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Relationships among psychological functioning, dental anxiety, pain perception, and coping in children and adolescents

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A Dissertation

Entitled

Relationships among Psychological Functioning, Dental Anxiety, Pain Perception, and Coping in Children and Adolescents

By

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Children and adolescents often face a variety of stressful dental procedures and experience dental anxiety when attending appointments. Previous research has identified a positive relationship between avoidant coping and dental anxiety and a negative relationship between approach coping and dental anxiety. In addition, dental anxiety has been found to be negatively related to global psychological functioning. Further, research findings that dental anxiety and perception of pain are positively related indicates the importance of addressing a child’s dental anxiety. Both approach and avoidant coping have been found useful in reducing pain perception in children in dental situations. However, the overall relationship among dental anxiety, psychological functioning, coping, and pain perception remains unclear. Additionally, findings about
the relationship between a child and parent’s dental anxiety and coping styles are mixed. Thus, the present study sought to help clarify these relationships.

Participants included a total of 129 dental patients and 84 parents. Specifically, the sample included 69 (31 female) children (ages 9-11) and 60 (29 female) adolescents (ages 12-15). Youth completed the Dental Subscale of the Children’s Fear Survey Schedule (DS-CFSS; Cuthbert & Melamed, 1982), the Measure of Dental Coping Styles (MDCS), and a 5-point Visual Analogue Scale for pain. Parents completed a demographics questionnaire, Corah’s Dental Anxiety Scale (DAS; Corah, 1968), the Strengths and Difficulties Questionnaire (SDQ; Goodman, 2001), and the COPE (Carver, Scheier, & Weintraub, 1989).

The results revealed no significant differences for gender or age for any of the dependent variables. Correlational analyses indicated positive relationships between dental anxiety and total psychological symptoms as well as between dental anxiety and pain perception for child and adolescent dental patients. Both child and parent coping measures were examined using principal axis factor analysis and clear 2-factor structures (i.e., approach and avoidant coping factors) emerged. For the COPE, both the approach ($\alpha = .97$) and avoidant ($\alpha = .85$) factors were conceptually sound and had high internal consistencies. On the MCDS both factors were also conceptually strong and had acceptable internal consistencies (approach $\alpha = .65$; avoidant $\alpha = .63$). Youth’s approach coping was negatively related to both dental anxiety and pain perception; youth’s use of avoidant coping was also negatively related to dental anxiety. A small, negative relationship emerged between parent avoidant coping and child approach coping. There was no significant relationship between parent and child dental anxiety. Psychological
functioning served as a mediator in the predication of pain perception from dental anxiety.

Overall, findings suggest that both coping and psychological functioning are important variables in relation to dental anxiety and pain. Further, dental anxiety might be an indicator of additional psychological symptoms that dental professionals and clinicians should consider in treatment planning. Future research should assess the accuracy and generalizability of the results. Additionally, research should examine the effectiveness of programs targeted to teach positive coping styles (i.e., particularly aimed at increasing approach coping) and decrease general psychological symptoms with the purpose of reducing dental anxiety and pain perception.
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Chapter One

Introduction

Medical procedures have been shown to cause stress, anxiety, and pain in children (Blount, Piira, & Cohen, 2003). In particular, dental procedures can be stressful experiences. Dental caries, tooth decay, predominantly affect children and adolescents (Blinkhorn, Kay, Atkinson, & Miller, 1990). Research indicates that 5-33% of children experience at least one toothache during childhood (Slade, 2001). The prevalence rate of toothaches is higher for older children and for children of lower socioeconomic status, though rates vary widely across countries (Slade). Dental pain affects children’s school attendance, ability to eat, ability to sleep, and ability to play (Shepard, Nadanovsky, & Sheilham, 1999; Slade). In addition to the strong likelihood of youth experiencing dental pain, research has shown that 20% of children have dental fears and 21% engage in negative behaviors in a dental office (Baier, Milgrom, Russell, Mancl, & Yoshida, 2004). Increased anxiety has been shown to increase perceived pain in children (Blount et al.). Further, dental anxiety can be considered an important barrier to patients receiving the recommended dental care (Smith & Heaton, 2003); more specifically, dental anxiety in children is positively related to missed dental appointments (Wogelius & Poulsen, 2005).

The dental field now accepts that the success of dental treatment is influenced by children’s psychological processes (Blinkhorn et al., 1990). The acquisition of dental fears has been explored by several researchers and is thought to involve a number of
variables including poor dental health, direct conditioning, modeling, dispositional factors, personality traits, gender, and socioeconomic status (Berge, Veerkamp, & Hoogstraten, 2002a; Poulton, Waldie, Thomson, & Locker, 2001; Townend, Dimigen, & Fung, 2000). However, many variables that may play a role in dental anxiety and dental pain perception in children and adolescents remain unexplored. For example, although research has indicated that children can use specific coping skills to reduce their distress when facing a medical stressor (Harbeck-Weber, Fisher, & Dittner, 2003), the role of coping as it relates to the experience of dental anxiety and dental pain perception remains unclear. Also, in general, type of coping has been related to a child’s experience of pain (Dahlquist & Switkin, 2003). More specifically, Versloot, Veerkamp, Hoogstraten, and Martens (2004) identified a relationship between coping and pain specifically in child dental patients; however, the nature of this relationship is not well-understood.

Because of the role parents have in children’s development, one factor that should be considered in assessing a child’s coping and dental anxiety is the parent’s coping and dental anxiety. Results of existing research on the relationship between the child’s and the parent’s dental anxiety are inconsistent. Some studies find a positive relationship (Berge et al., 2002a; Milgrom, Mancl, King, & Weinstein, 1995; Townend et al., 2000), while others find no relationship (Baier et al., 2004). Additionally, research suggests a possible relationship between the child’s and parent’s coping; however, the nature of the relationship is unclear (Kliwer, Fearnow, & Miller, 1996; Kotchick, Forehand, Wierson, Armistead, & Klein, 1996; Power, 2004).

The current study aimed to clarify the relationships between a child’s psychological functioning, dental anxiety, type of coping, and pain perception. In
addition, the study assessed the relationship between a child and parent’s dental anxiety as well as the relationship between a child and parent’s coping with a dental procedure. Further, the study explored the effect of type of procedure and the child’s age on dental anxiety, coping and pain. By better understanding the relationships among these variables, clinicians can decide which variables to target to make dental procedures less traumatic for youth.

The project is presented in five chapters. This chapter provides a brief project overview and rationale for the significance of the research project. Chapter Two provides a literature review to introduce the reader to previous research on dental anxiety, coping with dental procedures, and dental pain perception in children and adolescents. The project’s hypotheses are also found in Chapter Two. Next, in Chapter Three, the project’s method is discussed in detail; this section describes participants, procedure, and measures used. Chapter Four presents a detailed description of the results including exploratory analyses, measure development, and hypothesis testing. Chapter Five describes the importance and the rationale behind the findings as well as clinical and community implications and limitations.
Chapter Two

Literature Review

Theories of Dental Anxiety

In a review of research on normal fear, Gullone (2000) defines fear as “a normal reaction to a real or imagined threat” (p. 429). She explains that normal fear is different from clinical fear in that clinical fear persists past an age-appropriate stage and interferes with daily life (Gullone). Thus, this same idea can be applied specifically to dental fear in that some dental fear is common. However, dental fear becomes a problem when it interferes with a child’s dental treatment. Several studies suggest that the dental anxiety becomes interfering when children act out in the dental office or refuse treatment (Baier et al., 2004; Humphris, Mair, Lee, & Birch, 1991). Additionally, research has indicated that dental anxiety is associated with missed dental appointments by children (Wogelius & Poulsen, 2005).

Researchers have suggested a number of ideas regarding the origin of dental fear including poor dental health, direct conditioning, modeling, dispositional factors, personality traits, gender, and socioeconomic status. One prominent theory of fear acquisition is Rachman’s (1977) three-pathway model. The theory suggests that fears can develop through direct conditioning, modeling or information gathering. To evaluate the components of Rachman’s three-pathway theory and dispositional factors as it applies to dental anxiety in children, Townend and colleagues (2000) designed a study assessing
children attending their first dental appointment at a specialized dental center. More specifically, participants in the study included 60 child patients attending their first appointment at a dental hospital/school at a facility in Scotland, which specializes in complicated dental work and in serving anxious children. Each child also had a parent participate in the study. Participants were divided into two age groups (7-10 years old and 11-14 years old), and into non-anxious and anxious groups. Researchers reported that the average age of the participants in each group was approximately equal; similarly, they noted that the numbers of males and females in each group were about the same. The dentist assessed behavior (1-10 scale) during the exam to determine whether the child fit into the anxious or non-anxious group. Researchers interviewed children to collect information regarding the child’s self-reported anxiety using an adapted version of the Dental Anxiety Scale (DAS; Corah, 1968) and obtained the child’s estimate of their parents’ dental anxiety for the current appointment. Additionally, researchers evaluated the child’s perception of previous dentist’s empathy using a modified version of Dental Beliefs Survey (DBS; Smith, Getz, Milgrom, & Weinstein, 1987). Finally, the research team asked children questions to determine the content and level of their dental knowledge. Researchers collected data to assess previous dental conditioning by using the decayed teeth, missing teeth, filled teeth system (DMFT; Klein & Palmer, 1937) and asking parents about the child’s previous “traumatic” dental experiences. The parent’s dental anxiety was assessed using a self-report measure, the DAS, and an observer behavior measure, the Dyadic Prestressor Interaction Scale (DPIS; Bush, Melamed, Sheras, & Greenbaum, 1988). Parents’ current anxiety was measured using the State Anxiety Scale (Spielberger, Gorush, & Luschene, 1970). Results indicated that anxious
children were more likely to live in an area of a lower socio-economic status than non-anxious children. Also, females in the older group reported a higher level of dental anxiety than any other group and males in the older group reported lower levels of dental anxiety than any other group; however, dentists’ ratings of children’s dental fears did not differ by gender. Anxious children also had a greater number of traumatic dental experiences and worse dental health than non-anxious children. Additionally, mother’s and child’s self-reported dental anxiety scores were found to be positively related. Further, mothers of children in the anxious group had higher scores of state anxiety than those in the non-anxious group. Researchers concluded that Rachman’s three-pathway theory helped explain the development of dental anxiety with direct conditioning having the largest effect, followed by modeling. Researchers also concluded that the acquisition of dental anxiety was due to conditioning and modeling rather than dispositional factors. However, the information pathway component of the theory could not be adequately tested due to the lack of information the children had received about the dental procedures.

In another study based on Rachman’s (1977) theory, Berge and colleagues (2002a) examined the relationship between child and parent dental anxiety and previous dental experiences in children in the Netherlands. Participants included 401 children (183 girls) between ages 5 and 10. To be included in the study, children were required to have their first dental visit before age 4. Dental fears were assessed by having the children’s parents complete the Dental Subscale of the Children’s Fear Survey (CFSS-DS; Cuthbert & Melamed, 1982). In addition, each parent rated his or her own dental fear on a 5-point Likert scale. Finally, dentists rated dental fear for the child’s most
recent dental visit on a 5-point Likert scale. Dental history was measured by coding the child’s number of extractions, number of fillings, number of cleanings, and number of dental visits from the child’s medical chart. Results suggested a weak relationship between number of extractions and dental fear and no relationship between number of fillings and dental fear. Also, a significant, yet weak, relationship emerged between parent and child dental fear. Additionally, results indicated that children who had a higher number of non-invasive dental appointments prior to invasive treatments had lower dental fear. Results showed no significant differences in fear ratings by gender or age. Researchers concluded that although dental procedures play a role in dental fear, the procedures only account for a small percentage of dental fear variance; therefore, they suggest that a number of other variables are likely contributing to the fear. Thus, their results suggest that Rachman’s modeling and direct conditioning pathways only partially explain the development of child dental anxiety.

Milgrom and colleagues (1995) conducted a study in the state of Washington to evaluate the origins of dental fear in children also via Rachman’s (1977) pathways of fear. Participants included 895 children ages 5-11 and their mothers. Each child was interviewed at home and each mother completed questionnaires at home about their child’s dental anxiety. To measure the pathway of direct conditioning, researchers assessed previous dental experiences, actual dental health, perceived dental health, and the family’s response to the dental health problems. Modeling was assessed by measuring the mother’s dental fear, dental health, frequency of dental care, and number of family members in the house who could expose the child to dental fear. Results indicated that that direct conditioning and parent modeling significantly predicted dental
fear, thus supporting two of the three of Rachman’s fear acquisition pathways. Further, researchers suggested that a parent’s dental anxiety is likely related to the information that the parent passes to the child about dental procedures. While each study examining Rachman’s model of fear acquisition found that two of the pathways’ components (i.e., direct conditioning and modeling) contributed to the development of dental anxiety, researchers failed to examine variables other than anxiety that caretakers could be modeling or conditioning that could be contributing to the development of dental anxiety.

In addition to Rachman’s (1977) three-pathway theory, other variables have been proposed to impact the acquisition of dental anxiety. Poulton and colleagues (1997) analyzed data from a longitudinal study on health and development to examine the causes of dental anxiety. Participants included 976 individuals from New Zealand. A dental health assessment was performed at ages 5 and 15 (assessing dental caries using DMFT and DMFS). Data on dental fear was collected at age 18 using the Diagnostic Interview Schedule (DIS; Feehan, Mcgee, Raja, & Williams, 1994). Results indicated that dental fear at age 18 was not significantly related to a potentially negative dental experience at age 5, while dental fear at age 18 was significantly related to a similar negative dental experience at age 15. Researchers concluded that dental patients likely habituated to mild dental pain at an early age, making them less susceptible to develop dental fears later. Thus, the researchers suggest that early exposure to mild treatments might help to prevent dental fear. Using the same data set, Poulton and colleagues (2001) evaluated the differences in early-onset (i.e. before age 18) and late-onset (age 18 or older) dental anxiety. The sample originally consisted of 1037 individuals born in New Zealand. The final sample included 980 individuals. Dental anxiety assessments were conducted with
the participants at ages 11, 15, 18, and 26. Dental health was assessed at ages 15, 18, and 26. At age 18, personality traits were measured. Data on service use behavior was collected by asking participants how long it had been since their last dental visit as well as what type of visit their last visit was (i.e., check-up or a tooth problem); service use was then coded into symptomatic visitor (attends appointments only when they notice a problem with a tooth), preventative visitor (attends regular cleaning appointments regardless of dental health), and refuser visitor (avoids the dentist until there is no other option due to a problem with a tooth). Results indicated that early-onset dental fear was significantly related to “poor dental health, service use behavior, personality factors, and specific beliefs about health professionals” (Poulton et al., p.782). Further, being a symptomatic dental patient was a significant predictor of early-onset dental fear. In contrast, late onset dental fear was linked to negative dental experiences, symptomatic dental visits, and external locus of control. While the findings for early- and late-onset of fears differed, the authors concluded that participating in preventive dental care early in life as well as during young adulthood likely reduces the risk for developing dental anxiety. Taken together, research conducted by Poulton et al. (1997; 2001), Townend et al. (2000), Berge et al. (2002a), and Milgrom et al. (1995) suggests that the acquisition of dental fear appears to be related to personality factors, early conditioning (e.g., early experiences and beliefs regarding dental health) and modeling of fears; however, a number of other variables involving the manner in which the individual learns to deal with dental procedures or anxiety could be contributing to this relationship.
Dental Anxiety and Child Behavior

Research suggests that dental anxiety is related to negative child behaviors in the dental office. For example, Humphris and colleagues (1991) investigated the relationship among dental anxiety, pain, and uncooperative behavior in children undergoing a small restoration. Participants included a total of 58 children (25 females) ages 7 to 16 years who were referred by dental practitioners as a result of uncooperative behavior and by the Community Dental Services in Liverpool, England. The sample was divided into a refuser group, an acceptor group, and a comparison group. Dental anxiety and dental pain were assessed using 5-point Likert scales (i.e., “relaxed” to “worried”; “no pain” to “pain as bad as it could be”). Behavioral observations of anxiety and of pain were coded from videotapes. Results indicated that, overall, children were more anxious before receiving dental treatment than after. Additionally, children who were referred for treatment because they were uncooperative were more anxious than the control group. Also, refusers reported a higher level of anxiety after the appointment and demonstrated more uncooperative behaviors than other children. Thus, the study suggests that high anxiety is likely related to negative behaviors in a dental setting. Similarly, Baier and colleagues (2004) conducted a study to evaluate the proportion of children with dental fears and with negative behaviors in pediatric dental offices in the state of Washington and the relationship between these fears and negative behaviors. Twenty-one private pediatric dental offices participated in the study. A total of 421 children (200 female) ages 9 months to 12 years 9 months were evaluated. Children’s dental fear was assessed by the primary caregiver completing the Dental Subscale of the Child Fear Survey Schedule. Behavior during the appointment was measured using the Frankl scale (Frankl, Shiere, &
Fogels, 1962), which has four behavior classifications including “definitely negative,”
“negative,” “positive,” and “definitely positive.” Independent observers rated the child’s
behavior using the Frankl scale at 16 stages throughout a single appointment. The most
negative rating across the appointment was used in data analysis. Results showed that
20% of children had dental fears and 21% of children illustrated negative behaviors in the
dental office. Further, a positive relationship emerged between dental fears and negative
behaviors. Also, results indicated that children under age 6 are more likely to exhibit
negative behaviors, suggesting that age may play a role both in behavior and anxiety in a
dental setting. Previous dental experiences and primary caregiver dental fears were not
significantly related to the child’s behavior or dental anxiety. However, while behavior
ratings did not differ significantly by gender, female patients were significantly more
likely than male patients to self-report high dental anxiety on the CFSS-DS.

