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**APPLICATION OF A THEORY-BASED EDUCATIONAL INTERVENTION TO
INCREASE THE FREQUENCY OF PERFORMING ORAL HEALTH ASSESSMENTS
ON CHILDREN AMONG ADVANCED PRACTICE REGISTERED NURSES AND
NURSES**

by

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A Dissertation Submitted to the Faculty of
Old Dominion University in Partial Fulfillment of the
Requirements for the Degree of

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December 2016

Approved by:

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ABSTRACT

APPLICATION OF A THEORY-BASED EDUCATIONAL INTERVENTION TO INCREASE THE FREQUENCY OF PERFORMING ORAL HEALTH ASSESSMENTS ON CHILDREN AMONG ADVANCED PRACTICE REGISTERED NURSES AND NURSES

Denise Michelle Claiborne
Old Dominion University, 2016
Director: Dr. Susan Daniel

The purpose of this study was to determine if the use of a theory-based educational intervention would increase the frequency of performing oral health assessments (OHAs) during well-child visits among nurses. A randomized experimental design was conducted to determine if the educational intervention would improve frequency of performing OHAs, in addition to, knowledge, confidence in performing OHAs, and advising parents. Using a non-probability sampling frame, “snowball technique,” a total of 46 participants were recruited. After exclusion criteria, 33 advanced practice registered nurses (APRNs), registered nurses (RNs), and licensed practical nurses (LPNs); were randomized into a control or experimental group. Data collection occurred over a four-week period. An adapted validated 21-question survey designed through Qualtrics© software was used to measure oral health-related practices on children of all participants at pre and post-intervention. The electronically delivered intervention was a continuing education (CE) course that focused on children’s oral health. Participants in the experimental group received the CE course immediately following completion of the electronic survey whereas; participants in the control group received the CE course content after completing the post-survey at 4 weeks. At 3 weeks, a trivia question related to children’s oral health, and a brochure, “Promoting Oral Health” sponsored by the American Academy of Pediatrics was electronically delivered. Participants received 1 free CME credit as an incentive for participating and completing all portions of the study. A two-way Analysis of Variance

(ANOVA) mixed design statistical analysis was used to determine statistical significant difference ($p \leq 0.05$). There was no significant main effect, or difference between the experimental and control groups for frequency of performing OHAs on children. However, there were significant main effects of time from pre to post-tests within the experimental and control groups for the following variables: knowledge ($F(1, 31) = 12.67, p = 0.001$), confidence in performing OHAs ($F(1, 30) = 10.17, p = 0.003$), and confidence advising parents ($F(1, 30) = 10.78, p = 0.003$). While there were no significant differences found between-groups, or interactions for all four dependent variables measured, scores related to knowledge, confidence in performing OHAs, and advising parents improved within groups.

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This dissertation is dedicated to the proposition that to whom much is given, much is expected.

First giving honor to God for providing me guidance and strength to pursue doctoral studies.

Without Him providing me with the wisdom, none of this would have been possible.

To my parents

Dennis and Priscilla Claiborne

Without your encouragement and advice this would not have been possible

I dedicate this dissertation not only to myself but you.

To my older brother

Dennis Claiborne Jr.

It has been nothing but a pleasure to be your little/big sister

Thank you for your continued support.

To my significant other, and best friend

J'von McKinney

For always keeping a smile on my face

Thank you for your support over the years.

I love you all!

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CHAPTER I

INTRODUCTION

Dental caries, or “dental cavities” remains a public health crisis for infants, children and adolescents impacting both primary and permanent teeth. In the Surgeon General’s 2000 Oral Health in America report, he described dental caries for children as a “silent epidemic” (General, 2000). In children less than 71 months, early childhood caries (ECC) is “the presence of one or more decayed (non-cavitated or cavitated lesion), missing (due to caries), or filled tooth surface in a primary tooth (Council, 2008, p. 15).” Several multilevel factors increase the susceptibility to dental caries these include: oral hygiene behaviors, eating habits, and time of preventive oral care. If untreated, dental caries can result in negative health outcomes such as decrease in nutritional intake, cognitive growth and development and in severe cases, mortality (Bagramian, Garcia-Godoy, & Volpe, 2009; Chou, Cantor, Zakher, Mitchell, & Pappas, 2013; U.S. Department of Health and Human Services, 2012).

The global impact of dental caries has matriculated through countries, regions, states, and local communities. In 2010, Western Europe, North Africa, Middle East, and East Asia were reported as having the largest reported number of untreated dental caries in deciduous teeth (Kassebaum et al., 2015). However, the prevalence of untreated dental caries in the U.S has been reported to be slightly higher (9.2 per 100 population) than the global prevalence (8.8 per 100 population) (Kassebaum et al., 2015). In fact, untreated deciduous teeth were the 10th most prevalent condition, impacting 9% of the global population or 621 million individuals worldwide (Kassebaum et al., 2015). Dental caries among children stems far beyond the U.S. borders similar to the U.S., low-income and developing countries are actively creating opportunities to promote preventive oral health services.

Problem Statement

Background and consequences of problem. Exposure to dental caries at an early age yields a short and long-term economic burden for the parent and child. According to the 2000 U.S. Surgeon General report, 50 million school hours and 164 work hours are lost each year due to dental concerns (Foundation, 2012; General, 2000). In 2014, the U.S. spent \$122 billion on treatment of dental diseases (Center for Disease Control and Prevention [CDC], 2014). Moreover, dental caries is the fourth-most expensive chronic disease to treat (Kassebaum et al., 2015). The cost of early preventive dental care is significantly less than secondary or tertiary interventions. For example, for every \$1 spent on oral health preventive measures, U.S. taxpayers save approximately \$50 on restorative and emergency dental procedures (Foundation, 2012).

Dental disease is often carried into adulthood among children who experience dental caries early in life. Data has shown that, 14% of children aged 3-5 years have at least one carious lesion (U.S. Department of Health and Human Services, 2012). This then increases to 50% of children aged 5-9 years having at least one cavity or restoration; and then to 78% among 17 year olds (Bagramian et al., 2009). Delayed preventive oral care such as oral health assessments (OHAs) increases the incidence dental caries among children. Increasing preventive measures through performing OHAs as early as six months or by 12 months will decrease the incidence of undetected dental caries (Council, 1997). Determining how the responsibility of OHAs will be shared among dental and medical providers remains an ongoing discussion. Most general dentists will not provide preventive care to children less than three years of age. Similarly, there are fewer pediatric dentists available to provide care to children 0-3 years of age. Primary health

care providers (PHCPs) such as advanced practice registered nurses (APRNs) and nurses can assist in meeting the oral health needs of children through well-child visits.

Advanced practice registered nurses (APRNs) such as nurse practitioners, registered nurses (RNs), and licensed practical nurses (LPNs) often have early encounters with the caregiver and children immediately after birth. In fact, APRNs will see children approximately 8 times within the first 12 months of life as a result of well-child visits (Futures & Pediatrics, 2008). Having the frequent interactions with children makes these providers ideal discussing basic oral health needs and performing OHAs. However, many are reluctant to perform such practices due to their minimal reported knowledge and confidence related to children's oral health care. In a study conducted by Wessel et al., (2005), approximately 60% of PHCPs reported having "minimum" oral health training in their respective professional programs, while 36% reported having no training (Hegner, 2005; Wessel et al., 2005). This reported data brings relevance to the need for increased opportunities of oral health education among practicing nursing professionals.

Knowledge gaps. PHCPs such as family physicians, physician assistants (PAs), pediatricians, APRNs, RNs, and LPNs have a unique opportunity to promote oral health through oral health counseling and assessments (Murthy & Mohandas, 2010; U.S. Department of Health and Human Services [HHS], 2012). In fact, the American Academy of Pediatric Dentistry's (AAPD) and American Academy of Pediatrics (AAP) recommends collaborative efforts between medical and dental providers in meeting children oral health needs.

The encounters between APRNs, RNs, LPNs, and children 0-3 years are far more than those experienced by a dental provider, for most general dentists do not see children until the age of three (Wessel et al., 2005). With respect to medical providers, APRNs, RNs, and LPNs are

more likely to serve a larger population of patients in various settings than physicians and dentists (Hallas & Shelley, 2009). There are approximately 125,000 nurse practitioners in the U.S. and 13,000 of these practitioners are pediatric nurse practitioners (PNPs). In a survey conducted by Allen, Fennie and Jalkut (2008), an estimated 45% of PNPs provided care in medically underserved areas, 66% provided care to children with Medicaid and 25% provide care to children with no coverage (Allen et al., 2008).

Therefore, embracing the roles of APRNs (NPs and PNPs), RNs, and LPNs can assist in decreasing the oral disparity gap through providing assessments and making proper referrals to a dental provider by the recommended age of one year. Even with support and recommendations from the AAPD and AAP regarding collaborative efforts in addressing children dental needs prior to the age of one year, reported barriers exist. These barriers include: insufficient time during the appointment to perform additional responsibilities, lack of confidence in referring patients to local dentists, existence of a non-seamless referral system to dental providers, inadequate oral health educational training during formal medical training, and no reimbursement for oral health services (Hegner, 2005; Mitchell-Royston & Nowak, 2014).

Significant efforts have been made to address the well-documented barriers through state and nationally funded oral health training programs. Inadequate oral health training is the most common reported barrier among PHCPs, APRNs, and nurses. Providers report receiving an average of three hours related to oral health education within their formal training (Caspary, Krol, Boulter, Keels, & Romano-Clark, 2008; Lewis et al., 2009; Prakash et al., 2006). In spite of the insufficient number of hours related to oral health training throughout medical and nursing programs, providers report a high interest in receiving continuing medical education courses

(CME) to improve their oral health knowledge (Caspary et al., 2008; Prakash et al., 2006; Rabiei, Mohebbi, Patja, & Virtanen, 2012; Rabiei, Mohebbi, Yazdani, & Virtanen, 2014).

Proposed solution. One solution to decreasing the incidence of undetected and untreated dental caries is through educating APRNs and nurses. Providing opportunities for oral health trainings has shown to increase competence and confidence in performing OHAs among practitioners (AlYousef et al., 2013; Associates, 2008; Hallas & Shelley, 2009; Riter, Maier, & Grossman, 2008; Rozier et al., 2003; Yousef, 2011). Growing efforts for curriculum modifications are being made in academia to increase oral health knowledge among medical and nursing students (Golinveaux et al., 2013; Schaff-Blass, Rozier, Chattopadhyay, Quiñonez & Vann, 2006; Rozier et al., 2003); although, few studies have implemented an educational intervention among practicing nurses.

To date, one study evaluated a theory-guided online oral health educational training intervention (Yousef, 2011). This study was conducted in a population of medical interns and was a cross-sectional design. Implementation of a theory-guided electronic educational intervention delivered in a randomized control trial design has not been published. The benefits of delivering interventions electronically outweigh the potential disadvantages. Web-based intervention delivery is convenient, cost-effective, efficient and flexible for both the participant and researcher (Fotheringham, Owies, Leslie, & Owen, 2000). While utilizing the Internet to implement educational interventions has its advantages, careful attention to the development, delivery, and assessment is imperative. Plans for troubleshooting technical difficulties be considered and developed. Researchers have compared Web-based educational interventions to delivery and found no significant difference in delivery effectiveness (Marshall, Leslie, Bauman,

Marcus, & Owen, 2003; Wutoh, Boren, & Balas, 2004). Moreover, whether behavioral change will result in practice changes is yet to be determined (Wutoh et al., 2004).

Purpose

The proposed project was conducted to add to the body of literature on children's oral health education by the nursing profession. Majority of the literature has focused on oral health-related practices of family physicians and pediatricians (Herndon, Tomar, Lossius, & Catalanotto, 2010; Lewis et al., 2009; Lewis, Cantrell, & Domoto, 2004; Lochib, Indushekar, Saraf, Sheoran, & Sardana, 2014; Murthy & Mohandas, 2010; Nammalwar & Rangeeth, 2012; Prakash et al., 2006); however, minimal studies have evaluated oral-health related practices in the nursing profession (Golinveaux et al., 2013; Rabiei et al., 2014). Additionally, few studies have used an educational intervention to measure behavioral and practice changes (Golinveaux et al., 2013). The use of a theoretical framework to guide an educational intervention has not been reported in the literature. However, one study reported using email and web-based resources to deliver an educational intervention (Yousef, 2011). Therefore, an electronic oral health educational intervention guided by Social Cognitive Theory (SCT) to increase knowledge, attitudes and confidence in performing OHAs on children (0-3 years of age) among APRNs and nurses was implemented.

