to apathy and are defined as “…an attitude which consists of a significant undervaluing of teeth and lack of interest in oral health manifesting itself in oral neglect, poor compliance with oral care recommendations, a quick-fix attitude toward dental treatment (for example by preferring teeth to be extracted rather than filled) and poor dental attendance for reasons other than dental anxiety” (pp. 112-113).

In a study assessing the relation between the importance attached to the retention of natural teeth and dental attendance, participants were asked to rank order retention of natural teeth, a television set, a car, a living room suite, and a vacation in terms of their relative importance to the individual (Schuurs et al., 1984). They also were asked to relate how much money they would be willing to spend to retain their natural teeth, with the options of no money, ¼, ½, 1, 2, or 3 times their monthly net income. Their results indicate that regular attenders were not only willing to spend a greater portion of their

income on dental care, but also assigned a higher priority to the retention of their teeth as well as a stronger dislike of getting full dentures at any age.

Relation of Oral Health Values and Dental Fear

Low dental values (indifference) and dental fear are similar in their function and behavioral topography; both may lead to missed appointments and general non-attendance, especially when symptoms are absent. In the development of the Dental Indifference Scale (DIS), Nuttal (1996) noted that highly fearful patients may obtain high indifference scores on some items, especially items measuring frequency of dental visits and actions based on symptoms (e.g., what the individual would do if s/he had a painful back tooth). For this reason, Nuttal maintained that individuals endorsing the dental fear item receive a total indifference score of zero. However, a difference that may appear between the two groups is in their level of oral self-care. It seems likely that the high dental fear group may show typical or possibly even heightened levels of oral hygiene, while those that are indifferent would likely be less conscientious about caring for their teeth. Initial data collection and analysis using the Dental Indifference Scale (Nuttal, 1996) found the construct of indifference to be positively related to being young, male, and a manual worker.

*Matching Law as a Conceptual Basis for Understanding Dental Attendance Behavi*or

The matching law states that given the option of two different response choices, the proportion of responding for each alternative will be proportionate to the response/reinforcement ratio for that alternative (Herrnstein, 1974). In essence, organisms tend to choose the response that provides the most frequent reinforcement, often regardless of the magnitude of the reinforcer. Preference for the smaller, more immediate

reinforcement is referred to as impulsivity, while preference for the delayed larger reinforcer has been called self-control (Ito & Oyama, 1996; Rachlin, 2000).

Two factors seem to influence whether the organism will choose the immediate smaller reinforcement or the delayed large reinforcement: (a) sensitivity to delay and (b) sensitivity to reinforcer amount. In a study of self-control, White and Pipe (1987) found that pigeons' sensitivity to reinforcer amount increased with increases in delay value when both reinforcer amount and delay to reinforcement were varied. In Ito and Oyama's study (1987), they found that "indifference" (the point at which the organism will respond equally on each option) was achieved when the reinforcer amount and delay ratios were equal.

Delay also can be thought of in terms of probability (i.e., the smaller the probability that a particular response will be followed by reinforcement, the longer it will take to obtain that reinforcement). Raineri and Rachlin (1993) put this concept to an empirical test by asking participants to choose between $1,000 with a given probablilty (e.g., $p = .5$) and a certain reward of $1,000 with a delay of zero. In this condition, all participants chose the certain reward with no delay. The delay was increased in steps until all participants chose the uncertain reward (e.g., participants chose the 5% chance of immediate money over a 3 year delay to certain money). The point at which 50% of participants chose the probabilistic reward over the delayed certain reward is called the point of "indifference" (Raineri & Rachlin). In general, it was found that organisms prefer smaller certain rewards than larger probabilistic ones.

Within the context of dental attendance, asymptomatic attendance behavior may be conceptualized as self-control. The reward is large (e.g., lack of disease and pain,

physical attractiveness of the hard and soft tissues), but is delayed for a significant period of time. Avoidance behaviors, on the other hand, can be conceptualized as impulsivity (responding for the small, immediate reward). Avoidance provides negative reinforcement in the form of relief (for highly fearful patients), and also provides more immediate (but smaller) reinforcement for non-fearful individuals in the form of monetary and time savings. Within this context, an increase in sensitivity to reinforcer amount would be equated with an increase in the perceived benefits of dental attendance. If, on the other hand, good oral health and lack of oral disease is not perceived as valuable enough to justify such a delay, it follows that the individual will choose the smaller, immediate reward of saved time and money, or relief from discomfort in the case of the highly fearful patient.

Also related to dental values is the concept of utility. Birch and Ismail (2002) wrote: "The utility associated with a particular intervention measures the expected effect of undertaking the intervention on the individual's assessment of his or her well-being." Unlike previous definitions of utility that only take into account the effect of the intervention on the hard and soft tissues (e.g., how viable is the tooth after the root canal?), it takes into account all aspects of the patient's life (e.g., how much will this cost, how much of a hassle is it to get to the dentist?). The procedure is considered to have utility if the benefits outweigh all of the costs. To relate the idea of utility to the present study, if the highly fearful participants choose to attend for dental appointments, they are demonstrating that the benefits of visiting the dentist outweigh the discomfort caused by their fear.

Statement of the Problem

Although there is much research to indicate that fear is negatively associated with dental attendance (Abrahamsson et al., 2001; Cohen, 1985; Liddell & May, 1984), some studies have demonstrated that many highly fearful patients attend regularly, implicating that high levels of fear alone do not necessarily lead to poor preventative oral health care (Gatchel et al., 1983; Vassend, 1992, 1993). Also, because some previous research in the area of dental values (particularly dental indifference) has excluded those patients with high levels of fear (Nuttal, 1996), it is unclear whether some fearful patients may place low value on the importance of dental visits. The aim of this study was to assess the degree to which dental health values affect attendance patterns among patients with significant dental fear. It was predicted that among patients with high dental fear, those who attend more often (or indicate their desire to do so by presenting for a screening appointment) would report higher dental values than those who presented for emergency care.