Berge, Veerkamp, Hoogstraten, and Prins (2002c) examined the predictive value
of the parent-rated scores on the CFSS-DS on behavior during the dental appointment.
Participants included 718 parents of children (356 girls) ages 4-12. Each parent
completed the CFSS-DS before the appointment to assess the child’s anxiety. Dentists
also completed a 5-point Likert scale (1 = not afraid at all to 5 = very afraid) to evaluate
the child’s anxiety based on their behaviors during the dental appointment. Results
indicated that the CFSS had strong negative predictive value but lower positive predictive
value. In other words, children who were rated by their parents as highly anxious were
highly likely to exhibit fearful or acting out behaviors during the dental appointment.
However, those who were rated lower by their parents did not always behave better
during the dental appointment. Thus, dental anxiety before the appointment might not fully explain a child’s behavior during the dental appointment.

Also examining the relationship between behavior and anxiety, Holmes and Girdler (2005) assessed anxiety and behaviors in children and adolescents facing dental surgeries. Participants included 100 children (55 female) ages 8 to 15 from the United Kingdom. Hospital staff referred each youth into a non-sedation group (low anxiety; n = 50) or a sedation group (high anxiety; n = 50). Variables included in their study were state anxiety and trait anxiety assessed using the State-Trait Anxiety Inventory for Children (STAIC; Speilberger et al., 1970), dental anxiety measured by the CFSS-DS and the Venham Picture Test (VPT; Venham, Bengston, & Cipes, 1977), and behavior using a global rating scale (Houpt, Sheskin, Koenigsberg, Desjardins, & Shey, 1985) at 5-minute intervals during treatment. Children in the sedation group had significantly higher state and higher dental anxiety self-report scores than those in the non-sedation group. Additionally, negative behaviors and anxiety were positively related; however, the majority of the children in the study were observed to have positive behaviors only. Interestingly, trait anxiety did not significantly differ between groups nor was it significantly related to dental anxiety. These findings suggest that general anxiety is not necessarily associated with dental anxiety; rather, the dental anxiety is specific to the situation (i.e., facing a dental procedure). In other words, general anxiety can not be used to predict whether or not a child will be anxious in when undergoing a dental procedure.

Kotsanos, Arhakis, and Coolidge (2005) evaluated the use of parental presence and absence (PPA) in managing a child’s uncooperative behavior during a dental appointment. These researchers conducted a retrospective study in Southern Greece on
data collected on 85 children (46 female) ages 2.6 to 8.4 years who were uncooperative at the beginning of the appointment (as rated on the Frankl scale). Dental professionals asked the parent to leave the room each time the child became uncooperative and return to the room when the child began cooperating with the dental procedures. Eighty-seven percent (n = 74) had positive Frankl ratings by the end of the appointment. Six children were uncooperative throughout the entire first appointment but were cooperative at a subsequent appointment, which produced a 94% success rate for the technique. Kotsanos et al. concluded that using the PPA technique was effective in managing child behaviors during dental procedures. Thus, strategic use of parental presence can have positive outcomes for children who initially exhibit poor behaviors in the dental office.

In addition to the immediate difficulties dental fears cause for children, dental fears also tend to persist over time. Looking specifically at the stability of dental anxiety over time, Locker, Poulton, and Thomson (2001) examined data from a longitudinal study on health and development. Participants were part of a larger, longitudinal study in New Zealand in which individuals were assessed from ages 3 to 26. Locker et al. used data collected from participants at ages 18 and 26. Participants completed the Corah Dental Anxiety Scale (DAS) and a structured clinical interview (Diagnostic Interview Schedule) to assess for psychological disorders. Results of the study indicated that 12.5% of the sample met criteria for moderate to severe dental anxiety; however, less than 10% of the sample met the DSM-III criteria for a dental phobia. Further, results showed that of those categorized as highly dentally anxious, 75% met criteria for one or more psychological disorder. The most common disorders in this group were agoraphobia, social phobia, and simple phobia. This group also had high rates of alcohol
dependence and conduct disorder. Individuals with high dental anxiety at age 18 were more likely to have high dental anxiety at age 26. Kent (1985) evaluated the relationship of dental anxiety and memory of acute pain during dental procedures. Participants included 58 patients (33 female) ages 16 to 66 years in the United Kingdom. Patients completed the Dental Anxiety Scale (DAS) and a Visual Analogue Scale for pain expected prior to the appointment and for pain experienced immediately following the appointment. Three months later, patients completed the DAS and VAS for pain remembered from the prior appointment. Results were that those in the low anxiety group had a strong association between experienced and remembered pain; for the high anxiety group, remembered pain was much higher than experienced pain. Additionally, results noted significantly lower levels of experienced pain than expected pain. These results indicate an importance for measuring pain perception immediately following the dental procedure. Kent concluded that memory for pain is reconstructed over time and might contribute to the persistence of dental anxiety.

In a review, Kendall and Ollendick (2004) concluded that, in general, children do not outgrow their anxiety and that if anxiety is left untreated it will likely interfere with the child’s functioning. Similarly, Poulton et al. (2001) concluded that it appears that children do not outgrow dental anxiety as they get older. In addition, in a review of literature involving the development and persistence of fears, Gullone (2000) concluded that medical anxieties are the one category of fears that do not decrease naturally over time. In evaluating the societal pattern of dental anxiety, Smith and Heaton (2003) conducted a review of over 200 articles and found that rates of dental anxiety in the United States have remained consistent over the past 50 years. Thus, even with the
advances in modern technology, rates of dental anxiety are not decreasing without intervention. Overall, research has indicated that dental anxiety is related to negative behaviors in the dental office (Baier et al., 2004; Holmes & Girdler, 2005; Humphris et al., 1991) and that these fears persist overtime (Gullone, 2000; Kendall & Ollendick, 2004; Locker et al., 2001). Research has yet to determine which variables to target in order to best intervene to help children overcome their dental fears and to improve their behaviors in a dental setting.

Factors Influencing Children’s Dental Fears

In regards to expression of fear in a dental setting, Hosey (1995) suggested that the age of the child can play a role. More specifically, she stated that younger children are often afraid of the dental office, no matter what procedure they are facing and that older children often hide their fears. Based on previous research, Hosey suggested that children are often afraid of the dentist for a number of reasons including “fear of choking, fear of injections and drilling, fear of the unknown, the attitude of parents towards dental treatment, the child’s medical and dental experience, the dental experience of friends and siblings, the type of preparation at home before the dental visit, and the child’s perception that something is wrong with his teeth” (p. 210). Also taking age into consideration, Arnrup, Berggren, Broberg, and Bodin (2004) found that older children are more likely to maintain high anxiety after anxiety-focused behavior management interventions than younger children. Blinkhorn and colleagues (1990) suggest that it is important for dentists to understand the child patient’s viewpoint and anxiety since dental caries mainly affect children and adolescents. Most researchers believe that the younger ages are those in which dentists can more strongly affect how individuals view dental health and dental
visits. Thus, the age of a child is likely an important factor when assessing dental anxiety.

Findings have been inconsistent in establishing the relationship of a parent’s dental anxiety to a child’s dental anxiety. As previously discussed, research by Berge et al. (2002a), Milgrom et al. (1995), and Townend et al. (2000) suggests that parent and child dental anxiety is related. On the other hand, also as previously discussed, Baier and colleagues (2004) found no relationship between parent and child dental anxiety. Similarly, Krain and Kendall (2000) conducted a study to assess the relationship between parents’ distress and their child’s anxiety. Participants included 239 children, ages 7 to 15, diagnosed with an anxiety disorder. To assess for parental anxiety, parents completed the State-Trait Anxiety Inventory. To measure child anxiety, parents completed the State-Trait Anxiety Inventory for Children- Parent Version and children completed the State-Trait Anxiety Inventory for Children. Results showed that parent and child self-reported anxiety scores were not significantly related. Additionally, parents reported significantly higher anxiety for their children than their children reported for themselves. Interestingly, parent–report and child-report anxiety for the child were more highly correlated for younger children. Like Krain and Kendall, Folayan and Idehen (2004) designed a study to assess the effect of previously received information on a child’s dental anxiety. Participants included 84 children, ages 8 to 13, in Nigeria. To be included in the study, it was required that children had no prior exposure to dental treatment. Dental anxiety was assessed using the CFSS-DS. Children were asked if they had been exposed to any information before the appointment and what the nature of that information was. The child’s behavior during the appointment was assessed by the
principal investigator using Venham’s clinical ratings of anxiety and cooperative behavior (Venham et al., 1977), which is a 6-point Likert scale, ranging from behaviors of smiling and relaxed to behaviors of attempted escape from treatment. Results suggested that children receive the majority of information about dental procedures from their parents. However, results also showed no significant relationship between this information (positive or negative) and the child’s anxiety or behavior. Thus, in reviewing previous literature regarding the relationship between parent and child dental anxiety, firm conclusions cannot yet be drawn.

Pain Perception and Dental Pain

Pain is the most common reason for individuals to seek medical attention. Until recently, it was believed that children did not experience pain as severely as adults due to their developing neurological systems. However, current research into pediatric pain has established that children are susceptible to the same types of pain as adults (Rudolph, Denning, & Wiesz, 1995). While pain used to be considered a uniquely biological process, it is now accepted that cognition and emotion are also components of the pain experience (Dahlquist & Switkin, 2003). More specifically, Rudolph and colleagues (1995) define pain as including “physiological, sensory, affective, behavioral, and cognitive components” (p. 328). Additionally, Dahlquist (1999) and McGrath (1994) suggest that emotional reactions, particularly fear, can increase a child’s perception of pain. Varni (1984) emphasizes the importance of distinguishing between acute and chronic pain. He defines acute pain as being “an adaptive biological warning signal, directing attention to an injured part or disease condition, functioning within an avoidance paradigm to encourage escape or avoidance or the harmful stimuli” (p. 23).
Thus, his definition suggests that it is a natural biological reaction for children to try to avoid acute pain, which is the type of pain most often encountered in a dental situation.

Dental pain can impair a child’s ability to engage effectively in his or her daily activities. Shepard and colleagues (1999) designed a study to assess the prevalence and effect of dental pain in children in Harrow, England. Participants included 589 (277 girls) 8-year-old children. Researchers interviewed the children using a structured interview designed for the purpose of the study. Results indicated that 48% of the children interviewed had experienced a toothache and that 18% of children had cried because of pain from a toothache. In addition, researchers found that 30% of the children had difficulties sleeping and playing as a result of a toothache. They concluded that dental pain can significantly impair a child’s daily functioning.

A number of factors have been found to be related to dental pain in children. Nomura, Bastos, and Peres (2004) conducted a study to investigate the relationship among dental pain, dental caries, and socioeconomic status in young adolescents. Participants included 169 (92 female) children from a public school in Brazil. Youth were all twelve or thirteen years old. A trained professional evaluated each child for dental caries using the DMFT Index (decayed, missing, filled teeth) as established by the World Health Organization. Information on socioeconomic status, access to dental services, and experience of dental pain was collected through an interview with the family. Results indicated that a high level of dental caries is associated with a high level of dental pain. Additionally, researchers found that low family income and low maternal education was associated with high dental pain, even after controlling for level of dental caries. Other researchers have identified relationships regarding pain, behavior, and
treatment. For example, as discussed previously, Humphris and colleagues (1991) studied the relationship among dental anxiety, pain, and uncooperative behavior in children undergoing a small restoration. In addition to their findings related to anxiety and behavior, researchers found that children who were referred for treatment for uncooperative behavior reported higher levels of pain. Further, children reported less pain after the treatment than they expected before the treatment. Interestingly, anxiety had also decreased after the appointment. Piira, Taplin, Goodenough, and von Baeyer (2002) designed a study to evaluate predictors of pain tolerance in children in Australia. Participants in the study included 53 children (31 females) ages 7 to 14 years old. Researchers measured self-efficacy, using a questionnaire designed for the study, coping (Pain Coping Questionnaire; Reid et al. as cited in Pirra et al., 2002), pain (Coloured Analogue Scale; McGrath et al., 1996), and the cold-pressor apparatus to measure pain tolerance. Results indicated that children who tended to engage in catastrophising had lower pain tolerance. Children who tended to use more cognitive distraction and had higher self-efficacy had higher pain tolerance. Additionally, results showed that older boys tended to have a higher pain tolerance than younger boys. Girls had intermediate pain tolerance regardless of age. Varni (1984) considers dental and medical procedure pain to be in the same category. He summarized research suggesting that teaching children specific coping techniques (i.e. relaxation, distraction, and self-calming) was related to significantly fewer disruptive behaviors. Overall, research has suggested a relationship between poor behavior, maladaptive cognitions and increased pain perception; however, it is unclear as to which factors underlying behavior and cognitions (e.g., anxiety, coping techniques) might be contributing to the pain perception.
Relationships between other variables and pain perception in children and adolescents have also been examined. In a review of pediatric pain literature, Dahlquist and Switkin (2003) concluded that females generally report higher levels of pain than males, beginning around school age. In addition, authors suggest that a child’s age might influence their ability to report pain. More specifically, they explain that younger children may have difficulties understanding the concept of pain or the measures used to assess pain. Looking specifically at pain due to medical procedures, Blount and colleagues (2003) also concluded that females and younger children report higher pain intensity than males and older children. Thus, research suggests that age and gender play a role in youth’s pain perception.