The SCT was chosen for the proposed project due to its application in educational interventions, health promotion and disease prevention initiatives (Bandura, 1998). Additionally, previous implemented oral health training programs have measured knowledge, attitudes and confidence, constructs of SCT (AlYousef et al., 2013; Bhat, Aruna, Badiyani, & Alle, 2012; Caspary et al., 2008; Douglass, Douglass, & Krol, 2009; Kressin et al., 2009; Rabiei et al., 2012; Schaff-Blass et al., 2006; Wessel et al., 2005). In 1986, Bandura identified 11 major constructs

for SCT application in understanding and changing human behavior (Bandura, 1993; Baranowski, Perry, & Parcel, 2002). These constructs include: environment, situation, behavioral capability, expectations, expectancies, self-control, observational learning, reinforcement, self-efficacy, emotional coping responses, and reciprocal determinism (Baranowski et al., 2002).

For the purposes of this project, five constructs will be used to guide the proposed intervention. The five constructs are environment, observational learning (vicarious learning), behavioral capability, reinforcement, and self-efficacy. The theoretical framework and application to the intervention is discussed later in the theoretical framework section. The major proposition of the theory suggests that decreased barriers in the environment, increased opportunity for observational learning leads to increased behavioral capability; then positively reinforcing the behavioral capability leads to increased self-efficacy, which perpetuates the desired behavior.

Research Questions

This project addressed the following research questions:

- What is the effect of an educational intervention on the frequency of performing oral health assessments on children?
- What impact will the educational intervention have on knowledge related to children's oral health?
- What impact will the educational intervention have on confidence in performing oral health assessments?
- What impact will the educational intervention have on confidence in discussing children's oral health with parents?

Hypotheses

The following hypotheses were evaluated and tested at alpha 0.05 level of significance:

- **Hypothesis one:** *Participants who receive the educational intervention will have a higher frequency score in performing oral health assessments than participants in the control group.*
- **Hypothesis two:** *Participants who receive the educational intervention will have a higher knowledge score related to children's oral health than participants in the control group.*
- **Hypothesis three:** *Participants who receive the educational intervention will have a higher confidence score related to performing oral health assessments than participants in the control group.*
- **Hypothesis four:** *Participants who receive the educational intervention will have a higher confidence score advising parents than participants in the control group.*

Definition of Terms

- **Primary health care provider/ primary care provider (PHCP/PCP)-** “A physician (M.D or D.O), nurse practitioner, clinical nurse specialist, or physician assistant as allowed under state law, who provides, coordinates or helps a patient access a range of health care services” (Healthcare.gov, 2016).
 - **Advanced practice registered nurses (APRNs) are also known as advanced practice nurses (APNs) -** “primary care providers that are at the forefront of providing preventive care to the public” (American Nurses Association [ANA], 2016a, 2016b). These providers are nurse practitioners, clinical nurse specialists, nurse anesthetists or nurse midwives (ANA, 2016a, 2016b). For the purposes of

this project, “APRNs” will be used to refer to nurse practitioner (NP), or pediatric nurse practitioners (PNP).

- **Nurses-** “a person who is trained to care for sick or injured people,” can be a caregiver, registered nurse (RN), licensed practical nurse (LPN), NP, physician’s assistant (PA) (Merriam-Webster, 2015). For the purposes of this project, “nurse” will be used to refer to a RN or LPN.
- **Registered nurses (RNs)-** “administer medication and treatment to patients, coordinate plans for patient care, perform diagnostic tests and analyze results, instruct patients on how to manage illnesses after treatment, and oversee workers such as LPNs, nursing aids and home care aides” (Allnursingschools, 2016).
- **Licensed practical nurses (LPNs) -** “provides skilled nursing care tasks and procedures under the direction of an RN, physician or other authorized health care provider” (New York State Center for School Health, 2015).
- **Oral health assessment-** oral health assessment involves lifting the lip, assessing the tongue, cheek and throat, identifying dental caries and pathology, discussing oral health behaviors and making proper referrals when applicable (Council, 1997).

CHAPTER II

REVIEW OF THE LITERATURE

Under diagnosed and untreated dental caries continues to be a global concern for children. Performing OHAs as early as six months of age (eruption of the first primary tooth) can reduce the incidence of dental caries. The objective of this study was to increase the knowledge, attitudes and confidence of advanced practice registered nurses and nurses in performing OHAs on children during well-child visits.

This chapter includes a discussion of the following: high rates of dental caries, delay in OHAs, successful educational interventions and programs, interventions implemented in PHCPs, and web-based and electronic interventions. Further, the chapter will discuss the educational intervention used in the dissertation project. Lastly, rationale for section of the theoretical framework and application in this study will be presented.

High Rates of Dental Caries in Children

In the U.S., dental caries is the most common chronic preventable disease and unmet health need among children (Wessel et al., 2005). Dental caries is five times more common than diagnosed asthma (Bagramian et al., 2009; General, 2000). Approximately, 17 million children live without dental care and 19% have untreated dental caries (Spurr, Bally, & Ogenchuk, 2015). Early childhood caries disproportionately impacts low-income and minority populations. Often times, children from low socioeconomic backgrounds have limited access to dental care, particularly preventive services (Rabiei et al., 2014; Wessel et al., 2005). Delayed preventive dental services often lead to poor quality of life for low-income and minority children compared to their counterparts (Rabiei et al., 2014; Wessel et al., 2005).

In many countries including the U.S., children do not receive a dental examination until the age of 3 years (Rabiei et al., 2014). Approximately, 1.5% of children who are 1 years old have visited the dentist compared to 89% of children who have only visited a physician (Foundation, 2012). Many general dentists are reluctant to see children under the age of 3 years. Additionally, there is a shortage of pediatric dentists who are able to provide care to children less than 3 years (Wessel et al., 2005).

The American Academy of Pediatrics (AAP), American Academy of Pediatric Dentistry (AAPD), American Dental Association (ADA), and the American Association of Public Health Dentistry (AAPHD), recommend that children have their first dental visit by 12 months. The following recommendations are established for pediatric providers: encourage the establishment of a dental home to parents and caregivers, administer OHAs periodically to all children; discuss anticipatory guidance, motivate at-home oral health behaviors, provide appropriate referral to a dental provider, and build and maintain a collaborative relationship with a local dental provider (Council, 1997; Segura et al., 2014). Even though this policy has been established since the late 1900s, many barriers exist among the medical and dental professions, which inhibits full adherence to this policy. Thereby, impacting the way oral health is managed among children.

Delay in Oral Health Assessments

Delay in OHAs is a result of inadequate knowledge related to oral health, lack of confidence in addressing oral health concerns, insufficient advocacy for preventive dental services among medical and dental professionals, and a shortage of dental providers to care for children less than 3 years. These factors have exacerbated dental caries among children in the United States.

Shortage of Dental Providers

Primary prevention strategies such as OHAs can assist in detection of dental disease and early referrals to dental providers. However, most general dentists do not see children before three years of age. Even fewer pediatric dentists are available to treat public insured populations. While these concerns are changing, the shortage of dental providers who will see children younger than three years remains a problem (Wessel et al., 2005). In the U.S. there are approximately 195,722 total dentists. Of those 195,722 dentists, 154,719 are general dentists and 7,163 pediatric dentists (American Dental Association [ADA], 2016). The limited number of dental providers to meet the oral health needs of children supports the action of non-dental professionals to assist in filling the void.

APRNs and Nurses in the U.S.

Nationally there are approximately 205,000 APRNs (Okrent, 2012). An APRN is a nurse who has a master's degree, post-masters, or doctoral degree in a nursing specialty and can generally practice medicine without a supervising physician. APRNs are nurse practitioners, clinical nurse specialists, nurse midwives, and nurse anesthetists (ANA, 2016b). This project focused on the roles of nurse practitioners and their potential to meet oral health needs among children. There are approximately, 205,000 total nurse practitioners with 10,865 specializing in pediatrics (Institute of Pediatric Nursing, 2016). Approximately, 37% of APRNs are primary care certified pediatric nurse practitioners working in a primary care outpatient clinic additionally, 28% will work in a private practice setting (Institute of Pediatric Nursing, 2016). This is about 55% of advance practice nurse population working in entities where children are treated.

Among nurses, there are approximately 3.1 million RNs with 219,000 specializing in pediatrics (Institute of Pediatric Nursing, 2016). Roughly 7.3% of the 3.1 million RNs work solely in a pediatric setting. Among the certified pediatric nurses, 60% work in children's hospitals, 16% in a community hospital, 12% provide care in a major medical center, 3.5% outpatient clinic, 1.8% school setting, 1.7% physician's office (Institute of Pediatric Nursing, 2016). Additionally, there are approximately 834,392 LPNs working in similar settings assuming various roles along with physicians, pediatricians, APRNs and RNs.

APRNs and nurses are well-positioned to provide oral health counseling and assessments, which involves lifting the lip, assessing the tongue, cheek and throat, identifying dental caries and pathology, discussing oral health behaviors and anticipatory guidance, making proper referrals, and applying topical fluoride when applicable (Council, 1997; Hegner, 2005). Additionally, APRNs and nurses are more likely to serve a larger population of patients in various settings than physicians and dentists (Hallas & Shelley, 2009). For this to become a reality, opportunities to increase oral health knowledge are essential to support, and promote nurse practitioners' role in oral health.

Barriers Associated with Performing OHAs

Advance practice registered nurses, registered nurses, and licensed practical nurses can assist with decreasing the incidence of dental caries through performing OHAs. Unlike dental providers, PHCPs are the first to establish a relationship with the caregiver and child. On average, a child will see a PHCP at least eight times within the first year of life for well-child visits (Futures & Pediatrics, 2008). Therefore, these providers can assist in decreasing the oral disparity gap through promoting oral health and making proper dental referrals when needed. Although collaborative efforts between medical and dental in addressing children's oral health is

recommended by the AAP, ADA, and AAPHD, reported barriers among those in the medical field exists. These barriers include: insufficient time during the appointment to perform additional responsibilities, lack of confidence in referring patients to local dentists, existence of a non-seamless referral system to dental providers, inadequate oral health educational training, and no reimbursement for oral health services (Hegner, 2005; Mitchell-Royston & Nowak, 2014).

With the current practice model in many primary care offices, a strategy within the team to manage oral health counseling and assessment is necessary. A focus group conducted by Mitchell-Royston & Nowak (2014) noted that insufficient time allotted for well-child visits was a barrier. One solution for maximizing time during a well-child visit was to delegate the OHAs among team members. For example, a pre-questionnaire regarding oral health habits or concerns would be completed by the guardian and reviewed by a healthcare worker or nurse. Then during the wellness exam, the nurse practitioner, physician, or physician assistant would ask additional questions and perform the OHA.

Next, the lack of confidence in referring patients to local dentists and the non-seamless process was noted in the following studies (Chou et al., 2013; dela Cruz, Rozier, & Slade, 2004; Hegner, 2005; Mitchell-Royston & Nowak, 2014). Identifying local dentists in the community who will accept patients <3 years and accept public insurance can be a challenge. In addition to, the lack of confidence in referring patients; providers also report inadequate oral health training in their professional programs. This knowledge gap creates a barrier performing OHAs in children prior to the age of one year. Lastly, lack of reimbursement for performing oral health services particularly fluoride varnish application varies from each state (Mitchell-Royston & Nowak, 2014). While these barriers exist across the continuum for many PHCPs they are well positioned to meet the oral health needs of children less than year and thereafter.

Successful Interventions and Programs

This section will discuss two national educational interventions that have been successfully implemented among primary healthcare providers. These interventions were successful in reaching many children and meeting their oral health needs. Lastly, close attention will be placed on future direction and recommendations provided by the reports.