Method

Participants

The initial screening group consisted of 592 (279 male and 313 female) patients consecutively presenting to the Oral Diagnosis Clinic at the West Virginia University School of Dentistry. Of these, 517 patients had no prior appointments and were seeking emergency services. The remaining 75 patients had scheduled screening appointments, seeking to become established patients at the West Virginia University School of Dentistry clinic. The sample was split by gender and by emergency or screening status, and separate fear distributions were developed based on the DFS scores. Individuals from across the top 50% of these distributions (258 emergency patients and 37 screening

patients) who agreed to participate were recruited for further data collection and analysis. In the end, 18 screening patients (7 males, 11 females) were available to complete the interview. Thirty-two emergency patients (18 males, 14 females) completed the interview, making the final number of participants equal to 50.

Materials

Demographic and dental attendance information. Data about patients' age, gender, ethnicity, and educational level was collected via self-report during the initial data collection phase. Dental attendance data (i.e., number of times attended, procedures involved) since the initial screening was collected via self-report (private dental visits) and from the patient's dental chart (School of Dentistry visits).

Dental Fear Survey (DFS). As shown in Appendix A, the DFS (Kleinknecht, Klepac, & Alexander, 1973) is a 20-item Likert-type inventory that asks participants to endorse items related to fear and anxiety symptoms as they relate to dental treatment, as well as items about appointments missed due to fear. Severity of symptoms is rated from 1 (never/not at all) to 5 (nearly every time/very much). Higher scores are indicative of higher levels of dental fear. It has been thoroughly studied in the U.S. and internationally and has been confirmed to have sound psychometric properties (Kleinknecht, 1978). Normative data have been derived from university students in the USA. The average male score was 38.0 (*SD* = 12.8), and the average female score was 43.2 (SD = 15.7) (McGlynn, McNeil, Gallagher, & Vrana (1987).Test-retest reliability is 0.74 and its correlation with another dental fear self-report measure is 0.92 (Johansson & Berggren, 1992).

Dental Indifference Scale (DIS). The DIS (Nuttall, 1996) is an 8-item multiple-

choice instrument, as shown in Appendix B, designed to measure lack of concern about dental health. Higher scores indicate higher levels of dental indifference. The test-retest reliability is 0.79 and the internal consistency is good (Cronbach's alpha = 0.71). In the original normative sample (910 dentate Scottish adults), those who scored high had fewer teeth than the remainder of the sample and over 50 percent had not received dental care in the last 4 years, indicating a good degree of discriminant validity.

Dental Free Time Trade-Off Scale (DFT-O). The DFT-O (Fyffe, Deery, Nugent, Nuttall, & Pitts, 1999) is a 5-item instrument, as shown in Appendix C, designed to provide (a) a measure of how satisfied the patient is with the current status of his/her dentition, and (b) a utility score based on how much of an individual's free time s/he would be willing to spend to improve the condition of his/her teeth on a daily basis. The first item is a Likert-type question about the patient's general satisfaction with the status of the dentition. The second item actually consists of 14 "yes" or "no" statements about specific aspects of oral health. The third item asks about the amount of time the person generally spends daily caring for their teeth, and the fourth and fifth items are used to calculate utility using the following formula: ..

Utility = (FREE TIME - TIME 1)/(FREE TIME)

Where FREE TIME = free time, in minutes

TIME 1 = extra tooth care time, in minutes

Test-retest reliability is acceptable (r = 0.67, p <0.001). No other psychometric information is available on the DFT-O.

Dental Neglect Scale (DNS). Appendix D contains the DNS, which is a 6-item Likert-type scale in which participants are asked to indicate their level of agreement with

statements regarding their oral hygiene habits and the importance of oral health. The authors of the scale conducted a factor analysis, revealing two factors (neglect and avoidance) with eigenvalues greater than 1.0, and these two factors accounted for 58.4% of the variance in the items. Internal consistency of the scale is good (Cronbach's ($\propto$ = 0.74). A composite variable is created by adding the scores on all of the items except for item three, which is reverse scored and then added to the remaining items (Thomson, Spencer, & Gaghwin, 1996).

Importance of the Retention of Teeth Scale (IRTS). In a procedure adapted from Schuurs et al. (1984), participants were asked to rank order the relative importance of the retention of their natural teeth along with four other items: purchasing a television set, purchasing a living room suite, purchasing a car, and having a vacation. The IRTS is shown in Appendix E. Psychometrics for the scale as it was employed in this study are not available.

Procedure

The initial phase of data collection occurred in the context of an earlier project over a 10-week period with all consecutively admitted outpatients. Approval for this prior study was obtained from the West Virginia University Institutional Review Board; similarly, separate approval was secured for the present project. Upon entering the waiting room, each patient was met by a research assistant who invited him/her to participate on a voluntary basis, and then obtained written informed consent. Each participant completed a packet of material containing a DFS, and a demographic questionnaire, along with other related instruments. Results from this period of data collection were reported in McNeil et al. (2002). Upon completion of the material, each

participant was thanked and given a voucher for five dollars that could be exchanged for cash at the reception desk.

In the present study, between 12 and 16 months later, 50 participants previously identified as having a high level of dental fear (as evidenced by their placement in the top 50% of total DFS scores) were contacted by telephone. Their dental charts were reviewed for attendance information by a psychology graduate student and the two dental students. They were then asked to participate in a study over the telephone conducted in conjunction with the West Virginia School of Dentistry about various reasons people have for visiting or not visiting the dentist. They were informed of the time commitment (approximately 45 minutes) and that they would be mailed a $20.00 money order for their time.

Interviewing. Interviews were conducted by three different persons: two third-year dental students and a second-year clinical psychology graduate student. A detailed script (Appendix F) was developed to help insure reliability. Each interviewer administered practice interviews to the other experimenters and practiced on their own to become proficient in the interviewing technique. All interviewers were blind to the group status (emergency or screener) of the participants. Interrater reliability data were derived from 3 pairs of interviews in which a second rater listened to another experimenter administering an interview over a telephone extension and separately recorded the participant's responses. The recorded responses of the interviewer who administered the interview were then compared to the recorded responses of the interviewer who listened only. All interviewers were in perfect agreement (r = 1.0). The interview consisted of an introductory section in which the participant was informed of the nature of the study,

along with items regarding confidentiality and voluntary participation, questions regarding demographics, the DFS, DIS, DNS, DFT-O, and IRTS (in that order), as well as three other questionnaires whose results are reported in McNeil et al. (2004). Attendance information was retrieved from the participants' patient records at the WVU School of Dentistry and patient self-report

Panograms. When available in the patient charts, panograms (whole-mouth x-rays) were analyzed to determine how many teeth (not including third molars) were present in each patient's mouth. The panograms were analyzed by both the principal investigators and a licensed dentist, who is a faculty member in the WVU School of Dentistry. This variable was included as a gross measure of oral health status.

