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Effectiveness of Autism Education in Accredited Dental Hygiene Programs

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EFFECTIVENESS OF AUTISM EDUCATION
IN ACCREDITED DENTAL HYGIENE PROGRAMS

A Dissertation
Presented to
The Faculty of the Educational Leadership Doctoral Program
Western Kentucky University
Bowling Green, Kentucky

In Partial Fulfillment
Of the Requirements for the Degree
Doctor of Education

By
Stephanie M. Riehn

May 2018

EFFECTIVENESS OF AUTISM EDUCATION
IN ACCREDITED DENTAL HYGIENE PROGRAMS

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DEDICATION

I dedicate this dissertation to my sweet Isabelle Grace, who shows me every day what it means to persevere despite challenges and obstacles that are placed within our path.

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I would like to thank my family for their unrelenting support throughout my educational journey. To my God, who has blessed me along my journey with drive, determination, and love. I do all things through Him. Thank you to Dr. Lynn Austin, who has served as a mentor from my undergraduate years to the present. I extend gracious gratitude to Dr. Joseph Evans for your words of encouragement and research expertise throughout my journey. To Robert Cobb, for spending countless hours ensuring my survey was at the highest level of excellence, and for walking me through every step of data analysis. To Christina Noel, for your knowledge and guidance about Autism, I extend my gratitude and heartfelt respect. To Dr. Tony Norman, for your guidance throughout my dissertation, and for always extending help within the doctoral program. I extend my heartfelt gratitude to Rachel Blevins for your support throughout my journey. Finally to the students and faculty of Western Kentucky University dental hygiene program, who have been instrumental with encouragement and support. I am eternally grateful for each and every one of you.

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**EFFECTIVENESS OF AUTISM EDUCATION
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Western Kentucky University

The increase in the prevalence of individuals diagnosed with autism spectrum disorder (ASD) has increased dramatically over the last few decades, causing an increase in the exposure of dental professionals to patients with the disorder in a clinical setting.

The purpose of this study is to understand the influence of the licensed dental hygienists' professional attitude towards treating a patient with ASD, and the level of accommodations provided to patients with ASD during a routine dental visit, based on the amount of knowledge provided about the disorder during an accredited dental hygiene program. Survey data were collected from 78 registered dental hygienists from the states of Kentucky and Tennessee. The results revealed that 58 (80.5%) treat patients with ASD within their dental practices, and 41.03% of these reported treating one patient per month. The researcher sought to investigate the influence of the amount of knowledge presented on ASD within an accredited dental hygiene program and the influence of the dental hygienists' attitude towards treating patients with ASD post-graduation. Results of the study revealed no significant difference of the dental hygienists' professional attitude toward treating a patient with autism spectrum disorder and the accommodations provided to patients with autism during a routine dental visit and the amount of education provided during their accredited dental hygiene program. Given the increased prevalence of ASD, it is vital to address the lack of access to care, and evaluate the amount of education received while attending an accredited dental hygiene program.

CHAPTER I: INTRODUCTION

Statement of the Problem

An increase in diagnosis of Autism Spectrum Disorder (ASD) has become a concern for dental professionals, as they struggle to stay abreast on procedures and techniques required to effectively provide preventive care to these patients, thus contributing to the lack of access to care. According to Nelson, Chim, Sheller, McKinney, and Scott (2017), “The prevalence of unmet dental need in children with ASD is 12% to 15% compared with approximately 5% of typically developing children” (p. 485). Autism is a spectrum disorder, meaning each individual will possess varying degrees of challenges, assimilation, and abilities, therefore, requiring the dental professional providing care for these patients to master the ability to modify treatment accordingly (Brown, Brown, & Woodburn, 2014; Delli, Reichart, Bornstein, & Livas, 2013; Williams 2009). According to the Autism and Development Disabilities Monitoring (AADM) Network, as cited by the Center for Disease Control (2016), approximately 1 in 68 children have been identified with ASD. Although more common in males than females, it is seen among all ethnicities, races, and socioeconomic groups. The prevalence of ASD will require dental professionals to become familiar with the defining characteristics of the disorder. They must make accommodations and treatment considerations to alleviate patient anxiety during dental visits and become more knowledgeable of ASD and other behavioral disorders affecting patients on a daily basis.

Limited exposure to patients with ASD while attending an accredited dental hygiene program and lack of knowledge of the disorder are suspected to be the most pressing issues in effectively delivering successful routine dental prophylaxes in a dental

practice. According to Jaccarino (2009), modification of traditional treatment delivery procedures, flexibility, increased knowledge, and patience of a dental team will allow for a safe and inviting environment for patients with ASD.

Dental Hygiene Education

Students

Undergraduate college students seeking a dental hygiene degree are required to attend an accredited dental hygiene program, successfully fulfill the clinical requirements, and pass national and regional board examinations upon completion of the program. Once students have successfully passed the board exam, they must apply for licensure in the state they intend to practice. Each two-year dental hygiene program requires patient exposure in the clinical setting. However, preparation for successfully passing the national and regional board examinations requires dental hygiene students to recall a wealth of information in a short period of time. This results in a lack of knowledge and limited or no exposure to many different patient populations the clinician will treat post-graduation.

Educators

Dental hygiene educators are faced with a plethora of information that must be taught within a two-year period, including oral anatomy, oral histology, periodontology, radiology, pathology, dental materials, and preventative procedures, just to name a few. This limited time frame often prevents educators from including significant lecture time on the treatment of patients with ASD. It is essential for dental hygiene students to be knowledgeable about ASD and have experience treating these individuals in order to effectively provide routine dental care post-graduation.

“The Commission on Dental Accreditation (CODA) serves the public and profession by developing and implementing accreditation standards that promote and monitor the continuous quality and improvement of dental education programs” (ADA, 2017). The adequacy of student education within an accredited dental hygiene program in regards to treating patients with (ASD) in a clinical setting has received little attention. Within the dental office, the dental hygienist is the individual who will initially treat a patient with ASD. Therefore, proper education is critical for the patient and clinician. According to the CODA, as cited by the American Dental Association (2017), special needs includes conditions such as heart disease, hypertension, cancer, decreased mental capacity, asthma, chronic obstructive pulmonary disease (COPD), Autism (ASD), and Sensory Processing Disorder (SPD). Yet, as stated earlier, there is a daunting amount of information required to prepare dental hygiene students for the written national board exam. Therefore, instructors are limited with the amount of time available to spend on each of the special needs listed above, and lack of access to an adequate pool of individuals with disabilities continues to be an issue in dental hygiene programs.

Dental Hygiene Accreditation

The educational standards required for successful completion of a dental hygiene program are governed by CODA, and the standards set must be followed by each dental hygiene program to maintain accreditation. Accreditation standards have been regulating dental programs since January 1, 1975. CODA is comprised of 30 members, including one representative from the American Dental Hygienists’ Association (ADHA), as well as several other dental disciplines. The goal of CODA is to protect the welfare of the public, provide guidance for dental programs, stimulate continued growth of existing

programs, and set guidelines for newly developed programs. According to the Accreditation Standards for Dental Hygiene Programs, included in the report of CODA, “the importance of academic freedom is recognized by the Commission; therefore, the standards are stated in terms that allow institution flexibility in the development of an educational program. It is expected that institutions which voluntarily seek accreditation will recognize the ethical obligation of complying with the spirit as well as the letter of these standards” (p. 6). However, ensuring accreditation standards are followed and implemented, while providing each student adequate exposure to all patient populations, is at the discretion of the educational institution.

Delivery of information in an accredited program is typically presented using didactic lecture style complemented by a hands-on clinical approach to ensure each student can proficiently demonstrate applied learning in a clinical setting using live patients. Access to patients with special care needs can be challenging depending on the clinic’s patient population, and many students do not have the opportunity to treat patients with special needs throughout their educational experience. CODA defines “special needs” as

those patients whose medical, physical, psychological, or social situations make it necessary to modify normal dental routines in order to provide dental treatment for that individual. These individuals include, but are not limited to, people with developmental disabilities, complex medical problems, and significant physical limitations. (p. 11)

CODA includes developmental disabilities and behavioral disabilities within the same category and outlines the criteria for dental hygiene programs to follow to allow exposure

of dental hygiene students to patients with special needs in the category of *Patient Care Competencies* in standard 2-12:

Graduates must be competent in providing dental hygiene care for the child, adolescent, adult, and geriatric patient. Graduates must be competent in assessing the treatment needs of patients with special needs.

Intent: An appropriate patient pool should be available to provide a wide scope of patient experiences that include patients whose medical, physical, psychological, or social situations may make it necessary to modify procedures in order to provide dental hygiene treatment for that individual. Student experiences should be evaluated for competency and monitored to ensure equal opportunities for each enrolled student. Clinical instruction and experiences with special needs patients should include instruction in proper communication and techniques and assessing the treatment needs compatible with these patients. (p. 22)

Although accreditation standards provide outlines for expectations of dental hygiene programs to provide the necessary experiences, how dental programs choose to meet the standards varies.

Autism Spectrum Disorder Characteristics

ASD is diagnosed by a classification system developed by the American Psychiatric Association (APA) and was developed by psychiatrists, psychologists, and physicians who specialize in the area of ASD. The system utilized internationally is the *Diagnostic and Statistical Manual of Mental Disorders* (DSM), and is published by the APA (Hall, 2013). Revisions included in the DSM-5 included a single diagnostic category of autism spectrum disorder and the term Asperger's syndrome is no longer

utilized, and according to Hall (2013) the new criteria included allowed for varying degrees of severity including a scale of 1-3 (1 requiring support and 3 requiring very substantial support).

According to Hall (2013), the criteria for diagnosis of ASD includes the following: “(a) social communication and social interaction across contexts, and (b) restricted patterns of behavior, interests, and activities with (c) symptoms that must be present in childhood that (d) limit and impair everyday functioning” (p. 2). The DSM-5 contains the most current diagnostic criteria for ASD as illustrated in Figure 1.

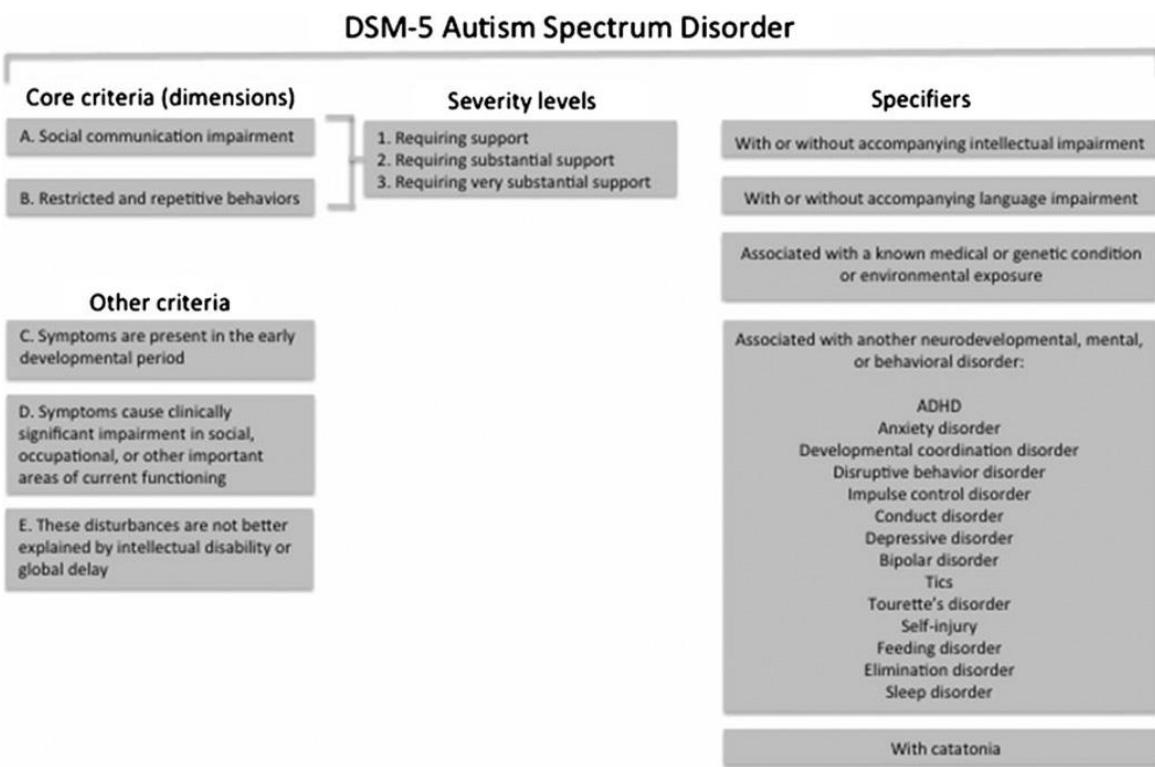


Figure 1. Illustration of the DSM-5 ASD diagnostic criteria and specifiers. Adapted from “Autism Spectrum Disorder: Defining Dimensions and Subgroups,” by O. Ousley and T. Cermak. 2014, Current Developmental Disorders Report, 1(1), p. 15.

It is vital to understand the characteristics and fully comprehend the different levels of this spectrum disorder to effectively treat a patient with ASD in a clinical dental setting. Specialized behavior modifications are essential when treating a patient with ASD in the dental office, and as indicated by Weil, Inglehart, and Habil (2010), a lower percentage of general dentists are comfortable with treating patients with ASD due to the following symptoms: lack of communication, decreased social interaction, and a dislike for change.

According to Nelson et al. (2017), when children with ASD are placed in new environments, such as doctor/dentist offices, it is essential that the medical/dental professional initiate a process of desensitizing the individual to prepare for a successful visit. Desensitization techniques include slowly introducing the patient with ASD to the staff, showing instruments to be used during the procedure, use of social stories, and interaction with the same medical/dental professional to promote consistency. Nelson et al. explains that it may be necessary for the patient with ASD to encounter multiple desensitization visits to become fully comfortable with the staff and environment, especially if the patient is hyper-sensitive to sensory input.

