Pediatric and General Dentists' Behaviors and Attitudes Towards Adolescent Oral Health Care Issues

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THESIS

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LIST OF ABBREVIATIONS

AAPD	American Academy of Pediatric Dentistry
AN	Anorexia Nervosa
ANOVA	Analysis of Variance
GD	General Dentists
HPV	Human Papilloma Virus
ISDS	Illinois State Dental Society
ISPD	Illinois Society of Pediatric Dentists
IRB	Institutional Review Board
PD	Pediatric Dentists
SD	Standard Deviation
STD	Sexually Transmitted Diseases

Summary

Both pediatric and general dentists are responsible for treating adolescent patients. Over the last decade, the American Academy of Pediatric Dentistry has developed guidelines to address issues unique to adolescence. Limited research has been done in regards to pediatric and general dentists' behaviors and attitudes towards adolescent oral health care issues.

In this study fourteen topics of adolescent oral health care were explored. Issues requiring more tact, care, and caution during treatment were considered "more sensitive" issues. "More sensitive" issues included: tobacco use, alcohol and drug abuse, oral cancer, pregnancy, sexually transmitted diseases, oral piercings, and eating disorders. "Less sensitive" issues included: oral hygiene, dental caries, nutritional habits, dental sealants, orthodontic treatment, mouthguards, and teeth whitening. This study gathered information on pediatric and general dentists screening practices for these topics as well as comfort levels and views on relevance to practice. A questionnaire was sent to pediatric dentists and general dentists practicing in the state of Illinois.

Overall, pediatric dentists address more issues of adolescent oral health care than general dentists, especially the "less sensitive" topics of adolescent oral health care. Both pediatric and general dentists address the "more sensitive" topics of adolescent oral health care much less often than the "less sensitive" topics. For the "less sensitive" topics, the dentist's view on relevance to practice was more predictive for increased screening levels. For the more sensitive topics, the dentist's comfort level was more predictive for increased screening levels.

1. INTRODUCTION

1.1 Background Information

Adolescent patients are often treated by both pediatric dentists and general dentists. These patients present with oral health care needs common to all age groups, including oral hygiene, dental sealants, and caries prevention. They also present with more sensitive issues as they transition to adulthood. These more sensitive issues include risks of oral cancer, smoking, teenage pregnancy, sexually transmitted disease, alcohol and drug abuse, oral piercings, and abnormal eating habits.(AAPD, 2010) Over the last decade the American Academy of Pediatric Dentistry has revised the guidelines for adolescent oral health care to address these unique oral health care topics of adolescence. Because adolescence is the age of transition of care between pediatric dentists and general dentists, both groups of providers should be comfortable with addressing these adolescent issues. Furthermore adolescent patients are more likely to see a dental provider than a pediatrician, emphasizing the importance of dental providers' abilities to address adolescent oral health care issues. (Vann, 2005)

Currently pediatric dentistry residency programs often focus on infants and young children. During training, pediatric dental residents may not often treat adolescent patients. The general dentists' education also may not have been supplemented with training in adolescent oral health care needs, especially the more sensitive issues. Therefore both pediatric dentists and general dentists may have a lack of comfort and familiarity in addressing adolescent oral health care needs.

In 2011, a research study about parental attitudes towards topics of adolescent oral health care was conducted by Dr. Rosa Ortega at UIC College of Dentistry. In her study parents reported that dentists were less likely to address more sensitive topics of adolescent oral health

care than less sensitive topics.(Ortega, 2011) Ortega also found that parents were comfortable with dentists addressing both sensitive and non-sensitive topics of adolescent oral health care.

At present, there are a limited number of studies that report on pediatric dentists' and general dentists' practices involving adolescents. Surveys that do exist focus on individual topics for adolescent patients, including caries detection, oral hygiene instruction, orthodontic treatment, and tobacco control.(Sarmadi, 2011; Yee, 2008) There are no published studies that review dentists' practice behaviors and make comparisons among the less sensitive and more sensitive topics of adolescent oral health care.

1.2 Purpose of the Study

The primary aim of this study is to gather information on pediatric dentists and general dentists' behaviors and attitudes regarding topics of adolescent oral health care in the state of Illinois. The second aim is to assess their behaviors, comfort levels, and attitudes towards these topics.

1.3 Hypotheses

1. Pediatric dentists are more likely than general dentists to address adolescent oral health care issues in practice.
2. Both pediatric dentists and general dentists are less likely to discuss "more sensitive" issues of adolescent health care with their patients than "less sensitive" issues.

   "More sensitive" topics include: tobacco use, pregnancy, oral cancer, sexually transmitted diseases, alcohol and drug abuse, oral piercings, and eating disorders.

"Less sensitive" topics include: oral hygiene, dental caries, nutritional habits and caries, orthodontic treatment, mouth guards, and teeth whitening.

3. The more training the dentist has received in regards to Adolescent Oral Health Care the more likely the dentist is to address adolescent oral health care issues.
4. The more comfortable the dentist is with a topic and the more relevant the dentist views a topic of adolescent oral health care, the more often the dentist will discuss the topic with adolescent patients.

2. REVIEW OF LITERATURE

2.1 Behaviors and Attitudes of General Dentists and Pediatric Dentists

Almost three quarters of adolescents see a dental provider each year for routine dental preventive care. (Albert, 2006) Although adolescent patients are seen by both pediatric and general dentists, few studies compare dentists' behaviors and attitudes towards topics unique to adolescence.

Pediatric and general dentists' behaviors and attitudes for treatment and prevention of caries in younger children have been described in the literature. Overall, general practitioners who do treat children often treat older children including adolescents and do not see very young children under the age of five. (Barker, 2012; Shulman, 2008) Those general practitioners who do treat very young children received more training for this in dental school. (Seale, 2003) For adolescent patients, similarities do exist between pediatric and general dentists as far as diagnostic, preventative, and corrective care. (Cooke, 2001; Kuin, 2012) Indeed, in regards to preventative treatments, diagnostics, and corrective care, pediatric and general dentists have shown no significant difference in care pattern for older age groups, ages twelve to seventeen years old. (Schorer-Jensma, 2010) Few studies are available exploring dentists' behaviors and attitudes regarding adolescent oral health care topics unique to adolescence.

2.2 Adolescent Oral Health Care Topics

2.2.1 Oral Hygiene and Caries

Adolescence is both a time period of increased caries risk and of developing oral hygiene habits. (AAPD, 2010) If oral hygiene habits have not been well-established in early childhood,

adolescence becomes a particularly vulnerable time period for the risk of caries. Good oral hygiene habits, including the use of fluoride toothpaste established early in childhood at the ages of 3 to 6 years old, significantly reduce caries in adolescence. (Alm, 2008 and 2012) The parents of adolescents also play a role. The mother's self-estimation of her own oral health care is particularly important, with a mother's low self-esteem about her own oral health associated with increased caries in adolescence. (Alm, 2012) This is in accordance with a study in Norway, which reported that the tooth brushing and flossing habits of parents and their adolescent offspring are significantly associated. (Astrom, 1996) It is evident that oral hygiene habits are transferred from parent to child and that parents provide an important model for their children.

Dentists and dental hygienists are aware of the importance of oral hygiene. In a retrospective study of dental records of high caries risk children and adolescents in Sweden, the primary modes of preventative treatment were oral hygiene information, tooth brushing instruction, and fluoride treatment provided at the clinic. (Sarmadi, 2011) Studies are beginning to investigate different models for providing oral hygiene instruction to adolescents. One study in Lithuania found that in the short term, an authoritative parenting model based intervention is more effective than conventional dental education at reducing plaque levels in adolescence. (Brukiene, 2012) At 12 months however no difference in oral hygiene trends was observed. The dental provider must be aware of the particular need for establishing and maintaining good oral hygiene habits in adolescence and understand that the parent also plays a role.

2.2.2 Nutritional Habits and Caries

Another factor in the high caries risk of adolescence is nutrition, as adolescence can be a time of high carbohydrate consumption and intake of acid containing beverages. In the 2011 Youth Survey of Risky Behaviors, one in five adolescents reports drinking at least two sodas per day and one in ten reports drinking three sodas or more per day. (Eaton, 2012) Soft drink consumption and snacking is associated with higher rates of approximal caries as well as cervical caries. (Alm, 2008 and 2012; Cheng, 2009) This is understandable since soft drinks contain acids and sugars that are both acidogenic and cariogenic. As Moynihan explains, a wealth of evidence shows that when free sugar intake by a population is low, dental caries levels are low. The term "free sugars" refers to all mono and disaccharides added to foods by manufacturer, cook or consumer, plus sugars naturally present in honey, fruit juices and syrups. (Moynihan, 2004)

There has been considerable debate if obesity is related to dental caries, since diets high in carbohydrates and sugars are related to both obesity and dental caries. One study found that controlling for other covariates, no significant association between BMI-for-age and dental caries in primary or permanent dentition was found. (Macek, 2006) While in a study of Swedish children, overweight and obese adolescents had more approximal caries than normal-weight adolescents. (Alm, 2008) In a systematic review of literature relating obesity to dental caries, no conclusions were able to be made. (Kantovitz, 2006)

Dentists should be aware of the relationship between nutritional habits and caries. Dentists should be able to provide information on what types of foods and sugars are less cariogenic and acidogenic. For instance, epidemiological studies show that consumption of starchy staple foods and fresh fruit are associated with low levels of dental caries. (Moynihan,

2006) While research continues into the relationship of obesity and dental caries, the dentist can be sensitive to providing nutritional counseling especially since adolescence can be a time of poor nutrition and high soft drink consumption.

2.2.3 Mouthguards and Sports Injury

Children are most susceptible to sports-related oral injury at the beginning of adolescence, between the ages of 7 and 11 years old.(AAPD, 2008) The majority of sport-related dental and orofacial injuries affect the upper lip, maxilla, and maxillary incisors, with 50-90% of dental injuries involving the maxillary incisors. The use of mouthguards to prevent sports injury has been established as a good anticipatory measure to prevent injury. Custom fabricated mouthguards provide the greatest protection and comfort. (Newsome, 2001) Also, they have been shown to significantly decrease the magnitude of lateral luxation on individual teeth in animal studies. (Johnston, 1996) If a custom fabricated mouth guard is not available, the mouth-formed guards, also known as "Boil-and-bite", are preferable to stock mouthguards. It is important to understand that even with a mouthguard in place, up to 25% of dentoalveolar injuries still can occur. (AAPD, 2008)

Despite the potential benefits of mouthguards, usage in sports has been low. In a study in Ontario, mouthguard use was very low in both school and league sports and the largest proportion of those who wore mouth protection used generic products rather than custom-fitted mouthguards. Lack of parental or coaching advice on mouthguard usage and peer beliefs about esthetics and function were the main reasons for noncompliance. (Fakhruddin, 2007)

Convincing athletes, parents and coaches on the use of mouthguards has been met with barriers. As recently as 1998, one third of Arizona coaches in high risk sports such as baseball,

softball, basketball and wrestling, would not recommend mouthguards even if they were provided free of charge.(Berg, 1998) Even when parents are educated on the benefits of mouthguards, mouthguard use does not necessarily correlate. In a survey of parents of children who play competitive youth soccer, 92% of parents believed mouthguards prevent injury and 50% thought mouthguards should be mandatory. Of these same parents, only 14% stated that their child wore a mouthguard during soccer. (Pribble, 2004) In a survey of adolescent athletes, awareness of the importance of mouthguards did not mean its usage by the athletes, except by hockey players. (Ferrari, 2002)

Even when mouthguards are provided free of charge, compliance remains a major barrier. In a study of 80 children aged 9-17 years old, custom fitted mouthguards were made. After one year, two thirds of the children still possessed the guard, but one third of the children never wore it, one third wore it sometimes, and only one fifth wore it whenever it was needed. The main reasons for not wearing the mouthguard were because it is uncomfortable or they forgot it. Also, 40% of parents said they would not invest in the appliance in the future because the child would not wear it. (Matalon, 2008)

Dentists should be aware of the increased risk for dental injury, especially when patients are involved with high risks sports, such as football, basketball, hockey, baseball, and soccer, both for girls and boys. The dentist should be comfortable with providing anticipatory guidance on the usage of a mouthguard and the different types of mouthguards available. Dentists must continue to work with coaches, parents, and adolescent athletes to understand the benefits of mouthguards and increase their usage during sports activities.

2.2.4 Orthodontic Treatment

Adolescence is a time period when individuals become more self-conscious of their appearance and smile. It is also the time period when most orthodontic treatment is rendered. Even before adolescence, some patients satisfied with their own smiles would like to have braces. In a study of Michigan pre-adolescents, 8-11 years old, 90% of pre-adolescent children had positive views of their own smile, while half of these children also stated they would like to have braces. (Christopherson, 2009) Pediatric dentists and general dentists must be prepared to answer patients and parents' concerns about esthetics and orthodontics. Often it is the parent's concerns that are more motivating than the patient's concerns. In a survey of German parents and adolescent patients at 11 and 15 years old, the main motivating factor for orthodontic treatment was esthetic concerns. Parents' concerns and attitudes towards braces were more significant than the patient's concerns at age 11. (Birkeland, 1999)

Depending on the extent of orthodontic treatment needed and the severity of the case, general dentists and pediatric dentists can refer to an orthodontist specialist or treat the patient themselves. Indeed many general dentists and pediatric dentists are providing limited orthodontic treatment. (Aldawood, 2011; Hilgers, 2003; Wolsky, 1996) In the 1990's, as many as 20% of Michigan general dentists provided comprehensive orthodontic treatment.(Wolsky, 1996) Pediatric dentists are more likely to provide orthodontic treatment when they receive more CE hours of training in orthodontics. (Galbreath, 2006) Pediatric dentists are also likely to provide orthodontic treatment in the primary or early mixed dentitions, treating anterior crossbite, ectopic eruption, habits, posterior crossbite, and space maintenance issues. (Hilgers, 2004) When general dentists refer to an orthodontic specialist, the most important factors

governing their choice of an orthodontic treatment provider were patient satisfaction, favorable experience in the past, and oral hygiene monitoring by the orthodontist. (de Bondt, 2010)

Fortunately, there is agreement between different providers on when treatment is needed. In a western Pennsylvania study, general dentists, pediatric dentists, and orthodontists agreed when orthodontic treatment was indicated.(Berk, 2002) Agreement among providers can be increased with standardized training. In a study of fourth year dental students at Ohio State University, dental students receiving training with the Index of Orthodontic Treatment Need showed more treatment planning agreement with a panel of orthodontists than dental students receiving no training or sham training. (Bentele, 2002) Parents report equal satisfaction with orthodontic treatment by pediatric dentists and orthodontists. (Mascarenhas, 2005) While pediatric dentists treat younger patients than orthodontists, orthodontists are more likely to extract primary teeth than pediatric dentists. (Mascarenhas, 2005)

Dentists treating adolescent patients must be prepared to recognize the need for orthodontic treatment, to discuss esthetics and orthodontic expectations with both parents and patients, and to refer to an orthodontist when necessary. Pediatric dentists are more likely to recognize and address orthodontic needs at an earlier age in the primary and mixed dentitions, yet should also be conscious of the different orthodontic needs of their adolescent patients.