Results

The initial pool of 592 participants was divided into male (n = 279) and female (n = 313) distributions by emergency or screening status; those who were in the top 50% of fear scores were selected as possible participants. Because there were far fewer screening patients than emergency patients (75 versus 517), multiple and ongoing attempts were made to contact each of the screening patients.

Of the 37 possible high-fear screening patients (22 females), there were 18 (11 females) who completed the study. Of the 19 who did not participate, there were 11 who had incorrect or disconnected phone numbers (9 females), 6 whose listed number was never answered (2 females), and 2 who declined to participate (0 females). The number of potential participants is based on the top 50% of the male (n = 34) and female (n = 46) distributions from the original sample.

For the high-fear emergency patients, there were 142 eligible females and 122 eligible males, representing the top 50 % of each distribution. In these two groups, contact was attempted with 66 males and 72 females. For the males, 18 completed the study, 28 had incorrect telephone numbers, 6 had no answer at the listed number, 6 declined, 4 repeatedly rescheduled their survey but were never available, 1 completed part of the survey and terminated the phone call, and 3 were deceased. For the females, 14 completed the study, 33 had incorrect telephone numbers, 16 had no answer at the listed number, 4 repeatedly rescheduled without giving any data, 4 declined, and 1 completed part of the survey and hung up.

The initially planned approach was to match each screening patient with an emergency patient based on age, sex, education and fear level, and so contact was attempted with every emergency patient in that top fear distribution as well. Forty-seven participants were Caucasian, 3 of the emergency patients were African-American and 50% of the participants were female. After many attempts at creating matched pairs that were comparable in each of those variables, it was found that education was significantly and consistently different each time ($F(1,49) = 5.68$, $p < .05$). As a result, the analysis approach became a two group multivariate design with education as the covariate. The two groups are not significantly different in dental fear ($F(1, 49) = .968$, $p = .33$) or age ($F(1, 49) = .01$, $p = .92$). In order to assess the relative fearfulness of the present sample versus other highly fearful dental patients, the DFS total score was compared to published norms. The original screening DFS, not the later telephone-administered DFS, was used for purposes of normative comparison. The average score on the latter DFS is lower, likely due to context effects or regression towards the mean. The original DFS score

mean of 60.5 (*SD* = 17.6) was quite consistent with that of Johannson and Berggren (1992), in which highly fearful individuals reporting to an emergency clinic had a mean of 60.9 (*SD* = 17.5). (It should be noted that this comparison population was Swedish and there are possible cross-national differences). The present sample was considerably more fearful than the general population, as evidenced by higher DFS scores for the total sample ($t = 8.6$, $p < .001$), as well as for both males individually ($t = 5.5$, $p < .001$), and females individually ($t = 6.9$, $p < .001$). These latter comparisons are based on published norms (McGlynn et al.) for college students who would differ in terms of age and perhaps other parameters. Nevertheless, it seems very likely that the present sample is indeed highly fearful, consistent with other highly fearful samples in the literature.

Descriptive Statistics

Table 1 shows the mean age, DFS, DIS, DNS, DFTO, Utility, and appointment attendance for both the emergency and screening groups.

Multivariate Analyses

Effects of group (emergency vs. screening) were analyzed through a multivariate analysis of covariance (MANCOVA) with education entered as a covariate and scores on the DIS, DNS, DFTO, IRTS, their utility scores and the number of times they have attended for an appointment at the WVU School of Dentistry clinic since the visit when data was first collected entered as the dependent measures. The number of dental visits for each participant was adjusted for the amount of time between the first visit and the date of the interview. A significant main effect was demonstrated for group (Wilk's $\Lambda = .730$, $F(6, 42) = 2.60$, $p < .03$, $\eta^2 = .27$). The covariate (education) was not significant.

Univariate Analyses

Univariate analyses of variance (ANOVA) indicated significant differences between the emergency and screening groups on the DNS (F (1, 49) = 4.91, $p < .05$) and the number of dental visits (F (1, 49) = 8.36, $p < .01$). Both of these differences were in the expected directions (i.e., emergency patients showed higher levels of dental neglect and attended the dentist fewer times). Ten participants reported visiting a private dentist during this time period, including six emergency patients and four screening patients. None of the other measures (DIS, DFTO, IRTS, Utility) were significant. It should be noted, however, that group differences on the Dental Indifference Scale (DIS) approached significance (F (1, 49) = 3.28, p = .076). There was not a significant difference between the two groups in terms of number of remaining teeth, and number of teeth did not correlate with any of the dental value measures.

Discussion

The present study identified differences in the oral health values of a group of highly fearful dental clinic patients. The patients who had come to the clinic for an emergency appointment differed significantly from those who had come to be screened for ongoing dental care on a measure of dental values (DNS) and in their actual subsequent visits to the WVU School of Dentistry. The screening group showed a higher level of dental values and presented to the clinic more often than the emergency patients.

The results of this study demonstrate that fear alone is not sufficient to keep all people away from the dentist. Fear, mixed with an attitude of indifference toward dental health may lead to avoidance, and presumably poor dental health. This poor dental health may possibly lead to increased fear because the patient's next visit is likely to be painful.

It can then be concluded that for this population of patients, treatment for their fear or measures to reduce a patient's fear in the dentist's office will likely not be enough to encourage them to attend regularly. Although it was not examined in this study, there seems to be a belief among some West Virginians that complete tooth loss is inevitable, and many opt for full extractions of all teeth in favor of dentures at an early age to avoid the costs of keeping up their natural teeth. Public knowledge of dental health and the connection between oral health and overall health must be increased, and oral health care must be made a priority in the lives of West Virginians.

The issues of education and economics are very important here. It is generally accepted that individuals of higher socioeconomic status (SES) take better care of their health, and that higher education is tied to a higher SES (Morris, Martina, & Western, 1999; Murphy & Welch, 1992). Although education was significantly different between the two groups in this study, the mean years of study were 12.3 for the emergency patients and 14.0 for the screening patients, a difference of less than 2 years.