North Carolina program. For successful integration of OHAs into clinical practice, educational interventions must focus on behavioral changes that will modify current practices. Douglass et al., (2009) provides examples of two well-documented oral health educational training interventions in the U.S. that were successful in changing behaviors of practicing practitioners. These interventions include: The North Carolina-based, “Into the Mouths of Babes Project,” and the “First Smiles Project” in California (Douglass et al., 2009).

The North Carolina-based “Into the Mouths of Babes Project (IMBs), is the most sought after training program. The project included medical providers and their personnel (Rozier et al., 2003). Implementation of this project was first piloted in 1999, with 15 locations across the state and practitioners from 66 offices (Rozier et al., 2003). The project has evolved over the years within the state from the initial 1,500 medical providers to over 3000 medical providers and staff members being trained from this project in 2008 (Douglass et al., 2009; Futures & Pediatrics, 2008; Rozier et al., 2003). The educational intervention of this project consists of a 1-1/2 hour continuing education course. The course content and training consists of oral screening, parent education, fluoride varnish application, information on Medicaid billing, and an oral health toolkit. The delivery of the course consists of lectures, case presentations, and discussion of clinical interventions; additionally, a video or mannequin is used to demonstrate fluoride application (Douglass et al., 2009; Rozier et al., 2003).

Researchers were able to obtain the effectiveness of their intervention through the NC-Division of Medical Assistance (NC-DMA), the agency that manages Medicaid in the state. In 2002, the number of claims submitted for reimbursement for preventive dental services increased from when the project first began. At the end of 2002, approximately 38,000 preventive dental services were billed from medical offices. Compared to the reported 3,100 preventive dental services in 2001 (Rozier et al., 2003). This project supports the efficacy of educational interventions to increase the behaviors and practices of practicing practitioners.

First Smiles Project. The next comprehensive oral health-training program is the “First Smiles Project” in California. This program is unique to others because the educational training was provided to both dental and medical professionals. The project reached a total of 15,000 practitioners to include physicians, medical residents, obstetricians/gynecologists, NPs, and PAs (Associates, 2008; Douglass et al., 2009). Similar to the NC-IMB program, funding for this four-year project provided oral health education and training to practitioners across the state. The primary goal of the project was to increase access to oral health services for children age 0-5 years. Key findings from the project include: increased oral health knowledge among practitioners, self-perceived skill increase related to disease identification, assessing disease risk, knowing when to refer to dental provider, and providing oral health education (Associates, 2008). With respect to medical providers, skills learned from the intervention were maintained at the 6-month follow-up.

Overall, the educational course was highly regarded, 45% of medical providers and 57% dental providers recommended the training to their colleagues (Associates, 2008). The ability to communicate and provide anticipatory guidance skills increased for both medical and dental providers. Additionally, medical providers reported increased clinical skills for assessing dental

caries risk (Associates, 2008; Douglass et al., 2009). An interesting reported finding was the difference in performing OHAs between medical and dental providers. Prior to the course, medical providers reported more frequently than dental providers to conducting OHAs on new patients 0-5 years. This reported finding remained the same at follow-up: approximately 29% of dental providers indicated, “always or most always” in performing OHAs compared to 42% of medical providers (Associates, 2008).

This project was the first known oral health educational interventions to be implemented simultaneously among medical and dental providers. The findings support the need for more collaborative learning among professions. Per the AAPD and AAP, managing children’s oral health should be a collaborative effort among the professions and not a silo approach.

Lastly, Douglass et al., (2009) provided the following recommendations for increasing access to preventive dental services for children: requiring oral health education to be a part of physicians’ training, and/or continuing education, quality teaching, quality of educational content, outcome evaluation, and medical-dental collaboration (Douglass et al., 2009). Quality teaching would require existing and new curricula programs to be evaluated for their effectiveness in changing knowledge, behaviors and attitudes (Douglass et al., 2009). Additionally, it was recommended that attention focus on the science of education, best practices and innovative approaches. Quality of educational content suggests that the content of oral health programs be consistent in content, high quality and reflect the latest science (Douglass et al., 2009). Outcome evaluations of programs would ensure effective preparation for managing children’s oral and overall health. Lastly, medical-dental collaboration suggests closer relationships between physicians and dentists to foster favorable referral environments (Douglass et al., 2009).

Oral Health Practices among Primary Healthcare Providers

This section will discuss interventions that have been implemented among PHCPs. A significant amount of the literature has focused on physicians' oral health-related practices, only a few have focused on nurses; hence, the reason for conducting this current study. Further this section will support the need for collaborative efforts between medical and dental providers. For example, there are fewer pediatric dentists than general dentists available to provide preventive care for children prior 3 years of age. Moreover, general dentists rarely provide care to children less than 3 years of age (Wessel et al., 2005). These challenges support the need for non-dental professionals to have a role in early dental prevention.

Family physicians and pediatricians. A significant amount of literature has focused on comparing knowledge, attitudes and confidence of family physicians and pediatricians with respect to preventive oral health care practices (Herndon et al., 2010; Nammalwar & Rangeeth, 2012; Prakash et al., 2006). Studies conducted by Herndon et al., (2010), Nammalwar and Rangeeth (2012), and Prakash et al., (2006), compared differences between pediatricians and family physicians. All of the studies were cross-sectional with self-administered surveys mailed and/or delivered electronically to the providers. The studies sought to provide an assessment for current knowledge and practices among providers based on previous oral health education obtained during medical training. These studies (Herndon et al., 2010; Nammalwar & Rangeeth, 2012; Prakash et al., 2006), did not include oral health interventions; however, the researchers suggested the need for refresher oral health trainings such as continuing medical education (CME) to improve knowledge and confidence related to oral health practices. Surveys used assessed the following: knowledge related to ECC, age of first dental visit, role of the dental provider; amount of oral health education received in formal training, confidence in oral health counseling and visual inspection of the oral cavity.

In general, knowledge regarding ECC was higher in pediatricians than family physicians (Prakash et al., 2006). This was also the case regarding the pediatric dentist's role and age of the first dental visit (Nammalwar & Rangeeth, 2012; Prakash et al., 2006). With respect to oral health education, pediatricians and family physicians reported receiving less than two hours in their formal education (Nammalwar & Rangeeth, 2012).

Similarly, Prakash et al., (2006), further analyzed the amount and resource of oral health training in their study. For example, 18% of pediatricians reported receiving oral health education compared to 38% of family physicians in medical school. Approximately, 20% of pediatricians and 11% family physicians reported receiving oral health education in their respective residency programs. Lastly, 30% of pediatricians and 16% of family physicians reported receiving continuing medical education post-graduation. Participants in all the studies who reported higher knowledge and confident scores were also more likely to practice the recommended oral health promotion behaviors (Herndon et al., 2010; Nammalwar & Rangeeth, 2012; Prakash et al., 2006).

The majority of cross-sectional studies have been conducted on both pediatricians and family physicians. However, Lewis et al., (2004 and 2009), Murthy and Mohandas (2010), and Lochib et al., (2014), exclusively assessed pediatricians' knowledge, attitudes and practice behaviors (Lewis et al., 2004; Lewis et al., 2009; Lochib et al., 2014; Sheoran, & Sardana, 2014; Murthy & Mohandas, 2010). Among these studies, inadequate oral health training continued to be a reported barrier related to insufficient oral health practices. For example, approximately 12% of pediatricians reported routinely performing oral exams and 11% examined teeth for dental caries (Lochib et al., 2014). In the survey conducted by Lewis et al., (2009), 50% of pediatricians performed oral exams on children 0-3 years and 90% believed they should evaluate

children for dental caries (Lewis et al., 2009). Similar results were found in Murthy and Mohandas (2010) study regarding performance of oral exams and dental caries evaluation. Approximately, 91% of pediatricians examined teeth for dental caries and 52% reported observing dental caries among their patients at least once a week (Murthy & Mohandas, 2010).

Pediatricians strongly embrace the AAP/AAPD dental home policy. However, there were differences in opinions among pediatricians regarding the age of the first dental visit. Between all three studies, approximately 40% recommended the first dental visit by the age of two; 50% by three years of age and 97% by year one (the recommended age) (Lewis et al., 2009; Lochib et al., 2014 Sheoran, & Sardana, 2014; Murthy & Mohandas, 2010). Inconsistencies in the recommendation for establishing a dental home and the age of the first dental visit support the need for more oral health educational training opportunities among practicing providers.

Medical students and pediatric residents. Understanding oral health practices of medical students and residents is as equally important as those of practicing providers. In order to change the future practices of PHCPs, it is important to evaluate students' current knowledge and behaviors. Studies conducted by AlYousef et al., (2013) and Bhat et al., (2012), assessed medical students' oral health knowledge and practices through self-administered surveys (AlYousef et al., 2013; Bhat et al., 2012). Approximately, 88% of students reported fair or poor OHAs preparation while 86% of students reported that time devoted to oral health was "too little" (AlYousef et al., 2013). The students saw 16 child patients per week with 6 children being less than five years of age. With respect to comfort, 65% felt comfortable referring children who were high caries risk. Approximately, 13% referred all children to a dental provider 12 months and older (AlYousef et al., 2013). In general, individuals who were more likely to provide oral

health counseling and refer patients reported seeing patients with oral problems, satisfaction with their oral health training, and demonstrated an interest in public health (AlYousef et al., 2013).

The study conducted by Bhat et al. (2012), did not provide as much information regarding medical students' perception of their oral health training. However, the study focused on the medical students' knowledge concerning primary teeth. Approximately 67% of the medical students knew that the first primary tooth erupts around 6 months, and problems associated with primary teeth could impact the permanent dentition (Bhat et al., 2012). Unlike students in AlYousef et al., (2013) study, the students' responses related to ECC showed a lack of knowledge and lower attitudes toward preventive strategies for children (Bhat et al., 2012). The need for increased oral health education within the curriculum is further supported by the inconsistencies in knowledge of medical students regarding basic oral health related to children.

The study conducted by Caspary et al., (2008), was the first to assess pediatric residents' oral health literacy in the last year of their professional training (Caspary et al., 2008). The American Academy of Pediatrics annual exit survey of graduating residents captures experience while in the residency program. In 2006, the AAP resident survey included an oral health component for the first time. The survey examined perceptions of oral health training and attitudes about performing OHAs (Caspary et al., 2008). Approximately, 35% reported having no oral health training; in contrast, 73% reported having less than three hours of seminars and lectures, and 14% reported having clinical observation with a dentist. The majority of residents felt confident in educating parents on the effects of bottle-feeding and juice, or carbonated drinks. Only 15% of the residents felt comfortable assessing parents' oral health knowledge and identifying dental caries (Caspary et al., 2008). With respect to awareness of the child's first

dental visit, the average age reported was 2.4 years. Overall, the residents embraced oral health promotion among children and parents and recognized the need for more oral health education.

The literature is replete in capturing the attitudes, knowledge, and confidence among current practitioners and medical students. The need for additional oral health training beyond the formal medical and nursing education has also been well documented. However, there are limited studies supporting the need for educational interventions to enhance knowledge and increase OHAs.

Advanced practice nurses and nurses. Embracing the role APRNs and nurses in preventive dental services is essential to addressing the oral health disparities among children. There are approximately 205,000 APRNs with 10,865 who are pediatric nurse practitioners (PNPs), there are 219,000 pediatric registered nurses, and 834,392 LPNs (Institute of Pediatric Nursing, 2016; National Federation of Licensed Practical Nurses [NFLPN], 2003). PNPs are APRNs who receive specialized training in pediatrics. In general APRNs and nurses are more likely to serve a larger population of patients in various settings than physicians and dentists (Hallas & Shelley, 2009). Additionally, primary health nurses are low cost health workers who have frequent contact with mothers and children (Rabiei et al., 2014). In a survey conducted by Allen, Fennie, and Jalhut (2008), an estimated 45% of PNPs provided care in medically underserved areas, 66% provided care to children with Medicaid and 25% provide care to children with no coverage (Allen, Fennie, & Jalkut, 2008).