2.2.5 Esthetics and Teeth Whitening

Similar to the esthetic motivation for orthodontics, teeth whitening is also of concern for adolescent patients. As social media and advertisements market teeth whitening products, dentists must be familiar with teeth whitening options, both at home and in office. In a professional dental market that includes veneers and porcelain crowns, teeth bleaching should be

considered the least expensive, least invasive, and the starting point of addressing patients and parents' concerns with dental esthetics. (Ahmad, 2010)

Peroxide containing whiteners or bleaching agents are used to improve the teeth's intrinsic color. Carbamide Peroxide (10%-38%) is the ingredient most often used in dentist-dispensed home-use bleaching products. Carbamide peroxide is a good compromise to hydrogen peroxide because it releases hydrogen peroxide at a lower rate and at lower concentration, still providing satisfying esthetic results. Dentists should be cautious in the concentration of whitener prescribed, as young dentin is more permeable than older dentin, and it has been shown that hydrogen peroxide diffuses at higher concentrations through younger dentin. (Camps, 2007) The most common side effects of dental bleaching are tooth sensitivity and soft tissue irritation, which are usually temporary and reversible after treatment stops. Due to the concern of the hydroxyl free radical and the potential side effects of dental bleaching, minimizing exposure at the lowest effective concentration of hydrogen peroxide or carbamide peroxide is recommended by the AAPD. (AAPD, 2008)

There are many different modalities of teeth bleaching available. Full arch options include in office application with or without the use of a light source, custom tray fabrication and at home application over several weeks, as well as whitening strips bought over the counter, with these modes each showing varying degrees of improved tooth color. (Donly, 2005; Almeida, 2012) In cases of dental trauma and non-vital teeth, single tooth bleaching techniques can include power bleaching, inside-outside bleaching technique, and a walking bleaching technique. (Leith, 2009; Plotino, 2008) These teeth must be carefully monitored for external root resorption and ankylosis as potential side effects. In cases of moderate flourosis, enamel microabrasion

followed with 6% hydrochloric acid associated with silica carbide and followed by in office bleaching has been shown to be another option for treatment. (Pontes, 2012)

Dentists must be aware of the potential for abuse with whitening products and the adolescent patient. Children as young as ten years old have been reported to wear tooth whitener strips on their way to school. (Lee, 2005) In the worst case scenario, improper use of whiteners by one adolescent and one adult patient resulted in permanent enamel disintegration and pitting. (Lee, 2005) When whiteners are being used at home, the dentist has less control over the amount of whitening product applied. Risks and benefits of use and overuse of products should be explained to both the adolescent patient and the parent as part of a consent process.

In addition to teeth bleaching, dentists must be aware of more invasive esthetic dental treatments including composite veneers, porcelain veneers, and even full coverage crowns. The dentist must treat each patient on a case by case basis, being cautious in what treatment is provided, especially considering that adolescents bone structure and gingival architecture are continuing to grow and change. Also, during adolescence, both the patients and parents may present with psychological and body dysmorphic disorders which may result in unrealistic expectations and demands for esthetic dental treatments. (Ahmad, 2010)

Dentists treating adolescent patients must be well versed in esthetic dentistry and teeth bleaching. Communication with both parents and patients regarding risks, benefits, and expectations for any esthetic treatments must be thorough. Finally, while teeth bleaching can be performed during permanent dentition, the AAPD discourages teeth bleaching during the mixed dentition stage. (AAPD, 2008)

2.2.6 Tobacco Prevention and Cessation

Tobacco use has many established health risks including chronic respiratory problems and increased incidence of cancers. In terms of oral health, smoking tobacco is associated with oral cancer, periodontal disease, increased rates of caries, gingival recession and halitosis. (Warnakulasuriya, 2010) Since most tobacco use begins during adolescence, the dentist must be concerned with the tobacco habits of the adolescent patient.

Adolescents are particularly vulnerable to addiction, with symptoms of addiction to nicotine beginning within days to weeks of occasional cigarette use. (DiFranza, 2000) Unfortunately, adolescents continue to experiment with cigarettes. In the 2011 Youth Survey of Risky Behaviors, 44.7% of high school students had ever smoked a cigarette and 10% had smoked a cigarette before age 13. (Eaton 2012) For many adolescents smoking is already an established habit. Of the high school students surveyed, 10% smoked at least one cigarette daily and 23.4% of students had reported current cigarette, smokeless tobacco, or cigar use in the last thirty days. (Eaton, 2012) Risk factors associated with tobacco use include parents who smoke, friends who smoke (90% of young smokers indicate that a close friend smokes), co-morbid psychiatric disorders such as ADHD, and weight concerns. (Albert, 2006)

Since the 1990's, the dental community has been interested in the dentists' role in tobacco cessation. In a review of tobacco cessation programs in dental offices, it was concluded that dentists who implement an effective smoking cessation program including screening, counseling, and pharmacologic intervention, can expect 10-15% quit rates among adult patients. (Warnakulasuriya 2002) It must be emphasized that one intervention is seldom enough to evoke change. An emphasis must be placed on repeated screening and intervention in order to help tobacco smokers overcome their addiction. (Mecklenburg, 2001; Walsh, 2005)

The vulnerability of the adolescent patient to smoking addiction creates a need for both tobacco cessation and prevention programs among adolescent patients. The standard in-office intervention program consists of the 5 A's of quitting, "Ask, Advise, Assess, Assist, Arrange." For adolescents this program can be modified to include anticipatory guidance for prevention at the dental visit. (Albert, 2006) The dentist has the opportunity to provide information to adolescents on the effects of tobacco use on the oral cavity, including increased rates of oral cancer and periodontal disease. The dental provider should be asking and documenting tobacco use of every adolescent and their parents at every visit. This process can take as few to three minutes at the dental visit. (Albert, 2006; Kast, 2008)

An early study in 1996 of adolescent tobacco intervention practices in orthodontists' offices, found no statistical difference in smoking cessation rates after two years between orthodontist practices who implemented smoking intervention practices and those that did not. (Hovel, 1996) However, this early study did not follow the more recent recommendations emphasizing the 5 A's of quitting and anticipatory guidance. The study emphasized a standard "prescription" for all adolescent patients that included a strong anti-tobacco message and a place for the patient to sign. The study also noted that only 64% of the experimental group offices consistently followed the screening and intervention protocols. More studies are needed on the effectiveness of tobacco intervention among adolescent patients in dental offices.

Dental providers are aware of their responsibility to the adolescent patient and smoking intervention but are not reliably providing intervention. In a study of Saudi Arabia general dentists, two thirds felt it their responsibility to aid in smoking prevention and cessation among adolescent patients.(Wyne, 2006) Two thirds also did not feel confident in providing counseling and almost half thought their counseling efforts would be ineffective. The study did not report

on the general dentists actual practices in providing tobacco counseling. In a study of general dentists in Colorado, only 38% of dentists and 44% of hygienists did report counseling children ages 8-12 years old on tobacco use prevention. (Kast, 2008) Factors increasing dentists counseling practices included perceiving tobacco use in children as a problem, effectiveness of counseling, and perceived role of dental practitioner in counseling children. The main barrier among dentists was lack of skills.

Compared to general dentists, pediatric dentists are more aware of their responsibilities. In 2001, while pediatric dentists agreed tobacco intervention was important with their young patients, most felt uncomfortable with this task. The more training they had received the more confident they were to provide counseling, but only 18% reported receiving training with tobacco intervention. (Shenkin, 2003) In a 2008 study of AAPD members, a majority of pediatric dentists view adolescent tobacco counseling and cessation as part of their practice responsibilities. (Yee, 2008) Yet most do not have tobacco cessation programs implemented as part of daily practice routines. As many as 85% have positive viewpoints about the pediatric dentist's role in tobacco intervention, meanwhile only 19% screen all adolescent patients for tobacco use.

Adolescent tobacco use is one of the more studied topics in adolescent oral health care. It can be concluded that among general dentists and pediatric dentists, both groups are aware of their responsibilities to intervene in tobacco use among adolescent patients, both groups are not providing adequate screening and counseling, and barriers include confidence and training.

2.2.7 Alcohol and Drug Abuse

Alcohol and drug use is common among adolescents. According to the Youth Risky Behavior survey, 70.8% of high school students had ever drank alcohol, 20.5% drink before age 13, 38.7% drink on a regular bases, and 21.9% reported binge drinking (5 or more drinks at one time) in the previous 30 days. (Eaton, 2012) In a national survey of adults and adolescents from 12 to 65 years old, the prevalence of alcohol abuse was highest among respondents aged 18-23 years, followed by respondents aged 12-17 years. (Harford, 2005).

For illicit drug use, the data for prevalence among adolescents is more complex. 39.9% of students reported ever having smoked marijuana, 23.1% reported current marijuana use in previous 30 days, 6.8% ever having used cocaine, 3.0% had used cocaine in the previous 30 days, 8.2% had ever used ecstasy, 2.9% heroin, 3.8% methamphetamines, and 8.7% hallucinogenic drugs. (Eaton, 2012) Also of concern is that 20.7% of high school students had used prescription drugs without a prescription, including Oxycontin, Percocet, Vicodin, Codeine, Adderall, Ritalin, or Xanax. (Eaton, 2012)

The dental provider must be aware of oral manifestations of both alcohol and drug abuse in the adolescent patient. The AAPD includes alcohol and drug use in the potential psychosocial factors that affect adolescent oral health.(AAPD, 2010) An increased risk of dental disease can be related to any of the following: lack of an adequate diet; dry mouth induced by drugs, tobacco, alcohol, and medications; poor oral hygiene; increased acidity in the oral cavity from drug intake, gastrointestinal regurgitation, and vomiting; drug-associated impaired smell and taste sensation leading to use of heavily sweetened foods; and high sugar content of medications. (da Fonseca, 2009) Furthermore, the dentist should suspect any patient or parent who actively seeks pain medications not consistent with the dental complaint. (da

Fonseca, 2009) Indeed, it has been suggested that at each recall visit the dentist ask the adolescent patient about their attitudes towards alcohol and drugs and whether the patient has ever used alcohol or drugs. (da Fonseca, 2009)

Routine screening for alcohol use is low among general dentists; at most 50% of general dentists screen for alcohol use.(Cruz, 2005) No reports have been made on pediatric dentists practices. In a focus group of general dentists in Scotland, significant barriers to having discussions about alcohol with patients were the dentists' own lack of knowledge and confidence in discussing alcohol abuse. (Shepherd, 2010) It is likely that pediatric dentists also lack knowledge and confidence in discussing alcohol abuse with adolescent patients.

One potential barrier to counseling is that the patient will be resistant to the dentist providing alcohol counseling. In focus groups, general practitioners in the Scotland study were concerned that discussions of alcohol with patients would cause a disruption in the patient-clinician relationship. (Shepherd, 2010) However, in a study of American adult patients, the patients were open and receptive to alcohol screening. Alcohol use was high with 1 in 4 patients found to be heavy alcohol users; a majority of patients stated they would be accepting of their dentist screening for alcohol use; and most patients regardless of how much alcohol they drank were accepting of the dentist providing advice on alcohol use and its relation to oral cancer. (Miller, 2006). Understanding that patients are open and receptive to alcohol screening should give the clinician more confidence in approaching the topic with patients.

2.2.8 Oral Cancer

Each year approximately 30,000 people in the United States are diagnosed with oral cancer. (McDowell, 2006) The two main risk factors are tobacco use and heavy alcohol use,

accounting for 75% of oral cancers in the United States. (Silverman, 2001) Only half of those diagnosed with oral cancer will survive more than 5 years and for those that due survive there is a high morbidity with aggressive cancer treatments. (McDowell, 2006) Oral cancer most often occurs in those older than 45 years of age with a mean age of onset in the 7th decade of life. (Silverman, 2001, McDowell, 2006) However there is a recent increase in oral cancer among younger persons in their 20s and 30s.(Silverman, 2001, McDowell, 2006).

The most current evidence based recommendations from the American Dental Association stress the need for a thorough visual and tactile oral cancer screening exam on all dental patients, especially those who report tobacco and heavy alcohol use. (Rethman, 2012) While providers report screening for oral cancer in older patients, the quality of these exams may be inadequate. Most general dentists report performing oral cancer screening examinations for patients older than 45 years, with screening rates ranging from 80-92% (Applebaum, 2009; Cruz, 2005). The quality of these exams and the dentists' confidence in detecting oral cancer during an exam is not necessarily high. In a study of North Carolina dentists, only 30% had medium to high knowledge scores in oral cancer risk factors and diagnostic aids in detecting oral cancer. (Patton, 2005) In a study of Scottish dentists, while 58% reported regularly screening patients >16 years, 63% felt less than confident in detecting oral cancer and only 43% felt confident discussing suspicious findings with patients. (McCann, 2000)

While dentists may be performing less than adequate oral cancer screening exams, dentists are definitely neither trained nor prepared to provide preventative counseling for oral cancer. In a study of New York dental providers, while 80% screened for oral cancer in patients older than forty years, only half of the providers routinely screened for tobacco and alcohol use and a majority did not assist patients in developing plans to quit. (Cruz, 2005). In a survey of

dentists in the United Kingdom, over half of respondents did not routinely inquire about tobacco or alcohol use. (Warnakulasariva, 1999) Among Massachussets dentists, only 24% of dentists felt they were adequately trained to provide tobacco counseling and 12% felt they were adequately trained to provide alcohol counseling. (Applebaum, 2009) In the study of New York dentals providers, 12% of dentists reported consistently providing tobacco counseling and only 2% reported alcohol abuse counseling. (Cruz, 2005) In the study of Scottish dentists, 3% reported any tobacco or alcohol counseling. (McCann, 2000)

While dentists know that tobacco use and alcohol use are the main risk factors for oral cancer, they are not providing the necessary counseling and preventative services needed for primary prevention of oral cancer. Given adolescents use of tobacco and alcohol, adolescence is a potential time for anticipatory guidance and counseling to prevent habits that lead to oral cancer later in life.

2.2.9 Sexually Transmitted Diseases

Sexually transmitted diseases have a wide range of effects on the oral cavity, ranging from dry mouth to oral cancer. Human Immunodeficiency Virus is known to have oral manifestations as the disease progresses, including candidiasis, dry mouth, oral ulcerations, oral lymphomas, and Kaposi's sarcoma. The human papilloma virus is known to cause more benign oral lesions including squamous papillomas and verruca vulgaris. Recently, HPV has been shown to cause cancer in mucosal surfaces including the uterine cervix, vulva, vagina, anus, and penis and dental researchers are beginning to recognize HPV as a potential co-factor in oral cancer. (McDowell, 2006)

While studies on HPV and oral cancer are continuing, there is a strong association between tonsillar squamous cell carcinoma and oral cancer at the base of the tongue with HPV. (Liang, 2008; Cleveland, 2011) In British Columbia, rates of oropharyngeal cancer have surpassed rates of oral cavity cancer in men. (Auluck, 2010) Furthermore, that while oral cancer rates are declining in older populations, they are becoming more common in younger generations, especially among females ages 15-34 years old. (Bleyer, 2009) Researchers hypothesize these oral cancer trends may be related to HPV and other sexually transmitted diseases and increasing trends of orogenital sexual practices. (Auluck, 2010; Bleyer, 2009; DesMarteau, 2009) The dental provider must be aware of sexually transmitted diseases and their potential impact on the oral cavity.