*Coping Styles and Dental Procedures*

Because dental procedures are often a stressful situation for children, coping can play a significant role of a child’s experience at the dental office. Researchers have developed several classifications and descriptions of coping as a construct. Lazarus (1996) suggests that individuals engage in coping behaviors for two main purposes: to control and change the situation and to manage emotional reactions to the perceived stressor. Griffith, Dubow, and Ippolito (2000) divide coping into two main classifications: approach-based and avoidant-based coping. Approach-based coping is defined as actions that strive to change the stressful event so that it becomes less distressing to the individual. More specifically, the individual recognizes the stressor and uses a skill to reduce his or her negative reactions to the stressor. When engaging in avoidant-based coping, the individual’s responses “are characterized by an absence of attempts to alter the situation (p. 184)”; thus, he or she fails to take an active role in
managing the stressor. Instead, avoidant coping shifts the focus of distress away from the original stressor. While most literature suggests that avoidant coping is not beneficial, results examining avoidant coping in children and adolescents are mixed (Power, 2004). Current literature suggests that most researchers examine coping from a situational perspective rather than a global perspective (Schmidt, Peterson, Bullinger, 2002); the type of coping that works well for one stressor may not be effective for another stressor (Eisenburg, Fabes, & Guthrie, 1997). Importantly, medical stressors are unique in that they are situations in which the child must endure the situation. While children are generally accustomed to having a parent resolve their stressors, this often is not possible in the case of medical stressors (Peterson, Oliver, & Saldana, 1997). Further, research has suggested that children exhibit certain coping behaviors specific to dental procedures (Curry & Russ, 1985). When coping is applied specifically to a dental procedure, coping works to reduce the child’s distress from the procedure (Christiano & Russ, 1996). Thus, coping should be examined specific to the dental situation in which the child is engaging.

Coping has been considered within a developmental context. Specific to medical procedures, Harbeck-Weber and colleagues (2003) reviewed literature and concluded that age is a factor in medical coping. More specifically, authors suggest that younger children often need prompting to use coping, while adolescents are often able to independently cope with medical stressors. In addition, these researchers conclude that coping type changes over time with older children using more emotion-focused coping and a wider variety of coping techniques than younger children. Similarly, Eisenburg and colleagues (1997) also concluded that children tend to use more emotion-focused (i.e., coping targeting emotions, not the situation) coping styles as they grow older;
however, they noted that some of the problem-focused (i.e., coping aimed to change the situation) strategies decrease as the child grows older. Additionally, these researchers agreed with Harbeck-Weber and colleagues in that children tend to use a larger variety of coping techniques as they grow older. Specific to medical stressors, Peterson et al. (1997) concluded that very little research is available for the effect of age in coping; however, they note that present research does suggest that older children tend to cope better than younger children when facing medical stressors. Looking specifically at coping patterns, Donaldson, Prinstein, Danovsky, and Spirito (2000) conducted a study to evaluate children’s coping across stressors. Participants included 768 (364 girls) ages 9-17. The sample was divided into three groups by age: early adolescence (9-11), middle adolescence (12-14), and late adolescence (15-17). Participants were asked to choose a problem that they had experienced in the past month and complete the Kidcope in regards to the problem. Researchers divided problems into four categories: school, sibling, family, or peers. Results indicated that adolescents tended to use similar coping patterns across stressors. Researchers note that this finding differs from much previous research which suggests that coping strategies do not generalize across stressors. However, these researchers explain that most studies examine individual coping strategies rather than patterns. According to these studies, coping should be considered within a developmental context when examining youth’s efforts to cope with medical stressors.

In addition to considering a child’s developmental level, because parents’ play an integral role in teaching their children skills, it is important to consider parents’ role in their child’s acquisition of coping skills. A few studies have examined the relationship between parents’ and children’s coping styles. Kliewer and colleagues (1996) conducted
a study to evaluate the relationship between child and parent coping in 310 (171 girls) children ages 9 to 12. Children completed the Children’s Coping Strategies Checklist (CCSC; Sandler, Tein, West, 1994) and a short version of the Child Report of Parent Behavior Inventory (CRPBI; Schaeffer, 1965). Parents completed a demographics questionnaire, the Parental Socialization of Coping Questionnaire (PSCQ; Miller, Kliewer, Hepworth, & Sandler, 1994), the COPE (Carver et al., 1989), and the Cohesion, Expressiveness, and Conflict Subscales of the Family Environment Scale (Moos, 1986). Coping was divided into six styles: active, positive cognitive reframing, distraction, support seeking, denial, negative actions, and avoidance. Analyses were conducted separately for mothers and fathers of boys and girls. Results showed that fathers’ use of religious coping was positively related to their daughters’ use of active coping. Additionally, mothers’ use of reframing coping was positively correlated with boys’ active coping while fathers’ use of reframing coping was negatively correlated with boys’ active coping. Father and son use of active coping were positively related. Thus, authors concluded that parent coping is related to child coping through modeling; however, it is unclear why some coping styles were related and others were not. Kotchick and colleagues (1996) examined the relationship of parent-child coping in families with a father diagnosed with hemophilia. Participants included 75 families with children ages 7 to 18. Children completed the Child Behavior Checklist-Youth Report (CBCL; Achenbach & Edelbrock, 1987) and the Coping Response Inventory (CRI; Billings & Moos, 1981) for how they cope with their father’s illness. Parents completed a demographics questionnaire, the Coping Responses Inventory (CRI; Billings & Moos), the Brief Symptom Inventory (BSI; Derogatis & Spencer, 1982), and the Child Behavior
Checklist (CBCL; Achenbach & Edelbrock, 1983). Coping strategies were divided into active and avoidant. In this study, avoidant coping was related to worse outcome for every family member. In addition, the relationships that emerged were that mothers’ use of avoidant coping was negatively related to sons’ use of avoidant coping and for girls, fathers’ use of active coping was negatively related to daughters’ use of avoidant coping. In a review of current child coping literature, Power (2004) concluded that parents can influence their child’s coping techniques through the home environment they provide and through their responses to the child’s behavior; however, he states that a relationship between parents’ type of coping and children’s type of coping has not yet been established.

Results of research into youths’ coping with dental procedures remains inconsistent. Curry and Russ (1985) conducted an exploratory study to identify the types of coping strategies children use when coping directly with a restorative dental procedure. Participants were recruited from Case Western Reserve University’s School of Dental Medicine and included 30 children (12 girls) ages 8 to 10. Results indicated that every child participating attempted to cope with the dental visit in some manner. Results also suggested that these children used twice as many cognitive coping strategies as behavioral strategies. Further, results showed that older children tended to use more cognitive coping strategies than younger children. A recent study suggests that the type of coping a child engages in might be related to dental anxiety. Versloot et al. (2004) designed a study to assess coping with pain during a dental procedure in children age 11. Participants were recruited from the Netherlands and included 597 children (269 girls). They completed the Dental Cope Questionnaire [version of the Kidcope (Spirito, Stark, &
Williams, 1988) modified to be specific to dental procedures] to assess coping techniques, the Dental Subscale of the Children’s Fear Survey Schedule to assess dental anxiety, and rated (on a 3-point Likert scale) if they had ever experienced pain at the dentist. Children completed these questionnaires in the classroom as part of a larger study. Based on a factor analysis of their adapted coping scale, researchers divided coping into three categories: destructive (strategies unhelpful for treatment), external (using other people to help cope), and internal (cognitive strategies to change negative feelings). Results indicated that internal coping strategies are used most often when children are coping with dental pain. Also, children rated both internal and external strategies as effective. However, children with higher levels of dental fear and higher pain perception tended to use more coping strategies overall. Additionally, children with higher dental fears used more external coping strategies while children with past dental pain used more internal coping. Also, results indicated that past dental pain was significantly related to dental anxiety. When investigating the role of gender, results showed that girls reported significantly higher levels of dental anxiety than boys. Researchers concluded that the type of coping that children choose was influenced by both dental fear and past pain experience. Thus, it is possible that the type of coping a child uses might impact the child’s dental fear and pain perception in either a positive or negative direction.

Also researching coping and distress, Christiano and Russ (1996) examined a child’s quality of play, coping styles and distress during an invasive dental procedure. Researchers divided coping into two types: cognitive (reality-oriented working through, cognitive reappraisal, emotion-regulating, behavior-regulating, and diversionary
thinking) and behavioral (information-seeking, support-seeking, and direct efforts to maintain control). Participants were recruited from Case Western Reserve University’s School of Dental Medicine and a private dental office in Cleveland, Ohio. The sample included 37 children (16 girls) ages 7 to 9 who had appointments for restorative dental work. Researchers used the Affective Play Scale (APS; Russ as cited in Christiano & Russ), which is a structured puppet play task, to measure cognitive and affective play. Specifically, the scale is scored for the frequency and variety of affect expressed in the play, the child’s comfort with the play task, and the quality of fantasy expressed through the puppet play. In addition, researchers also used the Cognitive Coping Inventory (Curry, 1984, 1985; Curry & Russ 1985) and the Behavioral Coping Observation Scales (Curry, 1984) to measure coping strategies, the Distress Scale (Curry, 1985) to measure perceived pain, the Behavior Profile Rating Scale (Melamed, Yurcheson, Fleece, Hutcherson, & Hawes, 1978) to measure anxiety-related behaviors during the procedure, the Clinical Anxiety Rating Scale (Venham et al., 1977; Curry, 1984, 1985) and the Cooperative Behavior Rating Scale (Venham et al; Curry, 1984, 1985) to measure the child’s responses to treatment, and the Personal Adjustment and Role Skills Scale III (Walker, Stein, Perrin, & Jessop, 1990) to measure global adjustment. Results indicated that children who engaged in more emotional and fantasy play used significantly more cognitive coping strategies. On the other hand, there was not a significant relationship between cognitive play and behavioral coping. In addition, results showed a negative relationship between fantasy play and distress; in other words, children with better imaginations tended to report less distress about the dental procedures. Contrary to what researchers expected, results did not show a significant relationship between more
attempts to cope and using more coping strategies, with lower distress. Additionally, global adjustment was not related to either play or coping. While Christiano and Russ did not find any significant results for coping and the child’s distress, they examined only approach coping and did not assess an avoidant or a negative coping component. Also, Christino and Russ did not measure coping or anxiety specific to the dental appointment or procedure.

Also examining coping in dental situations, Miller, Roussi, Caputo, and Kruus (1995) conducted a study to assess the interaction of children’s dispositional patterns, coping, and anxiety when facing an invasive dental treatment. Researchers explained that high and low monitors are different in how they perceive threats and the type of expectations they have when facing a stressor. More specifically, when experiencing anxiety and stress, individuals in the high monitor group tend to seek out more information about the threat, which in turn causes an increase in their focus on the threatening information. Contrarily, individuals in the low monitor group do not seek out negative stimuli regarding the stressor. Participants included 82 children (35 female) ages 7 to 12 years old. Children recruited were scheduled for dental procedures at a clinic in Philadelphia, Pennsylvania. Researchers interviewed children individually before the appointment and used the Child Behavioral Style Scale, which was designed for the purpose of the study, to assess monitoring disposition (by asking children how they would respond in specific threatening situations) and had children rate their anxiety using a visual analogue scale (VAS). The VAS was a picture of a thermometer on a 0-100 scale, in which children responded to the question “How nervous or frightened are you now (were you) about being with the dentist?” Experimenters also rated the child’s
anxiety before the procedure. After the appointment, the interviewer asked the child how frequently he or she used 15 different coping strategies (divided into 3 categories: sensory vigilance, information seeking, and avoidance). Observable coping strategies and disruptive behaviors were also coded from videotapes. Results suggested that a child’s disposition (i.e., temperament) is related to the type of coping he or she engaged in. For example, a child who tended to perceive his or her environment as more threatening, tended to use more sensory vigilance and avoidant coping. Additionally, children who were considered high monitors also reported greater distress from the dental procedure. Also, the interaction between the type of monitoring and the type of coping affected the child’s anxiety. More specifically, children who were high monitors and engaged in high amounts of avoidant coping had higher anxiety while children who were low monitors and used high avoidant coping had lower anxiety. Further, high monitors who used a low amount of avoidant coping had lower anxiety ratings after treatment. Thus, overall, the study suggested that type of coping can help to modify anxiety regardless of the child’s dispositional state.

Several other studies have been conducted in which coping techniques were taught, though coping was not measured directly. Weinstein and colleagues (2003) conducted a study in the United Kingdom to evaluate the efficacy of a perceived control intervention to reduce dental anxiety in children ages 7 to 9. Participants included 80 (51 females) children. The intervention group included 62 children and the control group included 18 children. All children were shown a two-minute video at school in groups of four. Children in the intervention group watched a video depicting a child of the same gender and age waiting for his or her dental appointment and talking about his or her
fears. The dentist was then shown explaining the procedure (in this case, an injection) to the child and allowing the child to raise his or her hand if they needed to stop the injection. The control group viewed a video depicting an advertisement for Disney World. The researchers had children rate their fear of dental injections on a visual analogue scale before and immediately following the video. Results indicated a significant change in anxiety in the intervention group pre-test to post-test. The control group did not show this effect. Although the researchers did not measure coping directly, it is possible that the approach coping techniques that the researchers taught the children acted to reduce the child’s dental anxiety. Another study identified avoidant behavior and high anxiety as being variables in patients who did not respond well to behavior management interventions in the dental office. Specifically, Arnrup et al. (2004) investigated dental fear in children referred to a specialized pediatric dental clinic in Sweden. Participants included 81 children (44 female), ages 4-12. The clinics participating in the study used either behavior management techniques alone or behavior management and sedation techniques. Child’s dental anxiety was assessed (by parents) using the Dental Subscale of the Children’s Fear Survey Schedule. Parents’ dental fear was measured using Corah’s Dental Anxiety Scale. Dentists rated the child’s acceptance of the procedures. Researchers had parents complete measures before and after the first appointment and after a follow-up appointment. Retrospectively, researchers divided children into four groups: non-fearful/extrovert/outgoing (n = 34; 17 female), fearful/extrovert/outgoing (n = 20; 11 female), fearful/inhibited (n = 17; 12 female), and externalizing/impulsive (n = 10; 4 female). Results showed that two-thirds of children showed a decrease in dental anxiety rated by parents after use of behavior management
techniques; this decrease was maintained at follow-up. Additionally, results indicated that children in the fearful/inhibited group were more likely to remain fearful at follow-up. Children in the externalizing/impulsive group had the highest rate of non-acceptance. The combination of avoidance and moderate to high dental fears predicted poorest outcome at follow-up. Although researchers did not specifically address coping, the avoidant coping technique that the children used may have interfered with the intervention program and contributed to their high level of anxiety. Thus, implications from research suggest that approach coping is related to lower dental anxiety while avoidant coping is likely less beneficial.

In addition to the relationship between dental anxiety and coping, a relationship between pain and coping has also emerged. From a literature review of pediatric pain in medical procedures, Blount and colleagues (2003) concluded that information seeking (also known as approach coping) is related to lower pain perception before the procedure; this same technique has been found to be related to lower distress during the medical procedure. These researchers also reported that avoidant coping generally does not benefit the child. Further, researchers concluded that there is not enough information currently to determine how to use coping to create better outcomes in the child (Blount et al.). Tsao, Fanurik, and Zeltzer (2003) examined the long-term effect of distraction training (i.e. as a coping technique) on pain tolerance in children ages 8 to 10. Participants in the first study included 64 children (36 females). Half of the children in the study received a 5-minute distractor training session. The follow-up study included 32 females. Researchers used the cold pressor task to evaluate pain tolerance. Pain intensity was measured using a 1-10 rating scale. Coping was assessed by a clinical
interview and participants were divided into attender and distracter groups. Participants were given either attender or distracter 5-minute trainings. Results indicated that children used the same coping styles at baseline as they did at follow-up. Children who were initially trained in distraction tended to continue to use distraction as a coping technique even when they were trained in the attender group before the second study. Additionally, children in the 5-minute distraction training group had significantly higher pain tolerance than those in the attending training group. Also, there was no difference in pain tolerance for children who naturally distracted versus children who were taught distraction. One final important finding was that there was no difference in pain ratings among groups. Thus, research regarding pain perception indicates that approach coping can aid in decreasing perception of pain, and avoidant coping does not decrease pain perception.