Similar to physicians, APRNs and nurses are the first point of contact with children and caregivers (Marrs, Trumbley, & Malik, 2011 2011). In fact, PNPs are more likely to provide oral health promotion recommendations than their counterparts (Hallas & Shelley, 2009). Additionally, within a group practice setting APRNs, nurses and health care coordinators are

more likely to discuss anticipatory guidance and conduct OHAs (Mitchell-Royston & Nowak, 2014). Similar to physicians, providing opportunities for oral health training is a reported barrier within the nursing profession (Hallas & Shelley, 2009). However, among nursing students, a platform has been established to incorporate a more comprehensive and extensive oral health training within the current curriculum (Golinveaux et al., 2013; Hallas & Shelley, 2009; Mahat, Lyons, & Bowen, 2014; Marrs et al., 2011).

More importantly, the relationship between a nurse and mother/caregiver is established before the child is born. Nurses develop a dialogue with mothers and/or caregivers regarding feeding habits and nutritional intake associated with oral health prior to the child's entrance into the world (Mahat et al., 2014). These discussions of oral health behaviors often occur prior to the first well-child visit, which place nurses a unique collaborative care arrangement of children.

Similar to studies discussed thus far, a study in Tehran, Iran assessed primary care nurses' attitudes and willingness to perform oral health care (Rabiei et al., 2014 & Virtanen, 2014). Knowledge, attitudes and willingness of nurses based on previous education received was assessed. Tehran, a developing country presents with similar concerns of those in the U.S. related to children's oral health. Most children in Tehran do not receive their first dental visit until the age of three years (Rabiei et al., 2012); and therefore, education of primary care nurses to integrate oral health into primary care is needed.

Similar to previous studies conducted by Herndon et al., (2010), Namamalwar et al., (2012), and Prakash et al., (2006); knowledge, attitudes, and oral health practices among nurses was based on the level of oral health education within their professional training. A nurse was more knowledgeable in the areas of medical and pediatric health as was expected. With respect to oral health, approximately 24% of the nurses knew the eruption pattern of the first tooth, 27%

were aware of the oral bacteria transmission between mother and child and 80% knew the cariogenic effects of formula verses breast milk. Majority of the nurses reported a positive attitude towards oral health care. Additionally, they believed their role was important in oral health promotion. Lastly, 69% of the nurses were willing to learn more about oral health care (Rabiei et al., 2012).

In summary, the literature presented an understanding of the level of knowledge, attitudes, current practices and the willingness to improve current practices related to oral health among APRNs and nurses. It is evident that oral health training courses for current practitioners are beneficial in changing practice behaviors. There are significantly more studies that have assessed knowledge, attitudes and behaviors of medical providers. Yet, the literature also suggests that nurses are more involved with mothers and children prior to birth than physicians. The next section of this chapter, will review studies that have implemented educational interventions among student health professionals.

Implemented Educational Interventions among Student Health Professionals

This section presents a discussion of the literature on educational interventions implemented among pediatric residents, PNP's and medical students (AlYousef et al., 2013; Golinveaux et al., 2013; Schaff-Blass et al., 2006; Yousef, 2011). Studies conducted by Schaff-Blass et al., (2006) and Golinveaux et al., (2013), utilized an interprofessional approach to educate practitioners on the importance of OHAs among children.

In the study conducted by Schaff-Blass et al., (2006), pediatric residents were included from three schools East Carolina University (ECU), Wake Forest University (WFU) and the University of North Carolina (UNC) (Schaff-Blass et al., 2006). UNC was the school selected to receive the educational intervention; ECU and WFU were the comparison schools. Similar to the

previously discussed interventions, this educational intervention was implemented to address barriers associated with oral health practices.

The oral health educational training course consisted of lecture series and hands-on training. The school of dentistry provided the delivery of hands-on training to pediatric residents. Additionally, the following content was delivered: identification of children's oral health problems, caries risk assessment, indications for referral; fluoride application, and providing anticipatory guidance to caregivers (Schaff-Blass et al., 2006). A pre-post questionnaire measured knowledge, opinions, confidence, and practice. Results yielded a significant difference in the knowledge and practice domains at from baseline to follow-up for UNC. For example, residents at UNC had greater knowledge scores on the post-test questionnaire (76) compared to pre-test questionnaire (65). Similar results were also reflected with frequency of performing oral health practices pre-test questionnaire scores were (40) compared to (76) on the post-test questionnaire (Schaff-Blass et al., 2006). There were no significant differences from baseline to follow-up with respect to confidence and opinion domains at UNC. However, these domains were high at baseline data collection. With the respect to ECU and WFU no significant differences were noted between the four domains from baseline to follow-up (Schaff-Blass et al., 2006).

Similar to the previous study, Golinveaux et al., (2013), used an interprofessional approach to provide oral health education to PNP students (Golinveaux et al., 2013). Thirty first-year PNP students at the University of California participated in the educational intervention. Delivery of the educational intervention consisted of didactic education, simulated exercises and clinical observation of a dentist. The students received a one-hour lecture based on content from the "First Smiles" and AAP curriculum, a one-hour simulated skills exercise, and a half-day

observation at a pediatric dental office. The delivery of content occurred at different days and times. PNP students received a pre-intervention survey, a 5-month and 9-month post-intervention survey follow-up. Participants' knowledge, confidence and attitudes toward providing oral health services during well-child visits significantly increased after the intervention (Golinveaux et al., 2013). Following the intervention, 83% of PNP students reported performing more than 10 dental examinations during well-child visits with respect to their clinical experience while in the program (Golinveaux et al., 2013). While overall knowledge improved for PNP students, inadequate knowledge still existed for recommended age of first dental visit and fluoride application. Additionally, PNP students were able to retain knowledge gained at the 5 and 9-month follow-up evaluations. The use of a multidisciplinary approach to educating students supports the initiative for collaborative learning and care.

Lastly, the educational intervention conducted by Yousef (2011), was a part of his dissertation. In contrast to the previous intervention studies mentioned, Yousef (2011) used a theory-guided electronic educational intervention to measure knowledge, attitudes and practices related to children's oral health among medical interns in Saudi Arabia (Yousef, 2011). This study was the first to explicitly indicate use of a theoretical framework to guide the intervention. The specific theoretical framework was not stated; however, the delivery of the educational content supports use of social cognitive theory. The educational intervention was delivered over a four-week period. Throughout a five-day workweek, participants received oral health care emails at least three times. Each email consisted of a unique primary oral health care issue. Participants were then invited to learn more information through a web-link that provided information regarding the topic (Yousef, 2011). Lastly, participants were asked to provide feedback on the information presented. Additionally, participants were sent procedural videos

demonstrating performance of dental screening, counseling of caregivers; caries risk assessment, referral, and fluoride application (Yousef, 2011).

Use of an electronic delivery method as opposed to face-to-face instruction was based on the population. The researchers communicated through the students' university email.

Additionally, tracking measures were used for information sent through email and websites.

Similar to other studies, attitudes, comfort levels, and practices increased at post-intervention (Yousef, 2011). Approximately, 91% of students reported being comfortable in counseling patients compared to 25% prior to the intervention (Yousef, 2011). The results suggested that increased oral health knowledge, high perceived comfort levels, more encounters with oral-health problems were predictors of performing oral-health related services (Yousef, 2011).

Lastly, all participants agreed with the AAPD and AAP recommendations that the first dental visit should occur by 12 months (Yousef et al., 2011).

The use of interventions to change behaviors related to oral health practices among students and medical residents was found to be efficacious. Furthermore, similar interventions could be implemented among practitioners such as the nursing profession.

Web-based Educational Interventions

This section will discuss the efficacy of educational training performed via web-based media. It will address the advantages and disadvantages in using technology versus the physical face-to-face delivery of educational material. A majority of the studies found in the literature to support use of technology in educational interventions occurred from 2000-2008. Among these studies, the efficacy of educational interventions among primary care providers was reported (Woosung Song & Marisol, 2004).

The benefits of delivering interventions via web-based technology outweigh the potential disadvantages. Web-based intervention delivery is convenient, cost-effective, efficient and flexible for both the participant and researcher (Fotheringham et al., 2000). While utilizing the Internet to implement educational interventions has its advantages, careful attention to the development, delivery and assessment is imperative. As with any use of technology, plans for troubleshooting have to be considered and developed. Researchers found no significant differences in the effectiveness of delivery when comparing Web-based educational interventions to face-to-face educational interventions (Fotheringham et al., 2000; Marshall et al., 2003; Wutoh et al., 2004). Whether behavioral change will result in practice changes is unknown (Wutoh et al., 2004).

Theoretical Framework

Yousef, (2011) was the first study reported in the literature to use a theory-guided electronic educational intervention that focused on oral health-related practices. Social Learning Theory (SLT) and Social Cognitive Theory (SCT) guided the delivery of the oral health training in this project. SLT is an earlier model of SCT and has been utilized in the nursing profession particularly in academic and training settings (Aliakbari, Parvin, Heidari, & Haghani, 2015; Bahn, 2001; Braungart & Braungart, 2007). SLT emphasizes observational learning and role modeling to promote behavior change. The SCT model adds constructs for maintaining behavior and behavioral outcomes.

Description of theory. Social Learning through Imitation,” was the first publication by Bandura in 1962 (Baranowski et al., 2002). Social Learning Theory (SLT) has evolved over the past decades adding constructs with each modification (Baranowski et al., 2002). In Bandura’s 1977 publication “Social Learning Theory,” emphasis was placed on observational learning, role

modeling, cognitive ability and the environment (internal vs. external contributors) (Bandura & McClelland, 1977). The earlier concept of SLT focused on reciprocal determinism where the environment, person, and behavior are continually interacting (Figure 1) (Baranowski et al., 2002). SLT has been used in educational activities, interactions with patients, employee training, continuing education, health promotion among health professionals; particularly nursing (Aliakbari et al., 2015). Additionally, constructs from SLT have been used in formal nursing educational training due to its strong emphasis on role modeling of behaviors (Aliakbari et al., 2015; Bahn, 2001). For example, observation of professional nursing practices and interactions between patients and care team members.

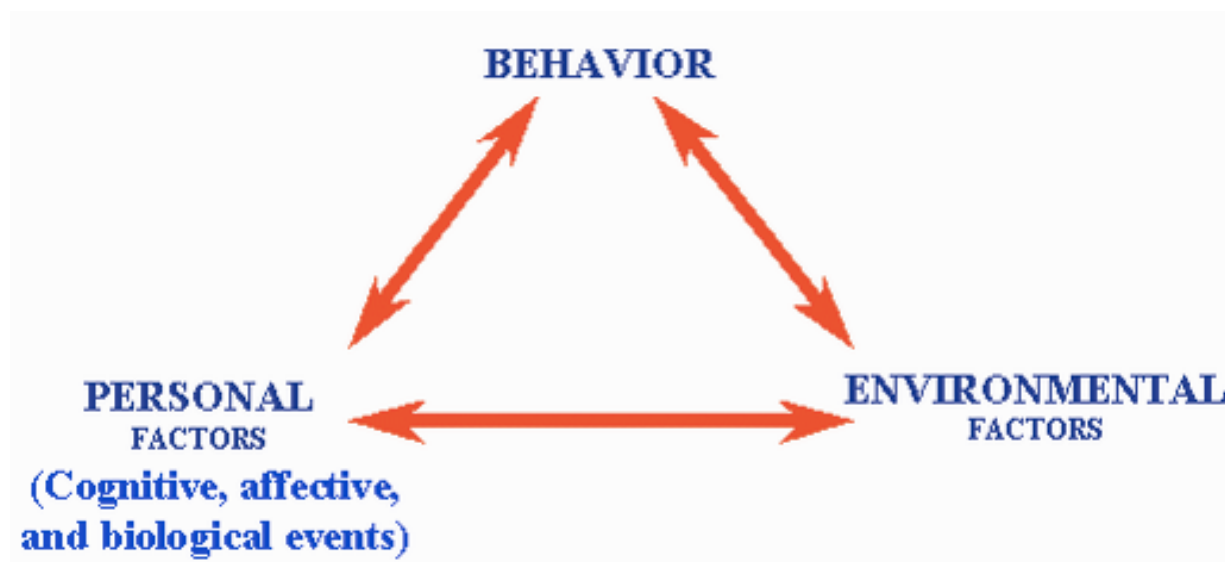


Figure 1. SLT reciprocal determinism.