Adolescents are sexually active. According to the Youth Risky Behavior Survey, 47.4% of adolescents had ever had sexual intercourse, 6.2% had sexual intercourse before age 13, and 15.3% had sexual intercourse with four or more partners. (Eaton, 2012) In 2000, half of the 19 million sexually transmitted infections in the United States occurred in the 15-24 year old age group. (Dempsey, 2010) These studies do not report specifically on the oral sex behaviors of adolescents. Yet, realizing that sexual activity begins in adolescence and that sexually transmitted disease manifest in the oral cavity with potentially malignant outcomes, STDs becomes another topic that the dental provider must be familiar with. According to the American Academy of Pediatric Dentistry guidelines, oral manifestations of venereal disease are a consideration for the dental provider team. (AAPD, 2010) There are no studies on dental providers' behavior in screening for STDs or discussing potential consequences of STDs among adult or adolescent patients.

2.2.10 Pregnancy

Pregnancy during adolescence is a complex topic for the pediatric and general dentist to consider. The AAPD first issued a guideline on pregnant adolescent patients in 2007 and extensively reviewed this guideline in 2012. (AAPD, 2012) Pregnancy itself presents issues of pregnancy gingivitis and periodontitis, exposure to dental radiographs, exposure to nitrous oxide, use of aspirin, NSAIDs, erythromycin, tetracycline, and timing of dental treatment in different trimesters. Adolescent pregnancy presents issues such as parental consent including differing state laws determining minors' rights to confidentiality. Also, early adolescent pregnancies in mothers 11-15 years old are at higher risk for medical complications including low birth weight babies and higher maternal mortality.(AAPD, 2012)

The dental provider must recognize that adolescent pregnancy does occur. In 2009, a total of 409,840 infants were born to 15-19 year olds. (Hamilton, 2010) According to the Youth Risky Behavior survey, adolescents are sexually active and some are using birth control measures. Of the 33.7% sexually active adolescents, 60.2% use condoms and only 12.9% had not used any method to prevent pregnancy.(Eaton, 2012) Of those adolescents that become pregnant, 50% of pregnancies occur within the first 6 months of sexual activity.(Haffner, 1995) Despite teen pregnancy rates decreasing for the last two decades in the United States, the United States still has the highest rate of teenage pregnancy of developed nations. (Lavin, 2012)

There are few current studies of dentists' behaviors and attitudes towards pregnancy in the adolescent patient. One study which surveyed pregnant minority adolescents on their dental knowledge and behavior found that minority adolescents had limited knowledge of oral health and pregnancy and limited dental visits. (Fadavi, 2009) In this same study, some of the pregnant adolescents even reported that medical doctors and dentists had encouraged them to delay dental

visits until after pregnancy. This reported finding is contrary to studies of dentists' attitudes towards adult pregnant patients. Most dentists and obstetricians agree that dental treatment should be part of prenatal care for adults. (Huebner, 2009; Strafford, 2008) These studies found that the greatest differences between pregnancy guidelines and dentists' behaviors towards adult pregnant patients were regarding timing of full mouth radiographs, providing nitrous oxide, administering long acting anesthetic injections, and recommending long term over the counter pain medications. (Huebner, 2009; Strafford, 2008) Due to the recent update of the AAPD guidelines on adolescent pregnancy in 2012, it is likely that most pediatric dentists and general dentists are not familiar with adolescent pregnancy guidelines and would benefit from more education on this topic.

2.2.11 Oral Piercings

Intraoral and perioral piercings are becoming more popular with the most common sites being the tongue and lip. In a study of university students, 16% of women and 4% of men reported having a tongue piercing and less than 2% of the students had lip piercing. (Mayers, 2002) The medical complications of body piercings include local trauma, bleeding, and bacterial infection. (Mayers, 2002)

Case report studies in the dental literature have shown that oral piercings have traumatic effects on the gingival and mucosal structures. In a case report of 5 patients ages 19-25 years old, piercings were in the lip and tongue. All patients had mucogingival defects in the areas of the piercings with three patients had probing depths between 5-8 mm. (Brooks, 2003) In a case report of a 16 year old patient with a lip and tongue piercing, severe gingival recession was noted on the mandibular incisors and chronic inflammation around the lip piercing. (Dibart, 2002) In a

case report of a 26 year old female with multiple lip and tongue piercings, moderate generalized gingival recession was noted on the mandibular incisors.(Er, 2000) These case studies demonstrate the more severe gingival complications of oral piercings.

In a South African cross sectional study, 250 patients ranging in age from 13 to 35 years old with oral piercings were given a survey and a dental exam. More than half of patients were not aware of any complications from oral piercings. (Oberholzer, 2010) On visual examination by two dental providers, the most common intraoral effect was chipped teeth (34%). However, the dental examiners did not use a periodontal probe to measure probing depths nor were radiographs taken and the incidence of mucogingival and periodontal defects was likely under reported in this study.

As intraoral and perioral piercings become more common, the dentist must be responsible for counseling patients on the risks and side effects of oral piercings. Sensitivity and care should be taken when explaining the effects of oral piercings and the patient's own autonomy must be respected. In the Dibart and Er case reports, both patients were informed of the severe mucogingival defects caused by the oral piercings and neither patient complied with the dentists' advice to remove the oral piercing. Given that most patients with oral piercings are unaware of their potential complications (Oberholzer, 2010), the dentist still must take an active role in providing information about oral piercings for the adolescent and adult patient. There are currently no studies on dentists' behaviors or attitudes towards counseling for oral piercings.

Similar to oral piercings, a new trend among adolescents is the wearing of metal grills. A grill is a gold, platinum, or other metal and often jewel-encrusted encasement for the dentition. It is placed over existing teeth and made based on an impression of the teeth. They can be bought at jewelry stores and are popular in child, adolescent, and adult populations. In a case report of a

16 year old from Alabama, new rampant caries of the anterior dentition was noted on a recall exam in a previously caries free dentition. (Hollowell, 2007) The main change in oral behavior was that the patient had recently purchased a grill from a neighborhood jewelry store and was wearing it regularly. Pediatric dentists and dentists treating adolescents should be aware of the use of grills and their possible effects on oral health.

2.2.12 Eating Disorders

According to the Diagnostic Systems Manual IV, eating disorders can be classified as Anorexia Nervosa, Bulimia Nervosa, and Eating Disorder Not Otherwise Specified. (Smink, 2012) There is considerable overlap among the disorders and a patient may have symptoms of different disorders at different times in their life. Key features of anorexia nervosa are refusal to maintain a healthy bodyweight, body weight that is 85% or less of normal body weight, and loss of menstrual cycles in females. Patients with bulimia nervosa have regular episodes of overeating and loss of control, called bingeing. This is followed by self-induced vomiting or use of laxatives to avoid gaining weight, called purging. Eating Disorders Not Otherwise Specified is a heterogeneous, not well defined group of eating disorders and includes partial syndromes of anorexia nervosa, bulimia nervosa, purging disorder and binge eating disorder. (Smink, 2012)

The prevalence of eating disorders in the population is difficult to estimate because the disorders are relatively rare, patients are likely to underreport symptoms, and practitioners are likely to under diagnose. Conservative estimates are that bulimia is present in 1-2% of the population and anorexia nervosa is present in 0.5-1% of the population. (Hudson 2007, Swanson, 2011) The prevalence of behaviors leading to eating disorders is more widespread. According to the Youth Risky Behavior Survey, 12.2% of adolescents had not eaten for 24 hours in the

previous 30 days in order to lose weight, 5.1% had taken diet pills without a doctor's advice, and 4.3% had vomited or taken laxatives to lose weight. (Eaton, 2012) Furthermore, eating disorders are dangerous. The highest mortality rate of any mental health disorder occurs with advanced stages of anorexia. Over a 10 year period, 5.1% of persons with anorexia will die and 1 in 5 of these persons will have committed suicide. (Smink, 2012) While more common in females, eating disorders also occur in males. Overwhelmingly, adolescence is the time of greatest risk for onset of anorexia nervosa and bulimia nervosa. (Striegel-Moore, 2007)

Eating disorders including anorexia nervosa and bulimia nervosa have side effects that can be recognized by the dentist. After an extensive review of case reports and cohort studies, Bretz concluded the oral side effects of bulimia include enamel erosion, dental caries, dental pain, orthodontic abnormalities, xerostomia, reduced saliva secretion, parotid enlargement and dysphagia. (Bretz, 2002) The most frequent finding in case-control studies of patients with bulimia was the presence of erosion or pathological wear on tooth surfaces. (Bretz 2002)

Dental providers do not possess sufficient knowledge about eating disorders. In a study of dental providers knowledge about eating disorders, most dentists and hygienists correctly identified dental erosion as a characteristic of anorexia nervosa and bulimia nervosa.(DeBate, 2005) However, providers had low scores for physical cues of anorexia nervosa and bulimia nervosa as well as low scores on oral cues for eating disorders. Providers did not recognize that most patients with AN have normal weight and loss of weight occurs in late stages of AN. Providers did not recognize that patients with bulimia nervosa are likely to be normal weight or 10 lbs overweight. Providers did not recognize thinning hair, Russell's finger, arrhythmia, parotid gland enlargement and dysfunction are other physical cues of eating disorders. (DeBate, 2005) There are no current studies of providers screening practices regarding eating disorders.

While dental providers can play a role in identifying late stage oral signs of eating disorders, more efforts should be made in exploring anticipatory guidance for eating disorders during adolescence. Bretz notes that diagnosis at the state of dental erosion and dental caries is a diagnosis made too late, and more efforts are needed to implement interceptive and preventive strategies at earlier times. (Bretz 2002) A dentist who is comfortable discussing eating habits with adolescent patients could also develop skills in discussing unhealthy eating habits and consequences of bingeing and purging with these same patients.

Besides the classical eating disorders of anorexia and bulimia, another consideration for the pediatric and general dentist is childhood obesity. Childhood obesity and adult obesity is a rapidly growing problem. Since the 1970s obesity has doubled for children ages 2-5, doubled for adolescents ages 12-19, and tripled for children ages 6-11. (Vann, 2005) Childhood obesity is defined as a body mass index for age and sex greater than the 95^{th} percentile; a BMI for age and sex of 85^{th} to 95^{th} percentile is considered overweight and at risk for obesity in children; an underweight BMI is less than 5% for children and adolescents.(Tseng, 2010) As part of dental practice, taking a height, weight, and calculating BMI on a growth chart can be a simple yet bold part for a dental practice that treats children and adolescents.(Vann, 2005) The parent and patient can be informed of the patient's BMI and advised of follow-up that may be needed with a pediatrician or nutritionist. Currently pediatric dentists are not comfortable calculating BMI or discussing weight issues with parents.(Tseng, 2010)

2.3 Sensitive Adolescent Health Care Issues

2.3.1. Definition of "Sensitive" Issues

The term "sensitive" issues has been used in the medical literature to describe adolescent health care topics including sexual intercourse, pregnancy, depression, anxiety, and alcohol and drug abuse.(Veit, 1996; Ford, 1997; Roche, 2002; Yeo, 2005; Thomas, 2012; Tsai, 2013) As defined in the Merriam Webster dictionary, the term "sensitive" can be understood as, "calling for tact, care, or caution in treatment." (Merriam Webster, 2013) In this study, "sensitive" issues for dental professionals have been defined as those which necessitate more tact, care, and caution in treatment. For dentists, these topics are also those that may not be immediately associated with the mouth yet still ultimately do carry implications for overall oral health. For dentists therefore, "more sensitive" topics include: tobacco use, pregnancy, oral cancer, sexually transmitted diseases, alcohol and drug abuse, oral piercings, and eating disorders. "Less sensitive" topics include: oral hygiene, dental caries, nutritional habits and caries, orthodontic treatment, mouth guards, and teeth whitening.

2.3.2. Screening for Sensitive Adolescent Health Care Issues in Medicine

In the medical literature, issues of adolescent health care, especially sensitive issues, have been gathering attention for the past twenty years. "Sensitive" issues in adolescent health care include STDs, pregnancy, drug and alcohol abuse, depression, and anxiety. In medical offices, there is a trend for under-screening of more sensitive and higher risk issues. (Yeo, 2005) Also known barriers to treatment are lack of knowledge of adolescents, lack of training for providers, and embarrassment discussing sensitive issues.(Veit, 1996) Non-screening of sensitive issues has been related to worker discomfort in asking sensitive questions and/or managing client

distress. (Roche, 2002; Thomas, 2012) More sensitive issues including depression, anxiety, and substance abuse are most often undiagnosed and untreated. (Yeo, 2005)

In the general health care field, screening of adolescent health issues results in positive outcomes and is accepted by patients and parents. (Yeo, 2005; Thomas, 2012) In one cross sectional study of adolescents, when screening occurred, it facilitated opportunities for education and intervention with at-risk clients. (Thomas, 2012) In the same study, despite concerns of under-reporting, screening was positively received by clients. Dr. Rosa Ortega of UIC found the same acceptance of screening for sensitive topics of adolescent oral health care in her study of parental attitudes towards adolescent oral health care topics. (Ortega, 2011)

The screening practices of dentists in relation to adolescent health care issues, both sensitive and non-sensitive, have not been well-studied. Currently, the dentists most likely to treat the overall oral health of adolescent patients are both pediatric dentists and general dentists. There is not a dental specialty involving adolescent oral health care, as has been developed in adolescent medicine. Indeed, when evaluating treatment of adolescent patients in a hospital setting, patients in adolescent medicine units receive the most thorough and complete screening. (Yeo, 2005) In dentistry, pediatric and general dentists have the responsibility of caring for adolescent patients. The hypotheses developed in this study will gather information on pediatric and general dentists screening for adolescent oral health care issues, their levels of training, and their levels of comfort and views on relevance to practice.

2.4 Methodology of Assessing Pediatric Providers' Screening Practices

There are limited studies on pediatric dentists' practices in regards to adolescent oral health care issues. To develop a method of assessing dentists' practices, a literature review of all

pediatric providers' practices was conducted. The review included a Pubmed search using the following terms: pediatric providers, adolescents, and practice. Of one hundred and forty one articles, abstracts were reviewed and eleven were chosen that specifically assessed pediatric health care providers' practices with respect to adolescent health care. The methodology of each study was examined.

The most common method used to understand providers' practices regarding adolescent health care issues were cross sectional surveys of pediatric providers' self-reported behaviors. (Barlow, 2002; Torkko, 2000; Rausch JC, 2011; Williams, 2004; Ellen, 1998; Lochrie, 2009) Four of these were sent by letter mail, two by email, and one by interviewing practitioners. These cross sectional surveys had overall good response rates but have the disadvantage of providers' ability to recall self-behavior.