Summary of Research Regarding the Relationships among Psychological Functioning, Dental Anxiety, Type of Coping, and Pain Perception in Children in Dental Settings

A number of studies suggest that the demographic variables of socioeconomic status, gender, and age are implicated in the experience of dental anxiety, pain perception, and coping with dental procedures. More specifically, research shows that children of lower socioeconomic status have higher dental anxiety and higher perception of pain than children of higher socioeconomic statuses (Nomura et al., 2004; Townend et al., 2000). In regards to gender, many researchers have concluded that females report significantly more dental anxiety and higher levels of pain than males (Baier et al., 2004; Blount et al., 2003; Dahlquist & Switkin, 2003; Townend et al.; Versloot et al., 2004). In general, younger children have more dental fears (Hosey, 1995) and report more dental fear than older children (Blount et al.). Further, older children tend to use more cognitive
and emotion-focused coping than younger children; younger children tend to need more prompting to cope with a medical stressor (Curry & Russ, 1985; Harbeck-Weber et al., 2003; Eisenberg et al., 1997). Thus, it appears important to consider demographic factors when evaluating anxiety, coping, and pain in a dental setting.

Other factors that have been found to be important in assessing child dental anxiety and pain include previous dental experiences, type of dental procedure, patient psychological functioning, and dental anxiety of the parent. Studies have found that having a previously negative dental experience is related to higher levels of dental anxiety (Baier et al., 2004; Poulton et al., 2001; Townend et al., 2000; Versloot et al., 2004). Dental anxiety also seems to be related to the patient’s psychological functioning (Locker et al., 2000). Results of existing research on the relationship between the child and parent’s dental anxiety are mixed (Berge et al.; Townend et al.; Baier et al., 2004); thus, the significance of the relationship is unclear. Importantly, dental anxiety has been found to have a positive relationship with pain perception (Blount et al., 2003).

Research suggests that children can use specific coping skills to reduce their anxiety when facing a medical stressor (Harbeck-Weber et al., 2003). Generally, avoidant coping has been found to not benefit the child when faced with a medical stressor (Blount et al., 2003). Most often, children used internal (cognitive strategies) coping strategies when faced with dental procedures; interestingly, children with higher dental fears tend to use more external coping strategies (using other people to help cope) (Versloot et al., 2004). In addition, avoidant coping has been found to be related to higher dental anxiety in children (Miller et al., 1995). While approach coping has not
been addressed directly, interventions in which approach coping is targeted have been successful in reducing dental anxiety in children (Weinstein et al., 2003).

The relationship between type of coping and pain perception is less clear. Blount and colleagues (2003) concluded that information seeking (one type of approach coping) is related to lower pain perception before medical procedures. In regards to avoidant coping and pain, Tsao et al. (2003) found that distraction (a type of avoidant coping) was related to higher pain tolerance but did not effect pain perception. Thus, it appears that both types of coping may be beneficial to particular children in a dental situation.

Research Questions and Hypotheses

The present study examined relationships among children and adolescent’s psychological functioning, dental anxiety, pain perception, and coping techniques used to deal with dental procedures. Additionally, the study assessed the relationship between youth’s dental anxiety and parent’s dental anxiety; and the youth and parent’s coping styles. Developmental differences between children’s and adolescent’s psychological functioning, dental fear, pain perception, and coping styles were evaluated. Planned comparisons were conducted to examine the importance of the variables gender, ethnicity, and previous dental experiences.

Specific hypotheses based on previous research are listed below:

I. Analyses examining differences related to demographic variables were conducted.
   A. Gender
      1. It was predicted that females would report more dental anxiety than males.
2. It was predicted that females would report higher levels of pain than males.

3. Consistent with prior research, it was predicted that significant differences (i.e., Cohen’s $d > .2$) in coping and psychological functioning for gender would not emerge.

B. Age

1. It was hypothesized that children (9-11) and adolescents (12-15) would differ on dental anxiety. More specifically, it was predicted that children would report higher levels of dental anxiety than adolescents.

2. It was predicted that children (9-11) and adolescents (12-15) would differ on coping styles. It was expected that adolescents would report more approach coping than younger children and younger children would report more avoidant coping than adolescents.

3. It was expected that children (9-11) and adolescents (12-15) would differ on pain perception. More specifically, it was predicted that children would report higher levels of pain than adolescents.

4. Planned comparisons analyses were conducted to examine the differences between scores on psychological functioning for children and adolescents.

C. Previous dental experiences
1. It was predicted that youth who had previous negative dental experiences would report higher levels of dental anxiety and pain perception compared to youth who have not had negative experiences.

D. Type of procedure

1. It was expected that dental anxiety would significantly differ for type of procedure.

2. It was expected that pain would significantly differ for type of procedure.

3. The relationship between coping and type of procedure has not been studied; thus, planned comparisons were performed to evaluate the differences between preventative and restorative procedures for type of coping (Approach/Avoidant subscales of the MDCS).

II. Because research is mixed regarding the relationship between parent and child dental anxiety, planned comparison analyses were completed to examine this relationship.

III. A prediction addressing the relationship between child and parent coping could not be made due to inconclusive previous research; thus, planned comparisons were performed to examine this relationship.

IV. It was hypothesized that youth’s dental anxiety and psychological symptoms would be positively related.
V. It was predicted that youth’s dental anxiety and pain perception would be positively related.

VI. It was expected that youth’s coping style would be related to his or her psychological functioning and dental anxiety.

A. It was predicted that avoidant coping would be positively related to dental anxiety and positively related to psychological symptoms.

B. It was predicted that approach coping would be negatively related to psychological symptoms and negatively related to dental anxiety.

VII. It was hypothesized that youth’s coping style would be related to his or her pain perception.

A. Research has suggested that both approach and avoidance coping decrease pain perception in children. Thus, planned comparison analyses were conducted between pain perception and coping styles to examine this relationship.

VIII. Based on the findings above, regression analyses were performed to explore the relative roles of dental anxiety, psychological functioning, and coping in pain perception.
Chapter Three

Methods

Participants

Participants included a total of 129 dental patients and 84 parents. By setting power at .8 and $\alpha = .05$, power analysis suggests that 129 participants allows for detection of a medium effect for both correlations and t-tests (Cohen, 1992). The youth were divided into two groups: children and adolescents. Specifically, the sample included 69 children (ages 9-11) and 60 adolescents (ages 13-15). The difference in the number of child/adolescent participants and the number of parent participants can be attributed to the fact that a number of the youth ($n = 64$) were siblings and had one parent completing the parent measures; however, 11 parents did not complete the parent measures. The age ranges of the children were selected because this age group has the capacity to self-reflect but is still young enough that interventions in the future could help to develop positive coping styles.

Overall, participants had similar backgrounds. Parents reported that 93.1% of children were performing at either an average or above average level in school, with only 3.9% reporting that their child was below average in school performance. Sixty-seven percent of parents reported that their child regularly participates in a religious group. The majority of the participants were European American (89.9 %). Most of the children who
participated were living in a two-parent home (84.5%) and 10.1% were living in a single parent home. Parents reported a variety of levels of education ranging from 8th grade to graduate degree. See Table 1 for percentages of parents’ educational level.

Table 1
Percentages of Parental Education Levels

<table>
<thead>
<tr>
<th>Educational Level</th>
<th>Mother</th>
<th>Father</th>
</tr>
</thead>
<tbody>
<tr>
<td>8th or Less</td>
<td>0.00</td>
<td>0.80</td>
</tr>
<tr>
<td>9th to 11th Grade</td>
<td>5.40</td>
<td>7.00</td>
</tr>
<tr>
<td>High School Graduate</td>
<td>21.7</td>
<td>28.7</td>
</tr>
<tr>
<td>Some College</td>
<td>28.7</td>
<td>17.1</td>
</tr>
<tr>
<td>College Degree</td>
<td>31.0</td>
<td>26.4</td>
</tr>
<tr>
<td>Graduate School or Graduate Degree</td>
<td>12.4</td>
<td>16.3</td>
</tr>
</tbody>
</table>

Procedure

Participants were recruited from private dental offices. Initially, dentists were contacted by phone investigating their interest in the study and, for those who agreed, the primary investigator met with dentists and office receptionists to explain the project and to provide the questionnaire packets. Each dentist signed a consent form to allow their patients to participate in the study (Appendix A). Receptionists screened and asked patients who qualified for the study if they wanted to participate. Patients who had a known history of cognitive delays or deficits were excluded from the study. See Figure 1 for specific data on participant recruitment. Parent (Appendix B) and youth (Appendix C) consent forms were signed by those who chose to participate. Youth completed the Dental Subscale of the Children’s Fear Survey Schedule (CFSS-DS; Cuthbert & Melamed, 1982) and the Measure of Dental Coping Styles (MDCS; Appendix E) before the appointment and a Visual Analogue Scale (VAS; Appendix F) rating pain
immediately following the appointment. Typically, youth completed all scales in less than 15 minutes. Parents completed a demographics questionnaire (Appendix D), Strengths and Difficulties Questionnaire (SDQ; Goodman, 2001; Appendix G), Corah’s Dental Anxiety Scale (DAS; Corah, 1968), and the COPE (Carver et al., 1989) during or after the youth’s dental appointment. It took most parents less than 25 minutes to complete all the scales. Youth were offered one pack of sugarless gum or a pen as a token of appreciation for participation. In addition, youth and parents had the option of being entered in a drawing to win a $20 gift certificate to Target as a token of appreciation for their time participating.

Figure 1. Recruitment of participants.
Measures

Dental Subscale of the Children’s Fear Survey Schedule (DS-CFSS; Cuthbert & Melamed, 1982). The DS-CFSS is a 15-item self-report questionnaire rated on a 5-point Likert scale (1 = Not afraid at all, 5 = Very afraid). The scale was designed to be used to assess dental anxiety in children. Scores on the scale range from 15 to 75 (Cuthbert & Melamed). Previous studies have found that scores between 32 and 39 are indicative of borderline levels of dental anxiety, and scores 39 and above represent clinical levels of dental fear in Dutch children (Berge, Veerkamp, Hoogstraten, & Prins, 2002). The internal reliability coefficients range from .85 to .90 across studies. Test-retest reliability has ranged from .72 to .97. Validity has been established across a number of studies in which the instrument was able to distinguish between anxious and non-anxious children. Additionally, low to moderate correlations have been found with the VPT ($r = .35$), the Children’s Fear Survey Schedule-Short Form ($r = .48$), and higher correlations with the Children’s Dental Fear Picture Test ($r = .87$) (Aartman, Everdingen, Hoogstraten, & Schuurs, 1998). In the current study, children and adolescents completed the DS-CFSS before the appointment; completion typically took less than 10 minutes.

Measure of Dental Coping Styles (MDCS). The MDCS was created for the purpose of the study by synthesizing and modifying the Kidcope (Spirito et al., 1988) and the Dental Coping Questionnaire (DCQ; Versloot et al., 2004). The MDCS is a self-report measure designed to assess coping in a dental situation in children and adolescents ages 9 to 16. The new first version of the questionnaire contained 21 items, and the Flesch-Kincaid reading level of the scale was 3.6. Similar to the Kidcope and DCQ the child was asked
whether or not he or she used the coping strategy (yes/no) when coping with a dental stressor. Following data collection, factor analysis was conducted to examine the structure of the scale. Based on the factor analysis, the final scale contained 13 items and was divided into two subscales: approach (7 items) and avoidant (6 items). Detailed analyses are presented in the Results section. See Table 2 for the eight items removed from the measure. See Table 3 for items used in analysis. See Appendix B for the complete measure.

Table 2

<table>
<thead>
<tr>
<th>Items Removed from the MDCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>I blame myself for needing to come to the dentist.</td>
</tr>
<tr>
<td>I am trying to think of answers about why I have to go to the dentist.</td>
</tr>
<tr>
<td>I am keeping my thoughts to myself.</td>
</tr>
<tr>
<td>I am not doing anything because I can’t do anything about going to the dentist.</td>
</tr>
<tr>
<td>I will keep quiet about my thoughts about the dentist.</td>
</tr>
<tr>
<td>I will yell, scream, or get mad.</td>
</tr>
<tr>
<td>I will do what the dentist tells me to.</td>
</tr>
<tr>
<td>I will think about the good reasons to come to the dentist.</td>
</tr>
</tbody>
</table>

Table 3

<table>
<thead>
<tr>
<th>MDCS Items Used in Analyses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subscales of the MDCS</td>
</tr>
<tr>
<td>Avoidant Coping</td>
</tr>
<tr>
<td>I am blaming someone else for needing to come to the dentist.</td>
</tr>
<tr>
<td>I think going to the dentist is good for my teeth.</td>
</tr>
<tr>
<td>I am angry at mom and dad.</td>
</tr>
<tr>
<td>I will get angry at the dentist.</td>
</tr>
<tr>
<td>I am wishing that I didn’t have to come to the dentist.</td>
</tr>
<tr>
<td>I am wishing that I could make things different.</td>
</tr>
<tr>
<td>Approach Coping</td>
</tr>
<tr>
<td>I am just trying to forget about it.</td>
</tr>
<tr>
<td>I will try to calm myself down.</td>
</tr>
<tr>
<td>I am trying to see the good side of things.</td>
</tr>
<tr>
<td>I will try to think about something else.</td>
</tr>
<tr>
<td>I am thinking of other things.</td>
</tr>
<tr>
<td>I will ask the dentist what the dentist is doing.</td>
</tr>
<tr>
<td>I am asking my mom or dad questions about my dental visit.</td>
</tr>
</tbody>
</table>
Visual Analogue Scale for Pain. Visual analogue scales are considered valid for assessing pain in children ages 5 and older (Dahlquist, 1990). Additionally, children over age eight are cognitively capable of using a 5-point Likert scale (Dahlquist, 1999). Thus, children and adolescents were asked by the dental assistant or dental hygienist to rate the pain that they experienced during the visit on a pain thermometer ranging from 1-5 (no pain to worst imaginable pain) immediately following the dental appointment. The dental professional showed patients the pain thermometer and said, “This is a different kind of thermometer called a pain thermometer. The top of the thermometer means the most pain you could possibly imagine. The middle of the thermometer means medium pain. The bottom of the thermometer means no pain. Point to or say the number that shows how much pain you had during your appointment today.” See Appendix F for the pain thermometer.

Strengths and Difficulties Questionnaire (SDQ; Goodman, 2001). The SDQ is a 25-item parent-report questionnaire, which measures psychological functioning in children. The parent is asked to answer each item on a 3-point Likert scale regarding their child’s behaviors and emotions. The SDQ provides a Total Difficulty score by adding together four subscales: Emotional Symptoms Scale, Conduct Problems Scale, Hyperactivity Scale, and Peer Problems Scale. Internal consistency for the scale is acceptable, averaging $\alpha = .73$. Total difficulties had particularly good internal consistency, $r > .80$, and test-retest reliability over four to six months ($r = .72$). In assessing validity, these researchers determined that the presence or absence of psychological disorders was associated with scores on SDQ. To examine this, each participant completed the Development and Well-Being Assessment, which integrates questionnaires with
structured interviews. Experienced clinicians were given the information, which they used to diagnose psychological disorders. These diagnoses were compared to the results on the SDQ. The high association between the diagnosis of disorders and scores on the SDQ helped to establish validity for the measure. Also, in conducting a factor analysis, researchers found very little item overlap for scales measuring internalizing and externalizing behaviors. For the current study, parents completed the measure during the child’s appointment. Only the Total Difficulties Scale was used in analyses. The measure took parents about 5 minutes to complete. See Appendix G for the complete measure.