It may be unfair to label all of these individuals as having low dental values. If one is forced to make the choice between shoes for their child and a dental cleaning and checkup for oneself, how many of us would choose the checkup? It is also important to note that in the many countries with government-subsidized health and dental care, overall attendance rates are higher (Ahlberg, Tuominen & Murtomaa, 1996). Even though this study was conducted at a reduced-cost student clinic, the financial condition of many rural West Virginians may be so dire that even reduced fees are difficult to pay.

One limitation of this study was the length of the interview. Even after being offered financial compensation, many were reluctant to participate in the 45-minute

interview. Also, many of those who chose to participate seemed irritated at one or more points, and a few seemed to be giving offhand or frivolous answers to speed up the process. In particular, many participants gave what seemed to be flippant or unrealistic responses the last two items on the DFT-O, (the ones used to calculate the utility variable, which ask about the amount of free time they have and how much of it they would be willing to spend on their oral health. The instruments themselves had the inherent problem that none of them were designed to be used as a telephone interview, and some participants seemed confused by the format of the items. The questionnaires all were under-researched and relatively little psychometric data was available for most of them.

Another concern relates to sampling. Because the difficulty in reaching participants stemmed mainly from their dental chart containing an outdated, disconnected telephone number, it may be possible that the patients who were able to be contacted were somehow different from the ones who were not.

To revisit the concepts of impulsivity and self control, can the results of this study be extrapolated to conclude that the patients who avoided dental treatment are impulsive and those that attended regularly for asymptomatic visits are self-controlled? It is difficult to draw a solid conclusion in this matter, partially because the dental situation varies so significantly from the experimental conditions that have been used to answer this question in other populations. While it can be assumed that most people view having healthy, attractive teeth as an asset, it is not a reinforcer that is delivered at a distinct moment in time such as a food pellet or a sum of money. It might be better viewed as negative reinforcement (i.e., the avoidance of the problems associated with poor dental care). So it might be said that both groups are avoiding a different negative situation,

demonstrating their level of dental values by choosing to avoid either the feared stimulus (the dentist and/or dental situation) or poor dental health. However, for a person who takes good care of his/her teeth, the worsening of their dental health is a consequence that would take some time to occur (i.e., the delay value is large), so perhaps regular dental attendance can be construed as self-control of a sort.

As a further study, it would be interesting to replicate the design but include a group of nonfearful patients, to see if there are differences in the distribution of dental values. If the nonfearful group showed higher levels of dental values than the fearful group, one speculation that may arise is that dental indifference is a manifestation of their fear, or it is simply more socially acceptable to act indifferent than to show fear. Another possible speculation is that, for a subset of individuals, the fear may be the result of indifference. For example, if a patient avoids the dentist for years simply because s/he does not care enough to go, their dental health may deteriorate to such a degree that they are forced to go for treatment, which at this point will likely be long and painful, giving rise to fear. It would also have been interesting to gather information about how many of these patients have dentures. There is likely to be a difference in measured dental values between patients who wear partial or full dentures and those that do not, even in an edentulous state.

In conclusion, high dental fear individuals vary in the importance they place on oral health and the maintenance of healthy teeth and gums. These discrepancies are associated with differences in dental attendance behavior, and even highly fearful patients will make regular dental visits if the importance he/she places on oral health is high enough. West Virginia is a unique population for the study of dental values, given the

elevated rate of poor oral health and the state's economic circumstances. This study provides an example of how behavioral sciences can inform clinical dental practices and even public health policy. These results suggest two possible courses of action: (a) to raise public awareness of the importance of oral health, and (b) to remove economic barriers to dental care, making it easier for impoverished and fearful populations to maintain their oral health.

References

Abrahamsson, K. H., Berggren, U., Hakeberg, M. & Carlson, S. G. (2001). Phobic avoidance and regular dental care in fearful dental patients, a comparative study. *Acta Odontologia Scandinavica, 59*, 273-279.

Ahlberg, J., Tuominen, R., & Murtomaa, H. (1996). Dental knowledge, attitudes towards oral health care and utilization of dental services among male industrial workers with or without an employer-provided dental benefit scheme. *Community Dentistry and Oral Epidemiology, 24*, 380-384.

Beck, J., Garcia, R., Heiss, G., Vokonas, P., & Offenbacher, S. (1996). Periodontal disease and cardiovascular disease. *Journal of Periodontology, 67,* 1123-1137.

Beck, J., & Offenbacher, S. (1998). Oral health and systemic disease: Periodontitis and cardiovascular disease. *Journal of Dental Education, 62,* 859-870.

Behavioral Risk Factor Surveillance System: 1998 Prevalence Data - West Virginia (2002). National Center for Chronic Disease Prevention and Health Promotion. Retrieved July 21, 2004 from http://www. cdc.gov/brfss/index.htm#ineteractive.

Cohen, M. E. (1985). Dental anxiety and DMFS status, association within a US naval population versus differences between groups. *Community Dentistry and Oral Epidemiology, 13*, 75-78.

Cohen, S. M., Fiske, J., & Newton, J. T. (2000). The impact of dental anxiety on daily living. *British Dental Journal, 7*, 384-390.

Corah, N.L. (1969). Development of a dental anxiety scale. *Journal of Dental Research, 48,* 596-603.

De Jongh, A., Aartman, I.H., Brand, N. (2003). Trauma-related phenomena in anxious dental patients. *Community Dentistry and Oral Epidemiology, 31,* 52-58.

Doerr, P. A., Lang, W. P., Nyquist, L. V., & Ronis, D. L. (1998). Factors associated with dental anxiety. *Journal of the Americal Dental Association, 129,* 1111-1119.

Fowler, E.B., Breault, L.G., & Cuenin, M.F. (2001). Periodontal disease and its association with systemic disease. *Military Medicine, 166*, 85-89.

Frazer, M., & Hampson, S. (1988). Some personality factors related to dental anxiety and fear of pain. *British Dental Journal,* 165, 436-439.

Fyffe, H. E., Deery, C., Nugent, Z., Nuttall, N. M. & Pitts, N. B. (1999). The reliability of two methods of utility assessment in dentistry. *Community Dental Health, 16,* 72-79.