The second most common was provider reports of screening practices versus patient and parent reports of screening practices.(Ozer, 2004; Brown, 2008; Guevera, 2007) In a study screening for adolescent risky behaviors, provider reports and patient reports showed consistency.(Ozer, 2004) Risky behaviors included sex, alcohol, tobacco, safety belt, and helmet use. Two studies screening for mental health issues showed inconsistency between reports. (Brown, 2008; Guevera, 2007) The timing of when patients and providers were screened was not well described in these studies and may have introduced bias.

One study which was a cross sectional survey of patients reports of screening practices. (Lustig, 2001) This study found that with more provider training, rates of screening increased. There was also one study which compared health care providers' reports of screening practices with an electronic health database. (Hennes, 2005) This type of study would be difficult to apply to dentistry screening practices.

Overall, the most common method used was cross sectional surveys involving providers' self-reports of behaviors. The most convenient method was surveys sent by letter mail. Higher response rates were found with mailed surveys, with an average of 67% response rate. One survey was e-mailed with a 19% response rate.(Lochrie, 2009) A standard practice was to follow the first mailed survey with a repeat mailing to improve response rate.

As far as evaluating providers' behaviors, five to ten point likert scales were commonly used. Five point likert scales were the most common method to assess providers' behaviors and practices. (Barlow, 2002; Torkko, 2000; Rausch JC, 2011; Williams, 2004; Lochrie, 2009; Brown, 2008; Hennes, 2005) Surveys with ten point scales had similar response rates. (Ellen, 1998, Ozer 2004)

From this analysis of methodology in literature involving pediatric providers' behaviors and attitudes towards adolescent health issues, the methodology for this study was developed. The methodology will use a cross sectional survey with a mailed questionnaire followed by a second mailing. A ten point likert scale will be used to assess frequency of screening and a five point likert scale will be used to assess comfort levels and views on relevance to practice. The phrasing and wording in these studies was also used to inform the phrasing and wording of the questionnaire in this study.

3. METHODS

3.1 Sample Selection

The target population was general and pediatric dentists currently practicing in the state of Illinois who treat adolescent patients. The Illinois Society of Pediatric Dentists (ISPD) provided a current mailing list of one hundred and thirty six pediatric dentists practicing in Illinois. The Illinois State Dental Society (ISDS) provided a current mailing list of general dentists practicing in Illinois of approximately 4000 dentists. Two hundred twenty-five general dentists were randomly selected from this list using the Microsoft Excel random number function. Funding for postage, printing, and envelopes, was provided by the Department of Pediatric Dentistry, University of Illinois at Chicago.

3.2 Study Design

A cover letter (Appendix A) and questionnaire (Appendix B) were mailed in September 2012 with a stamped return envelope. The cover letter explained the nature, anonymity, and risks and benefits of the research. By returning the questionnaire the dentist provided consent for participating in the study. The initial mailing included the 136 pediatric dentists from the ISPD and the 225 general dentists from the ISDS. The pediatric dentists received light blue questionnaires and the general dentists received white questionnaires in order to track dentist type. The return envelopes were opened by the primary investigator as they were returned and the anonymous questionnaires were collected. The return envelopes were labeled to track which dentists responded. A second mailing was sent in November 2012 to those dentists who had not responded to the initial mailing. On January 15th, 2013 no further returned envelopes with questionnaires were accepted. All questionnaires had no identifiers on them and were kept

anonymous. Approval of the study was obtained from the University of Illinois at Chicago Institutional Review Board. (Appendix C)

3.3 Survey Tool

The four page questionnaire was developed by the investigators based on the AAPD guidelines for adolescent oral health care issues. See Appendix B. The questionnaire contained thirty questions regarding dentists' practices, comfort levels and attitudes towards adolescent oral health care. Demographic information on gender, race, years in practice, practice type, and practice location was gathered. Also information on the training received on adolescent oral health care during undergraduate dental school, residency programs, and CE courses was gathered. The adolescent oral health care topics included: Oral hygiene, Dental Caries, Nutritional Habits, Dental Sealants, Mouthguards, Orthodontic Treatment, Teeth whitening/bleaching, Risks of Tobacco Use, Pregnancy, Oral Cancer, Risks of Sexually Transmitted Diseases, Alcohol and Drug Abuse, Oral Piercings, and Eating Disorders. A ten point Likert scale was used for frequency of screening each topic. A five point Likert scale was used for comfort levels and relevance to practice for each topic.

3.4 Statistical Analysis

From the collected questionnaires, dentists who did not treat adolescent patients, reported retirement, reported not practicing in the state of Illinois, or who reported being neither pediatric nor general dentists were eliminated from data analysis. Question #6 included an option, "other," that the dentist attended a residency program other than pediatric dentistry residency,

AEGD, or GPR. These dentists were therefore considered specialists and excluded from data analysis.

Sensitive topics were those that required more tact, care, or caution in treatment for the dentist. “Less sensitive” topics included oral hygiene, dental caries, nutritional habits, dental sealants, mouth guards, orthodontic treatment, and teeth whitening. “More sensitive” topics included risks of tobacco use, oral cancer, alcohol and drug abuse, pregnancy, risk of STDs, oral piercings, and eating disorders.

A “Training Score” was developed from questions #5, 6, 7, and 8. For each positive answer one point was assigned. For question 5, three points were possible. For question 6, four points were possible, for each type of postgraduate dental training attended. Questions 6E, “did not attend postgraduate training,” received no points. For question 7, five points were possible. For the second part of question seven, participants chose one of three options, “a. treated adolescents frequently”= 3 points, “b. treated adolescents occasionally”=2 points, and “c. treated adolescents rarely”=1 point. For question 8, one point was possible if CE courses were attended. In total the training score ranged from 0 to 13 points possible.

Data from the collected surveys were analyzed and frequency tables were created. Statistical significance was set with 95% confidence intervals and $p<0.05$. Statistical tests for significance included Independent samples T-Tests, Paired T-Tests, Chi-Square, Pearson’s Coefficient of Correlation, and Regression analysis. The hypotheses were analyzed in the following manner.

Hypothesis I. Pediatric Dentists vs General Dentists Screening Practices.

An overall screening score (Q9-22) was made for each dentist, as well as a more sensitive topics screening score (Q16-22) and a less sensitive topics screening score(Q9-15). Independent T-Tests compared pediatric and general dentists on these variables.

Hypothesis II. Sensitive Topics of Adolescent Oral Health Care

For this hypothesis, the dentist type was not considered a variable. A paired T-test was used to compare the "more sensitive" screening scores (Q16-22 summed) and "less sensitive" screening scores (Q9-15 summed).

Hypothesis III. Training Regarding Adolescent Oral Health Care Issues.

The training score was developed from Q5, 6, 7, and 8 as previously described. A Pearson's Correlation Coefficient was used to evaluate if higher training scores were correlated with higher screening practices for individual topics and for overall screening score.

Hypothesis IV. Comfort Levels, Relevance to Practice and Screening Practices

A regression analysis was conducted with comfort levels (Q23) and relevance to practice(Q24) as the independent variables and screening for that topic as the outcome variable. Thus 14 regressions were completed.

4. RESULTS

4.1 Number of Respondents and Response Rate

Of the questionnaires mailed to the 136 pediatric dentists on the Illinois Society of Pediatric Dentists Mailing List, 4 were returned with the wrong address and 65 were returned and completed. Five questionnaires were deemed to be ineligible due to retirement (3), no longer practicing (1), or not practicing in the state of Illinois (1). Therefore the sample size was 60 responses out of 127 eligible pediatric dentists, for a 47% response rate.

Of the questionnaires mailed to the 225 general dentists from the Illinois State Dental Society Mailing List, 12 were returned with the wrong address and 70 were returned and completed. Twenty questionnaires were deemed to be ineligible due to retirement (8), did not treat adolescents (2), no longer practicing (1), not practicing in the state of Illinois (1), or were not a general dentist (9), including endodontists, orthodontists, and oral surgeons. Therefore the sample size was 193 eligible general dentists with 50 usable responses, for a 26% response rate.

4.2 Demographics

Table I presents demographic information regarding dentists' race, gender, primary practice type, practice location, and years in practice. Pediatric and general dentists differed on gender, primary practice type, and practice location ($p<0.05$). Pediatric dentists were more likely to be female and more likely to practice in a group practice setting. While both pediatric and general dentists practiced in cities, general dentists were more likely to practice in rural or small town locations. Regarding race, pediatric and general dentists were both more likely to report being white than a minority race. Pediatric and general dentists practiced a similar length of time, on average twenty years.

TABLE I
DEMOGRAPHIC CHARACTERISTICS OF PEDIATRIC AND GENERAL DENTISTS TREATING ADOLESCENT PATIENTS

		Pediatric Dentists		General Dentists		Total		Chi Square
		%	n	%	n	%	n	p
Race	White	75%	44	88%	43	81%	87	NS
	Black	2%	1	0%	0	1%	1	
	Hispanic/Latino	9%	5	2%	1	6%	6	
	Asian	14%	8	10%	5	12%	13	
	No Response		2		1		3	
Gender*	Male	44%	26	78%	39	60%	65	0.000*
	Female	56%	33	22%	11	40%	44	
	No response		1		0		1	
Primary Practice Type*	Solo Private Practice	38%	23	60%	30	48%	53	0.04*
	Group Private Practice	60%	36	36%	18	49%	54	
	Comm Clinic or Academic Setting	2%	1	4%	2	3%	3	
	No Response		0		0		0	
Location*	City	86%	50	63%	30	76%	80	0.005*
	Small Town or Rural	14%	8	38%	18	25%	26	
	No Response		2		2		4	
		Years	n	Years	n	Years	n	
Years in Practice	Average Years	21	60	23	50	22	110	NS
	StandardDeviation	12		13		12		

Significant at $p<0.05$

4.3 Number of Adolescents Treated and Referral Times

Table II demonstrates respondents' treatment rates for adolescent patients. Figure 1 shows that pediatric dentists generally refer adolescent patients to general dentists during or after late adolescence. No pediatric dentists reported referring adolescent patients to general dentists as early as the beginning of high school. One general dentist reported that adolescent patients were referred to another practice at the end of college.

TABLE II
ADOLESCENTS TREATED BY DENTIST TYPE

	Pediatric Dentists (n=59)	**General Dentists (n=50)**
Average percentage of patients in practice who are adolescents	28%	18%
Median number of adolescent patients seen each week	21-30	11-20

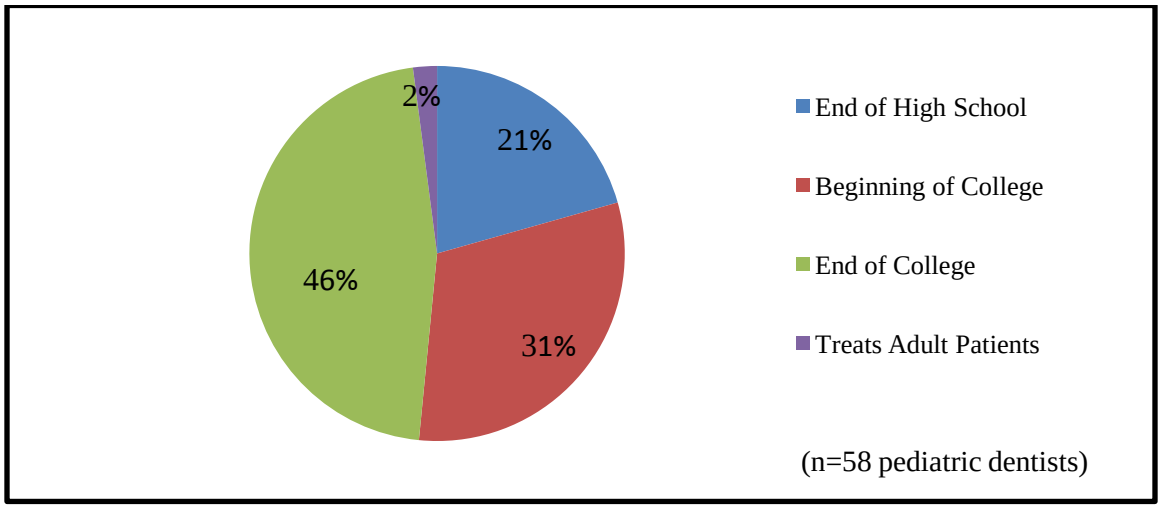

Figure 1. Pediatric Dentists' Time Frame for Referral of Adolescent Patients to General Dentists (n=58)

4.4 Parental Presence During Adolescent Appointments

Pediatric and general dentists reported different behaviors regarding parental presence during appointments with adolescent patients. See Figure 2. Pediatric dentists were more likely to have adolescent patients alone to discuss any adolescent oral health care issues (Chi Square, p=0.04).

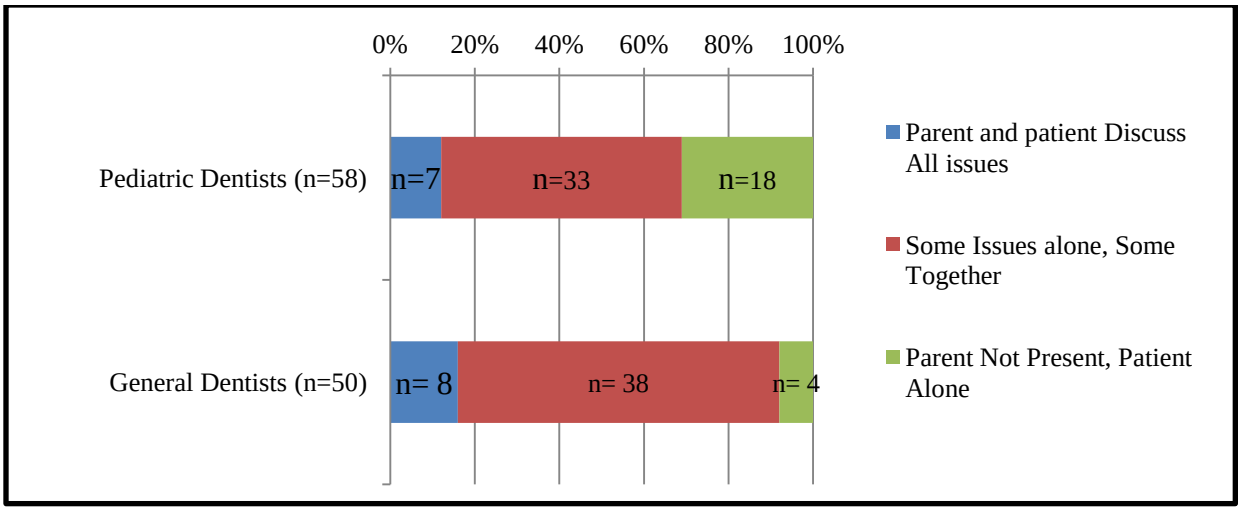

Figure 2. Parental Presence or Absence During Appointments for Adolescent Patients, Comparing Pediatric and General Dentists

4.5 Training Received by Dentists in Regards to Adolescent Patients

Pediatric dentists and general dentists reported similar amounts of training in adolescent dentistry during their undergraduate dental training years. Pediatric dentists received more training on adolescents during postgraduate pediatric dentistry residencies. Most Illinois general dentists did not attend postgraduate dental residencies. More pediatric dentists reported attending CE courses on adolescent oral health care issues than general dentists. See Table III.