**Dental Anxiety Scale** (DAS; Corah, 1968). The scale is a 4-item self-report measure to be rated on a 5-point Likert scale. Internal consistency was established using the Kuder-Richardson Formula 20 (K-R Formula Coefficient = .86). A score of 15 or higher classifies the patient as “highly anxious (Corah, Gale, Illig, 1979).” Test-retest reliability was measured over three months and the measure is considered highly reliable (.82). Validity was assessed by comparing patients’ ratings to dentists’ ratings ($r = .41$). Thus, the measure is considered to have acceptable reliability and validity (Corah, 1968). Parents completed the measure during the child’s appointment. The measure took parents less than five minutes to complete.

**COPE** (Carver et al., 1989). The COPE is a 60-item scale to be rated on a 5-point Likert scale ($1 = I$ usually don’t do this at all to $5 = I$ usually do this a lot). The measure was conceptualized based on three coping styles: problem-focused coping, emotion-focused coping, and negative coping. However, the COPE is further divided into 14 subscales: active coping, planning, suppression of competing activities, restraint and instrumental
social support (problem-focused); emotional social support, positive reinterpretation, acceptance, denial, and religious coping (emotion-focused); and focus on and venting emotions, use of alcohol, mental disengagement, and behavioral disengagement (negative coping). Internal consistencies for the subscales range from $\alpha = .45$-.92. These researchers found that test-retest reliability over 4-6 weeks was acceptable, $r = .48$-.89. Discriminant and concurrent validity was assessed by comparing the scores on the COPE to personality variables and social desirability; results showed that correlations between the COPE and personality variables as well as the COPE and social desirability were small, indicating that the COPE is measuring a unique construct. Correlations with functional personality traits were related to functional coping strategies, providing concurrent validity. Other researchers have supported three-factor structures for the instrument: rational ($\alpha = .89$), emotion-focused ($\alpha = .83$), and avoidance coping ($\alpha = .69$) (Lyne & Roger, 2000); or problem-focused, avoidance coping, and lack of emotion-focused coping (Ingledew, Hardy, Cooper, & Jemal, 1996). In the present study, a factor analysis was conducted that supported a two-factor structure: avoidant and approach coping. Six items were removed from the measure. The approach subscale had 41 items and the avoidant subscale had 13 items. Detailed analyses are presented in the Results section. See Table 4 for items removed from the measure.
Table 4

*Items Removed from the COPE*

<table>
<thead>
<tr>
<th>Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>I use alcohol or drugs to make myself feel better.</td>
</tr>
<tr>
<td>I daydream about things other than this.</td>
</tr>
<tr>
<td>I accept that this has happened and that it can't be changed.</td>
</tr>
<tr>
<td>I try to lose myself for a while by drinking alcohol or taking drugs.</td>
</tr>
<tr>
<td>I drink alcohol or take drugs, in order to think about it less.</td>
</tr>
<tr>
<td>I use alcohol or drugs to help me get through it.</td>
</tr>
</tbody>
</table>
Chapter Four

Results

Preliminary Analysis

For internal consistency, means, and standard deviations for measures in the present study, see Table 5. Since the measures of youth psychological functioning (SDQ), youth dental anxiety (CFSS), parent dental anxiety (DAS) both provide clinical cut-off scores, the data was analyzed to determine the prevalence of clinical symptoms. In assessing psychological symptoms utilizing the SDQ, the majority of the youth fell within a non-clinical range (87.6%) with 7.1% falling in the borderline range, and 5.3% falling in the abnormal range. Similar to the psychological symptoms, most youth had sub-clinical levels of dental anxiety (77.5%), with 14.0% falling in the borderline range, and 8.5% falling in the clinical range. In examining dental anxiety in the parents of the sample, 86.7% of parent participants scored below clinical significance.

Scale Structure and Descriptive Analyses

To explore the factor structure of the MDCS, a principal-axis factor analysis with a varimax rotation was conducted. Initially, a 21-item questionnaire was developed by the researcher by combining and modifying items from Spirito, Stark, and Willams’ (1988) Kidcope and Versloot and colleagues’ (2004) Dental Coping Questionnaire to assess dental coping in children and adolescents. A Scree Test indicated a 3-factor model (see Figure 2) while Kaiser’s stopping rule indicated a 5-factor model. However, several
of the factors did not make sense conceptually. Two, three, four, and five-factors models were each examined. Analyses determined that a 2-factor model was best fit the data because the factors make more sense conceptually, and the first and second Eigenvalues are significantly higher than the third Eigenvalue. In examining the 2-factor model, with the exception of one item (“I ask people who have had similar experiences what they did”), all items which loaded as .30 or higher were retained; the 7 items loading below .30 were removed from the scale. The previously mentioned item was removed because scale reliability (i.e., internal consistency) improved by eliminating it. Thus, a clear 13-item 2-factor structure (i.e., approach and avoidant coping factors) remained. Both factors were conceptually strong and had acceptable internal consistencies (approach $\alpha = .65$; avoidant $\alpha = .63$). See Table 6 for means, standard deviations, and factor loadings for the MDCS.

Table 5

<table>
<thead>
<tr>
<th>Measures</th>
<th># Items</th>
<th>$\alpha$</th>
<th>$M$</th>
<th>$SD$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dental Subscale of the Children’s Fear Survey Schedule</td>
<td>14</td>
<td>.88</td>
<td>26.42</td>
<td>9.54</td>
</tr>
<tr>
<td>Measure of Dental Coping Styles</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Scale</td>
<td>13</td>
<td>.66</td>
<td>21.93</td>
<td>2.34</td>
</tr>
<tr>
<td>Approach Coping</td>
<td>7</td>
<td>.65</td>
<td>10.78</td>
<td>1.83</td>
</tr>
<tr>
<td>Avoidant Coping</td>
<td>6</td>
<td>.63</td>
<td>11.14</td>
<td>1.14</td>
</tr>
<tr>
<td>Visual Analogue Scale for Pain</td>
<td>1</td>
<td>N/A</td>
<td>1.27</td>
<td>.50</td>
</tr>
<tr>
<td>Strengths and Difficulties Questionnaire</td>
<td>20</td>
<td>.79</td>
<td>7.42</td>
<td>4.86</td>
</tr>
<tr>
<td>Dental Anxiety Scale</td>
<td>4</td>
<td>.85</td>
<td>11.35</td>
<td>2.69</td>
</tr>
<tr>
<td>COPE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Scale</td>
<td>55</td>
<td>.96</td>
<td>120.79</td>
<td>30.62</td>
</tr>
<tr>
<td>Approach Coping</td>
<td>41</td>
<td>.97</td>
<td>101.41</td>
<td>27.42</td>
</tr>
<tr>
<td>Avoidant Coping</td>
<td>13</td>
<td>.85</td>
<td>19.37</td>
<td>5.65</td>
</tr>
</tbody>
</table>
To examine the factor structure of the COPE in the current sample, principal-axis factor analysis with a varimax rotation was utilized. Initially, a Scree Test indicated a 3-factor model (see Figure 3) though Kaiser’s stopping rule indicated a 14-factor model. The 14-factor model was not practical for interpretation or statistical analyses. Thus, two and three-factors models were each examined. Analyses determined that a 2-factor model was the best fit for the data due to factor loadings and conceptual interpretation. In examining the 2-factor model, all items which loaded as .30 or higher were retained; the 6 items loading below .30 were removed from the scale. The original 60-item questionnaire factored into approach (n = 41) and avoidant (n = 13) factors. Both the approach (α = .97) and avoidant (α = .85) factors were conceptually-based and had high
internal consistencies. See Table 7 for means, standard deviations, and factor loadings for items on the COPE scale.

Figure 3. Scree plot for factor analysis of the COPE.
Table 6

*Means, Standard Deviations, and Factor Loadings of the Measure of Dental Coping Scale (MDCS)*

<table>
<thead>
<tr>
<th>Items</th>
<th>M</th>
<th>SD</th>
<th>1&lt;sup&gt;a&lt;/sup&gt;</th>
<th>2&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am blaming someone else for needing to come to the dentist.</td>
<td>1.95</td>
<td>.212</td>
<td>.64</td>
<td>-.16</td>
</tr>
<tr>
<td>I think going to the dentist is good for my teeth.</td>
<td>1.97</td>
<td>.175</td>
<td>-.61</td>
<td>.14</td>
</tr>
<tr>
<td>I am angry at mom and dad.</td>
<td>1.94</td>
<td>.243</td>
<td>.58</td>
<td>-.12</td>
</tr>
<tr>
<td>I will get angry at the dentist.</td>
<td>1.96</td>
<td>.194</td>
<td>.56</td>
<td>-.01</td>
</tr>
<tr>
<td>I am wishing that I didn’t have to come to the dentist.</td>
<td>1.63</td>
<td>.483</td>
<td>.47</td>
<td>.18</td>
</tr>
<tr>
<td>I am wishing that I could make things different.</td>
<td>1.70</td>
<td>.462</td>
<td>.41</td>
<td>.24</td>
</tr>
<tr>
<td>I ask people who have had similar experiences what they did.</td>
<td>1.54</td>
<td>.498</td>
<td>.31</td>
<td>.11</td>
</tr>
<tr>
<td>I am keeping my thoughts to myself.</td>
<td>1.42</td>
<td>.493</td>
<td>.298</td>
<td>.23</td>
</tr>
<tr>
<td>I am trying to figure out the reason why I have to go to the dentist.</td>
<td>1.91</td>
<td>.280</td>
<td>.25</td>
<td>.15</td>
</tr>
<tr>
<td>I will yell, scream, or get mad.</td>
<td>1.98</td>
<td>.124</td>
<td>.073</td>
<td>.06</td>
</tr>
<tr>
<td>I am just trying to forget about it.</td>
<td>1.72</td>
<td>.450</td>
<td>.31</td>
<td>.57</td>
</tr>
<tr>
<td>I will try to calm myself down.</td>
<td>1.32</td>
<td>.460</td>
<td>.10</td>
<td>.53</td>
</tr>
<tr>
<td>I am trying to see the good side of things.</td>
<td>1.33</td>
<td>.470</td>
<td>.09</td>
<td>.51</td>
</tr>
<tr>
<td>I will try to think about something else.</td>
<td>1.48</td>
<td>.494</td>
<td>.15</td>
<td>.48</td>
</tr>
<tr>
<td>I am thinking of other things.</td>
<td>1.44</td>
<td>.495</td>
<td>-.10</td>
<td>.39</td>
</tr>
<tr>
<td>I will ask the dentist what the dentist is doing.</td>
<td>1.72</td>
<td>.443</td>
<td>.01</td>
<td>.33</td>
</tr>
<tr>
<td>I am asking my mom or dad questions about my dental health.</td>
<td>1.77</td>
<td>.419</td>
<td>.01</td>
<td>.31</td>
</tr>
<tr>
<td>I will think about the good reasons to come to the dentist.</td>
<td>1.19</td>
<td>.389</td>
<td>-.15</td>
<td>.24</td>
</tr>
<tr>
<td>I will do what the dentist tells me to.</td>
<td>1.03</td>
<td>.174</td>
<td>-.13</td>
<td>.21</td>
</tr>
<tr>
<td>I blame myself for needing to come to the dentist.</td>
<td>1.85</td>
<td>.356</td>
<td>.07</td>
<td>.11</td>
</tr>
<tr>
<td>I will keep quiet about my thoughts about the dentist.</td>
<td>1.34</td>
<td>.469</td>
<td>.08</td>
<td>.09</td>
</tr>
</tbody>
</table>

<sup>a</sup> = Avoidant Factor  <sup>b</sup> = Approach Factor

Table 7

*Means, Standard Deviations, and Factor Loadings of the COPE scale*

<table>
<thead>
<tr>
<th>Items</th>
<th>M</th>
<th>SD</th>
<th>1&lt;sup&gt;a&lt;/sup&gt;</th>
<th>2&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>I learn something from the experience.</td>
<td>2.78</td>
<td>1.02</td>
<td>.81</td>
<td>.01</td>
</tr>
<tr>
<td>I look for something good in what is happening.</td>
<td>2.74</td>
<td>.920</td>
<td>.80</td>
<td>.04</td>
</tr>
<tr>
<td>I think about how I might best handle the problem.</td>
<td>2.88</td>
<td>1.06</td>
<td>.78</td>
<td>-.12</td>
</tr>
<tr>
<td>I try to come up with a strategy about what to do.</td>
<td>2.51</td>
<td>1.04</td>
<td>.76</td>
<td>-.01</td>
</tr>
<tr>
<td>I think hard about what steps to take.</td>
<td>2.48</td>
<td>1.00</td>
<td>.75</td>
<td>.11</td>
</tr>
<tr>
<td>I talk to someone to find out more about the situation.</td>
<td>2.54</td>
<td>1.07</td>
<td>.74</td>
<td>.15</td>
</tr>
<tr>
<td>I ask people who have had similar experiences what they did.</td>
<td>2.62</td>
<td>1.03</td>
<td>.73</td>
<td>.15</td>
</tr>
<tr>
<td>I focus on dealing with this problem, and if necessary let other things slide a little.</td>
<td>1.36</td>
<td>.670</td>
<td>.72</td>
<td>.21</td>
</tr>
<tr>
<td>I talk to someone who could do something concrete about the problem.</td>
<td>2.50</td>
<td>1.15</td>
<td>.72</td>
<td>.21</td>
</tr>
<tr>
<td>I try to get emotional support from friends or relatives.</td>
<td>2.17</td>
<td>1.04</td>
<td>.71</td>
<td>.23</td>
</tr>
<tr>
<td>I try to see it in a different light, to make it seem more positive.</td>
<td>2.74</td>
<td>.92</td>
<td>.69</td>
<td>.07</td>
</tr>
</tbody>
</table>
Table 7 (cont.)