Gatchel, R. J. (1989). The prevalence of dental fear and avoidance, expanded adult and recent adolescent surveys. *Journal of the American Dental Association, 118,* 591-593.

Gatchel, R. J., Ingersoll, B. D., Bowman, L., Robertson, M. C., & Walker, C. (1983). The prevalence of dental fear and avoidance, a recent survey study. *Journal of the American Dental Association, 107*, 609-610.

Hakeberg, M., Berggren, U., & Carlsson, S. G. (1992). Prevalence of dental anxiety in an adult population in a major urban area in Sweden. *Community Dentistry and Oral Epidemiology, 20,* 97-101.

HRSA State Health Workforce Profiles: West Virginia (2000). U.S. Department of Health

and Human Services, National Center for Health Workforce Information, Bureau of Health Professions, Health Resources and Services Administration. Retrieved July 21, 2004 from: http://ftp.hrsa.gov/bhpr/workforceprofiles/wv.pdf.

Hakeberg, M., Berggren, U., & Gröndahl, H-G. (1993). A radiographic study of dental health in adult patients with dental anxiety. *Community Dental Health and Oral Epidemiology, 21*, 27-30.

Herrnstein, R. J. (1974). Formal properties of the matching law. *Journal of the Experimental Analysis of Behavior, 21,* 159-164.

Ito, M. & Oyama, M. (1996). Relative sensitivity to reinforcer amount and delay in a self-control choice situation. *Journal of the Experimental Analysis of Behavior, 66,* 219-229.

Johansson, P., & Berggren, U. (1992). Assessment of dental fear, a comparison of two psychometric instruments. *Acta Odontologia Scandinavica,50,* 43-49.

Johnsen, B.H., Thayer, J.F., Laberg, J.C., Wormnes, B., Raadal, M., Skaret, E., Kvale, G. & Berg, E. (2003). Attentional and physiological characteristics of patients with dental anxiety. *Journal of Anxiety Disorders, 17,* 75-87.

Kleinknecht, R.A., Klepac, R.K., & Alexander, L.D. (1973). Origins and characteristics of fear of dentistry. *Journal of the American Dental Association, 86,* 842-848.

Liddell, A., & May, B. (1984). Some characteristics of regular and irregular attenders for dental check-ups. *British Journal of Clinical Psychology, 23,* 19-26.

Maggirias, J., & Locker, D. (2002). Five-year incidence of dental anxiety in an adult population. *Community Dental Health, 19* 173-179.

McGrath, C., & Bedi, R. (2001). Can dental attendance improve quality of life? *British Dental Journal, 190,* 262-265.

McGlynn, F.D., McNeil, D.W., & Gallagher, S.L., & Vrana, S. (1987). Factor structure, stability, and internal consistency of the Dental Fear Survey. *Behavioral Assessment, 9,* 57-66.

McNeil, D.W., & Berryman, M.L. (1989). Components of dental fear in adults? *Behaviour Research and Therapy, 27,* 233-236.

McNeil, D.W., Crout, R.J., Lawrence, S.M., Sharh, P., & Rupert, N. (2004). Oral health values in Appalachia: Specific dental-related fatalism? *Journal of Dental Research, 83,* A-3329. [Abstract]

McNeil, D.W., Crout, R.J., Rice, E.R., Patthoff, E.B., Lewis, M.W., Sorrell, J.T., Razmus, T.F., & Lawrence, S.M. (2002, March). *Dental beliefs in emergency dental patients*. Poster presented at the meeting of the International Association for Dental Research, San Diego, CA.

McNeil. D.W., Turk, C., & Ries, B.J. (1994). Anxiety and fear. In V.S. Ramachandran (Ed.), *Encyclodedia of Human Behavior.* Academic Press.

Melamed, B.G., & Williamson, D.J. (1991). Programs for the treatment of dental disorders: dental anxiety and temporomandibular disorders. In: Sweet, J. (Ed.) Handbook of Psychology in Medical Settings.

Milgrom, P., Fiset, L., Melnick, S., & Weinstein, P. (1988). The prevalence and practice management consequences of dental fear in a major U.S. city. *Journal of the American Dental Association, 116,* 641-647.

Morris, Martina, & Western, B. (1999). Inequality in earnings at the close of the twentieth century. *Annual Review of Sociology, 25*, 623-657.

Murphy, K.M. & Welch, F. (1992). The structure of wages. *Quarterly Journal of Economics, 107,* 285-326.

Murray, J. J. (1996). Attendance patterns and oral health. *British Dental Journal, 181,* 339-342.

Nuttall, N. M. (1996). Initial development of a scale to measure dental indifference. *Community Dentistry and Oral Epidemiology, 24,* 112-116.

Nuttall, N. M., Bradnock, G., White, D., Morris, J., & Nunn, J. (2001). Dental attendance in 1998 and implications for the future. *British Dental Journal, 190,* 177-182.

Peretz, B., & Moshonov, J. (1998). Dental anxiety among patients undergoing endodontic treatment. *Journal of Endodontics, 24,* 435-437.

Rachlin, H. (2000). *The Science of self-control.* Cambridge, MA, Harvard University Press.

Raineri, A., & Rachlin, H. (1993). The effects of temporal constraints on the value of money and other commodities. *Journal of Behavioral Decision Making, 6,* 77-94.

Saito, T., Shimazaki, Y., Koga, T., Tsuzuki, M., & Ohshima, A. Relationship between upper body obesity and periodontitis. *Jounal of Dental Research, 80,* 1631-1636.

Satcher, D. (2000). Oral Health in America: A Report of the Surgeon General. U.S. Department of Health and Human Services. Retrieved on 11/8/04 from http://www2.nidcr.nih.gov/sgr/execsumm.htm.

Schou, L. (2000). The relevance of behavioural sciences in dental practice. *International Dental Journal, 50,* 324-332.

Scott, D. S., & Hirschman, R. (1982). Psychological aspects of dental anxiety in adults. *Journal of the American Dental Association, 104,* 27-31.

Scott, D. S., Hirshman, R., & Schroder, K. (1984). Historical antecedents of dental anxiety. *Journal of the American Dental Association, 108,* 42-45.

Schuurs, A. H. B., Duivenvoorden, H. J., Thoden van Velzen, S. K., & Verhage, F. (1984). Regularity of dental attendance in the Netherlands related to preference for preservation of teeth. *Community Dentistry and Oral Epidemiology, 12,* 249-254.