Sensory Sensitivities

Individuals with ASD have a higher sensitivity to sensory stimuli, creating barriers to comfort in environments such as the dental office due to strange smells, loud sounds, and bright lights. Sensory sensitivities vary among individuals and hyposensitivity can occur with one sense, while hypersensitivity can occur with another, and degree and stimuli can vary from day to day or moment to moment depending if the individual is stressed or tired. Stein, Polido, and Cermak (2012) reported, according to

Baranek, David, Poe, Stone and Watson (2006), “One factor that may influence the ability to successfully complete activities of daily living (ADL) is sensory processing, reported in 69%-95% of children with ASD” (p.73). The clinician becoming more knowledgeable about sensory stimuli for patients with ASD will increase the likelihood of a successful routine dental visit, and knowledge of desensitization techniques can determine how well a patient with ASD adapts to the sensory stimuli of the dental office, as well as increasing success when attempting ADLs.

Dental offices have many different sounds such as dental drills, ringing phones, chatter of dental professionals and patients, background music, dental equipment, and televisions. Individuals with ASD who experience auditory sensitivities could experience sensory overload if they are hypersensitive to these noises. This type of response to auditory stimuli could be the cause of a patient’s resistance to enter a dental environment and create a behavioral breakdown that the individual with ASD cannot recover from in a time frame that would allow continuation of the dental visit. This extends to the language pattern and speed of the language that is utilized by the dental professional when communicating with a patient with ASD. Complete understanding of how auditory stimuli affects these individuals is essential to achieving a successful dental visit.

Sensory Perceptual Difficulties

Sensory Oversensitivity. Sensory stimulation will vary among each individual and will be different from day to day, depending on the daily activities of the individual with ASD. Each child with ASD will have the potential to be overstimulated by varying stimuli; it may include all five senses or be selective to just a few senses. In any case, when a child is overstimulated, attention and focus are sacrificed.

Perceptual Issues. Each child will learn in a different manner, whether it be visually or interactively, and children with ASD are no exception. When a child has problems with perception, teachers and individuals providing care must explore the appropriate avenue for learning. Perceptual problems including both visual and auditory processing deficiencies could be accommodated in many ways, such as allowance for individuals who learn more effectively through touch, instructions with a step-by-step approach, or visual charts. According to Hall (2013) communication strengths of individuals with ASD will vary, with little to no issues with the physical form of the oral and vocal structures. However, each individual will possess differing levels of language skills that would require the dental professional to use alternative avenues of communication, such as, social scripts and stories when delivering pertinent information during the dental visit.

The Problem Defined

A lack of access to care is one of the most pressing issues with patients with ASD. According to Weil et al. (2010), “Research has shown that many general dentists do not accept patients with ASD” (p. 1294). Many dental professionals will never take a course post-graduation on ASD characteristics or learn how to effectively treat these individuals during their professional career. Research on treatment of patients with ASD in the dental profession as a whole is scarce; therefore, the role of the dental hygienist in the treatment of patients with ASD in a clinical setting is a pressing issue.

According to Clemetson , Jones, Lacy, Hale and Bolin. (2012), “The Commission on Dental Accreditation (CODA) defines dental patients with special needs as those patients whose medical, physical, psychological, or social situations make it necessary to

modify normal dental routines in order to provide dental treatment for that individual.”

Dental hygiene educators follow the accreditation guidelines set by CODA; therefore, the educators teach that special needs includes systemic and “behavioral special needs”, and requirements to provide dental care with the appropriate accommodations would include a wide range as a result. For example, the standard could be met in lieu of a variety of methods such as: a) writing a paper, b) visiting a center focused on special needs, or c) treating three patients with a specific condition.

Revision of the accreditation standards implemented in 2006 states that graduates from dental programs must be proficient in identifying treatment needs for patients with special needs. However, the guidelines fail to address the protocol for treating patients with “behavioral special needs”, such as ASD. According to Dehaitem, Ridley, Kerschbaum, Inglehart, and Habil (2008), “Considering the disproportionate burden of oral health for patients with special needs and their access to care problems, it seems important to reflect on the role of dental and dental hygiene education in preparing future practitioners for the treatment of this patient population” (p. 1010). The goal is to expose dental hygiene students to patients with “behavioral special needs” prior to graduation from an accredited dental hygiene program to ensure comfortability and confidence in caring for patients with ASD. Lack of exposure and knowledge has left patients with ASD neglected and underserved, in the dental field.

Deficiency of Research

Dental hygienists take an oath to provide quality, routine care to all patients they treat regardless of race, gender, or disability. However, the lack of research on treating patients with special needs has left the profession unable to provide care to all those in need. The best way to investigate the lack of access to care for patients with ASD is to survey the empirical evidence in the research. The current focus on predoctoral dental professionals and practicing dentists has left the dental hygiene profession as an under-researched entity.

The hygienist is the dental professional providing the preventative dental care in the dental practice on a daily basis, such as dental cleanings, radiographs, dental sealants, and fluoride treatments. Therefore, research on dental hygiene and autism is essential. According to Clemetson et al. (2012), “In 2005, the surgeon general identified gaps in the training and education of health care providers as a major part of the problem of inadequate access to care.” Researchers need to investigate the gaps in training and education in the field of dentistry, with a focus on dental hygienists.

Vague guidelines set by CODA on educational requirements for the treatment of special needs patients contributes to the lack of education on ASD in dental hygiene programs. Many dental hygiene students are taught very little about ASD and will never be exposed to treating an ASD patient in a clinical setting prior to graduating from an accredited program. Further, following licensure for clinical practice, the dental hygienist may never attend a continuing education course specifically focused on special needs including ASD. Research on this issue has not been done prior to this study. Therefore, it is imperative to establish a need for evaluation of the accreditation standards, as well as

the lack of preparation of dental hygiene students in effectively treating patients with ASD in a clinical setting.

Purpose and Central Research Question

This study integrates the issues described in “The Problem Defined” section. First, there is insufficient research related to the dental hygiene profession, with regard to treatment of patients with ASD in a clinical dental setting. Second, lack of research on the impact of CODA standards’ effect on preparation at the undergraduate level may leave dental hygienists with a lack of knowledge of ASD characteristics. Finally, dentists are the primary focus of existing research, which fails to consider that the dentist will perform mostly restorative dentistry while the hygienist is responsible for the majority of the preventative dental services, including oral hygiene instructions, dental prophylaxis, dental radiographs, and dental examinations.

The purpose of this study is to understand the influence of the licensed dental hygienists’ professional attitude towards treating a patient with ASD, and the level of accommodations provided to patients with ASD during a routine dental visit, based on the amount of knowledge provided about the disorder during an accredited dental hygiene program. The researcher will utilize a quantitative approach by surveying registered dental hygienists, which will allow the researcher to investigate how knowledge of ASD dictates how effectively accommodations are provided during routine dental visits. This study focuses on active, licensed registered dental hygienists in Kentucky and Tennessee. The central research question provides invaluable information for dental hygiene professionals: Is there a correlation between registered dental hygienists’ attitude in

treating a patient with ASD and the amount of education they receive pertaining to ASD during their time as a dental hygiene student?

Empirical Research Questions

The empirical research questions developed by the researcher are based upon a selective literature review of dental professionals within a clinical practice and ASD. The empirical research questions are related to clinical treatment of ASD patients within the dental profession. More specifically, the questions related to the adequacy of ASD education in accredited dental hygiene programs. With the growing number of individuals diagnosed with ASD each year, the pressure to become familiar with the characteristics of ASD will become overwhelming. Providing access to care for ASD individuals will become a focus in the field of dentistry. Therefore, exploring the professional attitude of registered dental hygienists when treating patients with ASD, and the adequacy of ASD education within accredited programs is imperative to reach an appropriate level of access to care.

The hypothesis for this study is as follows: Accreditation standards on special needs, outlined by the Commission on Dental Accreditation, and exposure during undergraduate studies in an accredited dental hygiene program will be a definitive factor in successfully treating patients with ASD. The researcher will seek to understand how current accreditation standards among dental hygiene programs has an impact on the attitude of registered dental hygienists when treating a patient with ASD during a routine dental visit by addressing the central research question outlined above and answering the following research questions:

1. Is there a significant difference in either dental hygienists' professional attitude toward patients with autism spectrum disorders or the accommodations they make for these patients based on the amount of education provided on autism spectrum disorder received during their dental hygiene education?
2. Is there a significant difference in either dental hygienists' professional attitude toward patients with autism spectrum disorders or the accommodations they make for these patients based on the number of years' experience practicing dental hygiene?
3. Is there a significant difference between the dental hygienists' professional attitude and the accommodations they provide when treating patients with autism spectrum disorder?
4. Is there a significant difference in either dental hygienists' professional attitude toward patients with autism spectrum disorders or the accommodations they make for these patients based on the age of the hygienist?

Significance of the Problem

With an increase of children diagnosed with ASD, a lack of exposure to patients with autism and minimal coverage of information on the disorder in the classroom could potentially have an effect on a lack of access to care to the patient population on the spectrum. This fact leads us to the conclusion that further research would be beneficial in determining if CODA standards and the broad spectrum of special needs, as outlined in the standards, have an impact on post-graduation competency to treat patients on the autism spectrum. This study will examine how the definition of special needs outlined by CODA has an impact on successful routine dental exams and prophylaxis procedures

performed by licensed dental hygienists on ASD patients in a clinical dental practice. Ensuring every individual can receive dental care, regardless of behavioral or developmental disabilities, improves access to care issues for this subset of patients. Additionally, determining how CODA standards dictate the level of exposure to individuals on the spectrum could promote vital amendments to how the standards are written.

Data Collection

The population for this study includes registered dental hygienists, with licenses to practice dental hygiene in the states of Kentucky and Tennessee. The researcher sought to utilize a large sample size by obtaining participants' information through licensure records from the Kentucky Board of Dentistry (KBD) and Tennessee Board of Dentistry (TBD). Permission has been obtained through email communication with the KBD and the TBD, and information shared with the researcher about active licensed dental hygienists in the respective states will be evaluated in the study. Surveys will be emailed to all active registered dental hygienists on record with the Kentucky Board of Dentistry and the Tennessee Board of Dentistry using WKU Qualtrics[®] survey software. This method will ensure the confidentiality of each participant and their participation in the survey, through implied consent for the use of data received through the survey submission.

CHAPTER II: REVIEW OF THE LITERATURE

A review of the current research regarding dental treatment for patients with ASD has revealed a lack of research studies on this topic. There is limited qualitative and quantitative research on the topic of ASD and dental professionals, but multiple articles are available for dental professionals to learn characteristics and dental considerations necessary to treat these patients in a clinical dental setting. However, few have been tested and supportive data are not available as a result.

Dental Considerations

Oral care is essential for life-long health, and according to the U.S. Department of Health and Human Services (as cited in Stein, Polido, & Cermak, 2012), “Poor oral health may result in difficulties with eating, sleeping, and speaking, as well as decreased school attendance and reduced self-esteem” (p. 73). The long-term effects of poor oral hygiene and lack of adequate dental care are some of the most pressing issues facing patients with disabilities. The link among periodontal disease and systemic disease is a cause of concern for many of these patients who are unable to successfully attend a dental visit to prevent oral disease. Many patients with ASD will demonstrate oral sensory issues posing challenges with toothbrushing at home, as well as difficulty with the texture and taste of toothpaste. Barriers to dental care for children with ASD, compared with typically developing children, is gaining attention from researchers. According to Nelson, Chim, Sheller, McKinney, and Scott (2017), “The prevalence of unmet dental need in children with ASD is 12% to 15% compared with approximately 5% of typically developing children” (p. 485). Lack of access to care is propelled by the barriers of care affecting this subset of patients.

Barriers to Dental Care

Patients with ASD will exhibit aversions to sensory stimuli, demonstrate communication barriers, lack of social skills, and decreased language, or be nonverbal. Therefore, it is essential for dental professionals to be cognizant of these deficiencies when providing dental care in a private practice. Limited research is available on the barriers to care for patients with ASD in a dental setting. Kuhaneck and Chisholm (as cited in Brown et al., 2014), stated that sensory defensiveness is common in many individuals with ASD and a clear understanding of sensory aversion of patients with ASD would elicit a more positive outcome for the patient and dental team. Learning about each individual patient and how sensory defensiveness dictates the patient with ASD is necessary, as no two will have similar sensory triggers.

Research conducted by Stein et al. (2012) examined the sensory-related issues of patients with ASD considered the challenges of oral care in the home and in the dental office, and heard stories from the parents of children with ASD and compared them to the outcome of the research from surveys evaluating oral care in the home and the dental office. The authors' survey instrument included 37 items to evaluate the home care routines of children with ASD, which included: tooth brushing, toleration of toothpaste, dental prophylaxis experiences, and sensory challenges during the visit, including aversion to the dental light and the effect of sounds during the dental visit. Stein et al. (2012) also included considerations for behavioral challenges that may have presented as a result of the dental visit, such as uncooperative behavior. 196 participants in the survey were parents of children with ASD and 202 were parents of typically developed (TD) children ages 2-18. Additionally, a focus group of five mothers was developed that

included a three hour session of open-ended discussion to learn about their personal dental experiences and examine why their children experienced successful or unsuccessful dental visits.

Stein et al. (2012) found that the parents of children with ASD reported more aversion to toothbrushing and the texture and taste of oral dentifrices in comparison to the TD children. Similarly, oral care provided in a dental office was more challenging for the children with ASD as compared to the TD children. The parents of the children with ASD reported that their children exhibited more unfavorable behavior due to overstimulation from the smells, sounds, bright lights, and reclining in the dental chair in comparison to the TD children's parents. The focus group reported that negative outcomes from the dental office visit impacted the way their children viewed future dental visits, and as a result, negative behavior occurred following the visit.

Limitations of the study, as identified by Stein et al. (2012) included parent-reported diagnosis of ASD, an informal analysis of the focus group data, and significant age differences in the two groups. The subjects in this study included children with ASD and children with typical development; however, they did not consider that the TD patients could potentially have sensory implications that affected the outcome of the results. Since the authors included the sensory issues of the children with ASD, they would need to ensure the TP children did not exhibit sensory characteristics as well. Sensory aversion is one of the most prevalent issues in providing dental care to patients with ASD, and careful exploration of other barriers to dental care is essential for making changes in access to care for the ASD population seeking effective dental services.