<table>
<thead>
<tr>
<th>Behavior</th>
<th>M</th>
<th>SD</th>
<th>a</th>
<th>b</th>
</tr>
</thead>
<tbody>
<tr>
<td>I make a plan of action.</td>
<td>2.51</td>
<td>1.06</td>
<td>.69</td>
<td>.23</td>
</tr>
<tr>
<td>I talk to someone about how I feel.</td>
<td>2.18</td>
<td>1.00</td>
<td>.69</td>
<td>.21</td>
</tr>
<tr>
<td>I let my feelings out.</td>
<td>2.27</td>
<td>1.00</td>
<td>.69</td>
<td>.32</td>
</tr>
<tr>
<td>I accept the reality of the fact that it happened.</td>
<td>2.87</td>
<td>1.04</td>
<td>.67</td>
<td>-.11</td>
</tr>
<tr>
<td>I take additional action to try to get rid of the problem.</td>
<td>2.36</td>
<td>1.00</td>
<td>.66</td>
<td>.05</td>
</tr>
<tr>
<td>I try hard to prevent other things from interfering with my efforts at dealing with this.</td>
<td>2.30</td>
<td>.928</td>
<td>.66</td>
<td>.27</td>
</tr>
<tr>
<td>I try to find comfort in my religion.</td>
<td>2.49</td>
<td>1.22</td>
<td>.63</td>
<td>.21</td>
</tr>
<tr>
<td>I discuss my feelings with someone.</td>
<td>2.21</td>
<td>1.04</td>
<td>.63</td>
<td>.10</td>
</tr>
<tr>
<td>I put aside other activities in order to concentrate on this.</td>
<td>1.87</td>
<td>.828</td>
<td>.62</td>
<td>.21</td>
</tr>
<tr>
<td>I get sympathy and understanding from someone.</td>
<td>1.95</td>
<td>.943</td>
<td>.62</td>
<td>.14</td>
</tr>
<tr>
<td>I do what has to be done, one step at a time.</td>
<td>2.96</td>
<td>.911</td>
<td>.61</td>
<td>-.19</td>
</tr>
<tr>
<td>I seek God's help.</td>
<td>2.52</td>
<td>1.20</td>
<td>.59</td>
<td>.18</td>
</tr>
<tr>
<td>I concentrate my efforts on doing something about it.</td>
<td>2.58</td>
<td>1.02</td>
<td>.59</td>
<td>.13</td>
</tr>
<tr>
<td>I take direct action to get around the problem.</td>
<td>2.26</td>
<td>1.05</td>
<td>.57</td>
<td>.23</td>
</tr>
<tr>
<td>I put my trust in God.</td>
<td>3.02</td>
<td>1.15</td>
<td>.56</td>
<td>.11</td>
</tr>
<tr>
<td>I laugh about the situation.</td>
<td>2.43</td>
<td>1.00</td>
<td>.55</td>
<td>.32</td>
</tr>
<tr>
<td>I pray more than usual.</td>
<td>2.27</td>
<td>1.24</td>
<td>.55</td>
<td>.36</td>
</tr>
<tr>
<td>I make jokes about it.</td>
<td>2.21</td>
<td>.958</td>
<td>.55</td>
<td>.21</td>
</tr>
<tr>
<td>I kid around about it.</td>
<td>2.13</td>
<td>.928</td>
<td>.55</td>
<td>.21</td>
</tr>
<tr>
<td>I force myself to wait for the right time to do something.</td>
<td>2.18</td>
<td>.893</td>
<td>.54</td>
<td>.34</td>
</tr>
<tr>
<td>I make sure not to make matters worse by acting too soon.</td>
<td>2.22</td>
<td>.958</td>
<td>.54</td>
<td>.13</td>
</tr>
<tr>
<td>I turn to work or other substitute activities to take my mind off things.</td>
<td>2.49</td>
<td>1.12</td>
<td>.54</td>
<td>.17</td>
</tr>
<tr>
<td>I learn to live with it.</td>
<td>2.37</td>
<td>.912</td>
<td>.53</td>
<td>.21</td>
</tr>
<tr>
<td>I keep myself from getting distracted by other thoughts or activities.</td>
<td>2.21</td>
<td>.906</td>
<td>.52</td>
<td>.10</td>
</tr>
<tr>
<td>I get used to the idea that it happened.</td>
<td>2.38</td>
<td>1.02</td>
<td>.50</td>
<td>-.06</td>
</tr>
<tr>
<td>I accept that this has happened and that it can't be changed.</td>
<td>2.60</td>
<td>1.00</td>
<td>.50</td>
<td>.08</td>
</tr>
<tr>
<td>I try to grow as a person as a result of the experience.</td>
<td>2.53</td>
<td>1.12</td>
<td>.49</td>
<td>.23</td>
</tr>
<tr>
<td>I try to get advice from someone about what to do.</td>
<td>2.20</td>
<td>1.07</td>
<td>.46</td>
<td>.24</td>
</tr>
<tr>
<td>I make fun of the situation.</td>
<td>2.10</td>
<td>1.01</td>
<td>.45</td>
<td>.36</td>
</tr>
<tr>
<td>I hold off doing anything about it until the situation permits.</td>
<td>2.30</td>
<td>.914</td>
<td>.45</td>
<td>.22</td>
</tr>
<tr>
<td>I restrain myself from doing anything too quickly.</td>
<td>2.18</td>
<td>.894</td>
<td>.35</td>
<td>.14</td>
</tr>
<tr>
<td>I pretend that it hasn't really happened.</td>
<td>1.29</td>
<td>.570</td>
<td>.11</td>
<td>.70</td>
</tr>
<tr>
<td>I go to movies or watch TV, to think about it less.</td>
<td>1.83</td>
<td>.903</td>
<td>.24</td>
<td>.60</td>
</tr>
<tr>
<td>I sleep more than usual.</td>
<td>1.36</td>
<td>.670</td>
<td>.03</td>
<td>.58</td>
</tr>
<tr>
<td>I admit to myself that I can't deal with it, and quit trying.</td>
<td>2.18</td>
<td>.829</td>
<td>-.07</td>
<td>.57</td>
</tr>
<tr>
<td>I give up the attempt to get what I want.</td>
<td>1.45</td>
<td>.701</td>
<td>.34</td>
<td>.40</td>
</tr>
</tbody>
</table>

a = Approach Factor  b = Avoidant Factor
Hypothesis Testing

First, each hypothesis addressing the demographic variables (Hypothesis One) was examined. No significant differences emerged for gender or age for any of the dependent variables. In evaluating the relationship of previous dental experiences with dental anxiety and pain, no significant differences were found for pain perception; however, youth whose parents reported previous negative dental experiences reported significantly higher levels of dental anxiety on the CFSS, \( t(2, 126) = 2.44, p < .05 \). For type of appointment, significant differences emerged for pain perception \([t(2, 33) = 2.34, p < .05]\), but no significant differences were found for dental anxiety or type of coping. See Table 8 for means, standard deviations, and effect sizes for the differences in the dental experience group (i.e. negative vs. positive/neutral) on dental anxiety and appointment type (i.e. routine vs. invasive) on pain perception.

Table 8

*Means, Standard Deviations, T values, and Effect Size for Youth Dental Anxiety & Pain Perception*

<table>
<thead>
<tr>
<th>Variables</th>
<th>M</th>
<th>SD</th>
<th>t</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Youth Dental Anxiety</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative Dental Experience</td>
<td>31.02</td>
<td>10.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive/Neutral Dental Experiences</td>
<td>25.54</td>
<td>9.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain Perception</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teeth Cleaning Appointment</td>
<td>1.22</td>
<td>0.48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restorative Appointment</td>
<td>1.50</td>
<td>0.53</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < .05

As planned, analyses also were conducted, utilizing the intra-class correlation coefficient method, for Hypotheses Two (i.e., parent and child dental anxiety) and Three (i.e., parent and child coping). No significant relationship was found between parent dental anxiety as measured by the DAS and child dental anxiety as measured by the
CFSS (Hypothesis Two). A small, negative relationship emerged between parent avoidant coping, as measured by the COPE, and child approach coping, as measured by the MDCS ($\alpha = -0.29, p < .05$); however, no other significant relationships were found for parent and child coping (Hypothesis 3). Additionally, independent samples t-tests were conducted to examine mean differences in dental anxiety, psychological functioning, pain perception, and coping for youth whose parents were present in the treatment room compared to those whose parents were not in the treatment room during the appointment. Significant difference emerged for dental anxiety [$t(2, 53) = 2.59, p < .05, d = .58$] and approach coping [$t(2, 126) = -2.10, p < .05, d = .40$]. More specifically, youth whose parents were present during the appointment reported higher dental anxiety and less approach coping than youth’s whose parents were not present during the appointment.

Next, to investigate Hypothesis Four, which stated youth’s dental anxiety and psychological symptoms would be positively related, the intra-class coefficient method was implemented. Scores on the CFSS were correlated with scores on the SDQ. As predicted, the youth’s perception of their dental anxiety was positively related to their parents’ perception of their psychological symptoms ($\alpha = .40, p < .01$).

To examine Hypothesis Five, which predicted that youth’s dental anxiety and pain perception would be positively related, the intra-class coefficient method was used by correlating scores on the CFSS with scores on the VAS. Results supported the prediction that the relationship between the youth’s dental anxiety and pain perception was positive and significant ($\alpha = .33, p < .05$).

To examine the expectation that youths’ coping style would be related to his or her psychological functioning and dental anxiety (Hypothesis Six), correlations were
conducted using the intra-class coefficient method. More specifically, it was predicted that avoidant coping would be positively related to dental anxiety and positively related to psychological symptoms. Additionally, it was expected that approach coping would be negatively related to psychological symptoms and negatively related to dental anxiety. Scores on the Avoidant and Approach Subscales of the MDCS were correlated with scores on the SDQ and CFSS. Results partially supported the above predictions. As predicted, approach coping was negatively related to dental anxiety, $\alpha = -.36, p < .01$. Unexpectedly, avoidant coping was also significantly negatively related to dental anxiety, $\alpha = -.34, p < .05$. No significant relationships were found between youth coping style and youth psychological symptoms.

In evaluating the prediction that youth’s coping style will be related to his or her pain perception (Hypothesis Seven), intra-class coefficient correlations were conducted. Scores on the Avoidant Coping Scale of the MDCS and the Approach Coping Scale of the MDCS were correlated with scores on the VAS. Results supported the prediction in that approach coping was negatively related to pain perception ($\alpha = -.26, p < .05$). However, no significant relationship emerged between pain perception and avoidant coping.

Based on the findings stated above, regression analyses were conducted to evaluate possible predictors of pain perception as well as possible moderating and mediating relationships. Results from regression analyses found that dental anxiety is a significant predictor for pain perception; more specifically, dental anxiety accounted for 4.2% of the variance in pain $[F(1, 126) = 5.55, p < .05]$. Using regression analyses and calculating orthogonalized two-way interaction variables, no significant moderators emerged. In
addition to assessing for possible moderators, analyses were also completed to assess for mediators involved in the prediction of pain perception. Specifically, approach coping was evaluated as a possible mediator between dental anxiety and pain perception. Results were not significant for mediation. See Figure 2 for the correlations between dental anxiety, approach coping, and pain perception, the Sobel z-value, and the standardized coefficient of dental anxiety on pain perception. See Table 9 for B, SE B, and β values. Additionally, psychological functioning was evaluated as a possible mediator between dental anxiety and pain perception. Results indicated that youths’ psychological symptoms were mediating (i.e. full mediation) the relationship between dental anxiety and pain perception. See Figure 3 for the correlations between dental anxiety, psychological symptoms, and pain perception, the Sobel z-value, and the standardized coefficient of dental anxiety on pain perception. See Table 10 for B, SE B, and β values.

Table 9
*Summary of Hierarchical Regression Analysis for Dental Anxiety and Approach Coping to Predict Pain Perception*

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach Coping</td>
<td>-.06</td>
<td>.02</td>
<td>-.21*</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach Coping</td>
<td>-.04</td>
<td>.03</td>
<td>-.15</td>
</tr>
<tr>
<td>Dental Anxiety</td>
<td>.01</td>
<td>.01</td>
<td>.15</td>
</tr>
</tbody>
</table>

* p < .001
Table 10

**Summary of Hierarchical Regression Analysis for Dental Anxiety and Psychological Functioning to Predict Pain Perception**

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychological Functioning</td>
<td>.03</td>
<td>.01</td>
<td>.26*</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychological Functioning</td>
<td>.02</td>
<td>.01</td>
<td>.22*</td>
</tr>
<tr>
<td>Dental Anxiety</td>
<td>.01</td>
<td>.01</td>
<td>.15</td>
</tr>
</tbody>
</table>

* p < .001

![Figure 4](image)

*Figure 4. Approach coping as a mediator between dental anxiety and pain perception*
Figure 5. Psychological symptoms as a mediator between dental anxiety and pain perception.

<table>
<thead>
<tr>
<th>Type of Mediation</th>
<th>Full</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sobel z-value</td>
<td>2.437453 significance .014791</td>
</tr>
<tr>
<td>Standardized coefficient of Dental Anxiety on Pain Perception</td>
<td></td>
</tr>
<tr>
<td>Direct:</td>
<td>.150</td>
</tr>
<tr>
<td>Indirect:</td>
<td>.055</td>
</tr>
</tbody>
</table>

- **Independent Variable:** Dental Anxiety
- **Mediating Variable:** Psychological Symptoms
- **Outcome Variable:** Pain Perception
Chapter 5

Discussion

The purpose of the current study was to examine relationships among dental anxiety, psychological functioning, coping, and pain perception in child and adolescent dental patients. Additionally, the study investigated the relationship between youth and parents’ anxiety and coping style specific to a dental appointment. Finally, the current research examined the factor structures of an existing adult coping measure (COPE) and a newly modified child coping measure (MCDS).

Dental Anxiety, Psychological Functioning, and Pain Perception

As predicted, findings from the current study demonstrate a positive relationship between dental anxiety and psychological symptoms. These findings support and extend those of Locker et al. (2001), in which 75% of people categorized as highly dentally anxious met criteria for at least one psychological disorder. Unlike the current study, Locker and colleagues (2001) assessed young adults and limited their comparisons to individuals with high dental anxiety. The current study adds to prior findings by examining younger patients (i.e., youth ages 9-15) in a population in which the majority had sub-clinical levels of psychological symptoms as well as dental anxiety. The important conclusions that can be drawn by combining results from Locker et al.’s study and the current study are two-fold. First, there is a positive relationship between dental anxiety and psychological symptoms for both youth and adults. It is possible that youth
who have higher dental anxiety and psychological symptoms are more likely to develop clinical symptoms as adults; future research can help explore this relationship to further determine the importance of intervening in childhood. Second, the relationship between dental anxiety and psychological functioning exists at both clinical and sub-clinical levels. One reason this finding is important is that it is possible that dental anxiety and psychological symptoms may worsen over time. Thus, professionals might be able to identify and treat dental anxiety or psychological symptoms in their beginning stages, thus preventing the development of worsening symptoms. Previous research indicates that dental fears persist overtime (Locker et al.); thus, these fears are best treated in childhood. Additionally, even though symptoms were found to be sub-clinical in the majority of patients in the current study, it is possible that these symptoms are still distressing to the patient. Future research might help to determine at what point dental anxiety makes the patient’s experience at the dental office more negative or at what point it interferes with dental treatment. Further, by examining a population in which dental anxiety and psychological functioning are mostly sub-clinical, results are easier to generalize across the population. Thus, it is expected that the current findings can be applied across a number of dental patients.

As expected, the current study also found that youth dental anxiety was positively related to pain perception. Findings are consistent with conclusions by Blount and colleagues (2003) stating that anxiety and pain during medical procedures are related. Rather than examining medical procedures as a whole as Blount et al. did, the current study focused specifically on dental procedures, which allows more specific application of results to dental procedures. Further, current results add to Humphris and colleagues’
(1991) research on dental anxiety and pain. These researchers found that both dental anxiety and pain perception were higher before the dental appointment than after the completed appointment; however, while Humphris et al. concluded that there was likely a relationship between anxiety and pain, the researchers did not evaluate the relationship between pain and anxiety directly. Current results suggest that pain perception might have decreased in Humphris et al.’s sample because dental anxiety had decreased. Further, current results are consistent with Versloot et al.’s (2004) results that pain perception is related to dental anxiety. However, Versloot et al. only examined the relationship between perception of past pain to current anxiety. Hence, the current study extends the results finding a relationship between pain perception and dental anxiety at a single appointment. Thus, overall, results suggest that anxiety might be a key factor to address when attempting to lower pain perception in youth during dental appointments and improve youths’ experiences during dental procedures.