Smith, T. A., & Heaton, L. J. (2003). Fear of dental care : Are we making any progress?. *Journal of the American Dental Association, 134,* 1101-1108.

Stabholz, A., & Peretz, B. (1999). Dental anxiety among patients prior to different dental treatments. *International Dental Journal, 49,* 90-94.

Syrjälä, A., Knuuttila, M. L. E., & Syrjälä, L. K. (1992). Reasons preventing regular dental care. *Community Dentistry and Oral Epidemiology, 20,* 10-14.

Ten Berge, M., Veerkamp, J.S., & Hoogstraten, J. (2002). The etiology of dental fear: the role of dental and conditioning experiences. *Journal of Anxiety Disorders, 16,* 321-329.

Thomson W. M., Spencer A. J., & Gaughwin A. (1996) Testing a child dental neglect scale in South Australia. Community Dentisty and Oral Epidemiology. *24,* 351-6.

U.S. Census Bureau (2003). Income 2003: Three-Year-Average Median Income by State: 2001-2003. Retrieved 11/8/04 from http://www.census.gov/hhes/income/income03/statemhi.html.

U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion (2002). Behavioral Risk Factor Surveillance System, Prevalence Data,

West Virginia -2002. Retrieved on 11/2/04 from http://apps.nccd.cdc.gov/brfss/page.asp?yr=2002&state=WV&cat=OH#OH.

U.S. Department of Health and Human Services, Centers for Disease Control and Prevention (2000). The Surgeon General's Reporet on Oral Health. Retrieved on 6/18/05 from www.surgeongeneral.gov/library/oralhealth/.

U.S. Department of Health and Human Services, Centers for Disease Control and Prevention (1999). Tooth loss among persons aged greater than or equal to 65 years – selected states, 1995-1997. *Morbidity and Mortality Weekly Report, 48* 206-210. Retrieved 11/8/04 from http://www.cdc.gov/mmwr/preview/mmwrhtml/00056723.htm.

U.S. Department of Health and Human Services, Health Resources and Services Administration (2000). The West Virginia health workforce: Highlights from the health workforce profile. Retrieved on 11/8/04 from http://bhpr.hrsa.gov/healthworkforce/reports/statesummaries/westvirginia.htm.

Vassend, O. (1993). Anxiety, pain and discomfort associated with dental treatment. *Behaviour Research and Therapy, 31,* 659-666.

Watkins, C. A., Logan, H. L., & Kirchner, H. L. (2002). Anticipated and experienced pain associated with endodontic therapy. *Journal of the American Dental Association, 133,* 45-54.

West Virginia University (1977). *Behavioral Dentistry: Proceedings of the First National Conference*. Unpublished conference program.

Wilson, J. H. (1985). Report about the status of dental health - West Virginia. *West Virginia Dental Journal, 59* 20-21.

Appendix A

DENTAL FEAR SURVEY

The items in this questionnaire refer to various situations, feelings, and reactions related to dental work. Please rate your feeling or reaction on these items by using the numbers 1-5, from the following scale. Put the appropriate number which most closely corresponds to your reaction in the space to the left of each item.

1	2	3	4	5
never	**once or twice**	**a few times**	**often**	**nearly every time**

____ 1. Has fear of dental work ever caused you to put off making an appointment?

____ 2. Has fear of dental work ever caused you to cancel or not appear for an appointment?

1	2	3	4	5
not at all	**a little**	**somewhat**	**much**	**very much**

When having dental work done:

____ 3. My muscles become tense . . .

____ 4. My breathing rate increases . . .

____ 5. I perspire . . .

____ 6. I feel nauseated and sick to my stomach . . .

____ 7. My heart beats faster . . .

Following is a list of things, and situations that many people mention as being somewhat anxiety or fear producing. Please rate how much fear, anxiety, or unpleasantness each of them causes you. Use the numbers 1-5, from the above scale. (If it helps, try to imagine yourself in each of these situations and describe what your common reaction is.)

____ 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 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 B

DENTAL INDIFFERENCE SCALE

Question	Responses	Score
1) I usually use (tick any which apply)		
	a. A toothbrush to clean my teeth	score 1 if neither
	b.Floss or a special brush to clean between my teeth	b. nor c. is ticked
	c. Disclosing tablets to check my teeth are clean	
2) At present		
	a. I think there is something wrong with my teeth but it is not bad enough to go to a dentist	score 1 if a. or d. is ticked
	b. I think there is something wrong with my teeth and I intend to see a dentist about it soon	
	c. I am going for a check-up within the next year	
	d. I do not think I need any treatment so I am not planning to go to a dentist just now	
3) If I lost a filling in a back tooth, but it did not hurt		
	a. I would immediately arrange to go to a dentist	score 1 if b. or c. is ticked
	b. I would wait to see if it started hurting or got any worse before going to a dentist	
	c. It would not be a problem - I would not see a dentist about it	
4) I usually make an appointment to visit a dentist		
	a. When my dentist reminds me	score 1 if d. is ticked
	b. At the end of my last appointment	
	c. When I think it is time to go for another check-up	
	d. Only when I think there is something wrong with my teeth	
5) If my gums bled, but they did not hurt		
	a. It would not be a problem; I would not see a dentist about it	score 1 if a. or c. is ticked
	b. I would immediately arrange to see a dentist	
	c. I would wait to see if it started hurting or got worse before going to a dentist	
6) About ALL your dental appointments in the last 5 years (tick any which apply)		
	a. I have not made a dental appointment in the last 5 years	score 1 if a. or b. or e. is ticked
	b. During the last 5 years I have forgotten to go to a dental appointment	
	c. During the last 5 years I have only missed an appointment through illness or another unavoidable reason	
	d. During the last 5 years I have never missed a dental appointment	
	e. During the last 5 years I have cancelled a dental appointment because the problem went away	
7) If I had a VERY painful BACK tooth		
	a. I would prefer it to be taken out	score 1 if a. or b. is ticked
	b. I would prefer it to be left alone	
	c. I would prefer it to be filled	

8) I would say my <u>main</u> reason for not going to the dentist for a checkup would be

a. Because I think treatment is painful	score 1 if b. or d.
b. Because it takes too long to get to a dentist	or g. is ticked
c. Because I feel worried or anxious about going	
d. Because I cannot see the point of visiting for a check-up	
e. Because my dentist makes me feel guilty about the state of my teeth	If c. is ticked no
f. Because it costs too much	dental indifference
g. Because I have no time to get to a dentist	score is given*
h. I do not put off going - I attend for regular checkups	

*This instruction was disregarded for the purposes of this study

Appendix C

DENTAL FREE TIME TRADE-OFF SCALE

In the next questions we would like to try to measure how much you value the condition of your teeth and gums. Remember, there are no right or wrong answers.