A similar study conducted by Brown et al. (2014) examined the perceived barriers to dental care of parents of children with ASD. The pilot study included 19 participants with varying levels of ASD, including additional diagnoses of Attention Deficit Hyperactivity Disorder (ADHD) and dyspraxia. Brown et al. (2014) utilized mixed methods by administering a survey and follow-up interviews with the parents of children with ASD. The researchers devised themes for potential barriers to dental care, including environmental or sensory factors, adaptations to dental services, explanations of dental services, and acceptances to differences of patients with ASD.

The researchers' results revealed that the dentist did not adapt to the anxieties of the patients with ASD, creating a lack of cooperation during dental visits. Additionally, the dental professionals failed to use language that the patient with ASD could understand. For example, use of technical dental terms or jargon, undesirable tone, and the use of "hyped-up" language was overstimulating for the patient. However, Brown et al. (2014) also reported that the parents of the children with ASD expressed successful experiences when the dental professionals utilized social stories as a tool in preparation for the dental visit. Additionally, promotion of successful outcomes were produced when the dental professional possessed knowledge of the characteristics of ASD and made accommodations to promote successful outcomes, such as collaborating with parents to tailor the dental environment to the child with ASD. The researchers found that the most prevalent dental barrier was the dental professionals' lack of knowledge of ASD. The limitations of this study included a small sample size and the fact that it was a pilot study. The researchers touched on key issues that warrant a need for further research on this topic.

Access to Care

Children with special needs may demonstrate behavioral aggression, hypersensory and/or hyposensory sensitivities, impaired executive function, attention and hyperactivity, language delays, and communication barriers, all of which can make dental treatment challenging and dangerous (Lai, Milano, Roberts, & Hooper, 2011). A wealth of literature is available to explore the lack of access to care for patients with special needs, while limited research is available on the effectiveness of predoctoral and undergraduate dental hygiene education on the treatment of patients with special needs. Current trends in the literature include evaluating predoctoral changes to education determined by the revision of accreditation standards, perceptions of dental education and practice patterns, surveys of U.S. programs, attitudes of dental professionals treating patients with special needs, and how the attitudes of dental professionals on patients with special needs affects practice characteristics.

The method utilized by Lai et al. (2011) included a mail-in questionnaire, sent to 1500 families that were currently on the North Carolina Autism Registry. The participants were selected from a pool of 4500 individuals on the registry by a stratified random sampling scheme with weighted allocation. The participants were all under the age of 18 and diagnosed with ASD. The questionnaire addressed demographic information, needs assessment, predisposing factors, enabling factors, barriers to access to dental care, and levels of severity of the disorder. The research was conducted from March to May of 2010, and all questionnaires returned were collected by the Autism Registry at UNC's Neurodevelopmental Disorders Research Center. Lai et al. (2011) reported that the response rate was 37%, and a total of 555 questionnaires were returned.

Unmet dental needs were reported in 11.7% of the questionnaires over a six-month time period. Ninety percent of the participants reported having a routine dental visit within a year of the survey, and 77% reported they visited the dentist every 3-6 months. The most common problems identified among the parents included negative behavior of the patient, as reported by the parents, and the dentist not accepting their type of insurance. Barriers to care included patient cooperation, cost of care, and lack of dental insurance.

Bias was perhaps another limitation, as the individuals of the Autism Registry of North Carolina are more likely to have access to care and resources for behavioral management. Additionally, children with severe disabilities are more likely to be institutionalized, therefore excluding them from participation in the study, and individuals who are illiterate or nonverbal are more likely to have a lack of access to care due to their disabilities. Last, the type of dental procedure was not included in the questionnaire. Varying procedures can potentially spark a negative behavior, and routine dental cleanings might be viewed as more tolerable when compared with fillings or root canals. Therefore, personal bias could result in a lack of accurate information. While it is important how the dental patient with ASD views access to care, it is equally important to understand how dental professionals view their personal comfort level when treating patients with ASD in a clinical setting.

Accommodations

A review of the literature on behavior management and successful accommodations for children with ASD in a dental setting conducted by Hernandez and Ikkanda (2011), revealed the need for further research in this area. The authors conducted a thorough examination of the existing research to identify gaps in the methods utilized in

dental settings by professionals attempting to provide routine dental care for patients with ASD. Hernandez and Ikkanda (2011) defined Applied Behavior Analysis (ABA) as “a branch of psychology that is focused on the analysis and modification of human behavior” (p. 283). This approach to examining human behavior is inclusive of the environment and evaluates the exhibited behavior, with an account of the existing variables present. ABA has been utilized in developmental behavioral disorders to elicit positive outcomes and can be used to promote positive behavior and negate negative behavior.

The use of ABA’s in dentistry can determine the result of successful routine dental visits through the use of stickers, praise, and the traditional toy treasure box given to pediatric patients following a dental visit. ABA for children with ASD can help the dental professional develop a plan of action that best suits the individual and promotes success in the dental office. According to Hernandez and Ikkanda (2011), the use of ABA has a long history in the field of education. The implementation of intake interviews and questionnaires were utilized to determine how the individual with ASD functions in certain situations and how the desirable behavior is achieved in the classroom. Preparation and planning using an intake questionnaire allows dental professionals to evaluate the appropriate behavior enforcers for the individual child, including conditional reinforcement and behavior-shaping techniques.

Dental professionals utilizing ABA could use the following techniques once the analysis has been conducted: praising the patient for sitting appropriately in the dental chair, giving a specified time frame the patient will be sitting in the dental chair, and allowing them to get up once the time has elapsed. Additionally, the use of behavior-

reinforcing techniques in the dental office should be balanced. For example, a patient who is allowed too much access to an object during a dental visit could potentially lose interest in the object and reduce the effectiveness of the behavior modification technique. Hernandez and Ikkanda (2011) concluded that ABA-based procedures are indicated in dentistry, and successful implementation could have the potential to elicit more successful routine dental experiences for children with ASD. However, the downside is the need for further education, and it is time-consuming to achieve implementation in a busy dental practice. The authors recommend empirical research be conducted to test how effective behavior management dictates successful routine dental visits.

Support of the use of ABA in the dental treatment of patients with ASD is discussed by Limeres-Posse, Castano-Novoa, Abeleira-Pozos, and Ramos-Barbosa (2014). While there is no one answer to ensure the desirable behavior is achieved, Limeres-Posse et al. (2014) state that the use of prior information, knowledge of the level of disability of the child with ASD, and previous successful behavioral modifiers can have the potential to promote a higher success rate in the dental office for these patients. One of the most commonly utilized pedagogic concepts is the TEACCH (Treatment and Education of Autistic and Communication related Handicapped Children) method, which connects behavior modification, and language and social communication therapies by using visual learning techniques such as social stories. Limeres-Posse et al. (2014) cited a 1999 study conducted by Backman and Pilebro that tested the effectiveness of visual aids in patients with ASD, with regard to toothbrushing. After one year of implantation of the social story the patients presented with less accumulation of dental plaque. Other techniques for behavior modifications included obtaining prior knowledge of how the

child demonstrates challenges and behavior under overstimulation, reduction of sensory stimuli (noises, smells, etc.), utilizing a repetitive approach to appointments (same clinician, treatment room, etc.), and practice at home prior to the appointment. Limeres-Posse et al. (2014) also stated that due to the degree of variance in behavior challenges in patients with ASD, successful behavior modifications will not be achieved the same way with each child who presents for dental visits; therefore, adjustments will be necessary from visit to visit.

Previous research discussed focuses on apparent barriers to dental care for patients with ASD, and how dental professionals can adapt to providing the necessary dental procedures with success. Therefore, research on accommodations necessary to achieve successful outcomes is vital to elicit change in the dental field. The management of children with ASD, accommodations, and ABA are key topics in the existing literature. As discussed by Nelson et al. (2017), children with ASD exhibit behavior differences in comparison to typically developing children. Therefore, altered methods are required in behavior guidance techniques (BGT) including “show-tell-do positive reinforcement, distractions, and voice control” (p. 486). Sensory input is a common barrier to care for patients with ASD, and lack of accommodations and altered methods will have a potentially negative outcome for dental professionals providing care to these patients.

Nelson et al. (2017) examined the effectiveness of desensitization techniques implemented in dental environments for patients with ASD, and found that when successful desensitization techniques were utilized by dental professionals, a successful dental outcome was experienced. Predictors for successful outcomes included variables

of older age; high-functioning individuals; increased ability of self-care; and higher communication skills, when compared to low-functioning individuals; increased sensory overload; and institutionalized individuals. As a result, the children with ASD who exhibit the successful predictors would benefit more from desensitization techniques.

Participants of the study included 168 children ages 4-18 with an ASD diagnosis from a physician, who took part in a three-year dental desensitization program at the Center for Pediatric Dentistry at the University of Washington. Secondary data were utilized from an intake questionnaire completed by parents of the participants prior to entering the desensitization program. The intake form included information regarding previous dental experiences, behavior, and social and communication skills of the child. The successful dental visit was defined by Nelson et al. (2017) as the child cooperating by sitting in the dental chair and allowing the dental professional to examine the oral cavity with a mouth mirror.

The clinical procedure for the dental staff included “administration of a pre-visit questionnaire, initial clinical behavioral assessment, development of an individualized care plan, use of a social story, and repeated clinical visits as necessary to achieve clinical goals” (Nelson et al., 2017, p. 487). Dental desensitization techniques utilized by the researchers resulted in successful dental exams for 77.4% of the participants within the first two visits (Nelson et al., 2017). The researchers did not account for the potential for maturity, amount of behavioral interventions and therapies, and increase in social skills during the three-year period revealing limitations to the study. Additionally, the parents provided the behavior information on the pre-visit questionnaire potentially creating bias in the data as the dental professionals’ knowledge of ASD from the questionnaires

throughout the research period could have been a determining factor in the success of the desensitization techniques.

Sensory processing in children with ASD can pose challenges in a dental setting due to the overwhelming number of high-pitched sounds and smells that are characteristic of a dental office. According to Cermak, Stein Duker, Williams, Dawson, Lane, and Polido (2015), “Difficulty with sensory processing is a well-recognized feature in autism, with reports indicating the presence of some form of sensory processing difficulty in up to 95% of children with ASD” (p. 2877). The use of social stories and behavior modification techniques aid in helping prepare the child with ASD for the process of the dental office, but do not accommodate other stimuli that may contribute to an unsuccessful dental visit.

Cermak et al. (2015) conducted a pilot study to evaluate the impact of sensory adapted dental environments (SADE) on successful dental visits in children with ASD. Sensory stimuli in the dental office include bright dental lights, close proximity of the dental professional and the patient, unusual taste and texture of prophylaxis paste, and sounds of the dental drill and suction devices. Additionally, the dental office may play music, have televisions in patient treatment areas, and have phones ringing, which can all elicit overstimulation of a child with ASD. Cermak et al. (2015) included 44 total participants (22 with ASD and 22 TD) between the ages of 6-12 years that had experienced a minimum of one dental prophylaxis, but not within 4-6 months prior to the study.

The participants included in the study were required to have a formal ASD diagnosis through the Autism Diagnostic Observation Schedule, with resources provided

to those participants without a diagnosis with this criteria. Dental examinations were provided to the participants in a regular dental environment (RDE) and in a SADE. Both were performed in the same treatment room with the abbreviations for the SADE including lowered treatment room lighting, with only a head light on the dental professional, music playing in the treatment room, and a butterfly wrap to simulate a hug and provide pressure to attempt to alleviate anxiety. Additionally, social stories were provided 1-2 weeks prior to the dental visit to aid parents in preparation for each visit.

Cermak et al. (2015) used electro dermal activity (EDA) to measure the stress and anxiety of the dental appointments. “Secondary outcome measures included behavioral distress, pain sensitivity, sensory discomfort, and measures related to cost of dental procedures” (Cermak et al. 2015, p. 2881). Results of the study were separated into four response to intervention categories including physiological measures, behavioral measures, child-reported measures, and cost savings. The researchers reported a decrease in EDA in the SADE treatment conditions in comparison to the RDE for both the ASD and the TD participants. According to Cermak et al. (2015) “Repeated ANCOVA models found a statistically significant effect of environment for SCL exam + prophylaxis + fluoride and exam + prophylaxis (p 's = 0.01), and NS-SCR exam + prophylaxis (p = 0.05)” (p. 2883). The child-reported measures revealed that there was a decrease sensory discomfort in both the ASD group and the TD group in the SADE environment (p 's = 0.05 and 0.09). However, only half of the ASD group recorded responses to both measures utilized for the self-reported ratings (n = 13 in RDE, n = 10 in SADE). Cost efficiency of the SADE included consideration for a decreased number of dental professionals needed to accompany the patients during the provided dental treatment, in

comparison to the RDE, which involved multiple people to restrain the patients and increase of sedation techniques used during the dental procedures.

Cermak et al. (2015) devised three hypotheses at the initiation of their research: a) children with ASD typically show more behavioral and physiological stress during routine dental visits in comparison to the children who are TD, which is evident in both the SADE and RDE treatment environments, b) children with ASD exhibit less stress in the SADE treatment environment, while the TD children would show no difference in the SADE and the RDE environment, c) cost and feasibility would be less with the SADE, but this type of treatment environment takes 5-7 minutes longer than the RDE, most likely because the child was more cooperative and allowed the dental professional more time to do a more thorough dental prophylaxis.

The study included a small sample size and was a pilot study, creating possible limitations to the results, but the findings create validity to perform the study on a larger scale. The use of sensory-adapted dental environments, like SADE, was proven to improve the experiences for the children with ASD and the TD children, thus validating the need for accommodations for these children in the future to ensure a successful and positive dental experience (Cermak et al., 2015, Stein et al., 2012). Additionally, the use of social stories and other desensitization techniques in preparation for dental treatment is essential when treating children with ASD in a dental practice (Cermak et al., 2015; Hernandez & Ikkanda, 2011; Limeres-Posse et al., 2014; Nelson et al., 2017; Stein et al., 2012). The importance of behavior modifications, sensory adapted dental environments, social stories, and desensitization techniques are essential, but the key factor in providing effective and successful routine dental care starts with the knowledge of ASD and the

characteristics involved, and this knowledge is vital for dental professionals who are providing the care to patients with ASD.