In 1986, SLT was named Social Cognitive Theory and other constructs were added to understand human behavior (Baranowski et al., 2002). These constructs include: environment, situation, behavioral capability, expectations, expectancies, self-control, observational learning, reinforcement, self-efficacy, emotional coping responses, and reciprocal determinism (Baranowski et al., 2002). Many of these constructs overlap with the major constructs in the

original model. This proposed project integrated structures of reciprocal determinism and the later added constructs of SCT (environment, observational learning, behavioral capability, reinforcement, and self-efficacy) (Figure 2).

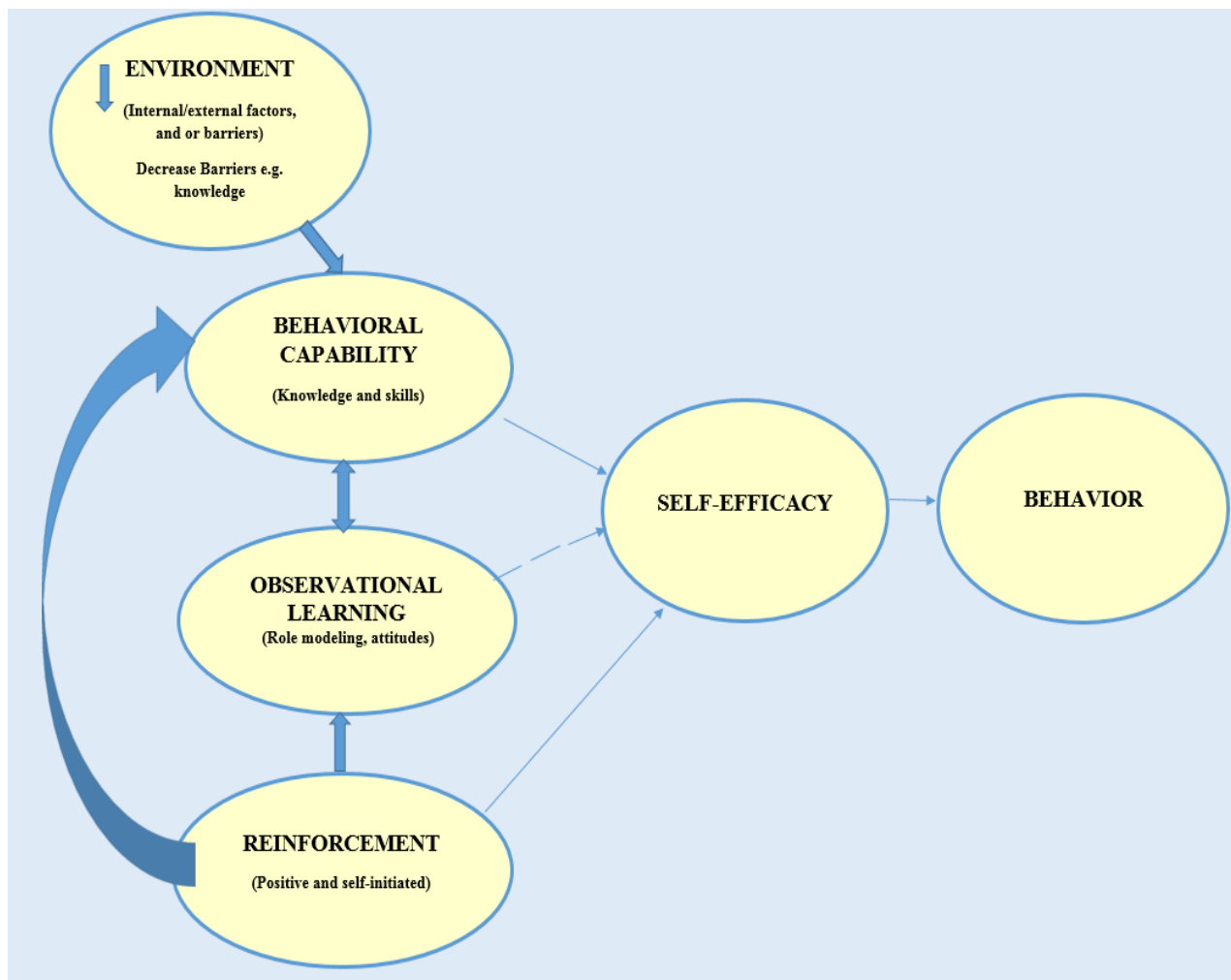


Figure 2. Integrated framework of SLT and SCT.

This framework posits that low perceived internal or external factors, and/or environmental barriers, creates the opportunity for knowledge (behavioral capability), and observational learning to occur. Positive reinforcement is then needed to enhance the behavior or skill in order for self-efficacy to be gained. Environmental factors are used in this model due to

the reported barriers in the literature of inadequate oral health training. Providing an opportunity for learning children's oral health needs is one way to decrease this environmental barrier. In this SCT model, observational learning is indirectly related to self-efficacy, while behavioral capability and reinforcement are direct effects of self-efficacy. Self-efficacy then directly effects behavior change.

This project was guided by five constructs of SCT (environment, observational learning, behavioral capability, reinforcement, and self-efficacy). The five constructs chosen for the project were based on the theoretical guidance employed by previous oral health educational interventions, and the variables measured in prior studies. Previous researchers have often measured knowledge, attitudes, and confidence with respect to practitioners' oral health training and performance of OHAs (AlYousef et al., 2013; Bhat et al., 2012; Caspary et al., 2008; dela Cruz et al., 2004; Golinveaux et al., 2013; Hallas & Shelley, 2009; Herndon et al., 2010; Ismail, Nainar, & Sohn, 2003; Lewis et al., 2004; Marrs et al., 2011; Nammalwar & Rangeeth, 2012; Rabiei et al., 2014; Schaff-Blass et al., 2006; Youef, 2011). Few researchers, however, have addressed environmental factors such as perceived barriers and opportunities for oral health training. Therefore, this proposed project addressed this construct by providing APRNs and nurses with the opportunity to receive oral health training through a continuing education course (intervention).

The following definitions were used to guide this project:

1. **“Environment:** Factors physically external to the person (Baranowski et al., 2002).
2. **Observational learning:** Behavioral acquisition that occurs by watching the actions and outcomes of others' behaviors.
3. **Behavioral capability:** Knowledge and skill to perform a given behavior.

4. **Reinforcement:** Responses to a person's behavior that increase or decrease the likelihood of reoccurrence.
5. **Self-efficacy:** The person's confidence in performing a particular behavior and overcoming barriers to that behavior."

Application of Theoretical Framework

Topics in the educational modules include: dental development, dental caries identification, preventive and oral screenings. These topics are derived from American Academy of Pediatrics, "Protecting All Children's Teeth (PACT)." The PACT curriculum is used to educate health care providers who treat children. The purpose of PACT is to increase the following: knowledge related to children's oral health, competence in providing oral health guidance and preventive care; and increase comfort in sharing oral health responsibilities with dental providers (Pediatrics, 2010).

Next, observational learning and role modeling will be demonstrated through a video that includes a medical provider performing an OHA on a child with the parent. The video demonstrates the following: supplies needed for an OHA (gloves, mirror gauze etc.), how to position the child for an assessment with the parent's assistance, what to look for during an assessment, how to identify dental caries, proper documentation of findings and the application of topical fluoride (Pediatrics, 2010). Lastly, due to no physical interaction with the participants, a question and answer portion at the conclusion of the course will reinforce information and skills learned. The goals for the oral health-training course are to increase knowledge related to the importance of performing OHAs, and promote the confidence to implement assessments in daily practice.

Limitations of Previous Research

Limitations of previous work include: lack of explicit theoretical framework, inadequate educational interventions implemented in the nursing profession, and insufficient use of randomized control trials. Among all of the studies that have assessed knowledge, attitudes, and confidence, none have indicated the rationale for using these particular variables with respect to a theoretical premise. In the nursing literature, only one study was identified that utilized an educational intervention to assess attitudes, knowledge and confidence among PNP students (Golinveaux et al., 2013). Therefore, an electronic theory-based oral health educational intervention was used to increase knowledge and practice among practicing nurses.

CHAPTER III

METHODOLOGY

In order to address the oral health needs of children, a collaborative effort is required between the medical and dental professions. APRNs and nurses have the first and subsequent encounters with children and parents in the first year of life, providing opportunities to discuss oral health behaviors than those of dental providers. This proposed project was the first to implement a theory-guided electronic oral health educational training intervention to APRNs and nurses. In order to modify current practices, refresher-training courses are needed to reach practicing providers. Several free oral health trainings are available to dental and non-dental professionals; however, the frequency of use or awareness of these courses is unknown. This project was designed to meet the educational needs of nurses by providing a structured oral health-training course.

Research Questions

The project addressed the following research questions:

- What is the effect of an educational intervention on the frequency of performing oral health assessments on children?
- What impact will the educational intervention have on knowledge related to children's oral health?
- What impact will the educational intervention have on confidence in performing oral health assessments?
- What impact will the educational intervention have on confidence in discussing children's oral health with parents?

Hypotheses

The following hypotheses were evaluated and tested at alpha 0.05 level of significance:

- **Hypothesis one:** *Participants who receive the educational intervention will have a higher frequency score in performing oral health assessments than participants in the control group.*
- **Hypothesis two:** *Participants who receive the educational intervention will have a higher knowledge score related to children's oral health than participants in the control group.*
- **Hypothesis three:** *Participants who receive the educational intervention will have a higher confidence score related to performing oral health assessments than participants in the control group.*
- **Hypothesis four:** *Participants who receive the educational intervention will have a higher confidence score advising parents than participants in the control group.*

Study Design

A randomized experimental design was used for this study to determine the cause and effect of the educational intervention (Figure 3). The major research question: "What is the effect of an educational intervention on the frequency of performing oral health assessments on children?"

	Groups	Pre-test	Intervention	Post-test
R	Experimental	O ₁	X	O ₂
R	Control	O ₁	---	O ₂

Figure 3. Research design: Randomized experimental pre-test-post-test.

Sample Strategy

Due to the direct access limitation to the nursing population, a non-probability sampling technique was used for the sampling frame. The snowball recruitment technique requires research participants to identify other potential subjects. The primary investigator began recruitment through larger organizations in the Hampton Roads area that had direct access to APRNs and nurses working in pediatric setting. The accessible population was obtained through the National Association of Pediatric Nurses and Practitioners (NAPNAP), Old Dominion University School of Nursing (ODUSON), Children's Hospital of the King's Daughters (CHKD), and the Virginia Oral Health Coalition (VA-OHC). The Hampton Roads Chapter of NAPRNAP had a social media page (Facebook) with 120 members. The gatekeeper of this organization posted the recruitment flyer for the study on the NAPRNAP professional and social media pages at minimum 3 times a week. The SON at ODU posted the recruitment flyer on their main page and alumni page. The recruitment flyer was sent to CHKD's clinical supervisor and overseer of nursing education. This coordinator sent the recruitment flyer to all the nurses who work at CHKD. Lastly, the VA-OHC sent the recruitment flyer to all of the medical providers and nurses on the board of directors, subcommittees within the coalition and affiliated pediatric offices. While the snowballing sampling strategy was used, participants were still randomly allocated into an experimental or control group.

Evaluating prior sample and effect sizes was a challenge due to an insufficient number of randomized control trials on topic. In most research studies, power is set at .50 or .80; alpha at 0.05 and the effect size can be based on similar studies. However, for this study a G*Power analysis table was used to determine sample size. G*Power was developed by Erdfelder, Faul and Buchner in 1996. The G*Power analysis software is a stand-alone power analysis tool that is

commonly used in social and behavioral research (Faul, Erdfelder, Lang, & Buchner, 2007). Based on the above parameters, research design, and projected statistical test, a sample size of 52 was recommended. Additionally, the study conducted by Golinveaux et al., (2013), was used as a point of reference; as this was the only study identified in the literature that implemented an educational intervention among nurses, and measured similar variables. Researchers in this study used a convenient sample of 30 pediatric nurse practitioners. In the current study, 46 participants were successfully recruited with, 33 retained throughout the project.