TABLE III
TRAINING LEVELS OF GENERAL AND PEDIATRIC DENTISTS

		Pediatric Dentists (n=60)	%	General Dentists (n=50)	%
Training In Undergrad	Yes	40	67%	31	62%
	No	5	8%	7	14%
	Not Answered	15	26%	12	24%
			100%	50	100%
Undergrad Treated Adolescents	Yes	34	57%	29	58%
Undergrad Lectures on Adolescents	Yes	34	57%	27	54%
Postgrad Training on Adolescents	Yes	44	73%	4	8%
	None	10	17%	7	14%
	Unsure	5	8%	0	0%
	Did Not Attend	0	0%	31	62%
	No Answer	1	1%	8	16%
			99%		100%
Frequency of Treating Adolescents	Rarely	4	7%	0	0%
In Postgrad	Occasionally	18	30%	1	2%
	Frequently	20	33%	4	8%
	No answer	18	30%	45	90%
			100%		100%
Didactic Training in Postgrad	Yes	26	43%	1	2%
	No	34	57%	49	98%
			100%		100%
CE Courses	Yes	36	60%	21	42%
	No	19	32%	27	54%
	Unsure	5	8%	1	2%
			100%		98%

4.6 Pediatric and General Dentists' Screening Practices

As shown in Figure 3, pediatric dentists screen more for adolescent oral health care issues than general dentists. Dentists responded on a 10 point Likert scale on the percentage of patients with whom the dentist or dental staff addressed topics at initial and recall appointments through conversations or brochures. Overall, pediatric dentists screen on more issues and report more frequent screening than general dentists.

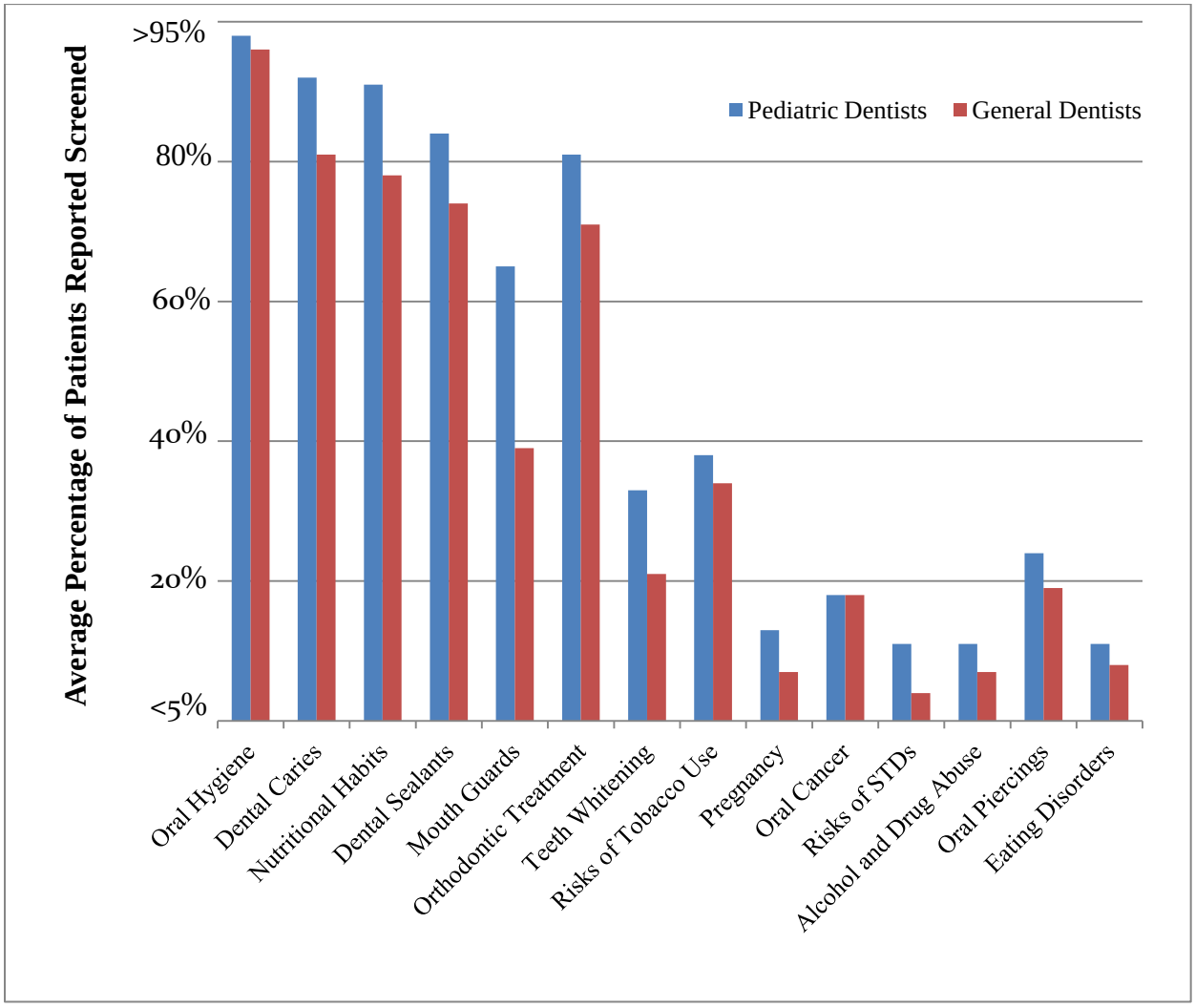

Figure 3. Frequency of Screening of Adolescent Oral Health Care Issues by Pediatric Dentists (n=55-58) and General Dentists (n=47-50)

4.7 Practices in Screening "Less Sensitive Issues" versus "More Sensitive" Issues

When issues were separated into sum scores for "more sensitive" and "less sensitive" issues, pediatric dentists screen significantly more for less sensitive issues than general dentists. However, the difference between screening levels for more sensitive issues by dentist type was not significant. Table IV includes information from independent samples t-test and displays significance levels ($p<0.05$), with a Bonferoni correction to reduce Type I error, ($p<0.004$).

TABLE IV
DIFFERENCE IN SCREENING LEVELS BY PEDIATRIC AND GENERAL DENTISTS

Sum of Scores	**Mean (SD) Likert Screening Score by Pediatric Dentists**		**Mean (SD) Likert Screening Score by General Dentists**		**Independent Samples T-Test (p-value)**
Sum All Scores*	67	(20)	55	(20)	0.001*
Sum Non-sensitive Scores*	57	(9)	46	(10)	0.000*
Sum Sensitive Scores	12	(14)	8	(13)	NS
Oral Hygiene	9.8	(0.8)	9.6	(0.9)	NS
Dental Caries*	9.2	(1.8)	8.1	(2.4)	0.006*
Nutritional Habits*	9.1	(1.8)	7.8	(2.6)	0.007*
Dental Sealants*	8.4	(2.3)	7.4	(2.9)	0.03*
Mouth Guards*	6.5	(3.1)	3.9	(2.9)	0.000*
Orthodontic Tx*	8.1	(2.0)	7.1	(2.4)	0.03*
Teeth Whitening*	3.3	(2.7	2.1	(2.3)	0.008*
Risks of Tobacco Use	3.8	(3.1)	3.4	(3.7)	NS
Pregnancy	1.3	(2.2)	0.7	(1.9)	NS
Oral Cancer	1.8	(2.8)	1.8	(3.2)	NS
Risks of STDs	1.1	(2.4)	0.4	(1.7)	NS
Alcohol and Drug Abuse	1.1	(2.1)	0.7	(2.0)	NS
Oral Piercings	2.4	(2.7)	1.9	(2.7)	NS
Eating Disorders	1.1	(2.1)	0.8	(1.9)	NS

Significant at $p<0.05$, Sum All Score Maximum=140, Sum Non-Sensitive Score Maximum=70, Sum Sensitive Score Maximum=70.

As Table V shows, pediatric dentists and general dentists were less likely to discuss "more sensitive" issues of adolescent health care with their patients than "less sensitive" issues. When sum frequency of screening scores for "more sensitive" issues and "less sensitive" issues are compared, dentists screen for "more sensitive" issues significantly less than "less sensitive" issues. A Paired Samples T-test compared the scores.

TABLE V
DIFFERENCE IN SCREENING LEVELS OF MORE SENSITIVE VS LESS SENSITIVE ISSUES

Paired Samples T-Test	Mean	Std Deviation	Sig 2-Tailed (p-value)
Sensitive Score	10.6	13.4	0.000*
Non-sensitive Score	50.0	10.6	

Significant at $p<0.05$

4.8 Training Levels Related to Screening Practices.

The Pearson's Correlation Coefficient was used to correlate training score with frequency of screening on each adolescent oral health care topic as well as with the overall screening score. The training score is described in the Methods, section 3.4, Item 8. Training score was not found to be significantly associated with the frequency of screening adolescent oral health care topics or for overall screening score. The three exceptions were dental sealants, mouth guards, and nutritional habits, which had $p<0.05$. The Pearson correlation for each was positive, so as training increased so did screening for these three topics. The magnitude of this correlation was small. See Table VI.

TABLE VI
CORRELATION OF TRAINING TO SCREENING ORAL HEALTH CARE ISSUES

	Pearson Correlation	Significance 2-Tailed	N
Oral Hygeine	0.15	NS	108
Dental Caries	0.13	NS	107
Nutritional Habits and Caries*	0.21	0.03*	106
Dental Sealants*	0.25	0.01*	105
Mouth guards*	0.29	0.002*	107
Orthodontic Treatment	0.08	NS	108
Teeth Whitening	0.02	NS	105
Risks of Tobacco Use	-0.02	NS	104
Pregnancy	0.07	NS	102
Oral Cancer	0.06	NS	105
Risk STDs	0.17	NS	100
Alcohol and Drug Abuse	-0.01	NS	103
Oral Piercings	-0.02	NS	107
Eating Disorders	-0.05	NS	103
Overall Counseling	0.15	NS	103

Significant at $p<0.05$

4.9 Dentists' Reports on Comfort Levels and Views on Relevance to Practice

Pediatric and general dentists responded on a 5 point Likert scale on comfort levels and on views on relevance to practice for adolescent oral health care issues. The oral health care issue of oral piercings was not included in the questionnaire for these topics. This was omitted in error.

For pediatric and general dentists comfort levels with adolescent oral health care issues, see Figures 4 and 5. For pediatric and general dentists' views on relevance to practice for adolescent oral health care issues, see Figures 6 and 7. In general comfort levels and views on relevance to practice decreased for more sensitive issues for both pediatric and general dentists. See Figures 8 and 9.

To analyze the association between comfort levels and views on relevance to practice, in determining the frequency of screening adolescent oral health care issues, a regression analysis was done. The regression analysis explored frequency of screening as a function of relevance and comfort for each oral health care issue. See Table VII.

For all adolescent oral health care issues the regression analyses were statistically significant. For less sensitive issues, including oral hygiene, dental caries, dental sealants, orthodontic treatment, and teeth whitening, relevance to practice was the more predictive factor. The two exceptions were mouth guards and nutritional habits for which both comfort levels and relevance to practice were predictive with statistical significance. For more sensitive issues, including pregnancy, risk of STD's, alcohol and drug abuse, and eating disorders, comfort was the more predictive factor. The two exceptions were tobacco use and oral cancer. For tobacco both factors were statistically significant as predictive factors. For oral cancer, relevance to practice was the predictive factor.

Overall, the amount of variance predicted by the models was low. One exception was nutritional habits. Both relevance to practice and comfort levels were significant and the regression model predicted 40% of the variance.

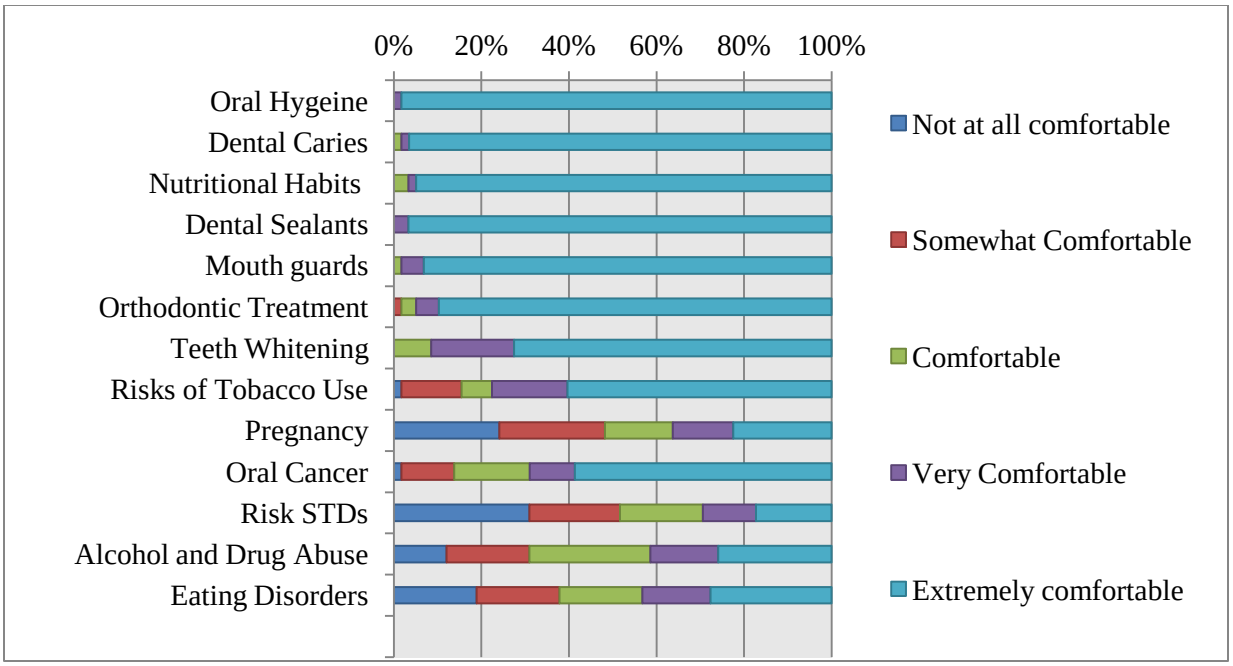

Figure 4. Percentage of Pediatric Dentists at Each Level of Rating Comfort with Counseling for Specific Adolescent Counseling Issues. (n=58)