Dental Education

Educational curriculum that encompasses all potential situations that may occur in a real-world setting is impossible in the limited time students spend in accredited dental hygiene and dental programs. Exposure to patients with disabilities is limited, leaving the graduate with little knowledge of how to effectively treat patients with special needs in a clinical dental setting. Limited exposure and knowledge of ASD has the potential to create a negative attitude towards treating those patients clinically; therefore, creating a lack of access to care. Prior research reveals issues regarding lack of knowledge of the dental professional, barriers to care for patients with behavioral disabilities like ASD, effectiveness of currently practiced treatment modifications, and controversial treatment.

Treating a patient with special needs can be somewhat intimidating if dental professionals feel they lack knowledge regarding what their patient needs. To ensure the appropriate steps are taken to effectively and safely treat the patient in a clinical setting, the dental professional must be well versed in the characteristics of special needs patients, specifically patients with ASD. Dental schools and dental hygiene programs across the United States must adhere to the guidelines set by the CODA when devising educational lessons on treating special needs patients.

According to Clemetson et al. (2011), “CODA defines dental patients with special needs as those patients whose medical, physical, psychological, or social situations make it necessary to modify normal dental routines in order to provide dental treatment for that individual” (p. 1457). Special health care needs is defined by the American Academy of

Pediatric Dentistry website (n.d.) as, “Any physical, developmental, mental, sensory, behavioral, cognitive, or emotional impairment, or limiting condition that requires medical management, health care intervention, and/or use of specialized services or programs.” Treating individuals with special needs requires specialized knowledge acquired through additional training, increased awareness and attention, adaptation, and accommodative measures beyond what are considered routine.

Research conducted in the field of dentistry, in terms of focusing on special needs education provided in dental and dental hygiene programs is limited, and the limitation is more stringent on the knowledge of dental hygienists and special needs, specifically with a focus on patients with autism. The existing research on how dental professionals’ knowledge of autism will predict the likelihood of a successful dental visit for patients with ASD focuses on dentists and dental educators, thus leaving post-graduate dental hygienists as an under-researched population.

Evaluating the quality of dental and dental hygiene accredited programs is essential as we move forward into effective preparation to provide adequate routine dental care to patients with ASD. While there are only a few studies that investigate the effectiveness of dental education within dental programs, there are even fewer studies on dental hygiene programs and practicing dental hygienists. The following studies take a look at how dental programs are preparing dentists to treat patients with ASD and other special needs upon entering private practice, and how a lack of knowledge of dental professionals on the characteristics of these patients with disabilities has limited the treatment in their dental practices.

Research conducted by Waldman, Fenton, Perlman, and Cinotti (2005) evaluated two educational programs' special needs curriculum by how well the students were provided learning experiences, according to the revised CODA guidelines implemented in July 2004. According to Waldman et al. (2005), individuals with special needs are less likely to be institutionalized due to the growing availability of therapies and interventions readily accessible to those patients with special needs. This has led to an increased need for dental care to be provided by private practice dentists, a service previously offered solely in special care facilities. According to a study to determine the unmet needs and barriers of children with ASD, dental needs are the most unmet health care need among children in the United States (Lai et al., 2011). Waldman et al. (2005) conducted a review of the existing literature and found that by the end of the 1990's researchers had reported that over a four year period within a dental education program, students would have received less than five hours of classroom didactic instruction, and only 75 percent of the dental schools had provided practical educational experience in treating patients with special needs. There is a need to revise the accreditation standards for dental education and dental hygiene education programs on exposure to patients with special needs.

The gap in the existing literature is a focus on specific special needs including ASD and other behavioral special needs. Similarly, Kleinert et al. (2007) reported a deficiency in the majority of dental students' preparation in treating patients with special needs, as a result of lack of educational experiences within accredited programs across the US. According to Kleinert et al. (2007), the American Dental Association (ADA) responded to the lack of special needs educational preparation of dental students by creating revisions to the current standards to ensure dental education programs created

learning experiences specifically targeted towards developmental disorders. However, the research since the adopted revisions by the ADA in 2002 has revealed a continuing gap in preparation of dental graduates to care for patients with developmental disabilities.

Waldman et al. (2005) evaluated the educational exposure of two dental programs, Stony Brook University School of Dental Medicine (SUNY) and the West Virginia University School of Dentistry, both of which implemented special programs intended to increase dental students' exposure to patients with special needs. Each program implemented didactic and practical exposure, as well as the use of behavioral modifications and accommodations specific to behavioral disorders, such as cerebral palsy, autism, hyperactivity disorders, respiratory disorders, and communication disorders. Waldman et al. (2005) concluded that further research on the effectiveness of special programs highlighted at Stony Brook University School of Dental Medicine and West Virginia University School of Dentistry would be essential to move forward in effective preparation of dental treatment for patients with developmental disabilities. The challenges presented following their study revealed a lack of justification for additional course time as this would create budgetary issues for many universities, as well as a lack of faculty that could be trained to teach these courses.

Research conducted by Kleinert et al. (2007) attempted to implement a "virtual patient program" case study form for a 10 year old child with special needs, whose chief complaint was a tooth ache. The student dentists were required to develop a treatment plan for dental care and patient management strategies to accommodate for the specific behavioral special needs. The virtual program provided a practical experience for dental students who might potentially be in a dental program without a patient pool of special

needs. According to Kleinert et al.,(2007) many dental programs' chief complaint about providing clinical exposure to patients with special needs is the lack of access to an adequate pool of patients with special needs that can accommodate the exposure needs of all students within the dental program. Kleinert et al., (2007) developed two virtual patient models on CD-ROM to deliver the didactic portion of the information, developed by a team of three pediatric dental faculty, three parents of children with developmental disabilities, and an instructional design specialist. Learning objectives, for example, inclusion of abbreviated dental techniques designed to elicit communication and effective behavioral management strategies, (Kleinert et al. 2007), were illustrated in the instructional videos, and followed by information on how to effectively provide dental care for patients with special needs, as well as review questions to provoke critical thinking. Dental students utilized the case study scenario to develop treatment planning skills for patients in a clinical dental setting. The study included 51 dental students who participated in the study as a required portion of the pediatric dental program, but inclusion in the research data report was voluntary for the participants. A pre and post-test procedure was utilized among 98 percent of the dental students, all of which were third year students, and included 15 multiple choice questions to evaluate the knowledge gained throughout the project, specifically measuring knowledge related to dental concerns impacting the patients with special needs, communication barriers, and potential overall medical conditions

Kleinert et al. (2007) found that “paired sample t-tests demonstrated that gains in knowledge were significant, $t(48) = -10.12, p < .001, d = 1.45$, with thirteen of the fifteen individual items reaching significance at the $p = .05$ level” (p. 284). Research has shown

that lack of knowledge and exposure to patients with developmental disabilities has consistently been an issue in dental education, and Kleinert et al. (2007) found that with the implementation of the virtual CD-ROM module was a potential avenue for dental professionals, accredited dental programs and dental hygiene programs to access didactic and practical application of knowledge for working with patients with “behavioral disabilities”, especially if an ample patient availability is not accessible. Lack of knowledge and exposure to patients with ASD and other “behavioral disorders” continues to be a source of concern for dental professionals (Dehaitem et al., 2008; Kleinert et al., 2007; Lai et al., 2011; Murshid, 2015).

General and Pediatric Dentists

Dao, Zwetchkenbaum, and Inglehart (2005) conducted a survey to determine if undergraduate dental education influenced behavior, attitude, and characteristics when treating special needs patients by general dentists. The authors of the study hypothesized that in spite of the new information reported by the CDC regarding the rise of special needs patients, and the new standards implemented by CODA, that dental education on special needs patient care is inadequate. The objective of this study was to reveal a correlation among a positive dental education experience in treating special needs patients and the attitude of the oral health professionals in private practice.

Methods utilized by Dao et al. (2005) included a survey method where 500 general dentists were randomly selected from a 7,000 member database from the Michigan Dental Association. There was a 41.3% response rate with the majority of responders being males aged 49, with an average of 23 years professional experience in dentistry. The survey consisted of questions involving the practitioner’s experience in

treating special needs patients; type of treatment provided to those patients; special accommodations were made during treatment; background and personal experiences; and attitudes of the practitioner in regards to treating special needs patients.

Dao et al. (2005) concluded that the majority of dental professionals surveyed felt pre-doctoral dental education did not provide adequate preparation for the treatment of special needs patients within the scope of dental treatment. Those dentists who did feel prepared were more likely to treat special needs patients, had a more positive attitude, and increased confidence when treating special needs patients. This also indicated that the dentists who felt more prepared were more likely to set up an office that accommodated special needs patients.

Limitations of the study conducted by Dao et al. (2005) included the lack of investigation on prior knowledge of the dentists or interaction with individuals with ASD. Prior knowledge of these special needs before entering a dental program would give false results in terms of evaluating the level of preparedness upon completion of the dental program. A second limitation is the exclusion of dental hygienists in the study, because it is the hygienist that provides preventative dental care in the majority of dental offices on a daily basis. Comfort level of the hygienist is crucial in determining if the office is prepared to provide preventative care to these special needs patients.

The literature supports a lack of adequate education and comfort level among dental professionals as a factor in lack of routine care for patients with special needs. The purpose of Dao et al. (2005) was to determine if special needs education is adequate in dental education, and if this is a barrier to care among patients with ASD. In comparison, Lai et al. (2011) sought to discover if the lack of dental education was included among

the reasons why dental care was not met for children on the spectrum. Many barriers exist when discussing the lack of care for these patients, which places importance on the research conducted to determine a starting point for addressing the need for change in the dental field, with regards to treating special needs patients.

Dao et al. (2005) and Lai et al. (2011) utilized surveys as a method of collecting data for their research projects. Dao et al. (2005) gained research approval through the University of Michigan Institutional Review Board and did not use a signed informed consent due to the random selection process, but explained the information to the participants prior to administering the survey. In comparison, Lai et al. obtained a signed informed consent from each patient because the individuals being surveyed were under the age of eighteen at the time of the study. Another difference of the two studies was the number of participants included, Dao et al. (2005) surveyed 500 general dentists from Michigan, while Lai et al. (2011) surveyed 1500 families of children with ASD from the state of North Carolina.

Lai et al. (2011) reported a response rate of less than 40 percent, comparable to Dao et al. (2005) who reported less than 43 percent. According to Lai et al., barriers to care included lack of access, cost, and lack of dental insurance, child cooperation, child's health status, and type of dental office. Dao et al. (2005) disclosed that 22.7 percent of the respondents stated they do not treat adult patients with special needs, and 51.6 percent do not treat children with special needs during a typical work week. Additionally, Dao et al. (2005) disclosed that 40% of the respondents believed that children with autism were less likely to be accepted in their dental practice. Lack of access to care and negative behavior of the child with ASD was reported by Lai et al. as the most common problems. Both

studies provide concrete evidence that supports the issue of lack of access to care, and the dental practitioner's role in unsuccessful routine dental visits for patients with ASD.

Further research is warranted on this topic due to the prevalence of individuals diagnosed yearly with ASD. Limitations for both studies conducted by Dao et al. (2005) and Lai et al. (2011) included a response rate of less than 50 percent. Dao et al. (2005) also reported a lack of accuracy in caregivers' perceptions of previous dental visits, which determine whether the appointment was successful or unsuccessful. A common limitation among both studies is that the researchers included one state within the survey population, which has the potential to provide limited data from a small population. Future researchers would benefit from surveying a wider population in their research on special needs patient care, as surveying individuals in multiple states could perhaps provide more accurate information on dental education and special needs care as a whole.

Providing care to these special needs patients will become a hot topic within dentistry, and the research is extremely limited. Preparing dentists and hygienists with the proper information within their program of study will enable these professionals to treat patients with special needs successfully. Both studies conducted by Dao et al. (2005) and Lai et al. (2011) show that there is a need for more education on special needs within dental programs, and that is essential in providing access to care for patients with special needs such as ASD.

A study conducted by Weil et al. (2010) examined general and pediatric dentists' professional attitudes towards treating patients with autism, their discernment on the level of education provided by their accredited dental program, and the correlation between educational experiences and how behaviors and attitudes determine access to care for

patients with ASD. The researchers identified three characteristics among individuals with ASD that pose challenges to effective dental treatment: lack of communication, deficiency in social skills, and resistance to changes in schedules or routines, all of which are classic symptoms of individuals with ASD.

Weil et al. (2010) conducted a survey method using a random sample size of 500 dentists who were members of their state dental association. The general dentists responded at a rate of 32 percent, and the pediatric dentists responded at 42 percent. The surveys focused on the participants' experience, type of dental practice, educational exposure to ASD and other behavioral disorders, and their attitude towards treating patients with ASD (Weil et al. 2010).

The results revealed that the pediatric dentists saw more patients on a daily basis compared to the general dentists. The pediatric dentists were also more likely to treat patients from a low socioeconomic background, as well as patients with Medicaid, and treat children under the age of 16. Weil et al. (2010) reported "Overall, 89 percent of the pediatric dentists treated patients with autism, while only 32 percent of the general dentists provided care for these patients" (p. 1298). As a result, the pediatric dentists reported feeling more comfortable with treating patients with ASD, were more likely to take a continuing education course on ASD, and felt the staff was comfortable with working with patients with ASD.

Weil et al. (2010) also included survey questions to evaluate the general and pediatric dentists' professional behavior and attitude towards treating patients with ASD, and found that the general dentists were more likely to provide visual aids to patients with ASD, in comparison to the pediatric dentists. The researchers concluded that

because pediatric dentists were more likely to treat patients with ASD, they were more suited to provide successful routine dental care and have a better attitude towards treating these patients. Weil et al. (2010) stated that regardless of the attitudes of dentists towards treating patients with autism, it is vital for general dentists and dental hygienists to provide care to patients with ASD to alleviate the lack of access to care in the United States, and educational changes are needed to promote this change. Only a small portion of the participants in this study reported that their dental education provided adequately prepared them to treat patients with ASD post-graduation, which is consistent with the findings of Dao et al. (2005) and Waldman et al. (2005). Lack of access to care, lack of exposure to patients with ASD in dental educational programs, and lack of defined criteria set by CODA regarding exposure and treatment guidelines of patients with ASD and other behavior disorders are all contributing factors.