Dental Anxiety, Coping, and Pain

Previous research has indicated that children can use specific coping skills to reduce distress when facing a medical stressor (Harbeck-Weber et al., 2003). The hypothesis that youth’s coping style would be related to his or her dental anxiety was partially supported. While it was expected that avoidant coping would be positively related to dental anxiety, avoidant coping was actually negatively related. As Power (2004) explained, previous research is mixed regarding the efficacy of avoidant coping. It is possible that if a child is not thinking about his or her dental appointment before the appointment begins, his or her anticipatory dental anxiety will be lower. Results from the current study do not examine the relationship of avoidant coping during the dental
appointment; it is possible that avoidant coping might be effective before the appointment, but not during the appointment. Even though avoidant coping might be considered effective before the appointment, research in other medical populations indicates that avoidant coping has other negative outcomes. For example, researchers have found that avoidant coping is related to worse psychological functioning, lower child quality of life, and lower parent quality of life in children diagnosed with asthma (Marsac, Funk, & Nelson, in press). Thus, since avoidant coping is only effective before the stressor (i.e., dental procedure) and is associated with other poor outcomes, it is recommended that professionals teach other coping techniques to reduce distress related to medical procedures. As predicted, approach coping was negatively related to dental anxiety. This finding is consistent with Weinstein and colleagues’ (2003) study results that indicated that teaching an approach coping technique (i.e., talking about dental fears and notifying the dentist if the child felt pain) decreased dental anxiety. However, Weinstein et al. did not measure approach coping directly. Rather, researchers examined the children’s perceived control of the dental situation. Thus, the results from the current study provide support for their conclusions by providing an additional explanation as to why their intervention was successful; while teaching children to have more perceived control, children also learned how to utilize approach coping. More specifically, children learned how to directly address the dental stressor by talking about their dental fears and letting the dentist know if they started to have a problem during the procedure. Hence, current result suggest that approach coping should be considered as a possible influential variable when implementing interventions to decrease dental anxiety.
Also, as predicted, youth’s coping style was related to his or her pain perception; however, only approach coping, not avoidant coping, was related to pain perception. Current findings are consistent with previous research that has indicated that type of coping is related to a child’s experience of pain (Dahlquist & Switkin, 2003). More specifically, the current study’s results add to Blount and colleagues’ (2003) results that approach coping was related to lower pain perception before the procedure, while avoidant coping was not significantly related to lowered pain. Additionally, current results support findings by Piira et al. (2002) which found that children who engaged in more cognitive distraction (i.e., a type of approach coping) had higher pain tolerance. Thus, the children who were able to utilize a coping strategy to directly target their distress were more successful at reducing pain perception (i.e., evidenced by increased pain tolerance) than children who did not utilize such strategies. Overall, the current results and results from previous studies suggest that using approach coping can be utilized as an effective technique in reducing perception of pain in youth. By reducing pain perception, youth will likely have more pleasant experiences and be less distressed in the dental office. Youth who have better experiences at the dental office are likely to engage in better dental hygiene practices by attending more appointments and sharing concerns about their teeth with dental professionals thus improving oral health. Additionally, because dentists are medical professionals, positive attitudes about the dental office might generalize to medical offices and possibly improve compliance with overall medical care.
Mediating Variables in the Prediction of Pain Perception

Based on the initial findings, dental anxiety was examined and determined to be a significant predictor for pain perception in children and adolescents. Additionally, level of psychological symptoms was identified as a significant mediator in this relationship. Consistent with Berge and colleagues (2002c) findings, current results suggested that evaluating anticipatory dental anxiety alone may not be the best way to predict outcomes for a dental appointment. While Berge et al. (2002c) found that dental anxiety alone did not account for anxious or externalizing behaviors during the dental appointment, results from the current study concur with their findings in that dental anxiety alone is not the best predictor for pain perception. Rather, the psychological functioning is serving as a conductor of the relationship between dental anxiety and pain perception. Thus, taking into consideration both dental anxiety and psychological symptoms better explains the predictive relationship between dental anxiety and pain perception. In addressing the role of psychological symptoms, it is possible that as symptoms increase, youth become less able to deal with their dental anxiety. Thus, more psychological symptoms channel the relationship between dental anxiety and pain perception. The significance of psychological symptoms as a mediator suggests that targeting dental anxiety independently would not produce the best results for decreasing pain perception during dental procedures. Instead, dental anxiety as well as psychological symptoms should be considered in attempting to reduce pain at the dental office. Future research can help to determine which specific symptoms should be targeted (e.g., anxiety, depression, oppositional, etc.)
Additional Factors Affecting Youth Dental Anxiety and Pain Perception

Type of procedure, previous negative dental experiences, and parental presence were taken into consideration in project design and analyses. The current study, like Townend (2000), found that youth whose parents reported a negative dental experience at a previous appointment reported higher levels of dental anxiety. While dental anxiety seemed either to develop or to persist after a negative experience, higher perception of pain did not. This is consistent with Kent’s (1985) findings that the memories of dental pain, or in this case negative dental experiences in general, might not be related to actual experience of pain during the appointment. The current study assessed dental anxiety prior to the appointment and pain perception after the appointment; thus, it is possible that youth are feeling better following the appointment and reported lower levels of pain. More specifically, when youth completed the appointment, there were no additional worries or future pain for them to be concerned about. Instead, the completion of the appointment signified the end of the dental visit. If youth are feeling relieved at the completion of the appointment, they might respond in a more positive manner, therefore reporting lower levels of pain. Following Kent’s results, current findings might have differed if expected pain was assessed prior to the appointment rather than actual pain following the appointment for the patients who had previous negative dental experiences. It is possible that dental anxiety would also decrease following the appointment for those who had negative dental experiences. However, because current results suggest that dental anxiety and negative dental experience are related, reducing dental anxiety will likely improve the youth’s experience during dental care.
As expected, youth who had more invasive procedures reported higher levels of pain; however, there were no differences in type of coping or dental anxiety between patients encountering routine appointments and those encountering more invasive procedures (e.g., fillings for cavities, extractions). This suggests that the procedure itself might not play a large role in a youth’s perceptions about the dentist. Instead, the perception of their experience in at the dentist office is more likely to contribute to the development of dental anxiety. More specifically, if a patient views their dental experiences as negative, they are more likely to become anxious when facing future dental appointments. Thus, in meeting with new patients and beginning treatment planning, dentists should possibly consider previous dental experiences more than new procedures in preparing youth for upcoming appointments.

Another factor that can modify children’s experiences during a dental appointment is whether or not their parent is in the operatory room during the procedure. Unlike results from Kotsanos et al. (2005), which found that use of parental presence can increase cooperative behavior in the dental office, the current study found that parental presence was associated with two negative outcomes: higher dental anxiety and lower use of approach coping. However, the studies differed in that Kotasanos et al. evaluated behavior (i.e., measured by observers) while the current study evaluated self-reported anxiety and coping (i.e., reported by youth). One possible explanation for current study results is that parents whose children were already more anxious tended to stay with them throughout the duration of the appointment; on the other hand, it is possible that parental presence increased the child’s anxiety through modeling their own anxiety. While one would assume that parents would aide in increasing approach coping when the child is
distressed, this was not the case. Instead of utilizing coping themselves, youth could have been depending on their parent for comfort and not addressed the stressor directly themselves or parents could have been interfering with the child’s coping techniques. Additionally, it is possible that parents were facilitating an avoidant coping technique because youth used their parents to distance themselves from the stressor rather than dealing with their distress directly. Hence, results suggest that dental and clinical professionals should be aware that parental presence might not always be beneficial to youth during dental appointments.

In examining the relationship between youth’s and parents’ dental anxiety previous research has provided mixed results (Baier et al., 2004; Berge et al., 2002a; Krain & Kendall, 2000; Milgrom et al., 1995; Townend et al., 2000). Results of the current study are consistent with Baier et al. and Krain and Kendall in that no significant relationship between parent and youth anxiety was identified. Unlike most previous studies that used either parent self-report of dental anxiety and parent report of youth anxiety or child report of both their own and their parent’s anxiety, the current study had youth self-report their dental anxiety and parents self-report their own anxiety. This is consistent with Krain and Kendall’s research design and findings. Thus, one of the reasons a significant relationship did not emerge between parent and child anxiety could be the difference in the reporters. Additionally, children completed their measure of dental anxiety immediately before a dental appointment while parents completed their dental anxiety measure before or during their child’s appointment. Thus, it is possible that parents’ dental anxiety was represented differently than it would be before their own dental appointment. In addition, most of the previous studies that found relationships
identified were of a small magnitude, suggesting that the relationships might be difficult to uncover. However, results from the current study, Baier et al., and Krain and Kendall all failed to identify a relationship between parents’ dental anxiety and youths’ dental anxiety, which raises questions as to how important parental anxiety is when working with a child’s dental anxiety.

The results involving the relationship between parent and child coping did not provide much clarity for the research question. While a small, negative relationship emerged between parent avoidant coping and child approach coping, there were no other significant relationships between parent and child coping. Thus, the current study supports previous research suggesting there is a relationship (Kliwer et al., 1996; Kotchick et al., 1996; Power, 2004), but fails to identify the exact nature of the relationship. Similar to Kliwer et al. (1996), the current results fail to clarify the relationship between parent and child coping. It remains unclear why relationships have emerged between certain coping strategies. The inverse relationship of parent avoidant coping and youth approach coping suggests the possibility that when children do not see their parents using a coping technique, as would be true with avoidant coping, children are then unable to learn effective techniques. However, the current research provides no evidence that watching their parents use approach coping improves children’s coping. Thus, the current study results again suggest that there is a relationship between parent and child coping but did not succeed in clarifying this relationship.

**Psychometric Properties of the Measure of Dental Coping Style (MDCS) and the COPE**

Results show promising psychometric properties for a new questionnaire, the Measure of Dental Coping Style (MDCS). Researchers have agreed that coping should
be considered in a situation-specific context (Schmidt et al., 2002). The MDCS measures a combination of coping before the dental appointment and anticipatory coping. One major benefit of the measure is its division of coping into two categories (i.e., approach and avoidant coping) composed of behaviors that are simple to understand and identify. Additionally, the structure supports Griffith and colleagues (2000) categorization of coping into approach and avoidant coping. Another strength of the measure also is that it was designed specifically to be used with youth and was based on another youth coping measure (i.e. Kidcope) which has been frequently used within the medical population as well as the Dental Coping Questionnaire (also developed by modifying the Kidcope) which was designed for use with child dental patients; thus, though validity of the MDCS was not assessed, some validity can be assumed due to the measure’s base in the previous measures and theoretical coping foundation. More specifically, since the Kidcope has been evaluated and has demonstrated concurrent validity (Spirito et al., 1988) and many of the items on the MDCS were modified from the Kidcope, it is likely that some degree of concurrent validity also exists for the MDCS. Additionally, the items of the MDCS are based on the theory that coping can be categorized as either avoidant or approach coping (Griffith et al., 2000); each item reflects a component of either avoidant or approach coping and demonstrates face validity. Another strength of the MDCS is that the brevity of the measure facilitates use in a dental office or clinic because its quick completion will not interrupt patient-flow. While the psychometric properties of the MDCS have not been fully established, results of the current study suggest strong internal consistency and an interpretable factor structure. Future research is recommended to confirm the reliability and validity of the new measure.
In examining the factor structure of the COPE in the current sample, a new structure emerged. Previous research has divided up the COPE into a number of different factor structures including 14 categories (Carver et al., 1989) and 3 categories (Ingledew et al., 1996; Lyne & Roger, 2000). Each of the previous structures includes some type of approach and avoidant categories; however, none have divided the items into two subscales as in the current study. The current study found that a 2-factor structure was the best fit for the measure; however, by retaining only two factors, 6 items had to be removed from the measure. Once these items were eliminated, the new 2-factor structure for the measure has strong internal consistencies and is conceptually strong across items. Further, the new subscales may facilitate coping research in simplifying the construct and making it more accessible to statistical analysis. Thus, future researchers are encouraged to examine the new factor structure and collect more data to better assess reliability and validity for the 2-factor structure COPE.

Cultural Similarities/Differences in Dental Anxiety

In reviewing the literature on dental anxiety, much of the background research on dental anxiety has been conducted in countries with widely varying cultural beliefs and medical systems (e.g., England, Netherlands, and New Zealand); it is likely that the dental procedures and offices differ greatly across countries. Therefore, it is important to consider the possible similarities and differences between the background research from other countries and the findings from the current study.

One difference in dental anxiety research in comparing other countries and current results in the United States centers on the relationship between parents’ and children’s dental anxiety. Researchers in Scotland (Townend et al., 2000) and the
Netherlands (Berge et al., 2002) both found that there is a positive relationship between parent and child dental anxiety, while researchers in the United States (Baier et al., 2004; Krain & Kendall, 2000), including the current study, did not identify this relationship. However, there was one exception for researchers in the United States: Milgrom and colleagues’ (1995) study results showed a positive relationship between parent and child dental anxiety. Thus, the question remains as to if there are possible cultural differences in the parent-child relationships in Scotland and the Netherlands as compared to the United States. However, with the research from Milgrom et al. conflicting with other results from the United States, firm conclusions cannot be drawn.

In comparing the current results in the United States to previous research in other countries, a number of similarities emerge. Before the current study there was little research on dental anxiety and overall psychological functioning in the United States. However, current results support those from Locker et al.’s (2001) research in New Zealand finding a relationship with dental anxiety and psychological symptoms. This suggests there is some similarity in psychological variables across the two countries. While research comparing pain perception during dental procedures in other countries to pain perception in the United States is not available, it is possible that the low levels of pain perception in the current study could be due to the specific procedures used in the United States as compared to other countries. However, the current results specific to coping and pain are consistent across countries. More specifically, consistent with current results, research conducted in the United Kingdom (Weinstein et al., 2003) and in Australia (Piira et al., 2002) has identified a positive relationship between the use of approach coping techniques (e.g., using cognitive distraction, telling the dentist if they
are in pain) and lower perceptions of pain in children. In addition, research from the Netherlands (Versloot et al., 2004) has found relationships between dental anxiety, coping, and pain perception which is similar to current findings that children with more dental anxiety and pain perception reported more approach coping. Specifically, Versloot et al. found that children with higher dental anxiety and self-reported pain used more coping overall. Examining the similarities and differences of the research findings on dental anxiety and dental pain across countries suggests that, for the most part, findings from other countries is comparable to the current research conducted in the United States.

**Limitations**

Several limitations of the current study need to be addressed. One significant impediment in the study’s design was that youth had limited time available to complete the measures. Because of the set-up of dental offices, youth needed to be able to complete measures quickly before their appointment, so it was important to use short measures. However, short measures restricted the amount of information that was collected. Additionally, since there were no appropriate established measures currently available, it was necessary for the researcher to modify existing questionnaires to adequately measure dental coping in children. One unique aspect of the new measure was the manner is which approach and avoidant coping factored. In some previous studies (e.g., Griffith et al., 2000; Miller et al., 1995) distraction techniques have been considered avoidant strategy because the child is not engaging in an action to change the stressor. However, in the current study, distraction techniques factored onto the approach scales. This is likely because the child is actively trying to reduce his or her distress as other approach items suggest. However, additional research should continue to assess
how the technique of distraction should be categorized in the coping literature. Similarly, a new factor-structure for the COPE emerged and was utilized in the remaining statistics. Thus, the results involving each coping measure should be interpreted with caution until additional research can be conducted using the new subscales. Another limitation involving measurement is the small range of pain that was reported on the VAS; overall, youth reported low levels of pain so this should be considered in data interpretation. One final measurement limitation is that the norms for the CFSS were based on research in the Netherlands (Berge et al., 2002b), and it is uncertain as to if the same norms can be used in the United States; however, to address this, the current study used dental anxiety as a continuous variable rather than depending on cut-off scores.