1. First think about your teeth and gums and decide how happy you are with their current condition, then tick the box which best describes how you feel about this.

Very unhappy 0 Unhappy 0 Neither 0 Happy 0 Very happy 0

2. Think about your teeth and gums and try to decide if there are any things you would like to change about them. Now read through the list below and tick any boxes which describe the way you feel.

I am happy with my teeth and gums as they are	0
I would be happier if I did not have a toothache	0
I would be happier if my teeth were whiter	0
I would be happier if I had fewer gaps between my teeth	0
I would be happier if I had straighter teeth	0
I would be happier if I had “nicer” looking teeth	0
I would be happier if my gums didn’t bleed when I brushed my teeth	0
I would be happier if I had fresher breath	0
I would be happier if I didn’t have any fillings	0
I would be happier if I had fissure sealants (plastic coatings) in my back teeth to stop them getting decay	0
I would be happier if I didn’t; have any decayed teeth	0
I would be happier if I didn’t have marks on my front teeth	0
I would be happier if I could change something else about my teeth or gums	0

If you ticked the last statement, tell us what you would like to change _____

3. How much time do you usually spend looking after your teeth and gums (brushing, flossing, or using a mouthwash) each day?

No time 0	about 1 minute 0	1-2 minutes 0	2-3 minutes 0
	3-4 minutes 0	4-5 minutes 0	5-6 minutes 0
	6-7 minutes 0	7-8 minutes 0	8-9 minutes 0
	9-10 minutes 0	more than 10 minutes 0	

If more than 10 minutes each day, tell us how long
_____

What we would like to know now is how important the changes you said you would like in question 2 are to you. One way of finding this out is to ask you how much of your FREE TIME you would be willing to give up each day to get these changes.

4. IMAGINE that ALL the changes you said you would most like to be made in question 2 could be achieved by you spending MORE of your FREE TIME each day looking after your teeth. How much of your FREE TIME would you be willing to spend to ge the change?

No more time each day	0	1 more minute each day	0
2 more minutes each day	0	3 more minutes each day	0
4 more minutes each day	0	5 more minutes each day	0
6 more minutes each day	0	7 more minutes each day	0
8 more minutes each day	0	9 more minutes each day	0
more than 10 minutes each day	0		

If more than 10 minutes each day, tell us how long _____

5. Approximately how much FREE TIME do you have in a day? _____

Appendix D

DENTAL NEGLECT SCALE

1	2	3	4	5
Definitely NO		**Neutral**		**Definitely YES**

____1. I keep up my home dental care…

____2. I receive the dental care I should…

____3. I need dental care, but I put it off…

____4. I brush as well as I should…

____5. I control snacking between meals as well as I should…

____6. I consider my dental health to be important…

Appendix E

IMPORTANCE OF THE RETENTION OF TEETH SCALE

The items below are to be rank ordered in order of preference:

____A new television set

____A new living room suite

____A new car

____A vacation

____Keeping you natural teeth

Appendix F

INTERVIEW SCRIPT

Hi. I'm calling for _____. Is this he/she? How are you this evening? My name is _____and I'm calling from WVU school of dentistry. We sent you a letter last month asking you to participate in a 15-20 minute interview about oral health. Do you have about 15- 20 minutes to answer some questions? (If no: would you like us to call you back at a better time?) I'd like to take a minute just to explain what we're doing. This is my/a master's thesis project and I'm interested in different reasons people have for going or not going to the dentist, and basic beliefs regarding oral health. Do you have any questions before we get started? (Answer any questions they have)

The first part of the interview asks about fears you may have related to dental treatment.

SEE DFS, PART 1

Next I will say several things or situations that many people mention as being somewhat anxiety or fear producing. Please rate how much fear, anxiety or unpleasantness each of them causes you. Use the numbers 1 through 5, with 1 being no fear at all, and 5 being an extreme amount of fear.

SEE DFS, PART 2

Now for the next set of questions I'm going to read a statement and then give you several different answers to choose from. Please listen to all of the options completely, and feel free to ask me to repeat anything. Do you have any questions?

SEE DIS

We're over halfway done, _____ do you have any questions for me?

For the next set of questions, I'm going to read a set of statements and ask you to indicate your level of agreement with each statement using the numbers 1-5, with 1 being "definitely no" and 5 being "definitely yes".

SEE DNS

Now I'd like you to think about your teeth and decide how happy you are with their current condition on a scale of 1 to 5, with 1 being very unhappy and 5 being very happy.

Now think about your teeth and gums and try to decide if there are any things you would like to change about them. For the next set of statements I'm going to say, please say "yes" or "no":

SEE DFTO

Now the last thing I'd like you to do is listen to a list of things I'm going to say and rank order them. That is, tell me which one you would like most, which one you would like second-best, and so on. Are you ready? (IRTS)

A new television set
A new living room suite
A new car
A vacation
Keeping you natural teeth

Well, Mr/Ms_____ you're all done. Thank you so much for giving us your time to answer these questions. Do you have any questions for me? Before you go, I'd like to make sure we have your correct address to make sure your check will get to you. (Read and verify address with participant). You can expect your check for $10.00 in a couple of weeks. Thank you again.