Summary

The correlation between a lack of adequate educational exposure and preparation in treating patients with ASD in dental and dental hygiene education, along with a lack of access to care for patients with ASD confirms the need to further explore these issues. Although research has been conducted on the professional attitude of general and pediatric dentists, dental hygiene students, and dental hygiene educators in treating patients with behavioral disabilities, there are no studies which researched the licensed dental hygienists' attitude towards treating these patients. Preventive dentistry is provided by a licensed hygienist and this professional will spend the majority of a routine dental visit with the patient, in comparison to the dentist who will spend less than 5-10 minutes of a 30-45 minute appointment. Therefore, evaluating CODA accreditation guidelines

and researching the attitude of the dental hygienist on treatment of patients with ASD is essential to promote better access to care and identify the gaps in education in accredited dental hygiene programs.

CHAPTER III: METHODOLOGY

The research conducted in this study included a quantitative approach utilizing a descriptive and correlational design to evaluate the influence of licensed dental hygienists' knowledge of autism spectrum disorder (ASD), and how their knowledge determines whether or not they can effectively treat patients with autism in a clinical dental setting. A quantitative approach in this research allowed the participants to take a survey that assesses their level of knowledge and attitude towards treating a patient with ASD, with the goal of discovering areas for potential revisions of the accreditations standards that dictate the amount of education and exposure to patients with ASD that dental hygiene students receive in an accredited dental hygiene program. The research questions included in this study are as follows:

1. Is there a significant difference in either the dental hygienists' professional attitude toward treating patients with autism spectrum disorder or the accommodations they make for these patients based on the amount of education provided on autism spectrum disorder received during their dental hygiene education?
2. Is there a significant difference in either the dental hygienists' professional attitude towards treating patients with autism spectrum disorder or the accommodations they make for these patients based on the number of years' experience practicing dental hygiene?
3. Is there a significant difference between the dental hygienists' professional attitude and the accommodations they provide when treating patients with autism spectrum disorder?

4. Is there a significant difference in either the dental hygienists' professional attitude toward treating patients with autism spectrum disorder or the accommodations they make for these patients based on the age of the hygienist?

Population and Sample

The population for this study included registered dental hygienists with active licensure in the states of Kentucky and Tennessee. The researcher sought to utilize a large sample size by obtaining participants' information through licensure records from the Kentucky Board of Dentistry (KBD) and the Tennessee Board of Dentistry (TBD), using a stratified random sampling of every eighth name on the list from Kentucky and every thirteenth name from the state of Tennessee. A total of 750 participants were chosen from the KBD and TBD lists of licensed dental hygienists. Permission and access to these lists of licensed dental hygienists were obtained through email communication and approved by the respective boards of dentistry. IRB approval to conduct this research was received through Western Kentucky University (Appendix A).

Overview of Instrument

A survey questionnaire was utilized to address the outlined issues (Appendix B). The survey instrument was developed from a revised version of the survey instrument used in the research conducted by Weil et al. (2010), with permission granted by the researchers. The survey consisted of two major components. The first component focused on the professional attitude of the dental hygienist towards treating a patient with ASD. Participants were asked to respond based on a five-point scale (1 = strongly disagree, 2 = moderately disagree, 3 = neutral, 4 = moderately agree, 5 = strongly agree). The second component focused on professional accommodations provided to the patients with

ASD to promote a successful routine dental visit. Participants were asked to respond based on a five-point scale (1 = never, 2 = occasionally, 3 = frequently, 4 = almost always, 5 = always).

A Content Validity Index (CVI) was used to provide evidence that the two components of the survey were content valid. The CVI was accomplished through expert ratings of relevance of the survey questions that explore the dental hygienists' level of knowledge of ASD by requesting six participants with expert knowledge on working with individuals with ASD.

Experts providing ratings included the following individuals with knowledge of working with individuals with autism: one school psychologist, one pediatrician who is an independent autism spectrum disorder evaluator and consultant, two board certified behavior analysts and licensed professional counselors, one assistant director of a center devoted to working with individuals with ASD, and one exceptional education teacher. The experts provided ratings, which measured their perceptions of how valid each of the two components were in accuracy of the professional attitude of the dental hygienist towards treating a patient with autism and the accommodations provided during a routine dental visit.

The experts validated each item for each of the two components on a four-point scale (1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, and 4 = highly relevant; Polit, Beck, & Owen, 2007). Data from this rating process provided an estimate of the validity of each of the two components. The overall CVI Kappa value for the professional attitude component was 0.97, which is judged as excellent (Polit et al. 2007). The overall CVI Kappa value for the accommodation component was 0.93, which is also

judged as excellent (Polit et al. 2007).

The final composition of the professional attitude and accommodation components were subject to a Cronbach Alpha to access internal consistency. The Cronbach Alpha for the professional attitude component was 0.77. The Cronbach Alpha for the accommodation component was 0.86. Both values were judged as good (Santos, 1999).

Reliability of the survey instrument was tested through a test/re-test pilot study including 19 registered dental hygienists. The participants were asked to provide responses for the two components of the survey instrument measuring the hygienists' professional attitude towards treating patients with ASD and the accommodations utilized to treat a patient with ASD within a routine dental visit. Each participant was given the original survey and then asked to complete the survey again one week following the initial administration.

The data were evaluated for test/re-test reliability using Kappa for the two components. The Kappa values utilized to determine reliability of the items included the following criteria: 0.1-.20 = slight, 0.21-0.40 = moderate, 0.61-0.80 = substantial, and 0.81-0.99 = almost perfect (Cohen 1960). All items scoring fair or below were omitted from the survey instrument. Table 1 (page 45) summarizes the test/re-test reliability data for the professional attitude component, and Table 2 (page 46) summarizes the data for the accommodation component. All of the professional attitude questions met the reliability threshold and were retained for the final version of the survey. Eight of the accommodation questions were eliminated for failing to meet the reliability threshold.

Table 1

Pilot Survey Attitude Questions Test-Retest Summary Results

Paired Survey Items	Number Of Completed Pre/Post Test	No. Pre/Post Ratings With Exact Value Matches	% Exact Responses	Kappa Value*	Final Disposition Of Survey Item
Pre1 - Pos1	19	15	78.95	0.7979	Kept
Pre2 - Pos2	19	12	63.16	0.5649	Kept
Pre3 - Pos3	19	11	57.89	0.5435	Kept
Pre4 - Pos4	19	14	73.68	0.7278	Kept
Pre5 - Pos5	19	17	89.47	0.8699	Kept

Note. 0.01-0.20 = slight, 0.21-0.40 = fair, 0.41-0.60 = moderate, 0.61-0.80 = substantial
0.81-0.99 = almost perfect.

Survey participants' information remained confidential, and they were identified through numbers provided by the participants, including the last two digits of their cell phone number, last two digits of their street address, last digit of their birthday, and the last digit of their high school graduation year.

The final survey was divided into three categories including demographics (age, gender, and level of post-secondary education); knowledge of ASD; and attitude towards treating a patient with ASD. The survey instrument utilized a combination of open-ended and yes/no questions, as well as a Likert scale for questions concerning the knowledge and attitude of the dental hygienists in treating patients with ASD. The survey included 23 questions, and estimated time of completion for each participant was 15-20 minutes. The language implemented in the survey was found by pilot responders to be clear, concise, non-threatening, and easy-to-read. Therefore, no known risks were associated with participation in this study. A copy of the final survey instrument is in Appendix B.

Table 2

Pilot Survey Accommodation Questions Test-Retest Summary Results

Paired Survey Items	Number Of Completed Pre/Post Test	No. Pre/Post Ratings With Exact Value Matches	% Exact Responses	Kappa Value*	Final Disposition Of Survey Item
Pre1 - Pos1	19	4	21.05	0.209	Dropped
Pre2 - Pos2	19	7	36.84	0.368	Dropped
Pre3 - Pos3	19	9	47.37	0.460	Kept
Pre4 - Pos4	19	12	63.16	0.336	Dropped
Pre5 - Pos5	19	10	52.63	0.54	Kept
Pre6 - Pos6	19	8	42.11	0.489	Kept
Pre7 - Pos7	19	9	47.37	0.36	Dropped
Pre8 - Pos8	19	15	78.95	0.829	Kept
Pre9 - Pos9	19	14	73.68	0.801	Kept
Pre10 - Pos10	19	10	52.63	0.537	Kept
Pre11 - Pos11	19	10	52.63	0.505	Kept
Pre12 - Pos12	19	11	57.89	0.507	Kept
Pre13 - Pos13	19	11	57.89	0.405	Dropped
Pre14 - Pos14	19	6	31.58	0.244	Dropped
Pre15 - Pos15	19	10	52.63	0.425	Kept
Pre16 - Pos16	19	11	57.89	0.649	Kept
Pre17 - Pos17	19	10	52.63	0.61	Kept
Pre18 - Pos18	19	6	31.58	0.288	Dropped
Pre19 - Pos19	19	16	84.21	0.212	Kept
Pre20 - Pos20	19	14	73.68	0.237	Dropped
Pre21 - Pos21	19	11	57.89	0.529	Kept
Pre22 - Pos22	19	10	52.63	0.421	Kept
Pre23 - Pos23	19	15	78.95	0.816	Kept
Pre24 - Pos24	19	14	73.68	0.738	Kept
Pre25 - Pos25	19	11	57.89	0.552	Kept

Note. 0.01-0.20 = slight, 0.21-0.40 = fair, 0.41-0.60 = moderate, 0.61-0.80 = substantial, 0.81-0.99 = almost perfect.

Research Construct

The survey instrument utilized in this study employed an ordinal/interval scale, which used numbers to indicate more or less of an attribute. Rating scales are typically used in behavioral and social sciences, and items were on a 1 to 5 scale (1 = never to 5 = always) for the accommodations section of the survey, and a range of strongly disagree to strongly agree measured the attitude of the dental hygienist towards treating a patient with ASD.

Procedures for Data Collection

The use of WKU Qualtrics[®] survey software was utilized through email with a greeting letter by the researcher, with a three-week window for participants to complete the survey. Consent was assumed by participation and completion of the electronic survey. The survey took the dental hygienists approximately 20 minutes to complete. A reminder email was sent to all subjects two weeks after the initial email to encourage participation. Survey data were placed in a statistical software to compute results. The system utilized was Statistical Analysis System (SAS).

Analysis Plan

The researcher utilized a descriptive survey with a correlational design within the study to discover a relationship between the dental hygienists' knowledge of ASD and attitude towards treating a patient with ASD in a clinical dental setting. Additionally, sociodemographic factors were evaluated to determine influences on perceived success of treatment of patients with ASD in a clinical dental setting. Descriptive statistics such as frequencies, percentages, and means were also calculated as part of the analysis of the research findings. An ANOVA was used to analyze the statistical significance of the

participants' knowledge of ASD and level of education received in an accredited dental hygiene program with a *p* value of < 0.05 considered for statistical significance. The final step in data analysis was to communicate the findings of the research to test the null hypothesis: There is no significant difference between a dental hygienist's attitude in treating a patient with Autism Spectrum Disorder and the amount of education on Autism Spectrum Disorder received during their dental hygiene education within an accredited program.

CHAPTER IV: RESULTS

Introduction

The purpose of this study is to understand the influence of the licensed dental hygienists' professional attitude towards treating a patient with ASD, and the level of accommodations provided to patients with ASD during a routine dental visit, based on the amount of knowledge provided about the disorder during an accredited dental hygiene program. As previously discussed, dental hygiene educators are faced with providing the necessary information to dental hygiene students within a two-year span of time to ensure successful passing of regional and national board exams, as well as ensuring the graduate is capable of providing successful routine dental care to patients with various health care needs upon graduation from an accredited dental hygiene program. The restriction of time and vague language provided by CODA on the meaning of "special needs patients" have the potential of creating a lack of exposure to certain patient populations, such as ASD.

The criteria to be met, as set by CODA, is determined by guidelines and accreditation standards that "promote and monitor the continuous quality and improvement of dental education programs" (ADA, 2017). This study takes a closer look at how the level of education about ASD within an accredited program affects the hygienists' attitude and level of accommodation of ASD.

Descriptive Statistics

Demographics

A survey instrument was sent electronically to registered dental hygienists licensed in the states of Kentucky and Tennessee. The list contained 7,653 participant

names, 4,921 from the state of Tennessee, and 2,732 from the state of Kentucky. A stratified random sample was conducted to narrow the number of participants to 360 from the state of Tennessee, and 350 from the state of Kentucky. Every eighth name was selected from the list of state of Kentucky hygienists and every thirteenth name was selected for the state of Tennessee hygienists. A total of 74 participants completed the survey for a rate of 10.4% participation rate, with an inclusion of ages ranging from 23-64 years (mean age 41.77), with 72 female and two male participants.

Dental Hygiene Education

The majority of participants attended an accredited dental hygiene school in Kentucky (59.46%), in comparison to Tennessee (13.51%), and the remaining reported attendance in another state (27.03%). Of the 74 participants, the majority possess an associate's degree (58.11%), 24 completed a bachelor's degree (32.43%), six respondents completed a master's degree (8.11%), and one survey participant possesses a doctoral degree (1.35%).

Dental Experience

Participants were asked if they had prior dental experience upon entering an accredited dental hygiene program, and 33 participants (44.59%) reported prior experience, while 41 (55.41%) reporting entering an accredited program without prior dental experience.

Participants were asked how long they had been a registered dental hygienist and the results revealed a range of 1-43 years of experience with a mean of 17.58 years. The majority reported working within a general dental practice (81.94%), two (2.78%) work within a pediatric practice, and 11 (15.28%) work in a practice other than the two

previously mentioned dental disciplines. Two of the participants did not provide a response to this question.

The survey participants were asked, “About how many hours do you practice dental hygiene per month?”, and the responses provided included a range of 0-288 hours per month. The majority reported practicing clinical dental hygiene approximately 128 hours per month, with a mean of 93.3 hours per month and a standard deviation of 52.9 hours. Five survey participants did not provide an answer for this question.

The next question inquired of the number of patients treated per week for each of the participants. The results revealed a range of 0-80 patients per week, with a mean of 28.3 patients per week and a standard deviation of 15.3. Seven survey respondents did not provide an answer for this survey question.

Experience with ASD

The next series of questions inquired about the participants’ exposure within their professional workday working with patients with ASD. The participants were asked if they treat patients with ASD. Responses revealed that 58 (80.56%) treat patients with ASD, while 14 (19.44%) reported that they do not treat patients with ASD. Two survey participants did not provide a response to this question.