Inclusion criteria for the study was APRNs (nurse practitioners, pediatric nurse practitioners) and nurses (registered nurses, licensed practical nurses) who provide care to children 0-3 years within a 5-day work period, practiced in the field for at least one year and currently practicing in a community or private setting. Participants were excluded if: 1) they received training on children's oral health within the past year; and/or 2) do not provide care to children 0-3 years within a 5-day work period. Participants who meet the inclusion criteria and complete all portions of the study will be provided a 1-hour of free continuing education credit. Additionally, participants will receive a free children's oral health educational brochure that can be used in their offices. After completion of the project, participants will be able to have access to the educational presentation.

Instrumentation

The validated questionnaire contains 21 questions with multiple sub-items in 8 different sections from the University of Iowa. The questionnaire was validated in 2007 by 10 pediatricians at the University of Iowa, College of Dentistry and 10 pediatricians not affiliated with the institution (Yousef, 2011). The questions within the survey have been assessed for reliability and validated; however, the specific statistical data was not reported (Yousef, 2011).

Permission to use the validated survey was granted by Thesis Supervisor, Dr. Peter Damiano. These sections include demographics (questions 1-9 and 16); knowledge related to dental caries and use of fluoride (questions 11, 14 and 15); identification and or reported oral health problems (question 12); frequency of OHA (questions 13); comfort providing anticipatory guidance and oral exam (questions 17 and 18); referral process used and frequency of referral (questions 19 and 21); and perceived barriers associated with referring children. Where appropriate, a Likert scale was used at levels of 3, 4, 5, and 6. Questions regarding procedural and/or screening information used a “yes” or “no” format (Yousef, 2011) (Appendix A). The questionnaire used in the proposed study is an adapted version of the original questionnaire and contain only 19 questions with 7 sub-sections (Appendix B).

Measurement of Dependent Variables

The following dependent variables were measured using the following Likert-scales:

- **Knowledge and attitudes-** opinion to a series of 8 subsets of questions that relates to dental caries, transmission of dental caries and age of the first dental visit. This variable is measured on a 3-point Likert scale of yes=3, no=2 and don't know=1. The highest knowledge score one could earn in this section is 21 and 7 would be the lowest.
- **Confidence-** comfort to counsel parents (4 subsets of questions) and perform oral screenings (5 subsets of questions). This variable will be measured on a 5-point Likert scale of 1=very uncomfortable, 2=somewhat uncomfortable, 3= neutral, 4=somewhat comfortable and 5=very comfortable. The highest score a participant could earn in these sections is 45 and 9 would be the lowest score.
- **Frequency of OHA-** having participants rate the frequency for each portion of the OHA. There are 8 subsets of questions in this section. This variable will be measured on a 4-

point Likert scale of 4=most of the time, 3= usually, 2=sometimes and 1=never. The highest score for these responses would be 32 and the lowest would be 8.

Measurement of Independent Variable

The two independent variables used in this study were:

- **Group-** experimental or control, a categorical variable. Participants will be assigned to either the experimental group =0 or control group= 1.
- **Time-** was a categorical variable, pre and post-test observations.

Educational Intervention for Proposed Project

A 1-hour theory-based oral health educational training was delivered electronically to APRNs and nurses. This project addresses the recommendation of providing oral health training opportunities to practicing nurses by NAPNAP (Hallas & Shelley, 2009; Mitchell-Royston & Nowak, 2014). The content for the educational intervention was obtained from the American Academy of Pediatrics, “Protecting All Children’s Teeth (PACT).” The PACT curriculum was designed to educate pediatricians and providers who treat pediatric patients (American Academy of Pediatrics [AAP], n.d.). Educational training consists of four modules focused on the following: dental development, identification of dental caries, preventive dental care and oral health screenings. The overall goal of the curriculum is to increase knowledge, attitudes and confidence towards the importance of OHAs among non-dental professionals (AAP, n.d.).

Data Collection Procedures

The recruitment period for participants began May 20, 2016 and concluded June 27, 2016. Participant in the study were instructed to email the primary investigator (PI) at childoh@odu.edu. The purpose of this email was to keep the PI blinded from the participants. This information was located on the approved recruitment flyer (Appendix C). The email

account was requested for the purposes of this dissertation project through the Old Dominion University Information Technology Department. Participants were instructed to avoid mentioning their name and use of automated signature when corresponding with the PI throughout the study. Participants who contacted the PI to participate in the study were thanked for their interest, provided basic information regarding study expectations, projected timeframe to expect the initial survey and were asked to pass the opportunity along to colleagues. Basic information regarding the study included the anticipated time commitment (2 hours over a 4 week period) and the requirement to complete all portions of the study in order to receive the continuing education certificate. At the conclusion of the study, the unique ODU email was deactivated. This information was explained to participants in the electronic informed consent. Email addresses of each participant were needed in order to send the pre/post-intervention surveys and the continuing education course materials.

At the conclusion of the recruitment period, participants were randomly allocated to either the experimental or control group. Through the use of an excel sheet the randomization process was blinded. All emails used to contact the PI for study participation were assigned a “participant number;” for example, participant 1 (P1), (P2), (P3) etc. The PI then utilized the Random Number Generator technology and entered the range of participants 1-46 into the system for number section (Random.org, 2016).

Next, two separate pre-intervention and post-intervention surveys were designed into Qualtrics©. Creating two surveys allowed the PI to keep the responses of both the experimental and control groups separate. The ODU informed consent along with the inclusion criteria and survey questions were built into the Qualtrics© survey. Consenting participants who met all the inclusion criteria were automatically directed to the pre-intervention survey. At the conclusion of

the pre-intervention survey, participants were asked to input the email address used in the initial communication and their date of birth (MM/DD/YYYY). This information was also requested after the post-intervention survey and for the control group at the conclusion of reviewing the educational content. DOB was requested as an additional method to track completion of research study items. The email address and DOB was used for participant accountability and confirm completion of all requested items in order to receive the continuing education (CE) certificate. All participants received the pre-intervention survey, continuing education course; follow-up email with a trivia question related to children's oral health at week 3 and the post-intervention survey. The order receipt of the above items differed for the experimental and control group participants.

At the conclusion of the pre-intervention survey, participants in the experimental group were emailed the electronic oral health educational content, "Don't forget the oral cavity." Participants in the control group received an email providing "next steps." The email stated the following: *"Thank you for completing the initial survey! Here is what to expect next: Week 3 (July 18th) follow-up trivia question related to children's oral health, week 4 (July 25th) a second survey, followed by the children's oral health educational content. After certifying completion of reviewing course content, you will receive the CME certificate via email. Thank you again for your time and do not hesitate to contact me if you have any questions."*

At "week 3" all participants received a two-page document sponsored by the American Academy of Pediatrics, Bright Futures (Bright Futures, 2015). This document contained basic information about children's oral health from infancy to adolescence. Participants also received the following trivia questions: *"A dental home for a child should be established by what age?"*

To ensure all participants received the incentive (continuing education course and 1-hr CE credit), those in the control group received the intervention (continuing education course) after taking the post-intervention survey (4 weeks from pre-intervention survey). Participants in the control group followed the same protocol as the experimental group to verify completion of all materials (Appendix D). Those in the experimental group certified review of the educational content at the end of the post-intervention survey. Once this information was received, the PI emailed the CME certificate to the participant. Participants in the control group had a link at the end of the educational content that directed them to Qualtrics© to verify completion of the educational content. The CME certificate was sent to participants after the PI retrieved all the required information.

Data Analysis

The statistical software used for this study was IBM SPSS Statistics 21.0 version. Descriptive statistics and frequencies were run initially to determine normality of each independent and dependent variable. These assumptions include: a normally distributed sample, homogeneity of variance, interval/ratio level of measurement and independent scores. Additionally cross-tabulations and correlations were used to determine statistical difference as appropriate for independent and dependent variables at baseline. A 2 (group) x 2 (time) analysis of variance (ANOVA) mixed design will be utilized for analysis; tested at $p = <0.05$. The 2 x 2 ANOVA was used to determine mean differences between and within subjects. Paired and independent sample t-tests were used as follow-up to significant interactions to further delineate findings. The independent variables were group (experimental and control) and time (pre and post). The dependent variables were continuous in the level of measurement. The four outcome measures were knowledge related to children's oral health, frequency of performing OHAs, confidence in performing OHAs, and confidence advising parents.

Protection of Humans Subjects

The primary investigator and co-investigators completed the human subjects process with the institutional review board at Old Dominion University. Approval for the project was granted on April 2016 (IRB Approval # 16-063). This study was deemed to be minimal risk to human subjects. Information obtained from this study was used to determine the effectiveness of an electronically delivered theory-based educational intervention. All information disclosed by subjects such as responses, email address and DOB remained confidential. Only the primary investigator had access to this information and the data collected remained in a password-protected device. Participants were informed that the email address (childoh@odu.edu) used to communicate with the primary investigator throughout the study would be deactivated 60 days after the final data collection.

CHAPTER IV

RESULTS

Overall, the purpose of this study was to determine if an educational intervention would increase frequency of performing OHAs during well-child visits among the APRNs and nurses. Additionally, knowledge, confidence in performing OHAs, and providing anticipatory guidance to parents was measured. This section is divided into descriptive statistics, preliminary analysis, and primary analysis. Significance for all statistical tests was determined at $p = <0.05$ however, $p = 0.05$ was considered marginally significant. For the descriptive analysis, frequencies and percentages were used for categorical variables while mean and standard deviation were used for continuous variables.

Preliminary analysis presents relationships between independent and dependent variables. Specifically, Cross-tabulations, and Chi-square tests were used to determine the relationships between categorical independent and dependent variables. Analysis of Variance (ANOVA) was used to assess relationships between continuous independent and categorical dependent variables and vice versa. For non-normal continuous independent variables, the non-parametric Kruskal-Wallis test was used. To test correlations between continuous independent variables and continuous dependent Variables, a Pearson's Correlation test was used. For non-normal or ordinal continuous variables, the non-parametric Spearman's correlation test was used. Lastly, in the primary analysis section, a two-way mixed ANOVA design statistical test was used to test the four hypotheses with follow-up paired and independent sample t-tests as appropriate.

Descriptive Statistics

The original sample consisted of 46 participants. The final sample consisted of 33 participants for analysis after exclusion criteria were applied. Participants were excluded from the study if they reported having oral health training within the last year at pre-test, were not an APRN, RN, or LPN, and/or did not complete post-test survey. Two participants did not complete the post-test survey (one from experimental and one from control group). While these exclusions occurred in the sample, the number of participants in each group remained fairly the same. There were 15 participants in the control and 18 participants in the experimental group; 100% of the participants were females. The average age of the participants was 38 years. The mean years of professional practice and experience was 11 years, and an average of 66 child patients was seen within a workweek (Table 1).

Table 1

Means and Standard Deviations for Continuous Demographic Independent Variables

	<i>N</i>	<i>M</i>	<i>SD</i>	<i>Mdn</i>	<i>Min</i>	<i>Max</i>
Age	33	38.5	9.81	37.0	21.0	63.0
Years of professional practice/experience	33	11.5	10.3	9.0	1.0	42.0
Number of child patients seen within a work week	*32	66.5	27.7	72.5	20.0	120.0

**Note.* 1 missing data point for number of child patients seen within a work-week.

All of the participants reported caring for children 0-3 years, and 9.1% reported practicing slightly less than a year. Among the nursing profession, 6.1% were registered nurses, 51.5% nurse practitioners, and 42.4% licensed practical nurses. The geographic areas of practice were the following: 33.3% urban (25,000-larger population), 60.6% suburban (10,000-24,999

population), and 6.1% rural (0-9,999 population). Specific practice sites were the following: community hospital (6.1%), private practice-solo (18.2%), private practice-group (60.6%), public health/community health center (6.1%), and other (9.1%) were located in a military setting. Approximately, 48/5% of all participants reported receiving oral health education training. Of those participants who reported, “yes” to receiving oral health education, 6.1% reported having 3 or more hours of training, while 42.4% reported having 1-3 hours of training (Table 2).