Table 1

Comparison between emergency and screening groups

	Univariate Analysis				
Variable	Emergency Mean (SD) (n = 32)	Screening Mean (SD) (n = 18)	F	p	η^2
Education	12.3 (2.1)	14.0 (2.7)	5.7	02	---
DFS	52.9 (15.8)	47.2 (17.5)	.97	.33	---
Age	36.8 (11.4)	37.4 (14.8)	.01	.92	---
DIS	4.7 (1.7)	3.6 (1.7)	3.3	.08	065
DNS	18.2 (4.7)	22.1 (4.1)	4.9	.03	.095
DFTO	7.8 (2.4)	6.8 (2.4)	2.6	.11	.053
Utility	.62 (.37)	.79 (.25)	1.7	.20	.035
IRTS	2.0 (1.3)	1.72 (1.1)	0.1	.83	.001
Attendance[1]	3.25 (4.8)	9.83 (8.6)	9.9	.003	.174

[1] Attendance = Number of attended dental visits over the data collection period

Note: DFS = Dental Fear Scale; DIS = Dental Indifference Scale; DNS = Dental Neglect Scale; DFTO = Dental Free Time Trade-Off; IRTS = Importance of the Retention of Teeth Scale.

CURRICULUM VITAE

Suzanne M. Lawrence

August 2005

9 Pietro St. Apt. B
Morgantown, WV 26501
(304) 322-1078
Slawren1@mix.wvu.edu

PERSONAL DATA

Date of Birth: October 27, 1978
Place of Birth: Wheeling, WV
Citizenship: United States of America

EDUCATION

Master of Science in Adult Clinical Psychology
West Virginia University
Morgantown, WV 26505
Degree Completed: August 2005

Bachelor of Arts in Psychology
University of Charleston
Charleston, WV 25304
Degree Completed: May 2000

RESEARCH ACTIVITY

McNeil, D.W., Crout, R.J., Lawrence, S.M., Shah, P., & Rupert, N. (2004, March). Oral health values in Appalachia: Specific dental-related fatalism? *Journal of Dental Research, 83,* A-203. [Abstract]

McNeil, D.W., Vowles, K.E., Crout, R.J., Sorrell, J.T., Razmus, T.F., Lewis, S.M., Lawrence, S.M., Rice, E., Patthoff, E., & Chrystan, J.A. (2003, March). Dental

fear and fear of pain: Differentiating clusters of dental patients. *Journal of Dental Research, 82*, 1004. [Abstract]

Sorrell, J.T., McNeil, D.W., Vowles, K.E., Lawrence, S.M., CHrystan, J.A., & Gochenour, L. (2003, March). Evidence-based assessment and patient education using informational videotapes. *Journal of Dental Research, 82,* 1004. [Abstract]

McNeil, D.W. & Lawrence, S.M. (2002). Relaxation Training. In M. Hersen (Ed.) *The Encyclopedia of Psychotherapy.*

Vowles, K.E., Sorrell, J.T., McNeil, D.W. Lawrence, S.M., & Rice, E. (2002, April). Is fear painful? An experimental investigation into the relation between fear and pain. Poster presented at the 2002 meeting of the Society of Behavioral Medicine, Washington, D.C.

Sorrell, J.T., Vowles, K.E., Lawrence, S.M., & McNeil, D.W. (2001). Fear of pain in dentistry: Current status and implications for treatment adherence. Paper submitted to the Society of Behavioral Medicine Annual Conference, Washington D.C.

Kennedy, S.G., McNeil, D.W. Hursey, K.G., Vowles, K.E., Sorrell, J.T., Lawrence, S.M., Patthoff, E.B., Whipkey, D.T., Broadman, L.M., Vaglienti, R.M., & Huber, S.J. (2001, November). Development of a short form of the fear of pain questionnaire. Poster presented at the meeting of the Association for the Advancement of Behavior Therapy, Philadelphia, PA.

McNeil, D.W., Cohen, L.L., Crout, R.J., Berk, N.W., Weyant, R.J., Lawrence, S.M., Davis, B.A., Patthoff, E.B., Vowles, K.E., Sorrell, J.T., & Tarter, R.E. (2001, November). Dental fear differences in Appalachian children and their parents. Poster presented at the meeting of the Association for the Advancement of Behavior Therapy, Philadelphia, PA.

Martin, C.A., McNeil, D.W., Crout, R.J., Lawrence, S.M. & Weyant, R.J. (2002, March). Orthodontic treatment needs in Appalachian youth and their parents. *Journal of Dental Research, 81,* A-271. [Abstract].

Patthoff, E.B., McNeil, D.W. & Lawrence, S.M. (2001, October). The role of predictability and controllability in pain and fear reduction during dental procedures. Poster presented at the West Virginia Psychological Association Fall Conference, Morgantown, WV.

Vowles, K.E., McNeil, D.W., Sorrell, J.T., McKee, D.R., Zvolensky, M.J., Graves, R.W., Weaver, B.R., Riel, J. & Lawrence, S.M. (2001, March). Relation among fear, anxiety, and appointment adherence in oral surgery patients. Poster presented at the meeting of the Society of Behavioral Medicine, Seattle, WA.

PROFESSIONAL EXPERIENCE

Psychology Intern August 2002 – August 2003
The Olympic Center
Provided group and individual therapy to adolescents in an inpatient drug and alocohol rehabilitation facility.

Research Associate August 2000 – May 2003
Anxiety, Psychophysiology, and Pain Research Laboratory
West Virginia University
Department of Psychology
Morgantown, WV
Attended weekly laboratory meetings including critical analysis of journal articles, helped in the planning and implementation of data collection for several projects, entered and analyzed data using SPSS, used graphics programs to produce figures.

Therapist August 2001 - May 2002
Quinn Curtis Center Vertical Team
Provided psychological services to clients presenting to the WVU Department of Psychology Training Clinic.

Assistant to the Associate Editor August 2000 – May 2001
Behavior Therapy
Assisted in the selection of reviewers and the handling of manuscripts submitted for publication.

Intern May – August, 1999
Process Strategies Institute
Charleston, WV
Assisted in intake evaluations, daily clerical tasks, administered self-report psychological tests.

Intern January – May, 1999
Beacon Partial Hospitalization Program
South Charleston, WV
Participated in group therapy sessions, performed intake evaluations.

TEACHING EXPERIENCE

Graduate Teaching Assistant August 2001 – May 2002

Independently taught two semesters of Introduction to Psychology at West Virginia University

REFERENCES

Daniel W. McNeil, Ph.D.
Department of Psychology
West Virginia University
P.O. Box 6040
Morgantown, WV 26506-6040

Michael Bayly, Ph.D.
Department of Psychology
University of Charleston
2300 MacCorkle Avenue
Charleston, WV 25304