The respondents who reported they treat patients with ASD were asked to provide a number of patients with ASD treated within a one month span of time. The range of responses were from 0-10, with nearly half (46.34%) reporting treating less than one patient with ASD per month.

Dental Hygienists' Attitude

The next section was used to evaluate the hygienists' attitude towards treating a patient with ASD in clinical practice by including five statements that provided the respondents with a five-point Likert scale of Strongly Disagree to Strongly Agree. Of the 74 respondents, six did not complete these items.

The first statement was, "I feel prepared to treat patients with autism," and the responses revealed 34 (50%) of the participants moderately agreed, 12 (17.65%) strongly agreed with this statement, 10 (14.71%) were neutral, nine (13.21%) moderately disagreed, and three (4.41%) strongly disagreed.

The second statement was, "Patients with autism are often unable to tolerate treatment because of sights and sounds in the dental operatory," and the responses indicated that 30 participants (44.12%) moderately agreed, 13 (19.12%) strongly agreed, 12 (17.65%) were neutral, 12 (17.65%) moderately disagreed, and one (1.47%) strongly disagreed.

The third statement was "I treat patients with autism without reservation," and 23 participants (33.82%) stated they strongly agreed, 21 (30.88%) moderately agreed, 15 (22.06%) were neutral, 6 (8.82%) moderately disagreed, and 3 (4.41%) strongly disagreed.

The fourth statement was "I feel comfortable communicating with the parent(s) of patients with autism during a routine dental visit," and the results revealed 38 participants (55.88%) strongly agreed, 23 (33.82%) moderately agreed, 3 (4.41%) were neutral, 3 (4.41%) moderately disagreed, and one participant (1.47%) strongly disagreed.

The final statement stated “My dental team is comfortable with treating patients with autism.” The results revealed that 27 participants (39.71%) moderately agreed, 19 (27.94%) strongly agreed, 16 (23.53%) were neutral, 5 (7.35%) moderately disagreed, and 1 (1.47%) strongly disagreed.

Mean scores for each statement were also calculated, and reported in Table 3. For analyses described later, each participant’s overall attitude score was created by combining scores on each of the five questions, with a possible total high score of 25.

Table 3

Means of Professional Attitude Treating Patients with ASD

Survey Question	Mean	SD
I feel prepared to treat patients with autism.	3.63	1.06
Patients with autism are often unable to tolerate dental treatment.	3.61	1.03
I treat patients with autism without reservation.	3.80	1.13
I feel comfortable communicating with parents of children with ASD.	4.38	0.88
My dental team is comfortable treating patients with ASD.	3.85	0.96
Overall Attitude Score	19.29	2.91

Note. 1 = strongly disagree, 2 = moderately disagree, 3 = neutral, 4 = moderately agree, 5 = strongly agree

Prior Knowledge and Dental Hygiene Practice Experience

Prior knowledge and experience working with individuals with autism addressed on the survey by asking, “How many years of experience, prior to entering your formal accredited dental hygiene program, did you have interacting with individuals with autism?” The responses revealed a range of 0-21 years of experience interacting with

individuals with ASD, with a mean of 1.82 years, and a standard deviation of 5.94.

Eleven participants did not provide a response to this question.

Continuing Education

The survey participants were asked, “How many continuing education hours have you attended in the past two years *specifically* related to autism?” The responses revealed 55 (84.62%) of the respondents had attended zero hours, while the remaining respondents were divided among 1-10 hours accounting for the remaining 15%, with a mean of 0.47 of continuing education hours and a standard deviation of 1.5 hours. Nine respondents failed to provide a response for this survey question.

Preparation to Treat Patients with ASD in Dental Hygiene Education

The next question addressed the number of patients with autism each respondent treated within their undergraduate dental hygiene program. The participants’ responses ranged from 0-8 patients with ASD treated within their accredited dental hygiene program. The majority of the survey participants reported they did not treat a patient with autism in their accredited dental hygiene program, accounting for 73.77% of the survey participants.

The survey participants were asked to rank on a scale of 1-10 (1 = Low, 10 = High) to what extent they believe their dental hygiene education adequately addressed treating patients with ASD. The majority of respondents, 22 (33.33%), indicated a two on a ten point scale, while 11 (16.67%) reported a 5 on a 10 point scale, with an overall mean score of 3.04 and a standard deviation of 2.61. Eight individuals did not provide a response for this survey item.

The research participants were asked if their formal accredited dental hygiene program institution had a special center or program where autism was a primary focus, and 66 (97.06%) reported their school did not have a special autism center. Six respondents did not provide a response for this survey question. The respondents were also asked if they recalled if autism was listed as a condition on the medical history form in their dental hygiene program, and 54 (79.41%) reported that autism was not listed as a condition. Additionally respondents were asked if ASD is currently listed on the medical history form in their current dental practice, and 50 (73.53%) of the respondents recorded an answer of “No.” Six individuals did not provide an answer for this survey item.

The next question asked the participants to rank on a scale of 1-10 (1 = Low and 10 = High) how well they believe their dental hygiene education prepared them to work with patients with autism. Twenty-four hygienists (36.36%) reported a score of 1, and the mean of the 68 respondents was 3.10 with a standard deviation of 3.16 and a range of responses from 1-10.

Total Clock Hours Devoted to Teaching about Patients with ASD in Dental Hygiene Education

Participants were asked to record the total number of clock hours devoted to teaching them about treating patients with autism in their formal accredited dental hygiene program, and the results included a range of 0-19 hours, with 23 (40.35%) reporting 0 hours were spent, with a mean of 2.46 total clock hours and a standard deviation of 3.80. Seventeen respondents failed to record a response for this survey item. Of those hours, respondents were additionally asked to break the reported hours into time spent within lectures, hands-on activities, video(s), and other methods. A comparison of

the total hours spent teaching about ASD within the respondents accredited dental hygiene program, along with mean score of the total hours are displayed in Figure 2.

For later analyses, respondents were placed in three groups based on the number of total clock hours spent reported being taught about ASD within their accredited dental hygiene program: Group 1 (Low) = Less than one total hour; Group 2 (Medium) = 1-4 total hours; Group 3 (High) = 5+ total hours.

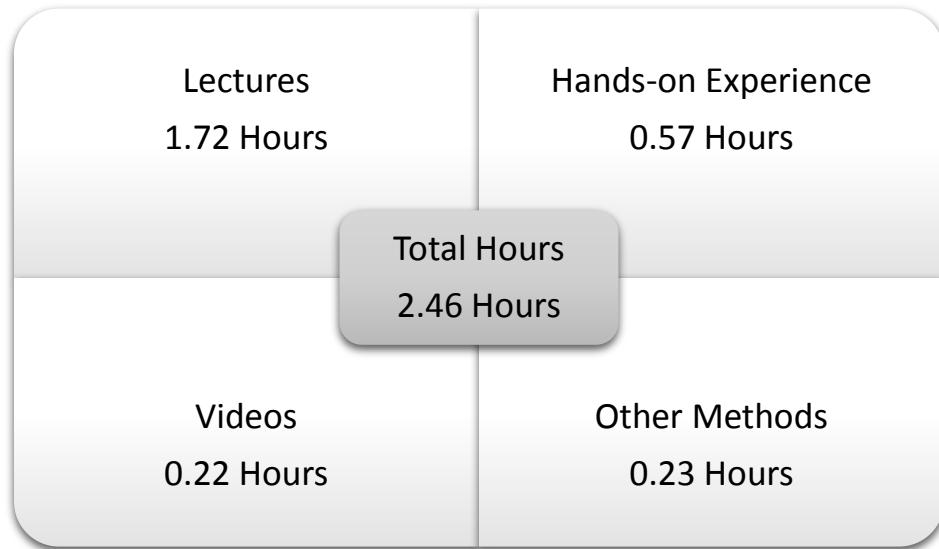


Figure 2. Mean scores of total clock hours spent teaching about ASD in comparison to total clock hours reported by survey participants.

Accommodations

The next section of the survey instrument addressed the accommodations provided during routine dental visits for patients with ASD to attempt to provide successful routine dental care. The survey participants were given a Likert scale divided into five options (ranging from 1 = never to 5 = always) for the accommodation typically provided to patients with ASD during routine dental visits. Of the 74 respondents, six did

not complete these items. Mean scores were tabulated for each of the accommodations items (as well as an overall accommodations score), listed in Table 4.

Table 4

Mean Accommodations Provided for Routine Dental Care in Patients with ASD

Survey Question	Mean	SD
Special instructions to parents prior to treatment	2.75	1.33
Familiarization visits prior to appointment	2.17	1.24
Special scheduling arrangements	2.55	1.25
TV in waiting area	3.14	1.80
TV in operatory	2.23	1.57
Parent can bring child's favorite video	3.23	1.77
Visual aids	3.08	1.26
Behavior shaping with rewards	3.36	1.37
Tell-show-feel	3.85	1.27
Letting them observe parents' dental visits	3.52	1.27
Hand over mouth technique	4.85	0.46
Use of a social story	2.10	1.12
Nitrous oxide inhalation	1.52	0.74
Oral sedation	1.30	0.57
General anesthesia	1.33	0.63
Refer to specialist	3.64	0.84
Overall Accommodations Score	44.72	9.32

Note. 1 = never, 2 = occasionally, 3 = frequently, 4 = almost always, 5 = always

An overall accommodations score for each participant was determined by adding scores on the accommodations questions, with a total possible score of 85. For later analyses, these overall scores were used to create three groups of participants: Group 1 (Low) = 0-41; Group 2 (Medium) = 42-48; and Group 3 (High) = 49+.

Findings for Research Question 1

Research question one asked if there was a significant difference in either dental hygienists' professional attitude toward patients with autism spectrum disorders or the accommodations they make for these patients based on the amount of education provided on autism spectrum disorder received during their dental hygiene education. To investigate this question the respondents were divided into three groups (described earlier) based on the number of total clock hours devoted to teaching about ASD within their accredited dental hygiene program. An ANOVA was performed using these groupings and the hygienists' professional attitude and accommodation composite scores, and no significant differences were found, as illustrated in Table 5.

Table 5

Hygienists' Education (Clock Hours) on ASD and Attitudes toward and Accommodations for Patients with ASD

Clock Hours	<i>N</i>	Attitudes		Accommodations	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Low (<1 hour)	24	18.33	3.72	42.62	8.75
Medium (1-4 hours)	23	19.69	2.85	45.17	9.40
High (5+ hours)	13	19.84	2.15	47.61	10.13

Findings for Research Question 2

Research question two asked if there is a significant difference in either dental hygienists' professional attitude toward patients with autism spectrum disorders or the accommodations they make for these patients based on the number of years' experience practicing dental hygiene. To investigate this research question the respondents were placed into three groups based on the number of years of experience practicing dental hygiene: Group 1 (Low) = 0-8 years; Group 2 (Medium) = 9-23 years; and Group 3 (High) = 24+ years). An ANOVA was performed using this grouping on the two variables: the composite score of the hygienists' professional attitude towards treating a patient with ASD; and the composite score of the level of accommodations provided to ASD patients during a routine dental visit. No significant differences were found among the groups, as illustrated in Table 6.

Table 6

Hygienists' Experience (years) on ASD and Attitudes toward and Accommodations for Patients with ASD

Experience	N	Attitudes		Accommodations	
		M	SD	M	SD
Low (0-8 years)	21	19.28	2.86	46.61	10.69
Medium (9-23 years)	24	19.66	2.59	44.45	9.07
(High) 24+ years	23	18.91	3.32	43.26	8.29

Findings for Research Question 3

Research question three asked if there is a significant difference in the dental hygienists' professional attitude and the accommodations provided when treating patients with autism spectrum disorder. To investigate this research question the hygienists' composite accommodation scores were divided into three groups described earlier. An ANOVA was performed using the composite score of the hygienists' professional attitude towards treating patients with ASD and the groupings of the composite score of the accommodations utilized when treating a patient with ASD during a routine dental visit, and no significant difference was found (Table 7).

Table 7

Effect of Hygienists' Professional Attitude on Accommodations for Patients with ASD

Accommodations	N	M	SD
Low (0-41)	23	18.17	3.12
Medium (42-48)	22	19.59	2.92
High (49+)	23	20.13	2.41

Findings for Research Question 4

Research question four asked if there is a significant difference in either dental hygienists' professional attitude toward patients with autism spectrum disorders or the accommodations they make for these patients based on the age of the hygienist. To investigate this research question the respondents were placed in three age groups: Group 1 = 23-34 years old; Group 2 = 35-48 years old; and Group 3 = 49 and older. An

ANOVA was conducted to determine the significant difference between the hygienists' age using the three age groups.

Regarding professional attitude, no significant differences were found across age groups. When evaluating the relationship between accommodation score provided by the hygienists when treating patients with ASD and age groups, a significant difference was found, $F(2,67) = 3.91, p = 0.02$. Further analyses revealed a significant difference between the hygienists' age Group 1 (23-34) and Group 3 (49 and over), as illustrated in Table 8.

Table 8

Influence of Hygienists' Age on ASD and Attitudes toward and Accommodations for Patients with ASD

Hygienists' Age	N	Attitudes		Accommodations	
		M	SD	M	SD
23-34 years	21	19.38	3.08	48.52	10.56
35-48 years	21	19.33	2.70	45.23	7.42
49+ years	26	19.19	3.04	41.23	8.63

Note. Age and Accommodations relationship significant, $F(2,67) = 3.91, p = 0.02$.

Summary

The null hypotheses for this study was that there is no significant difference between a dental hygienist's attitude in treating a patient with Autism Spectrum Disorder and the amount of education on Autism Spectrum Disorder received during their dental hygiene education within an accredited program. Four research questions were asked to attempt to investigate the impact of education about ASD in an accredited dental hygiene

program and the hygienists' attitude and accommodations utilized to provide successful routine dental exams. The researcher used the data by developing composite scores for the professional attitude of the dental hygienists when treating a patient with ASD, as well as a composite score for the level of accommodations provided for patients with ASD during a routine dental visit. Additionally the researcher divided the responding hygienists into three separate groupings using the hygienists' age, years of experience, and total clock hours. These groupings were utilized in four ANOVA analyses to determine statistical significance for each of the four research questions.