Table 2

Frequencies and Percentages for Categorical Demographic Variables

Categorical variable	<i>n</i>	%
Group		
Control	15	45.5
Experimental	18	54.5
Gender		
Male	0	0
Female	33	100.0
Missing	0	0
Workload		
Provide care to children 0-3 years	33	100.0
Practice experience		
At least 1 year	30	90.9
Less than 1 year	3	9.1
Profession		
RN	2	6.1
NP	17	51.5
LPN	14	42.4
Geographic area of primary practice		
Urban (25,000-larger population)	11	33.3
Suburban (10,000-24,999 population)	20	60.6
Rural (0-9,999 population)	2	6.1
Area of primary practice		
Community hospital	2	6.1
Private practice-solo	6	18.2
Private practice-group	20	60.6
Public health/Community health center	2	6.1
Other	3	9.1
Prior OH education		
OH education received with professional training	16	48.5
No OH education received with professional training	17	51.5
Hours of OH training related to children		
3 or more hours	2	6.1
1-3 hours	14	42.4
None	17	51.5

Overall, there were no differences between groups (experimental and control) for any of the demographic variables. For example, there was no difference between the experimental and control groups with respect to geographic location of primary practice (urban vs. suburban), profession (RN, LPN, and NP), primary practice setting (community hospital/public health, private practice-group, private practice-solo, or other), and prior children's oral health training within formal education (Table 3).

Table 3

Differences in Categorical Variables between Control and Experimental Groups

Variable	Categorical Variables				χ^2	<i>p</i>
	Control		Experimental			
	<i>n</i>	%	<i>n</i>	%		
Geographic Area of Primary Practice					.550	0.46
Urban	4	26.7 ^a	7	38.9 ^a		
Suburban/Rural	11	73.3 ^a	11	61.1 ^a		
Area of Primary Practice					1.94	0.38
Community hospital/Public health/Community health	1	6.7 ^a	3	16.7 ^a		
Private practice-Group	11	73.3 ^a	9	50.0 ^a		
Private practice-Solo/Other	3	20.0 ^a	6	33.3 ^a		
Profession					.259	0.61
RN/LPN	8	53.3 ^a	8	44.4 ^a		
NP	7	46.7 ^a	10	56.6 ^a		
Education Received					.793	0.37
Yes	6	40.0 ^a	10	56.6 ^a		
No	9	60.0 ^a	8	44.4 ^a		

Note. None of the variables differed significantly

Preliminary Analysis

There were statistical significant differences observed within the following independent variables: 1) Geographic location of primary practice with respect to area of primary practice, 2) Geographic location of primary practice with respect to prior children's oral health education, and 3) Prior children's oral health education received with respect to the profession. Participants who practiced in an urban area (36.4%) were more likely to work in a community hospital or public health setting. In contrast, a greater proportion of participants who practiced in a suburban or rural area (77.3%) were more likely to work in a group private practice setting, compared to those who practiced in an urban area (27.3%). There was no significant difference in participants who practiced in a single private practice setting with respect to urban (36.4%) vs. suburban (22.7%). Similarly, a greater proportion of individuals who practiced in an urban area were more likely to report receiving prior children's oral health education in their formal professional education (72.7%) compared to those who practice in a suburban/rural location (34.4%) (Table 4).

Table 4

Frequencies and Percentages for Area of Primary Practice and Education with Respect to Geographic Location of Primary Practice

Variable	Geographic Area of Primary Practice				χ^2	<i>p</i>
	Urban		Suburban/Rural			
	<i>n</i>	%	<i>n</i>	%		
Primary setting					11.5	0.003
Community hospital/public health/community health center	4	36.4 ^a	0	0 ^b		
Private practice-group	3	27.3 ^a	17	77.3 ^b		
Private practice-solo/Other	4	36.4 ^a	5	22.7 ^a		
Prior children's OH education received					3.88	0.049
Yes	8	72.7 ^a	8	36.4 ^b		
No	3	27.3 ^a	14	63.6 ^b		

Note. Percentages with different superscripts differ significantly, $p < .05$.

There was a marginal significant relationship with respect to education such that a greater proportion of NPs (64.7%) received prior education related to children's oral health than RNs/LPNs (31.3%) (Table 5).

Table 5

Frequencies and Percentages for Prior Children's Oral Health Education Received with Respect to the Profession

Variable	Profession				χ^2	<i>p</i>
	RN/LPN		NP			
	<i>n</i>	%	<i>n</i>	%		
Prior children's OH education received					3.69	0.055
Yes	5	31.3 ^a	11	64.7 ^a		
No	11	68.8 ^a	6	35.3 ^a		

Note. Marginal difference observed for "yes" to prior children's oral health education, $p = .05$.

There was a positive correlation between age and years of professional practice/experience ($r = .851, p = 0.00$) very strong relationship). Older age was significantly related to more years of professional experience practice/experience. There was a negative correlation between age and number of child patients seen within a workweek. There was a marginal significant relationship between older age and to fewer child patients seen within a workweek ($r = -.336, p = 0.060$). There was no correlation between number of child patients seen within a workweek and years of professional practice/experience (Table 6).

Table 6

Correlations Related to Age, Years of Professional Practice/Experience, Number of Child Patients Seen within a Workweek

	Age	Years of prof. exp.	Number of child pts.
Age	---	---	---
Years of professional practice/experience	.851**	---	-0.202
Number of child patients seen within a work week	0.336*	---	---

Note. **. Correlation is significant at the 0.01 level (2-tailed).

Note. * Marginal significance at $p=0.06$.

Relationships between independent and dependent variables. At pretest, there were no differences between the control and experimental group for any of the outcome variables (knowledge, frequency of OHA, confidence advising parents, and confidence performing OHA). However, when comparing the independent variable, profession to the outcome variables at pretest, there were statistically significant differences. Nurse practitioners ($M = 23.09$) reported significantly more frequency of performing OHAs than RNs/LPNs ($M = 9.03$), $U = 15.50, z = -$

4.24, $p = 0.000$, $r = -0.75$. Moreover, nurse practitioners ($M = 22.82$) reported significantly more confidence performing OHAs than RNs/LPNs ($M = 9.33$), $U = 20.00$, $z = -4.07$, $p = 0.000$, $r = -0.72$. Additionally, nurse practitioners ($M = 9.06$) reported significantly more confidence advising parents of children's oral health than RNs/LPNs ($M = 23.94$), $U = 9.00$, $z = -4.53$, $p = 0.000$, $r = -0.80$.

In comparing the independent variable, area of primary practice to the dependent variables (frequency of OHA and confidence advising parents) at pretest there were significant differences. Participants who practiced in private group practices reported a significantly higher frequency of performing OHAs as compared to, those practicing in a community hospital, public health, or community centers, $H(2) = 6.13$, $p = 0.05$. Similarly, participants who reported "other" (military) for their area of primary practice, had marginally significantly lower confidence score advising parents compared to those who practiced in a community hospital, public health, and community center, $H(2) = 5.73$, $p = 0.06$. Lastly, those who reported receiving children's oral health education during their formal training ($M = 19.97$), had significantly more confidence performing OHAs compared to those received no children's oral health education ($M = 13.03$), $U = 72.50$, $z = -2.10$, $p = 0.04$, $r = -0.37$.

Relationships between dependent variables. At pretest, higher frequency of OHAs was significantly associated with more confidence advising parents on children's oral health, $r = .902$, $p = 0.00$. Similarly, at pretest, more confidence advising parents was significantly associated with greater confidence in performing OHAs, $r = .892$, $p = 0.00$.

Descriptive statistics of dependent continuous variables. With respect to the outcome variables (knowledge, frequency OHA, confidence advising parents and confidence performing OHAs), the following changes in scores occurred from pre-post-test. The overall knowledge

score increased by about 1.3 from pre to post-test; similarly, the overall frequency in performing OHA score increased by 0.88 from pre to post-test. Likewise, the overall confidence for advising parents score increased by approximately 1.22 from pre to post-test. Lastly, the overall confidence of performing OHA scores increased around 1.5 from pre to post-test (Table 7).

Table 7

Descriptive Continuous Dependent Variables at Pre and Post-test

Variables	<i>N</i>	<i>M</i>	<i>SD</i>	<i>Mdn</i>	<i>Min</i>	<i>Max</i>
Knowledge						
Pre	33	17.09	1.89	17.00	13	21
Post	33	18.42	2.05	19.00	13	21
Difference	33	1.33*	2.10	1.00	-2.00	8.00
Frequency OHA						
Pre	32	20.47	8.61	22.50	8.00	32.00
Post	32	21.35	8.56	25.00	8.00	32.00
Difference	32	0.88*	3.51	0.071	-7.00	10.00
Comfort advising parents						
Pre	32	16.00	3.39	17.00	7.00	20.00
Post	32	17.22	3.76	19.00	4.00	20.00
Difference	32	1.22*	2.06	1.00	-3.00	7.00
Comfort performing OHAs						
Pre	32	17.06	5.42	17.00	5.00	25.00
Post	32	19.09	4.82	20.50	5.00	25.00
Difference	32	1.55*	4.54	0.00	-14.00	10.00

Note. *Difference between pre and post-test scores.

Primary Analysis

Research question one. What is the effect of an educational intervention on the frequency of performing oral health assessments on children? There was no significant difference between the control and experimental groups related to performing OHAs on children at pre and post-test observations, $F(1, 30) = 1.70$, $p = 0.20$, $n^2_p = 0.05$, Power = 0.24 (Table 8). Specifically, there was no effect of time on the frequency of OHAs; no significant effect of group on frequency of OHAs; and no significant interaction of time and group on frequency of OHAs (Figure 4).

Table 8

Mean Difference Pre to Post-test for Frequency of Performing OHAs

Frequency of OHA	Control	Experimental
Pre	20.21	20.67
Post	20.57	21.95

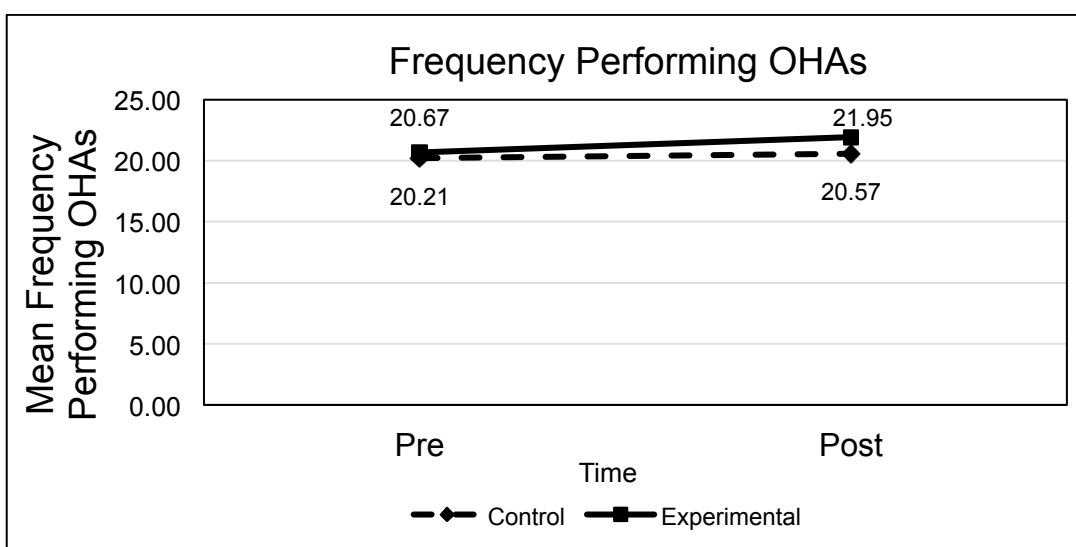


Figure 4. Frequency of OHAs at pre and post-test between control and experimental groups.

Research question two. What impact will the educational intervention have on knowledge related to children's oral health? There was a significant main effect of time on knowledge. Across all participants, knowledge scores increased significantly from pre to post-test, $F(1, 31) = 12.67$, $p = 0.001$, $\eta^2_p = 0.29$, Power = 0.93 (Table 9). There was no significant effect of group on knowledge, or interaction of time and group on knowledge (Figure 5).