In addition to measurement limitations, the nature of the sample itself is important. Participants were predominantly European American, middle-class youth and parents, so caution should be taken in generalizing results to dissimilar populations. The offices sampled were also restricted to private dental offices which limited diversity of patient-populations and treatment techniques. Moreover, the dental offices that agreed to participate may have self-selecting biases that are unknown to the researcher. Additionally, differences in techniques that each dentist might have used to reduce youths’ anxiety in the office were not assessed.

Clinical/Community Implications

Most importantly, the study highlighted several issues including the role of dental anxiety in pain perception, the role of coping in dental anxiety and pain perception, and psychological functioning as a mediator between dental anxiety and pain perception. Previous research has found that dental fears persist over time (Gullone, 2000; Kendall &
Ollendick, 2004; Locker et al., 2001); thus, intervention during childhood could help to decrease these fears. The current study helped to determine what factors need to be targeted in order to reduce dental anxiety. This study’s results suggest that dental anxiety plays a significant role in pain perception. Hence, it is important to consider anxiety when developing interventions to reduce pain during dental procedures. However, identifying psychological functioning as a mediator between dental anxiety and pain perception suggests that treating dental anxiety alone may not best alleviate the problem. Because of the relationship between dental anxiety and psychological symptoms, dental professionals and clinicians should consider that children with high dental anxiety might also present with additional psychological symptoms. Thus, youth that have been identified as having high levels of dental anxiety might benefit from being evaluated for other significant psychological symptoms. If other symptoms are present, youths’ dental anxiety might be able to be indirectly treated by targeting other symptoms. The current study did not assess factors that dentists consider in deciding if or when to refer a patient for psychiatric treatment of anxiety. Future research can help determine if dentists have a referral process and how to improve the process if necessary.

Additionally, findings suggest that coping is an important variable in relation to dental anxiety and pain; thus, dentists and clinicians should assess and teach effective coping strategies (i.e., approach coping) when working with a child or adolescent with dental fears. More specifically, findings indicate that use of either approach or avoidant coping can help to lower youths’ dental anxiety. In addition, implementing approach coping also can lower pain perception. Present findings are consistent with Varni’s (1984) review that concluded that specific coping techniques, such as relaxation,
distraction, and self-calming, can be taught to reduce medical procedure pain. Further, current results extended Varni’s conclusions on pain reduction to apply specifically to dental procedures. Thus, programs should be developed to teach children how to best cope with dental situations may work to lower anxiety and pain. Present findings suggest that possible interventions might include teaching children to use information-gathering strategies (i.e., ask the dentist or their parents questions), to use distraction (e.g., squeezing a squishy toy during the appointment, focusing their thoughts on other activities), or to use relaxation strategies (e.g., diaphragmatic breathing, autogenic relaxation, imagery) if they become stressed or concerned about their dental appointment.

*Future Research*

Future research should assess the efficacy of programs targeted to develop effective coping (i.e., particularly aimed at increasing approach coping) to reduce anxiety and pain perception during dental procedures. As discussed previously, programs might target education about dental procedures (by teaching children to ask questions), distraction techniques, or relaxation strategies. In the office, before the appointment begins, dental professionals can create a child-friendly atmosphere by providing videos, coloring books, or toys in the waiting room. If a child engages in a pleasurable activity, then his or her anticipatory anxiety is likely to be less. During the appointment, dentists might be able to facilitate the development of child approach coping by providing them basic information about the appointment and encouraging them to ask questions. Also, offices could provide toys or pictures and direct the child’s attention to them during the appointment to help children learn distraction techniques. If a dentist feels additional intervention is necessary, he or she can refer the patient to a mental health professional.
who can work more intensely with the child on distraction techniques as well as other
effective relaxation strategies (i.e., diaphragmatic breathing, guided imagery, biofeedback
training).

Because of the relationship between dental anxiety and overall psychological
symptoms, programs might not have to be made specific dental anxiety to be effective.
Thus, programs that target an overall decrease in psychological symptoms should be
developed and evaluated for their ability to decrease dental anxiety and pain perception.
Teaching approach coping strategies might not have to be specific to dental procedures if
the child is able to apply strategies across settings or across symptoms. Future studies
should take a closer look at the relationship between dental anxiety and other
psychological symptoms to see if certain symptoms have a stronger relationship to dental
anxiety. By identifying specific symptoms, it should help to clarify exactly which
symptoms should be targeted to improve the experience in the dental office (i.e., reducing
anxiety and pain perception). Further, future research should evaluate whether or not is is
important to examine dental anxiety as a specific type of anxiety rather than examining
general anxiety overall. Also, because most current dental procedures are not inherently
painful or anxiety-provoking as they had been in the past, researchers should determine
the reason behind the persistence of dental anxiety throughout time and aim to decrease
the prevalence of dental anxiety. Additionally, future research should examine the
circumstances under which it is helpful versus hindering to have a parent present during a
dental appointment. The current study was not able to identify factors that contributed to
the negative outcomes associated with parental presence. If parents can be trained to
encourage approach coping during the appointment, their presence might be helpful in
reducing youth distress.

Further, researchers should examine findings in a broader medical context. It is likely that findings might be able to be generalized across a number of medical appointments, particularly those that are routine (e.g., visits to primary care physician or regular follow-ups in specialty care clinics). More specifically, research studies should be created to examine approach and avoidant coping to reduce pain perception. Additionally, researchers should assess the efficacy of approach and avoidant coping in reducing anxiety in the context of other medical procedures.

Summary and Conclusions

The current study identified several key findings: (1) Positive relationships exist between dental anxiety, psychological functioning, and pain perception. Thus, both dental anxiety and general psychological symptoms should be considered in treatment planning with the goal of reduced pain perception. (2) While approach coping is associated with lower anticipatory dental anxiety and lower pain perception, avoidant coping is related only to lower anticipatory anxiety but not pain perception. Hence, clinicians should focus on teaching children approach coping since it is more effective across the dental appointment. (3) Results indicated that the new dental coping measure (MDCS) has promising psychometric properties, though more research is needed. Overall, future research should continue to examine the effectiveness of specific coping styles in dental situations and should develop and evaluate programs targeted to increase approach coping to manage distress in the dental office.
References


Derogatis, L.R., & Spencer, P.M. (1982). *The Brief Symptom Inventory (BSI): Administration, scoring, and procedures manual*. (Available from Johns Hopkins University School of Medicine, 601 N. Broadway, Baltimore, MD 21205).


Appendix A

Dental Office Consent

Principal Investigators: Meghan Guthrie, M.A. (419) 530-2721
Jeanne B. Funk, Ph.D. (419) 530-4392

______________________________ agrees to allow his/her patients to participate in the
project
(Name of Dentist) entitled The Relationships among Psychological Functioning, Dental Anxiety, Pain
Perception, and Coping in Children and Adolescents, to be conducted by Meghan
Guthrie and Dr. Jeanne Funk.

We do not expect that your patients will have any problems related to completing the
forms. A possible risk in participating is that your patients may feel uncomfortable with
some of the questions that are asked on the surveys. A benefit is that we hope that this
study will help us learn more about children’s fears and experiences in dental situations.

I understand that children’s participation in the study will take up to 15 minutes prior to
the appointment and 1 minute after the appointment to complete questionnaires. I also
understand that parents of children will take approximately 25 minutes to complete
measures during the child’s appointment.

I understand that my office staff will be involved in collecting data. Specifically, the
receptionist will be asking patients to participate in the study, obtaining informed
consent, and passing and collecting the questionnaires. An assistant or a hygienist will
have the child rate their pain immediately following the appointment on the pain
thermometer.

______________________________    ____________________
Signature            Date
Appendix B

Spring/Summer 2006

Dear Parent:

We are seeking you and your child’s participation in a project being done by Meghan Guthrie and Dr. Jeanne Funk from the University of Toledo. The purpose of the project is to look at how children and parents cope with their dental experiences.

We ask that you fill out the enclosed forms and return them to the front desk receptionist before you leave the office. For parents, this should take about 20-25 minutes during the child’s appointment.

To thank you for your help, we will enter you in a drawing to win a $20 gift certificate.

We would also like your child to complete questionnaires on dental anxiety, coping, and pain. This should take about 15 minutes before the appointment and one minute after the appointment. To thank your child, we will give him or her a pack of sugarless gum or a pen and enter him or her in a drawing to win a $20 gift certificate.

We do not expect that you or your child will have any problems related to completing the forms. A possible risk in participating is that you and/or your child may feel uncomfortable with some of the questions that are asked on the surveys. A benefit is that we hope that this study will help us learn more about children’s fears and experiences in dental situations.

Each family’s information will be given a number and will be kept in a locked file. Information that identifies you or your child will be removed. Only group information will be used in any future presentation of this work.

If you decide not to complete the forms this will not change any relationship with your child’s dentist or with the University of Toledo.

For more information, contact Meghan Guthrie (419) 530-2721 or Dr. Jeanne Funk at 419 530-4392.

I agree to complete the forms for the Dental Anxiety, Coping, and Pain in Children and Adolescents study.
I agree to allow my child to complete the children’s forms.

Parent’s signature ___________________________ Date ____________

Parent’s printed name ___________________________

I agree to be contacted after the completion of the study if my child or I win the $20 gift certificate.

Parent’s signature ___________________________

Address (to send gift certificate if you win)
Appendix C

Child Consent for Research

Principal Investigators: Meghan Guthrie, M.A. (419) 530-2721
Jeanne B. Funk, Ph. D. (419) 530-4392

Description of Project: Most children go to the dentist. We need more information about children's feelings about dental experiences. That is the purpose of this study.

If you agree, we will ask you to answer questions about how you feel about and how you deal with dental visits. This should take about 15 minutes before the appointment and one minute after the appointment. Your parent is also being asked to provide some background information and information about their feelings and experiences during dental visits. You and your parent should complete your forms independently and not read each other's answers. After we receive the completed forms from you and your parents, we will give you a free pack of gum or a pen and enter you in a contest to win a $20 gift certificate to thank you.

All your answers will be kept confidential. That means that no one outside the research team will know how you answer the questions. Even your dentist will not know how you answered.

A possible risk in answering the questions is that you may feel uncomfortable with some of the questions that are asked on the surveys.

If you do not want to be part of this project, you do not have to. If you start, and decide you do not want to finish, you may stop at any time. No one will be upset with you.

I have read the description of the project about the dentist visits and I understand what I am being asked to do. I agree to complete the forms. I understand that I may stop at any time. I understand that I can call Meghan Guthrie at (419) 530-2721 or Dr. Jeanne Funk at (419) 530-4392 and any questions I may have will be answered at any time.

Printed Name                                         Child’s Signature             Date
Appendix D

**General Information**
(to be completed by the parent)

Please circle the **best** answer below.

1) **Child's Gender**
   1. Male
   2. Female

2) **Age (of child)** ______ **Grade in School** ______

3) **School Performance**
   1. Above Average
   2. Average
   3. Below Average

4) **Child’s Ethnicity**
   1. African American/Black
   2. Asian American
   3. Biracial
   4. European American/Caucasian
   5. Hispanic American
   6. Other (Specify): _______________

5) **Are you an active or participating member of a religious congregation or group**
   (e.g. church, synagogue, or mosque)?
   1. Yes
   2. No

6) **Highest grade completed by mother:**
   1. 8th or less
   2. 9th to 11th
   3. High School Graduate
   4. Some College
   5. College Graduate
   6. Graduate School or Graduate Degree
   7. Don't Know

7) **Highest grade completed by father:**
   1. 8th or less
   2. 9th to 11th
   3. High School Graduate
   4. Some College
   5. College Graduate
   6. Graduate School/Graduate Degree
   7. Don't Know

8) **Mother’s occupation** ______________

9) **Father’s occupation** ____________

10) **Relationship to child of person completing this form:**
    1. Mother
    2. Father
    3. Other (Specify): ______________

11) **Child lives with (circle all that apply):**
    1. Mother
    2. Father
    3. Stepmother
    4. Stepfather
    5. Siblings
    6. Other (Specify): ______________
12) **What is your child’s appointment for today?**
   1. Routine Cleaning
   2. Filling for Cavity
   3. Other (please specify): _______________________

13) **Will you be in the room during the dental procedure?**
   1. Yes
   2. No

14) **Has your child been to a dentist other than the one that he/she is seeing today?**
   1. Yes
   2. No

15) **How old was your child when he or she first started visiting the dentist? _____**

16) **Has your child had any negative dental experiences (example: underwent a painful procedure in which the pain was not properly managed or became overly afraid at a dental office)?**
   1. Yes
   2. No
   If so, please describe: __________________________________________________
   ______________________________________________________________________

17) **Has your child ever had to see a professional because of his or her anxiety?**
   1. Yes
   2. No

18) **How many months has it been since your child’s last dental appointment? _____**
   What was that appointment for? ___________________________________________
Appendix E

MDCS

We are trying to find out how people deal with going to the dentist. Think about how you feel today about your dental visit when you answer the questions. There are no right or wrong answers.

Are you doing this?

1. I am just trying to forget about it.  
   Yes  No

2. I am trying to convince myself it is a good idea to go to the dentist.  
   Yes  No

3. I blame myself for needing to come to the dentist.  
   Yes  No

4. I am trying to figure out the reason why I have to go to the dentist.  
   Yes  No

5. I am angry at my mom or dad.  
   Yes  No

6. I am wishing that I didn’t have to come to the dentist.  
   Yes  No

7. I think going to the dentist is good for my teeth.  
   Yes  No

8. I am keeping my thoughts to myself.  
   Yes  No

9. I am not doing anything because I can’t do anything about going to the dentist.  
   Yes  No

10. I am wishing that I could make things different.  
    Yes  No

11. I am thinking of other things.  
    Yes  No

12. I am blaming someone else for needing to come to the dentist.  
    Yes  No

13. I am asking my mom or dad questions about my dental visit.  
    Yes  No
Appendix E (continued)

Now think about what you will do while you are sitting in the dental chair during your appointment.

<table>
<thead>
<tr>
<th>Will you do this?</th>
<th>1. I will try to think about something else.</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. I will ask the dentist what the dentist is doing.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>3. I will keep quiet about my thoughts about the dentist.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>4. I will be angry at the dentist.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>5. I will yell, scream, or get mad.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>6. I will try to calm myself down.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>7. I will do what the dentist tells me to.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>8. I will think about the good reasons to come to the dentist.</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Appendix F

Pain Thermometer

WORST Pain Ever
5

A LOT of Pain
4

Medium Amount of Pain
3

A Little Pain
2

No Pain
1
Appendix G

Strengths and Difficulties Questionnaire

For each item, please mark the box for Not True, Somewhat True or Certainly True. It would help us if you answered all items as best you can even if you are not absolutely certain. Please give your answers on the basis of your child's behavior over the last six months.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Not True</th>
<th>Somewhat True</th>
<th>Certainly True</th>
</tr>
</thead>
<tbody>
<tr>
<td>Considerate of other people's feelings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restless, overactive, cannot stay still for long</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Often complains of headaches, stomachaches or sickness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shares readily with other children, for example toys, treats, pencils</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Often loses temper</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rather solitary, prefers to play alone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generally well behaved, usually does what adults request</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Many worries or often seems worried</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Helpful if someone is hurt, upset or feeling ill</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constantly fidgeting or squirming</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has at least one good friend</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Often fights with other children or bullies them</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Often unhappy, depressed or tearful</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generally liked by other children</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easily distracted, concentration wanders</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nervous or clingy in new situations, easy loses confidence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kind to younger children</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Often lies or cheats</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Picked on or bullied by other children</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Often offers to help others (parents, teachers, other children)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thinks things out before acting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steals from home, school or elsewhere</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gets along better with adults than with other children</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Many fears, easily scared</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good attention span, sees chores or homework through to the end</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>