The first research question asked if there is a significant difference in either dental hygienists' professional attitude toward patients with autism spectrum disorders or the accommodations they make for these patients based on the amount of education provided on autism spectrum disorder received during their dental hygiene education. To investigate this question, an ANOVA was conducted using the total clock hours (divided into groups) spent teaching about ASD within the hygienists' accredited dental hygiene education along with the composite professional attitude of the dental hygienists and composite accommodation scores, and no statistical significance was discovered.

The second research question addressed if there is a significant difference in either dental hygienists' professional attitude toward patients with autism spectrum disorders or the accommodations they make for these patients based on the number of years' experience practicing dental hygiene. An ANOVA was performed using three groups of hygienists' divided by number of years' experience with the composite scores of professional attitude of the dental hygienists and accommodations composite score, and no statistical significance was discovered.

The third research question sought to discover if there was a significant difference in the dental hygienists' professional attitude and the accommodations provided when treating patients with autism spectrum disorder. The researcher performed an ANOVA using the composite scores of the professional attitude of the dental hygienists' when treating patients with ASD and the composite accommodations score grouping, and no statistical significance was discovered.

The final research question asked if there is a significant difference in either dental hygienists' professional attitude toward patients with autism spectrum disorders or the accommodations they make for these patients based on the age of the hygienist. The researcher divided the hygienists into three groups based on age and evaluated the significance of the hygienists' professional attitude when treating patients with ASD during a routine dental visit, with no significant difference found. However, when looking at the relationship between the hygienists' age and accommodation level, a significant difference was discovered with the youngest group more likely to provide accommodations than the oldest group.

CHAPTER V: DISCUSSION

Discussion of Findings

Dental hygienists provide the majority of preventive dental care within general and pediatric dental offices, and a clear understanding of the needs of all patients they serve is essential to providing access to care for all populations of patients. The assumption of this research was that the amount of education on ASD provided in an accredited dental hygiene program would have a direct effect on the professional attitude and the level of accommodations provided by registered dental hygienists during routine dental care for patients with ASD.

This study was conducted using survey research and the participants included licensed registered dental hygienists from the states of Kentucky and Tennessee. The survey explored the hygienists' professional attitudes towards treating a patient with ASD, as well as the level of accommodations provided during a routine dental visit for patients with ASD. Surveys were sent to 750 participants and 78 participants responded for a response rate of 10%.

The survey instrument in this study included 52 items and three sections exploring respondent demographics, a set of indicators for the hygienists' attitude towards treating patients with ASD, and a set of accommodations typically utilized for patients with ASD during routine dental visits (Appendix B). Part II of the survey included five statements used to measure the professional attitude of the dental hygienists towards treating patients with ASD. A composite score was used to determine overall professional attitude of the 74 participants in this study. Part III included a list of accommodations typically utilized when working with individuals with ASD during routine dental visits, and the researcher

developed a composite score from the participants' responses. The professional attitude and accommodations composite scores were used to determine statistical significance for the four research questions in this study.

The study included a central research question and four additional questions to explore the effect of variables of level of education provided on ASD during a two-year dental hygiene program including:

1. Is there a significant difference in either dental hygienists' professional attitude toward patients with autism spectrum disorders or the accommodations they make for these patients based on the amount of education provided on autism spectrum disorder received during their dental hygiene education?
2. Is there a significant difference in either dental hygienists' professional attitude toward patients with autism spectrum disorders or the accommodations they make for these patients based on the number of years' experience practicing dental hygiene?
3. Is there a significant difference between the dental hygienists' professional attitude and the accommodations they provide when treating patients with autism spectrum disorder?
4. Is there a significant difference in either dental hygienists' professional attitude toward patients with autism spectrum disorders or the accommodations they make for these patients based on the age of the hygienist?

The researcher found no significant difference for the first three research questions leading to the outcome there is not an influence of the amount of education provided on ASD within an accredited dental hygiene program and the professional

attitude or accommodations provided to patients with ASD in a clinical dental setting for the participants in this study. Additionally, the researcher did not find a significant difference in the professional attitude of the dental hygienists' and the age of the dental hygienists included in this study, but did find statistical significance among the level of accommodations provided to the patient with ASD during a routine dental visit and the age of the hygienist. The researcher also found statistical significance among the younger hygienists and the older group of hygienist included in this study, but no difference among the second age group of hygienists. A positive professional attitude towards treating a patient with ASD is a start, but knowing the appropriate accommodations for patients with ASD is essential to providing successful routine dental visits.

Lack of existing research on the dental hygienists professional attitude and accommodations for patients with ASD has left the researcher little comparison of the results of this study to similar studies. While no significant difference was found between a dental hygienist's professional attitude with treating a patient with ASD and the amount of education on ASD received during their dental hygiene education, there are some concerns that were revealed as a result of this research.

Dental Hygiene Education

The survey participants reported a mean of 2.46 total clock hours provided within their accredited dental hygiene program, with the range of total clock hours ranging from 0-19. The majority of survey participants (40.35%) reported that zero hours were spent teaching about ASD within their accredited dental hygiene program, providing evidence of a lack of adequate instruction for this subset of “special needs” patients as defined by CODA.

While no significant difference was found among the hygienists' professional attitude towards treating patients with ASD in a clinical dental setting and the amount of total clock hours spent on teaching about ASD, the hygienists surveyed reported a mean score of 3.10 on a ten-point scale when asked to what extent their dental hygiene education *prepared* them to work with patients with ASD. Many students entering an accredited dental hygiene program will have limited exposure with working with individuals with ASD. The hygienists in this study were asked "How many years of experience, prior to entering your formal accredited dental hygiene program, did you have interaction with individuals with autism?" with 50% reporting no prior experience. Lack of adequate educational instruction and lack of prior experience of ASD has the potential to promote a deficiency in preparation to effectively treat patients with ASD during a routine dental visit.

The participants in this study were additionally asked, "On a scale of 1-10 to what extent do you believe your dental hygiene education *adequately* addressed treating patients with autism?" with the mean being 3.04 and 46.34% reported a score of one. Therefore, lending to the notion that amount and content of education on ASD in accredited dental hygiene programs need to be evaluated. This is supported by the results discovered through this study that the respondents reported a mean of 2.46 total clock hours devoted to teaching about ASD in their accredited dental hygiene program, and less than an hour (mean 0.57 hours) devoted to hands-on instruction of treating a patient with ASD. Exposure and knowledge pre-graduation to ASD is deficient, and has the potential to effect the amount of comfortability patients with ASD has with regards to dental care, causing a lack of access to care for patients with ASD.

Lack of Access to Care

The results of the survey revealed a large gap in the number of patients with ASD treated per month in comparison to the number of hours the respondents spend each week treating patients, supporting the prevalence of unmet dental needs for patients with ASD (Nelson et al., 2017). The hygienists participating in this study reported a mean number of patients with ASD treated per month as 1.93 in comparison to the number of total patients treated per week as 28.34. Therefore, exhibiting a large difference in the number of typically developed patients in comparison to patients with ASD, and providing evidence that there is a potential for a lack of access to care for patients with ASD, with regards to preventative dental care. According to the CDC (2016), one in 68 individuals is identified as being on the spectrum, and a lack of access to care is apparent with the difference of the number of patients with ASD treated monthly by the dental hygienists surveyed in this research.

When asked to respond to the statement, “I feel prepared to treat patients with autism,” 68% of the respondents reported they agreed with feeling prepared to treat patients with ASD. When the respondents were asked to respond to the statement, “I treat patients with autism without reservation,” 64.7% of the hygienists agreed with this statement. This provides hope that the hygienists positive professional attitude towards treating a patient with ASD, sense of preparedness, and willingness to treat patients with ASD without reservation can make a difference in the lack of access to care for this sub-set of patients.

A concern raised by this study is the apparent disconnect among the number of patients with ASD treated and the number of total hours treating patients among the

participants in this survey. The majority of the survey participants agreed that they treat patients with ASD without reservation, but a mean of less than one patient with ASD was reported being treated monthly by the same participants. This lends to the question of where the disconnect lies on preparation, access to care, and comfortability with treating patients with ASD, and what the perceived barriers are by the patients with ASD when seeking routine dental care.

Accommodations

Appropriate accommodations are essential for patients with ASD to achieve a successful routine dental visit. While there was not a significant difference in the amount of education on ASD received in an accredited dental program and the attitude of the dental hygienists when treating patients with ASD, the mean scores of the accommodations included in this study was a three, indicating that the participants in this study “frequently” provide the accommodation to patients with ASD. A list of the accommodations included on the survey instrument are illustrated in Table 4 on pg. 54.

As previously discussed in the review of the existing literature, accommodations are essential for patients with ASD, and the use of social stories have proven to be successful in promotion of desirable behavior in patients with ASD during routine dental visits (Brown et al., 2014; Hernandez & Ikkanda, 2011; Limeres-Posse et al., 2014; Nelson et al., 2017). However, only 13.2% of the respondents agreed that they routinely use social stories when treating patients with ASD. This raises the question of how frequently the necessary accommodations are being utilized for patients with ASD, and if this is a contributing factor to the lack of access to care that is evident for these patients.

ASD is a spectrum disorder and each individual with ASD will require unique

accommodations to promote successful routine dental visits. Inclusion of the recommended accommodations within an accredited dental hygiene program would provide the necessary exposure for dental hygienists post-graduation, as well as, aid in the likelihood of successful routine dental visits for patients with ASD.

Another accommodation that could promote successful routine dental visits is effective communication with the parents of children with ASD prior to dental exams (Brown et al. 2014). The participants in this study were presented with the accommodation “special instructions to parents before dental treatment”, and the mean score for this accommodation was 2.75, indicating a response of occasionally providing the accommodation. Existing research found that collaboration with parents of children with ASD promoted successful outcomes during dental visits; therefore, more than occasional use of this accommodation would be useful more than on occasion. Increased knowledge of the effective use of accommodations provided to dental professionals would be beneficial and perhaps increase the frequency of use.

It is essential for the medical/dental professional to initiate a process of desensitizing the individual to prepare for a successful visit. Desensitization techniques include slowly introducing the patient with ASD to the staff, showing instruments to be used during the procedure, use of social stories, and interaction with the same medical/dental professional to promote consistency (Nelson et al. 2017). The participants responded to the accommodation “familiarization visits before the first appointment” with a mean of 2.17 and a standard deviation of 1.24, which translates to a response of “never” or “occasionally” providing this accommodation to patients with ASD prior to a routine dental visit. Previous research supports using this technique and accommodation

to promote successful medical/dental visits, but if it is “never” or “occasionally” utilized, the patient with ASD is at a disadvantage from the beginning.

The results in this study revealed that only five of the seventeen accommodations included on the survey instrument had a mean score of three or higher. Therefore, the majority of the accommodations are used “occasionally” as reported by the participants in this study. The use of proper accommodations sets the stage for a successful experience for the patient with ASD; therefore, proper and ample use is imperative to promote a successful routine dental exam.

Limitations

Several limitations impacted this study including lack of participation in the survey research. Of the 710 surveys emailed to licensed registered dental hygienists in the states of Kentucky and Tennessee a low response rate of 74 was reported, for a total response rate of 10%. This low response rate had a likely impact on the generalizability of the results. A larger sample size would allow for a more certainty that the results of the survey reflect the larger population of dental hygienists.

Surveys were sent electronically via email with addresses provided by the Kentucky Board of Dentistry and Tennessee Board of Dentistry. Accuracy of the information potentially had an effect on the researcher reaching the survey participants due to incomplete or invalid email addresses. Additionally, the survey participants may not check their email accounts regularly, causing a lack of inclusion in the survey within the allotted time frame for the active research study.

Another limitation includes lack of complete data included among the 74 participants. Missing data and mistyped data were other limitations for the researcher in

this study, and caused data to be excluded as a result. The electronic survey system utilized was an easy and inexpensive method to reach a large number of hygienists, but the survey was partially completed by a number of participants causing incomplete data within the study. Another disadvantage was that some survey participants provided data that did not fit the parameters of the survey question causing the data to be unusable.

ASD is a spectrum disorder, meaning that no two individuals will have the same challenges or needs, and each will require varying accommodations depending on the day they are being treated clinically in a medical or dental office. Therefore, each of the individual hygienists' who had experience with treating patients with ASD in a clinical dental setting would have utilized accommodations in a different manner for the particular patients within their experience.

Bias was another potential limitation for this study due to the hygienists feeling as though they provide adequate care and accommodations to patients with ASD. As clinicians they assume the care and accommodations being provided are adequate, but in hindsight are deficient for the majority of patients that fall on the spectrum. Definition of "successful", with regards to routine dental visits, could potentially vary among dental hygiene clinicians as well, causing a gap in the information presented on the survey and influence the data.

The lack of existing research on this topic and lack of exposure of dental professionals to empirical research is another limitation. Dental professionals are accustomed to hearing the language "special needs" in comparison to patients with ASD, and the language presented in the existing literature could cause confusion when hearing "ASD" and "special needs" being used synonymously. Additionally, this study surveyed

registered dental hygienists to evaluate attitude towards treating patients with ASD, which is unique to the existing research on the topic, and leaves little opportunity for comparison of results revealed from the survey data.

Recommendations

An increase of diagnosis and prevalence of ASD will increase the number of patients with ASD to be treated in a dental office in the near future. A lack of access to care is prevalent in this field currently as evident in the low number of patients treated by the participants included in this study.

CODA Standards

A review of the CODA standards will be necessary to ensure appropriate exposure for dental hygiene students within an accredited dental hygiene program to ensure confidence in treating patients with ASD upon graduation. Addressing the apparent lack of access to care for this patient population is the responsibility of the profession, and determining how to increase the educational exposure lies with dental hygiene educators and CODA.

A review of the language used within the CODA standards to address “special needs” patients would potentially aid in ensuring that all patients requiring accommodations are represented in the standards addressing special patient populations, and referencing individual conditions is one way to aid in this change.

Dental Hygiene Education

Exposure to designated lectures, hands-on experiences, videos, and other methods within an accredited dental hygiene program could have the potential to ensure proper education on the topic of ASD. When dental hygienists were asked on a scale of 1-10

how well their dental hygiene education prepared them to treat patients with ASD, the mean was a three. This indicates the level of education provided on ASD within an accredited program falls short in efforts to prepare the student to feel confident treating these patients post-graduation. Evaluation of the CODA standards and how they are followed, with regards to “special needs” patients, lies on the dental hygiene educators. While it is evident that educators are faced with providing a large amount of information spanning many topics to successfully pass the written board exam, it is also essential to provide an ample amount of education concerning special populations, such as patients with ASD.