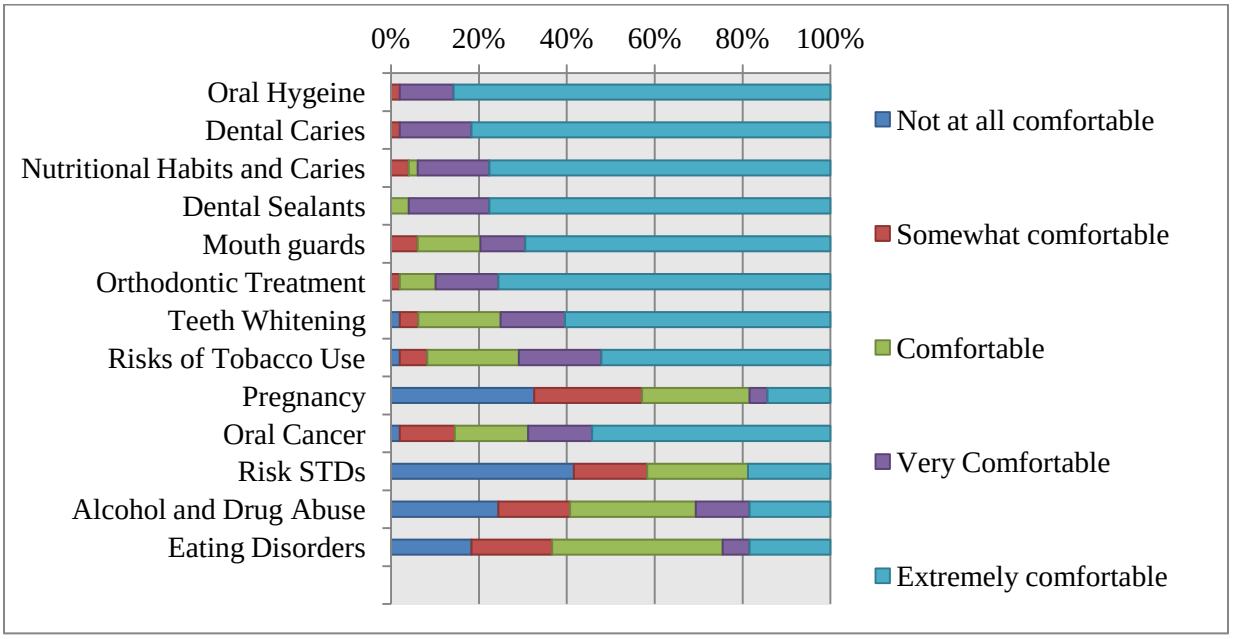

Figure 5. Percentage of General Dentists at Each Level of Rating Comfort with Counseling for Specific Adolescent Counseling Issues. (n=49)

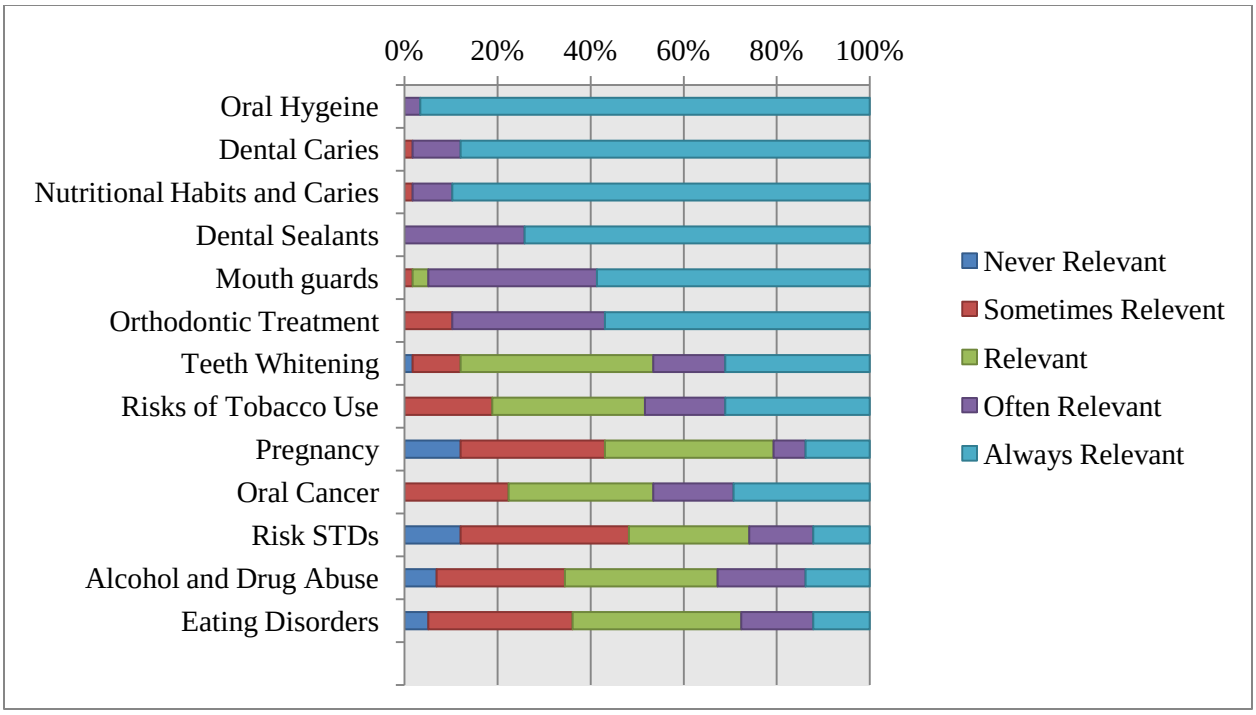

Figure 6. Percentage of Pediatric Dentists at Each Rating Level on Relevance to Practice for Specific Counseling Issues. (n=58)

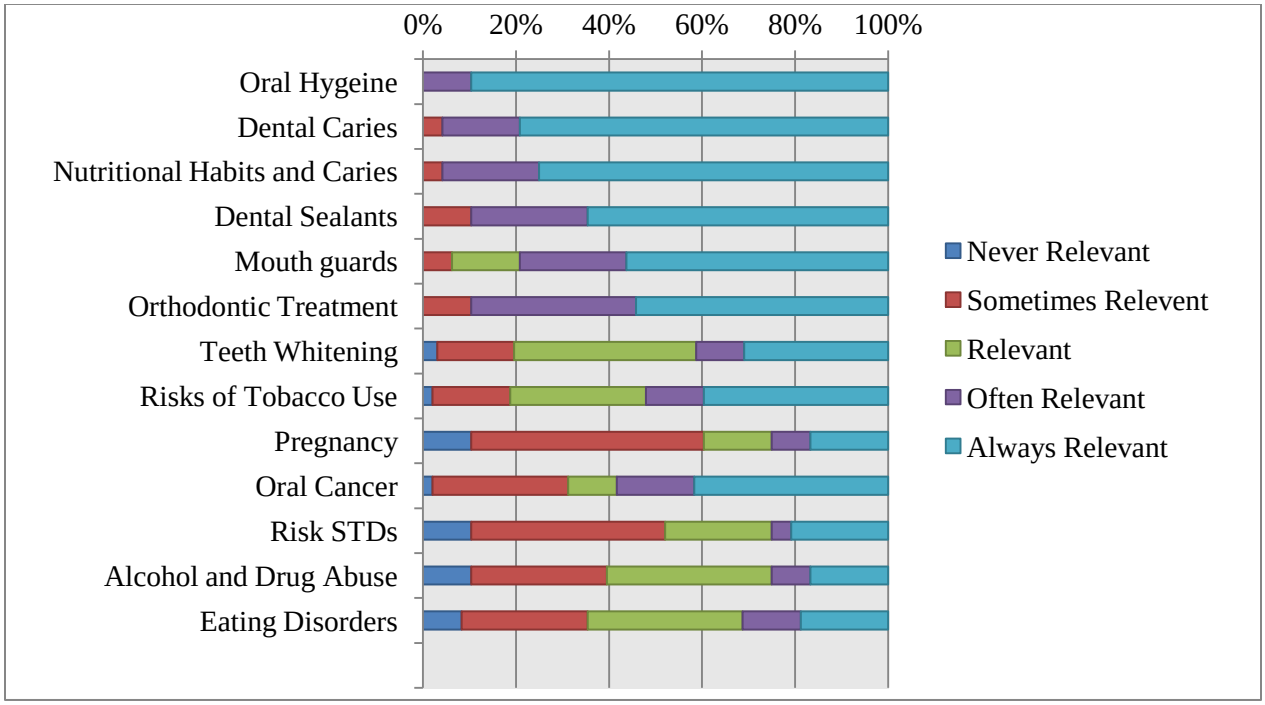

Figure 7. Percentage of General Dentists at Each Rating Level on Relevance to Practice for Specific Counseling Issues. (n=48)

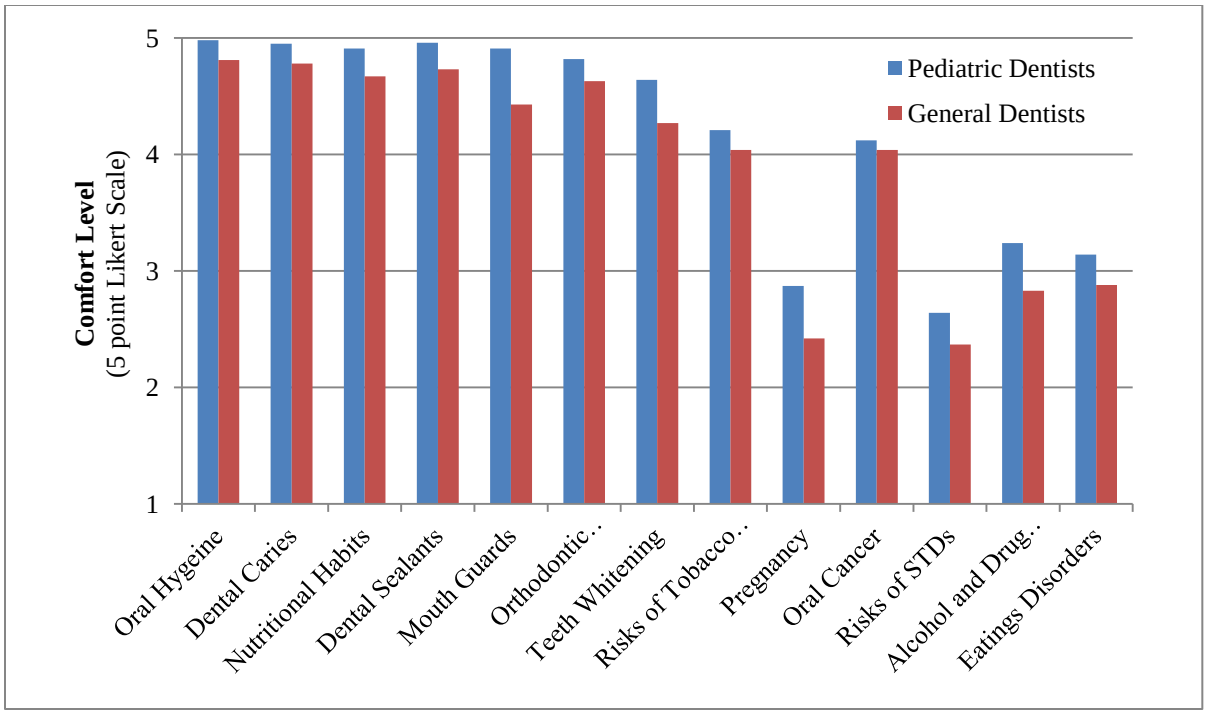

Figure 8. Dentists' Average Comfort Levels for Adolescent Oral Health Care Issues. (PD n=58, GD n=49)

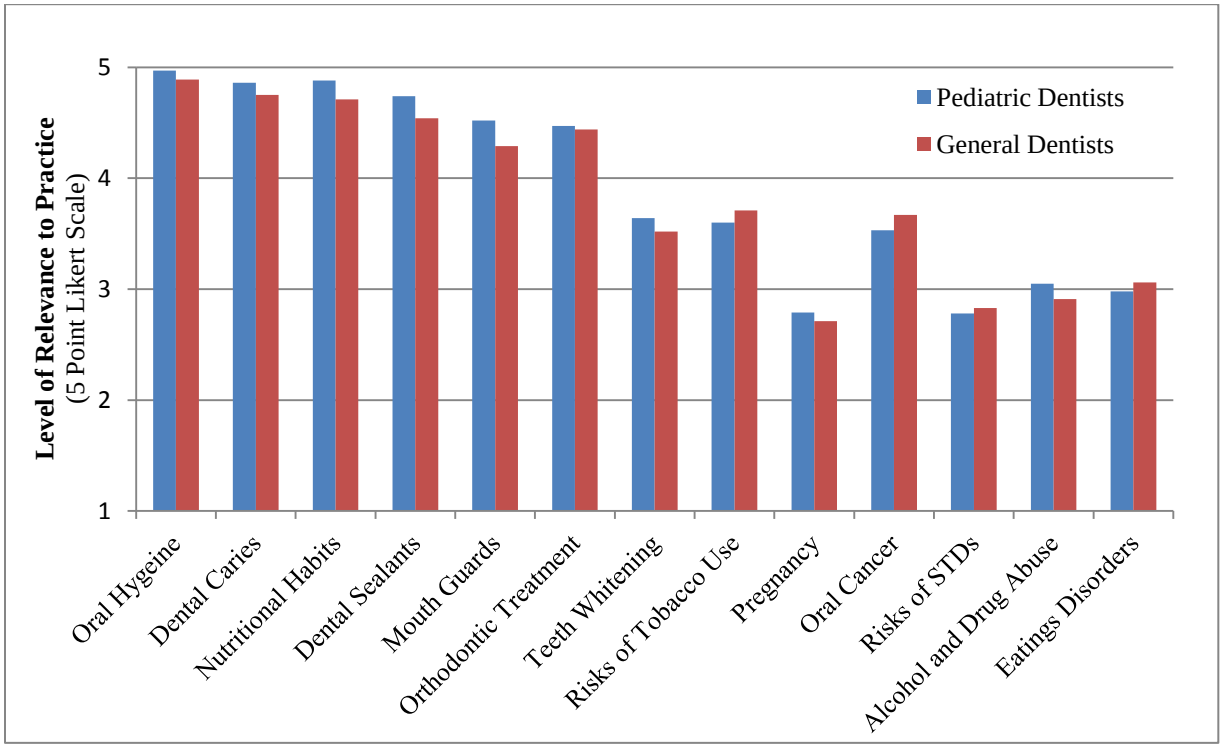

Figure 9. Dentists' Average Views on Relevance to Practice for Adolescent Oral Health Care Issues. (PD n=58, GD n=48)

TABLE VII
REGRESSION ANALYSIS of COMFORT LEVEL AND RELEVANCE TO PRACTICE PREDICTING FREQUENCY OF SCREENING

	Overall Significance	**Comfort Level**	**Relevance to Practice**	**Variance Predicted**
	ANOVA p value	p value	p value	R square
Oral Hygiene	0.03*	NS	0.009*	0.07
Dental Caries	0.001*	NS	0.000*	0.13
Nutritional Habits	0.000*	0.000*	0.000*	0.40
Dental Sealants	0.001*	NS	0.01*	0.13
Mouth Guards	0.000*	0.001*	0.02*	0.21
Orthodontic Treatment	0.03*	NS	0.03*	0.05
Teeth Whitening	0.000*	NS	0.000*	0.17
Risks of Tobacco Use	0.000*	0.008*	0.000*	0.25
Oral Cancer	0.000*	NS	0.000*	0.21
Pregnancy	0.000*	0.000*	NS	0.15
Risk STDs	0.000*	0.000*	NS	0.16
Alcohol and Drug Abuse	0.004*	0.004*	NS	0.08
Eating Disorders	0.000*	0.000*	NS	0.13

Significant at $p<0.05$

5. DISCUSSION

5.1 Strengths and Limitations of the Study

This study is the first investigation comparing pediatric and general dentists' attitudes and behaviors towards a wide range of topics of adolescent oral health care issues. We gathered information on dentists' frequency of screening for fourteen specific adolescent issues as well as information on comfort levels and views on relevance of the topics to practice.

The response rate of 47% for pediatric dentists was acceptable. The response rate of 26% for general dentists was lower than anticipated. From the review of methodology on health care providers' attitudes towards adolescent oral health care issues, mailed surveys averaged a 67% response rate and ranged from 33% to 82%. (Barlow, 2002; Torkko, 2000; Rausch, 2011; Ellen, 1998) While the response rate for pediatric dentists falls within this range, the response rate for general dentists does not. One reason for the low response rate was likely that the mailing list from the Illinois State Dental Society for general dentists included specialized dentists. A better method would be to use a mailing list of only general dentists, specifically excluding specialists. Despite this low response rate similar numbers of questionnaires were collected for both pediatric and general dentists and significant differences were able to be deduced. For dentists that reported treating adolescent patients, most questionnaires were returned with all questions answered, so the questionnaire design appears to have been straightforward and simple.

A limitation of the study was the "Training Score" developed from questions on dentists' education levels regarding adolescent oral health care topics. The score appeared to be more reflective on whether or not the dentist was a general dentist or a pediatric dentist. Future studies should consider more information on continuing education courses on adolescent oral health care topics. Useful information would include how many hours of CE courses the dentist

attends on adolescent oral health care topics as well as the types of CE courses available on different adolescent oral health care topics.

Another limitation of this study was that adolescents were considered as an age group from 12 years old to 18 years old. Studies of adolescent health care often divide adolescents into more age specific groups, making distinctions between early adolescence and late adolescence. (Dempsey, 2009; Tsai, 2013) In the interest of not making an overly complicated questionnaire, adolescents were considered as one age group in this study. Future studies would benefit from exploring attitudes and opinions of dentists and how they may change with specific adolescent age groups.

5.2 Pediatric Dentists Versus General Dentists

The pediatric dentists in this sample were more likely to be female, more likely to practice in a group practice, and more likely to practice in city locations than general dentists. These differences reflect the differences between pediatric and general dentists practice in the state of Illinois. This also highlights the few numbers of pediatric dentists practicing in rural Illinois and access to care issues for patients specifically seeking pediatric dentists. In terms of treating adolescent patients, it is therefore important to consider the level of care that general dentists are providing, especially in rural areas.

Both Illinois pediatric and general dentists treat adolescent patients as a significant portion of their practice. However, pediatric dentists were more likely than general dentists to report higher screening levels for adolescent oral health care issues, especially the less sensitive issues. In particular, pediatric dentists were more likely to report screening for dental caries, nutritional habits, dental sealants, mouth guards, orthodontic treatment, and teeth whitening.

Previous studies comparing practices of pediatric and general dentists showed similarities in treatment of adolescents. These studies showed similarities in terms of diagnostic, preventative, and corrective care for adolescents (Cooke, 2001, Kuin, 2012, Schorer-Jensma, 2010). Diagnostic care includes dental exams and radiographs, preventative care includes prophylaxis, fluoride treatment and sealants, and corrective care includes operative dentistry. In this study, pediatric and general dentists reported equal screening levels of over 95% for oral hygiene instruction. It is surprising that differences were found in this study for dental caries, nutritional habits, dental sealants, mouth guards, orthodontic treatment, and teeth whitening. This may reflect a greater emphasis on anticipatory guidance and preventive counseling in the treatment philosophies of pediatric versus general dentists.

Caution should be taken when interpreting these results. Due to the small sample size of this study, it is possible that some of the positive findings are due to Type I error. Using a Bonferoni correction, the one topic that is still statistically significant is screening for mouthguards.

5.3 Less Sensitive and More Sensitive Topics

Both pediatric and general dentists are less likely to screen for "more sensitive" topics of adolescent oral health care than the "less sensitive" topics. In this study screening levels are well below 20% for pregnancy, oral cancer, risks of STDs, alcohol and drug abuse, and eating disorders, with most pediatric and general dentists reporting less than 5% screening for these topics. Screening for tobacco use is slightly above 30% for both groups and screening for oral piercings is around 20%. This data is in accordance with an unpublished study (Ortega et al., 2011), in which parents of adolescent patients reported screening of these sensitive topics at

similarly low rates. Also, similar to this study, screening for tobacco use among adolescents has been reported at 38% among Colorado general dental practitioners.(Kast, 2008)

It is important to consider the phrasing of the question that tested for screening these issues. The dentists were asked to consider each topic when an adolescent patient presented for an initial exam or recall exam and to estimate the percentage of patients topics were addressed by the dentist, by the dental staff, including conversations and brochures.(See Appendix A) Both pediatric and general dentists reported higher screening levels for the "less sensitive" topics than the "more sensitive" topics. The definition of "sensitivity" and the categorization of topics is that these topics call for more care, tact, and caution in treatment. It is not surprising then that dentists will address "more sensitive" topics less frequently than others.

Best practices, however, would encourage screening of these "more sensitive" topics. Reviews of tobacco use and alcohol and drug abuse strongly suggest that all adolescent patients be screened for these habits.(Kast, 2008; DaFonseca, 2009) In addressing tobacco use in the dental office with the 5 A's of "Ask, Advise, Assess, Assist, Arrange," it has been proposed that "Anticipatory guidance" be added as the first A for adolescents. (Albert, 2006) Eating disorder diagnoses are made too late by dental professionals and interceptive efforts are needed. (Bretz, 2002) Patients who have had trauma from oral piercings were unaware of the risks (Oberholzer, 2010), and would benefit from anticipatory counseling. Given the sexual activity levels of adolescents and the high numbers of adolescent pregnancy in the United States(Lavin, 2012), safe treatment of the adolescent female should involve screening for the possibility of pregnancy.

Each topic of adolescent oral health care is unique, especially the "more sensitive" topics and each deserves in depth study. How each topic can and should be addressed is open to further research and discussion. In the medical field, treatment of adolescents has become its

own specialty area, and patients in adolescent medicine settings receive the most thorough health screenings. (Yeo, 2005) In one cross sectional study of adults, increased screening facilitated opportunities for education and intervention with at-risk clients. (Thomas, 2012) This study has informed us that both pediatric and general dentists in Illinois are not screening for the "more sensitive" topics on a frequent basis in their dental practices.

5.4. Comfort Levels and Relevance to Practice

In terms of barriers to addressing adolescent oral health care issues, this study investigated dentists' comfort levels and views on relevance to practice for each topic. As comfort levels and views on relevance to practice increased, so did screening for each topic. The more important finding was that comfort level was the more predictive factor for the "more sensitive" topics and view on relevance to practice was the more predictive factor for the "less sensitive" topics. This general information can be used by dental educators when approaching topics of adolescent oral health care and when trying to influence screening practices by dentists.

For the "less sensitive" topics of oral hygiene, dental caries, nutritional habits, dental sealants, orthodontic treatment, and teeth whitening, the dentists view on relevance to practice was the more predictive factor for higher screening rates. For nutritional habits and mouth guards, comfort level was also a significant predictive factor for higher screening rates. For the "more sensitive" topics of pregnancy, risk of STDs, alcohol and drug abuse, and eating disorders, the dentist's comfort level was the significant predictive factor for higher screening rates. These findings are in accordance with studies of sensitive topics of adolescent health care in the medical literature. Provider discomfort in asking sensitive questions and/or managing client distress has been related to non-screening issues. (Roche, 2002, Thomas, 2012)

One significant exception to this pattern was the topic of oral cancer. In this study oral cancer was considered a "more sensitive" topic because it would require more care and tact on the part of the dentist when discussing the issue. Unlike other "more sensitive" topics, comfort level was not a predictive factor, rather relevance to practice was the predictive factor. Similarly, tobacco use had both comfort level and relevance to practice as a significantly predictive factor. Since tobacco use is related to oral cancer these two topics are intertwined.

One explanation may be that dentists are comfortable discussing oral cancer and this is not a sensitive issue for the dentist to discuss. Comfort levels for discussing oral cancer and tobacco use were higher than other more sensitive topics. Most comfort levels for discussing oral cancer and tobacco use ranged from "very comfortable" to "extremely comfortable" while comfort levels for other sensitive topics was more likely to be "comfortable" or "somewhat comfortable." Another explanation is that dentists do not view adolescence as a time when discussing oral cancer is relevant to their practice. General dental practitioners screening rates for oral cancer has been well studied with screening rates for older adults ranging from 80-92% (Applebaum, 2009, Cruz, 2005). In this study, dentists and pediatric dentists both report screening rates under 20% for oral cancer.

Adolescence is a unique time period for anticipatory guidance on prevention of oral cancer. The main risk factors for oral cancer include tobacco use and alcohol abuse, two activities that are known to begin in adolescence. It has been repeatedly reported that half of dental providers do not routinely inquire and screen for tobacco and alcohol use among adult patients (Cruz et al, 2005, Warnakulasariva, 1999). This study found that for adolescent patients screening was less than 40% for tobacco use and less than 10% for alcohol and drug abuse.

Dentists would do well to explore ways in which anticipatory guidance for tobacco use, alcohol use, and oral cancer can be incorporated as part of anticipatory guidance for adolescent patients.

Also, another important factor to consider for oral cancer and adolescence is the recent research into HPV and STDs. While oral cancer rates are declining in older populations, rates are rising in younger age groups including females, ages 15-34 years old. (Bleyer, 2009) With rising rates of oropharyngeal cancer (Auluck, 2010) and new evidence linking HPV to oral cancer especially at the base of the tongue (Liang, 2008; Cleveland, 2011), oral cancer and STDs is a new topic of consideration for the dental practitioner. In this study most pediatric dentists and general dentists reported being "not at all comfortable" discussing STDs with adolescents. Screening rates for STDs were extremely low with most dentists' screening less than 5% of patients. General dentists and pediatric dentists may be unaware of the association between STDs and oral cancer and are likely uncomfortable discussing this association. More research into this topic is warranted.

Overall, caution should be considered when considering comfort levels and relevance to practice as predictive factors of screening for adolescent oral health care topics. The amount of variance predicted by the models was low for the majority of topics.

The one exception was nutritional habits, where 40% of variance was predicted and both comfort levels and relevance to practice were significant predictors. While studies have investigated the relationship of nutritional habits and caries, (Alm, 2008 and 2012; Cheng, 2008), no studies investigate conversations that dentists are having with adolescent patients in regards to diet. In a study of Taiwanese adolescents, the topics adolescents most wanted to discuss with their primary health care provider were weight and dietary health.(Tsai, 2013) Since nutritional habits play a significant role in eating disorders and obesity, this is a topic that could be

considered as potentially sensitive for dentists to discuss. Further investigation into dentists' behaviors regarding screening for nutritional habits of adolescent patients is needed.

5.5 Training on Adolescent Oral Health Care Topics

Lack of training is one of the perceived barriers in addressing adolescent health issues for medical providers (Veit, 1996). While this study did not find an overall significant correlation between training received and screening practices, this study did not use a sophisticated tool for understanding dentists' training levels. The training score was more reflective of whether or not the dentist had attended a pediatric dentistry residency. As discussed previously, more information on continuing education courses available and attended by dentists would be helpful.

Three topics did show correlations between a higher training score and higher screening practices: nutritional habits ($p<0.05$), dental sealants ($p<0.05$), and mouth guards ($p<0.01$). The Pearson correlation for all three however was weak and less than 0.3. Therefore, there is some weak evidence that dentists receive additional training regarding nutritional habits, dental sealants, and mouth guards during pediatric dentistry residencies. This training may increase their screening practices.

Another possible reason for the weak correlation between training score and screening practices may be that both pediatric and general dentists are receiving inadequate training on adolescent oral health care topics, both in undergraduate dental training and in residency programs. Again, further study is needed into amount and type of training received by dentists in regards to adolescent oral health care topics.

5.6 Parents and Adolescent Patients

How topics of adolescent oral health care are addressed by the dental provider becomes more complicated when one considers confidentiality of the patient and the parent's presence during treatment. Adolescents have a right to confidentiality especially when discussing the most sensitive issues including pregnancy, STD's, alcohol use, and drug use. Adolescents are also more likely to discuss sensitive topics when their confidentiality is ensured. Parents are the persons providing legal consent for adolescent patients to receive treatment. Therefore parents' attitudes towards dentists addressing adolescent oral health care issues, both sensitive and non-sensitive, are important.

Regarding medical doctors, parents are receptive to discussion of preventative care services for adolescents. (Dempsey, 2009) However, some parents are conflicted about how to incorporate confidentiality into prevention-focused visits. In the same study, parental opinions on screening changed with the age and gender of the patient. (Dempsey, 2009) In an unpublished study at UIC of parental attitudes towards dentists, parents of adolescents were accepting of dentists discussing both "less sensitive" and "more sensitive" topics.(Ortega, 2011) One main difference in the two studies was that Ortega's study reviewed parents' attitudes on a "yes" or "no" question scale. Dempsey's study used a four point Likert scale to assess parental opinions, a clinical case scenario, and considered age of patient as a factor. Also the patient populations in both studies had different socioeconomic and ethnic backgrounds.

The issue of patient confidentiality and parental consent needs more exploration, especially for adolescent oral health care topics being discussed in the dental office. In the medical field, assurance of patient confidentiality by the physician increases the adolescent's willingness to discuss sensitive issues.(Berlan, 2009) Even in the medical field, however,

physicians do not often assure patient confidentiality.(Berlan, 2009) This study found that pediatric dentists were more likely than general dentists to have the patient alone to discuss all issues. This may be that pediatric dentists are more aware of confidentiality issues. This may also be that pediatric dentists are more likely than general dentists to have a policy of "no parents" being permitted in the treatment area. However, the majority of both pediatric and general dentists will have the parent present for some issues and the patient alone for some issues.

Dentists would benefit from reviewing pediatricians' practices in discussing adolescent health care issues. In the medical field, the provider will often inform the parent during the appointment of confidentiality issues and ask the parent to step out of the room. Dentists should consider how to incorporate such practices in their screening practices of adolescent patients. Overall in the general health care field, screening of adolescent health issues results in positive outcomes and is accepted by patients and parents. (Yeo, 2005; Berlan, 2009) It would be beneficial to incorporate these positive outcomes into the dental office as well.

One recommendation is to include a time during initial appointments and periodic recall appointments for adolescent patients and parents to specifically address issues. For the more sensitive issues, including tobacco use, alcohol and drug abuse, sexually transmitted diseases, pregnancy, eating disorders, etc., the dentist can ask the parent to step out of the room to ensure confidentiality. It is important for the dentist to explain the right to confidentiality to the adolescent patient and to encourage disclosure to the parent when the adolescent is engaging in risky behaviors. Given the AAPD's current emphasis on anticipatory guidance, even adolescent patients not deemed to be high risk for behaviors would also benefit from discussion of these issues and their relevance to oral health. At the least, the dentist and dental staff should have a

specific time period when topics of adolescent oral health care can be explained and discussed with the patient in an open manner.