Continuing Education

Dental professionals are required to obtain and earn 30 continuing education hours every two years to qualify for re-licensure, but when the survey participants were asked how many continuing education hours devoted to learning about ASD they attended the last two years the mean was less than one hour. This is one way the profession could increase awareness and gain knowledge about ASD characteristics and the necessary accommodations to promote successful routine dental visits. Therefore, suggestion for a requirement of continuing education hours devoted to teaching about ASD could be a solution to the lack of education present on this topic.

Awareness

Inclusion of ASD on the medical history in dental offices and dental hygiene program clinics could increase the awareness of the disorder, as well as, enable patients to provide disclosure of the disorder on the medical history. It will be essential to include ASD in the future due to the increase prevalence of diagnosis, and it sparks a

conversation among the dental professional and patient to explore the necessary accommodations that are unique to each patient treated with ASD in dental clinics. As cited by Limeres-Possie et al. (2014), the use of prior information, knowledge of the level of disability of the child with ASD, and previous successful behavioral modifiers could have the potential to promote a higher success rate in the dental setting for those patients. This also could spark conversations among dental hygiene students who are required to review patient information prior to care, allowing a larger number of dental hygiene students the opportunity to gain exposure to patients with ASD in the learning environment.

Implications for Further Study

Future research on successful routine dental visits for patients with ASD, as well as, research on how to address the lack of access to dental care for this subset of patients will be essential. The research design will be a vital piece of the puzzle to fully investigate how to increase awareness, education, and to provide routine dental care that accommodates each individual on the spectrum. A mixed methods design using qualitative and quantitative research methods would be one suggestion moving forward on this research topic. This approach would allow the researcher the ability to interview parents of children with ASD, patients with ASD, and dental professionals providing the routine dental care, on how to promote a more conducive environment, as well as, the appropriate accommodations to elicit a successful dental exam for patients with ASD. A mixed methods approach would provide the largest lens into how successful treatment of patients with ASD could be achieved. A lack of access to care is evident in the research,

and discovery of how to close the gap will be essential in the future of dentistry to ensure dental care opportunities are available for patients with ASD.

REFERENCES

- American Dental Association. (2017). *Commission on Dental Accreditation.* Accreditation standards for dental education programs. Retrieved from:
<http://www.ada.org/~/media/CODA/Files/dh.ashx>
- Brown, J., Brown, J., & Woodburn, J. (2014). Dental services for children with autism spectrum disorder. *Learning disability practice*, 17(3), 20-25.
- Center for Disease Control. (2016). *Autism spectrum disorder (ASD): Data & statistics.* Retrieved from: <https://www.cdc.gov/ncbdd/ausitm/data.html>
- Cermak, S. A., Stein Duker, L. I., Williams, M. E., Dawson, M. E., Lane, C. J., & Polido, J. C. (2015). Sensory adapted dental environments to enhance oral care for children with autism spectrum disorders: A randomized controlled pilot study. *Journal of Autism and Developmental Disorders*, 45, 2876-2888. doi: 10.1017/s10803-015-2450-5
- Clemetson, J.C., Jones, D.L., Lacy, E.S., Hale, D., & Bolin, K.A. (2012). Preparing dental students to treat patients with special needs education after the revised accreditation standards. *Journal of Dental Education*. 76(11), 1457-1465. Retrieved from: <http://www.jdentaled.org/content/76/11/1457.long>
- Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement*, 20(1), 37-46.
- Dao, L.P., Zwetchkenbaum, S., & Inlehart, M.R. (2005). General dentists and special needs patients: Does dental education matter? *Journal of Dental Education*. 69(10), 1107-1115. Retrieved from:
<http://www.jdentaled.org/content/69/10/1107.full>

- Dehaitem, M. J., Ridley, K., Kerschbaum, W. E., Inglehart, M. R., & Habil, P. (2008). Dental hygiene education about patients with special needs: A survey of U.S. programs. *Journal of Dental Education*, 72(9), 1010-1019.
- Delli, K., Reichart, P. A., Bornstein, M. M, & Livas, C. (2013). Management of children with autism spectrum disorder in the dental office: Concerns, behavioral approached and recommendations. *Med Oral Patol Oral Bucal*, 1(18), 862-868. Retrieved from: http://www.mediciaoral.com/pubmed/medoralv18_16_p862.pdf
- Hall, L. J. (2013). *Autism spectrum disorder: From theory to practice*. (2nd ed.). Upper Saddle River, NJ: Pearson Education, Inc.
- Hernandez, P., & Ikkanda, Z. (2011). Applied behavior analysis: Behavior management of children with autism spectrum disorders in dental environments. *The Journal of the American Dental Association*, 142(3), 281-287.
- Jaccarino, J. (2009). Treating the special needs patient with a developmental disability: Cerebral palsy, autism, and Down syndrome. *The Dental Assistant*, 78(6), 7-36.
- Kleinert, H. L., Sanders, C., Mink, J., Nash, D., Johnson, J., Boyd, S., & Challman, S. (2007). Improving student dentist competencies and perception of difficulty in delivering care to children with developmental disabilities using a virtual patient module. *Journal of Dental Education*, 71(2), 279-286.
- Lai, B., Milano, M., Roberts, M. W., & Hooper, S. R. (2011). Unmet dental needs and barriers to dental care among children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 42, 1294-1303. doi:10.1007/s10803-011-1362-2.

- Limeres-Posse, J., Castano-Novoa, P., Abeleira-Pazos, M., Ramos-Barbosa, I. (2014). Behavioural aspects of patients with autism spectrum disorders (ASD) that affect their dental management. *Med Oral Patol Oral Cir Bucal.* 19(5), 467-472. Retrieved from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4192569/>
- Murshid, E.Z. (2015). Dental knowledge of educators and healthcare providers working with children with autism spectrum disorders. *Saudi Medical Journal,* 36(12), 1477-1485.
- Nelson, T., Chim, A., Sheller, B. L., McKinney, C. M., & Scott, J. M. (2017). Predicting successful dental examinations for children with autism spectrum disorder in the context of a dental desensitization program. *Journal of the American Dental Association,* 148(7), 485-492.
- Ousley, O., & Cermak, T. (2014). Autism spectrum disorder: Defining dimensions and subgroups. *Current Development Disorders Report,* 1(1), 15.
- Polit, D.F., Beck, C.T., & Owen, S.V. (2007). Focus on research methods: Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. *Research in Nursing & Health,* 30, 459-467. doi: 10.1002/nur.20199.
- Reynaldo, J. & Santos, A. (1999). Cronbach's Alpha: A tool for assessing the reliability of scales. *The Journal of Extension,* 37(2), ISSN 1077-5315.
- Stein, L. I., Polido, J. C., & Cermak, S. A. (2012). Oral care and sensory concerns in Autism. *The American Journal of Occupational Therapy,* 66(5), 73-76.
- Waldman, H. B., Fenton, S. J., Perlman, S. P., & Cinotti, D. A. (2005). Preparing dental graduates to provide care to individuals with special needs. *Journal of Dental Education,* 69(2), 249-253.

Weil, T. N., Inglehart, M. R., & Habil, P. (2010). Dental education and dentists' attitudes and behavior concerning patients with autism. *Journal of Dental Education*, 74(12), 1294-1307.

Williams, K. S. (2009, February). Autism and the clinical implications for dental hygiene. *Access*, 34-35.

APPENDIX A: IRB APPROVAL LETTER



INFORMED CONSENT DOCUMENT

Project Title: Autism Spectrum Disorder: An Evaluation of Hygienists' Knowledge to Provide Successful Routine Dental Prophylaxis
Investigator: Stephanie Riehn, RDH, Western Kentucky University Program of Dental Hygiene,
Stephanie.riehn836@topper.wku.edu

You are being asked to participate in a project conducted through Western Kentucky University. The University requires that you give your agreement to participate in this project.

You must be 18 years old or older to participate in this research study.

The investigator will explain to you in detail the purpose of the project, the procedures to be used, and the potential benefits and possible risks of participation. You may ask any questions you have to help you understand the project. A basic explanation of the project is written below. Please read this explanation and discuss with the researcher any questions you may have. You should keep a copy of this form for your records.

1. Nature and Purpose of the Project:

The purpose of this study is to understand the extent that hygienists' knowledge of autism spectrum disorder influences the treatment of patients with autism.

2. Explanation of Procedures: The use of WKU Qualtrics survey software will be utilized, with conclusion of the survey submission of participants within a two week time period. The survey will require approximately 20 minutes to complete.

3. Discomfort and Risks: There are no known risks associated with participation in this research study.

4. Benefits: Benefits of participation includes the advancement of the profession of dental hygiene, and potentially have an impact on the lack of access to care and bring awareness of the special needs of ASD patients. Upon completion of the survey each participant will be provided with a prompt at the end of the survey to complete the necessary information to be entered in the survey drawing for a \$100.00 gift card to Amazon.

5. Confidentiality: All survey data and records of active licensed dental hygienists provided by the Kentucky Board of Dentistry and Tennessee Board of Dentistry will be stored securely for a minimum of three years. All participants will be protected using WKU Qualtrics with personal identification numbers, keeping responses anonymous.

6. Refusal/Withdrawal: Refusal to participate in this study will have no effect on any future services you may be entitled to from the University. Anyone who agrees to participate in this study is free to withdraw from the study at any time with no penalty.

You understand also that it is not possible to identify all potential risks in an experimental procedure, and you believe that reasonable safeguards have been taken to minimize both the known and potential but unknown risks.

Your continued cooperation with the following research implies your consent.

THIS PROJECT HAS BEEN REVIEWED AND APPROVED BY
THE WESTERN KENTUCKY UNIVERSITY INSTITUTIONAL REVIEW BOARD
Paul Mooney, Human Protections Administrator
TELEPHONE: (270) 745-2129

APPENDIX B: Survey Survey of Dental Hygienist

The purpose of this survey is to survey dental hygiene practitioners to gauge their familiarity in treating patients with autism. Information gathered, from practitioners will significantly contribute to the understanding of how to best prepare dental hygienists in the future to treat patients with autism. Your participation of this survey is voluntary, and all of the information will be kept confidential. Thank you for your time and support of this research project.

Part I. Respondent Demographics

Part II. Autistic Patients

Below are some statements pertaining to the treatment of patients with autism. Indicate the extent you agree or disagree with by circling the appropriate response. Use this scale for your responses:

(SD)	(MD)	(N)	(MA)	(SA)
Strongly Disagree	Moderately Disagree	Neutral	Moderately Agree	Strongly Agree

Statement	Your Agreement
1. I feel prepared to treat patients with autism.	SD MD N MA SA
2. Patients with autism are often unable to tolerate dental treatment because of sights and sounds in the dental operatory.	SD MD N MA SA
3. I treat patients with autism without reservation.	SD MD N MA SA
4. I feel comfortable communicating with the parent(s) of patients with autism during a routine dental visit.	SD MD N MA SA
5. My dental team is comfortable with treating patients with autism.	SD MD N MA SA

12. How many years of experience, prior to entering your formal accredited dental hygiene program, did you have interacting with individuals with autism? _____
13. How many continuing education hours have you attended in the past two years specifically related to autism? _____ (Total hours)
14. Approximately how many patients with autism did you treat during your two-year formal accredited dental hygiene program? _____ (Total patients with autism)
15. On a scale of 1-10 (1=low and 10=high), to what extent do you believe your dental hygiene education adequately addressed treating patients with autism? _____
16. Approximately how many TOTAL clock hours were devoted to teaching you about treating patients with autism in your formal accredited dental hygiene program? _____ (Total Clock Hours)

17. Many methods are used to teach in dental hygiene programs. Thinking about all of the hours of instruction you received on treating patients with autism (#15 above), indicate the approximate number of hours you received, in the treatment of patients with autism, for each of the following instructional methods:

Approximate number of hours from Lectures: _____ (hours)
Approximate number of hours from Hands-on: _____ (hours)
Approximate number of hours from Video(s): _____ (hours)
Approximate number of hours from Other Methods: _____ (hours)
Total Hours of Instruction (*must agree with #15 above*) _____ (hours)

18. Did your formal accredited dental hygiene program institution have a special center or program where autism was a primary focus (check one)?

[] Yes [] No

If yes, did your dental hygiene program requirements include the treatment or interaction with individuals from the autism center or program? (check one) [] Yes [] No

19. Do you recall if autism was taught as a condition on the medical history form in your dental hygiene program? [] Yes [] No

20. Is autism currently listed on the medical history form in your practice? []
Yes [] No

21. On a scale of 1-10 (1=low and 10=high) how well do you believe dental hygiene education prepared you to work with patients with autism?

Part III. Accommodation of Autistic Patients

Below are listed accommodations sometimes utilized when treating patients with autism. Using the scale below, indicate the extent you use each in your current clinical practice.

1=Never 2=Occasionally 3=Frequently 4=Almost Always 5=Always

Accommodation	Extent You Use In Current Practice
Special instructions to parents before treatment	1 2 3 4 5
Familiarization visits before the first appointment	1 2 3 4 5
Special scheduling arrangements	1 2 3 4 5
TV in waiting area	1 2 3 4 5
TV in operatory	1 2 3 4 5
Parent can bring child's favorite video	1 2 3 4 5
Visual aids	1 2 3 4 5
Behavior shaping with rewards	1 2 3 4 5
Tell-show-feel	1 2 3 4 5
Letting them observe their parents' dental treatment	1 2 3 4 5
Desensitization efforts	1 2 3 4 5
Hand over mouth technique	1 2 3 4 5
Use of a social story	1 2 3 4 5
Nitrous oxide inhalation	1 2 3 4 5
Oral sedation	1 2 3 4 5
General anesthesia	1 2 3 4 5
Refer to specialist	1 2 3 4 5

Part IV. Comments

Are there any additional comments you would care to include pertaining the understanding of how to treat patients with autism (Optional)? Please make them in the space below.

Thank you for assisting us with this survey.
We sincerely appreciate your input and opinions.