5. 9 Future Studies

Anticipatory guidance in adolescent oral health care is an emerging field in pediatric and general dentistry. In the past twenty years much emphasis has been placed on anticipatory guidance for infants and small children, with an emphasis on the first dental visit by age one. Since general and pediatric dentists are the providers of oral health care for adolescents both groups must play a role. This study has highlighted areas of adolescent oral health care that need further study. One point of interest is how to increase dentists' comfort levels with discussing the more sensitive topics of adolescent oral health care. Another topic is what training do dentists receive in undergraduate dental programs, residency programs, and continuing education courses in treating adolescent patients. All of the fourteen topics of adolescent oral health care addressed in this study would benefit from more in depth analysis. Finally, as the field of dentistry incorporates adolescent anticipatory guidance into practice, parental consent and adolescent confidentiality will need to be explored more.

6. CONCLUSIONS

1. Pediatric dentists are more likely than general dentists to address adolescent oral health care issues, especially “less sensitive” issues.
2. Both pediatric and general dentists are more likely to screen for “less sensitive” issues than “more sensitive” issues of adolescent oral health care.
3. No correlation was found between the training the dentist has received and frequency of screening for adolescent oral health care issues.
4. Both comfort levels and views on relevance to practice were associated with increased levels of screening for adolescent oral health care issues. For “more sensitive” topics, comfort level was the more predictive factor. For “less sensitive” topics, view on relevance to practice was the more predictive factor.

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APPENDICES

APPENDIX A

August 16th, 2012

Dear Colleague,

My name is Amanda Day and I am a second year pediatric dental resident at University of Illinois at Chicago, Pediatric Dentistry Residency program. I am conducting this research under the guidance of my faculty advisor Dr. Shahrbanoo Fadavi. The purpose of this study is to investigate pediatric and general dentists' practices in regards to adolescent oral health care issues. The information collected will help us achieve an understanding of pediatric and general dentists' behaviors and attitudes in regards to adolescent oral health care issues. The study may also increase an understanding of barriers to addressing adolescent oral health care issues.

You are being contacted because you are either a member of the Illinois Society of Pediatric Dentists or the Illinois State Dental Society. The enclosed questionnaire will take **approximately 5-10 minutes** to complete and your participation is completely voluntary. Your assistance in providing this information will be most valuable and greatly appreciated.

A number has been placed on the corner of your return envelope to permit a second mailing in the event that you do not return the survey. Once the surveys have been collected, the envelope containing the number linking you to your survey will be discarded. All information you provide will remain anonymous.

If you have any questions or concerns about the research study, please contact me at aday81@uic.edu. My research advisor is Dr. Shahrbanoo Fadavi, sfadavi@uic.edu. If you have any questions about your rights as a research subject, please contact the Office for the Protection of Research Subjects at 1-866-789-6215 (toll free) or email OPRS at uicirb@uic.edu.

By completing the survey you agree to take part in this research study. After completing the survey, please return it in the enclosed pre-addressed envelope.

Thank you for your participation!

Amanda Day, DDS
2nd Year Pediatric Dentistry Resident
University of Illinois at Chicago, College of Dentistry

UIC IRB Research Protocol Approval #2012-0576

APPENDIX B

Adolescent Oral Health Care Questionnaire

1. Do you treat adolescent patients (ages 12-18 years old) in your practice?
   a. Yes b. No ***If no, please turn to last page and continue with question #26.***

2. In a typical week what percentage of your patients are adolescents (ages 12-18 years old)?
   <5% 10% 20% 30% 40% 50% 60% 70% 80% 90% >95%

3. In a typical week, how many adolescent patients are seen in your practice, including new patients, periodic recalls, and operative visits?
   0-10 11-20 21-30 31-40 41-50 >50

4. If you are a pediatric dentist, when do you encourage your medically healthy patients to transition to a general practice dentist?

a. Beginning of High School
b. End of High School
c. Beginning of College
d. End of College
e. I am not a pediatric dentist
f. I am a pediatric dentist and I treat adult patients.

5. In your undergraduate dental training program, did you receive specific training regarding adolescent oral health care?
   a. Yes b. No c. Unsure

   If yes, please circle all that apply.
   a. Treated adolescent patients
   b. Lectures or other non clinical educational activity regarding treatment of adolescent patients.

6. Did you attend any of the following postgraduate dental training programs? Please circle all that apply.
   a. Advanced Education in General Dentistry b. General Practice Residency c. Pediatric Dentistry Residency d. Other e. Did not attend postgraduate dental training program

7. During your postgraduate dental training, did you receive specific training regarding adolescent oral health care?
   a. Yes b. No c. Unsure d. Did not attend postgraduate dental program

   If yes, please circle all that apply:
   a. Treated adolescent patients frequently
   b. Treated adolescent patients occasionally
   c. Rarely treated adolescent patients
   d. Lectures or other non clinical educational activity regarding treatment of adolescent patients

8. Have you attended any CE courses on adolescent oral health care needs?
   a. Yes b. No c. Unsure

APPENDIX B (continued)

In your dental practice, please consider the following questions when adolescent patients present for an INITIAL EXAM or for a RECALL appointment. Please estimate the percentage of patients with whom these issues are addressed by you and your dental staff, including conversations and brochures.

9. **Oral hygiene, including brushing and flossing,** is discussed with what percentage of adolescent patients?
<5% 10% 20% 30% 40% 50% 60% 70% 80% 90% >95% Unsure

10. **Dental caries** is discussed with what percentage of adolescent patients?
<5% 10% 20% 30% 40% 50% 60% 70% 80% 90% >95% Unsure

11. **Nutritional habits and the caries process** are discussed with what percentage of adolescent patients?
<5% 10% 20% 30% 40% 50% 60% 70% 80% 90% >95% Unsure

12. **Dental sealants** are discussed with what percentage of adolescent patients?
<5% 10% 20% 30% 40% 50% 60% 70% 80% 90% >95% Unsure

13. **Mouth guards for sports and physical activities** are discussed with what percentage of adolescent patients?
<5% 10% 20% 30% 40% 50% 60% 70% 80% 90% >95% Unsure

14. **Orthodontic treatment** is discussed with what percentage of adolescent patients?
<5% 10% 20% 30% 40% 50% 60% 70% 80% 90% >95% Unsure

15. **Teeth whitening/bleaching** is discussed with what percentage of adolescent patients?
<5% 10% 20% 30% 40% 50% 60% 70% 80% 90% >95% Unsure

16. **Risks of tobacco use** are discussed with what percentage of adolescent patients?
<5% 10% 20% 30% 40% 50% 60% 70% 80% 90% >95% Unsure

17. **Pregnancy** is discussed with what percentage of adolescent patients?
<5% 10% 20% 30% 40% 50% 60% 70% 80% 90% >95% Unsure

18. **Oral cancer** is discussed with what percentage of adolescent patients?
<5% 10% 20% 30% 40% 50% 60% 70% 80% 90% >95% Unsure

19. **Risks of sexually transmitted diseases** are discussed with what percentage of adolescent patients?
<5% 10% 20% 30% 40% 50% 60% 70% 80% 90% >95% Unsure

20. **Alcohol and drug abuse** are discussed with what percentage of adolescent patients?
<5% 10% 20% 30% 40% 50% 60% 70% 80% 90% >95% Unsure

21. **Oral piercings** are discussed with what percentage of adolescent patients?
<5% 10% 20% 30% 40% 50% 60% 70% 80% 90% >95% Unsure

22. **Anorexia, bulimia, and/or eating disorders** are discussed with what percentage of adolescent patients?
<5% 10% 20% 30% 40% 50% 60% 70% 80% 90% >95% Unsure

APPENDIX B (continued)

23. **Please CIRCLE your own comfort level discussing each of the following topics with adolescent patients using the following scale:**

Comfort Level:	**Not at all comfortable**	**Somewhat comfortable**	**Comfortable**	**Very Comfortable**	**Extremely Comfortable**
Oral Hygiene Instructions	1	2	3	4	5
Dental caries as a Process	1	2	3	4	5
Nutritional Habits and Caries	1	2	3	4	5
Dental Sealants	1	2	3	4	5
Mouth Guards for Sports Activities	1	2	3	4	5
Orthodontic treatment	1	2	3	4	5
Teeth Whitening/bleaching	1	2	3	4	5
Risks of Smoking/Tobacco Use	1	2	3	4	5
Oral Cancer Risks	1	2	3	4	5
Pregnancy	1	2	3	4	5
Risks of Sexually Transmitted Diseases	1	2	3	4	5
Alcohol and Drug Abuse	1	2	3	4	5
Anorexia, Bulimia, and/or Eating Disorders	1	2	3	4	5

24. **Please CIRCLE how relevant you consider the following topics of adolescent oral health care to your own practice of dentistry using the following scale:**

Relevance to Your Practice:	**Never Relevant**	**Rarely Relevant**	**Sometimes Relevant**	**Often Relevant**	**Always Relevant**
Oral Hygiene Instructions	1	2	3	4	5
Dental caries as a Process	1	2	3	4	5
Nutritional Habits and Caries	1	2	3	4	5
Dental Sealants	1	2	3	4	5
Mouth Guards for Sports Activities	1	2	3	4	5
Orthodontic treatment	1	2	3	4	5
Teeth Whitening/bleaching	1	2	3	4	5
Risks of Smoking/Tobacco Use	1	2	3	4	5
Oral Cancer Risks	1	2	3	4	5
Pregnancy	1	2	3	4	5
Risks of Sexually Transmitted Diseases	1	2	3	4	5
Alcohol and Drug Abuse	1	2	3	4	5
Anorexia, Bulimia, and/or Eating Disorders	1	2	3	4	5

APPENDIX B (continued)

25. When addressing patient education issues for adolescent patients (ages 12-18 years old), please choose the following that **best applies** to your practice:
a. The parent accompanies the adolescent patient for the entire appointment, discussing all issues.
b. The parent accompanies the adolescent patient for some of the appointment, while some issues are addressed with the adolescent patient alone
c. The parent is not present for the appointment, the parent remains in the waiting room.

26. Your Gender a. Male b. Female

27. Which of the following describe you (please circle ALL that apply):
a. White b. Black/African American c. Hispanic/Latino
d. Asian e. American Indian/Alaska native f. Native Hawaiian/Pacific Islander

28. How many years have you been practicing dentistry? _____

29. What is your primary practice type?
a. Solo private practice b. Group Private Practice c. Community Clinic d. Academic Setting

30. How do you describe your practice location? a. City b. Small Town or Rural

Thank you for completing this survey, please return in enclosed envelope.

APPENDIX C

UNIVERSITY OF ILLINOIS
AT CHICAGO

Office for the Protection of Research Subjects (OPRS)
Office of the Vice Chancellor for Research (MC 672)
203 Administrative Office Building
1737 West Polk Street
Chicago, Illinois 60612-7227

Exemption Granted

July 13, 2012

Amanda Day, DDS
Pediatric Dentistry
801 South Paulina Street
M/C 850
Chicago, IL 60612
Phone: (312) 996-7530 / Fax: (312) 413-8006

RE: Research Protocol # 2012-0576
"Pediatric and General Dentists' Behaviors and Attitudes towards Adolescent Oral Health Care Issues"
Sponsors: None

Dear Dr. Day:

Your Claim of Exemption was reviewed on July 12, 2012 and it was determined that your research protocol meets the criteria for exemption as defined in the U. S. Department of Health and Human Services Regulations for the Protection of Human Subjects [(45 CFR 46.101(b)]. You may now begin your research.

Exemption Period:	**July 12, 2012 – July 12, 2015**
Performance Site:	UIC
Subject Population:	Adult (18+ years) subjects only
Number of Subjects:	600

The specific exemption category under 45 CFR 46.101(b) is:
(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless:(i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

APPENDIX C (Continued)

You are reminded that investigators whose research involving human subjects is determined to be exempt from the federal regulations for the protection of human subjects still have responsibilities for the ethical conduct of the research under state law and UIC policy. Please be aware of the following UIC policies and responsibilities for investigators:

1. Amendments You are responsible for reporting any amendments to your research protocol that may affect the determination of the exemption and may result in your research no longer being eligible for the exemption that has been granted.

2. Record Keeping You are responsible for maintaining a copy all research related records in a secure location in the event future verification is necessary, at a minimum these documents include: the research protocol, the claim of exemption application, all questionnaires, survey instruments, interview questions and/or data collection instruments associated with this research protocol, recruiting or advertising materials, any consent forms or information sheets given to subjects, or any other pertinent documents.

3. Final Report When you have completed work on your research protocol, you should submit a final report to the Office for Protection of Research Subjects (OPRS).

4. Information for Human Subjects UIC Policy requires investigators to provide information about the research protocol to subjects and to obtain their permission prior to their participating in the research. The information about the research protocol should be presented to subjects in writing or orally from a written script. When appropriate, the following information must be provided to all research subjects participating in exempt studies:
    a. The researchers affiliation; UIC, JBVMAC or other institutions,
    b. The purpose of the research,
    c. The extent of the subject's involvement and an explanation of the procedures to be followed,
    d. Whether the information being collected will be used for any purposes other than the proposed research,
    e. A description of the procedures to protect the privacy of subjects and the confidentiality of the research information and data,
    f. Description of any reasonable foreseeable risks,
    g. Description of anticipated benefit,
    h. A statement that participation is voluntary and subjects can refuse to participate or can stop at any time,
    i. A statement that the researcher is available to answer any questions that the subject may have and which includes the name and phone number of the investigator(s).
    j. A statement that the UIC IRB/OPRS or JBVMAC Patient Advocate Office is available if there are questions about subject's rights, which includes the appropriate phone numbers.

APPENDIX C (Continued)

Please be sure to:
→Use your research protocol number (listed above) on any documents or correspondence with the IRB concerning your research protocol.

We wish you the best as you conduct your research. If you have any questions or need further help, please contact me at (312) 355-2908 or the OPRS office at (312) 996-1711. Please send any correspondence about this protocol to OPRS at 203 AOB, M/C 672.

Sincerely,

Charles W. Hoehne, B.S., C.I.P.
Assistant Director, IRB # 2
Office for the Protection of Research Subjects

cc: Indru C. Punwani, Pediatric Dentistry, M/C 850
Shahrbanoo Fadavi, Pediatric Dentistry, M/C 850

VITA

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Certificate in Pediatric Dentistry
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University of Tennessee Health Science Center, Memphis, Tennessee — 2007 - 2011
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Duke University, Durham, North Carolina — 1999 –2003
Bachelor of Arts
English Major, Biology Minor
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EMPLOYMENT:

Japan Exchange and Teaching Program, Miyagi-ken, Japan — 2003 - 2006
Assistant Language Teacher,
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Student National Dental Association, Community Health Clinics — 2007-2011
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