Table 9

Mean Difference Pre to Post-test for Knowledge

Knowledge	Control	Experimental
Pre	16.67	17.44
Post	17.93	18.83

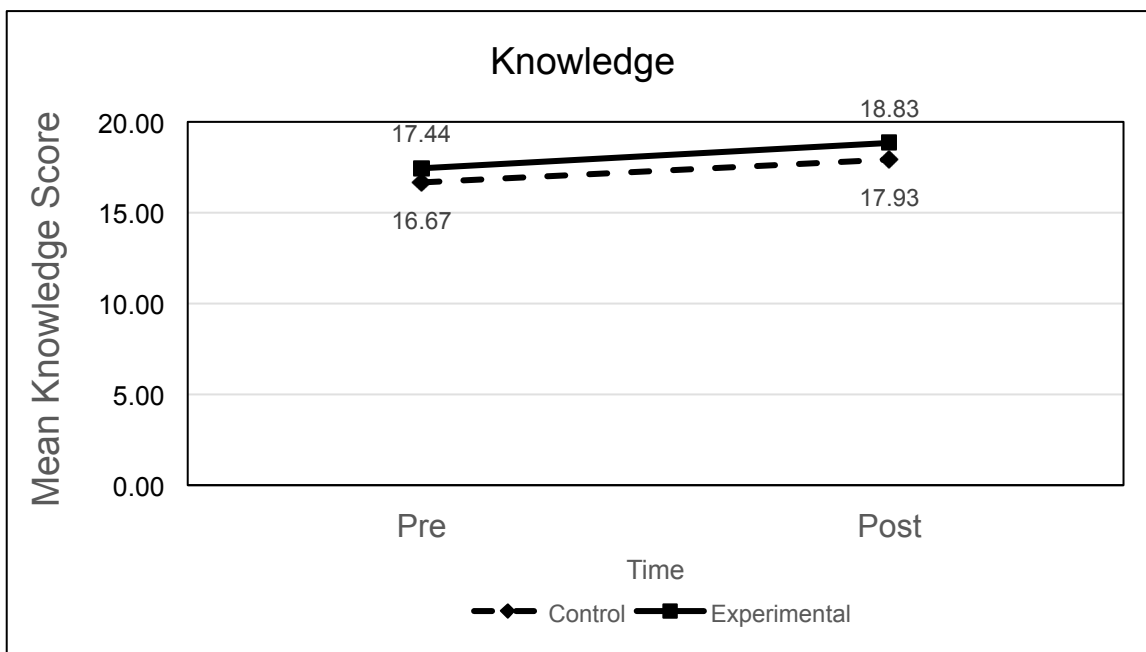


Figure 5. Knowledge scores at pre and post-test between control and experimental groups.

Research question three. What impact will the educational intervention have on confidence in performing oral health assessments? There was a significant main effect of time on

confidence performing OHAs. Across all participants, confidence in performing OHA scores increased significantly from pre to post-test, $F(1,30) = 10.17$, $p = 0.003$, $\eta^2_p = 0.25$, Power = 0.88 (Table 10) (Figure 6). However, there was no significant effect between groups on confidence performing OHAs. Additionally, there was no significant interaction of time and group on confidence performing OHAs.

Table 10

Mean Difference Pre to Post-test for Confidence in Performing OHAs

Confidence Performing OHAs	Control	Experimental
Pre	16.86	17.22
Post	19.36	18.89

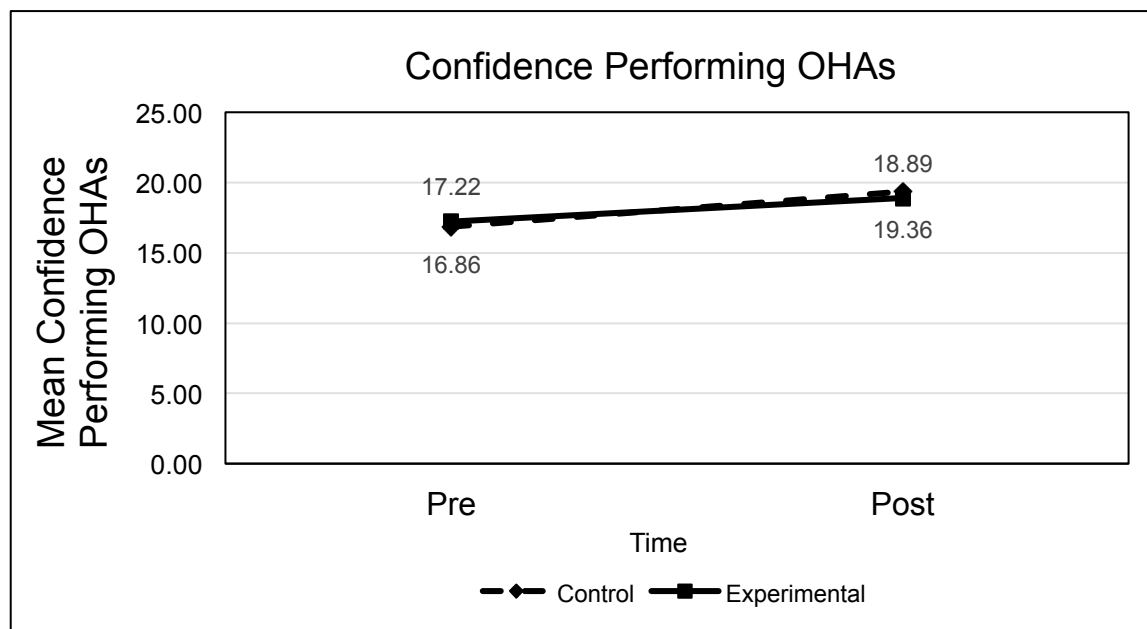


Figure 6. Confidence performing OHAs scores at pre and post-test between control and experimental groups.

Research question four. What impact will the educational intervention have on confidence in discussing children's oral health with parents? There was a significant main effect of time on confidence in advising parents of children's oral health, $F(1, 30) = 10.78$, $p = 0.003$, $n^2_p = 0.26$, Power = 0.87. Across all participants, confidence scores in advising parents increased significantly from pre to post-test (Table 11) (Figure 7). However, there was no significant effect between groups on comfort advising parents. Additionally, there was no significant interaction of time and group on comfort advising parents.

Table 11

Mean Difference Pre to Post-test for Confidence Advising Parents

Confidence Advising Parents	Control	Experimental
Pre	15.73	16.24
Post	16.53	17.83

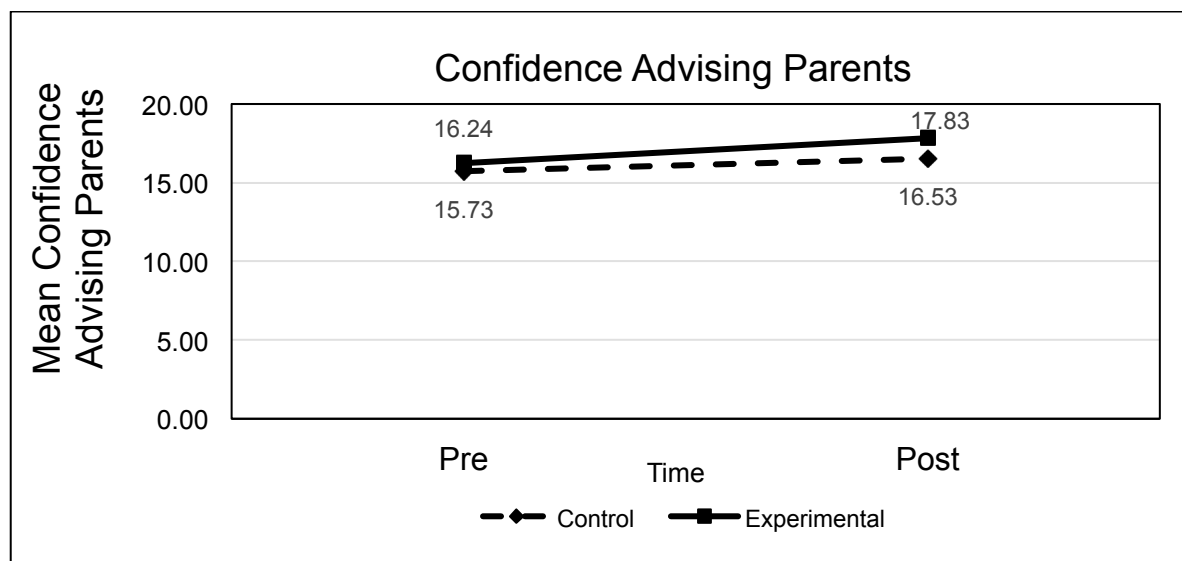


Figure 7. Confidence advising parents scores at pre and post-test between control and experimental groups.

CHAPTER V

DISCUSSION

The purpose of this study was to provide nursing professionals with education and resources in order to increase the importance and frequency of performing OHAs on children 0-3 years during well-child visits. Additionally, a randomized control experimental design was used to validate the effectiveness of the educational intervention used in this study.

Application of Theoretical Framework

Social cognitive theory was used to guide and organize the educational intervention for this study. Moreover, this was the first study to explicitly utilize constructs of SCT with respect to the application of the intervention and foundation for the study. The results suggest that participants' knowledge increased from pre-post supporting the behavioral capability construct used in SCT model. Additionally, confidence scores in performing OHAs and providing anticipatory guidance, supports the self-efficacy construct of SCT. Based on the SCT model used in this study, it can be assumed that the educational intervention used in this study provided observational learning, role modeling and positive reinforcement. Yet to be determined, is the efficacy of the educational intervention due to the overall results of the control group in this study.

Descriptive Characteristics

With regard to the demographic characteristics, all of the participants were female, provided care to children 0-3 years, and a majority of the participants reported practicing for a year or longer. Among the sample, a majority of participants were NPs and LPNs only a few participants were RNs. With respect to area of primary practice, the majority of participants worked in a private group practice and private solo practice. This finding is consistent with the

national information related to APRNs, RNs, and LPNs primary area of practice. Nationally, about 28% of APRNs work in private practice settings, 60% of pediatric nurses work in children's hospitals, and 16% work in community hospitals (Institute of Pediatric Nursing, 2016).

The results were consistent with prior studies with respect to prior oral health training within formal educational training (AlYousef et al., 2013; Bhat et al., 2012; Caspary et al., 2008; Herndon et al., 2010; Mitchell-Royston & Nowak, 2014; Nammalwar & Rangeeth, 2012; Prakash et al., 2006). Participants in prior studies reported receiving three hours of oral health training during their formal education and/or no oral health training. In a study conducted by Wessel et al., 2005, approximately 60% of PHCPs reported having "minimum" oral health training in their respective professional programs, while 36% reported having no training (Hegner, 2005; Wessel et al., 2005).

The majority of participants in the current study reported receiving no prior oral health training. Participants, reporting prior oral training, received less than 3 hours. Among the participants, majority of NPs reported receiving children's oral health education. Additionally, those who reported receiving children's oral health education worked in an urban location. Inadequate prior or current knowledge related to children's oral health, decreases the chances of practitioners performing recommended OHAs during well-child visits. Furthermore, providing a platform where healthcare professionals can obtain resources regarding children's oral health increases knowledge and awareness.

Discussion of Primary Analysis

Research question one. What is the effect of an educational intervention on the frequency of performing OHAs on children? There were no significant differences between or

within subjects with respect to the frequency of performing OHAs from pre to post-test (Table 7). Participants in both groups reported high frequency in performing oral health assessments at pre-test, and scores remained relatively the same for both groups at post-test (Table 7). To determine how much change would have been required to observe a statistically significant increase in frequency of OHA from pretest to posttest in the experimental group; a post hoc power analysis for paired t-test was used. Using the standard deviations obtained from the experimental group at pretest and posttest, it was determined that an effect size (d) greater than .496 would be needed to obtain significance at post-test. The pre-test mean score in the experimental group was 20.67 ($SD = 8.54$), with a post-test mean score of 21.95 ($SD = 8.63$). A post-test mean score of 22.36 (an increase of 1.69) with an effect size of $d = .496$ would have provided a significant increase from pretest to posttest in the experimental group, when using the current standard deviation values. Since the mean frequency score of OHAs also increased in the control group by .36 from pretest to posttest, an increase of 2.05 or higher in the experimental group may have been enough to obtain a significant interaction, assuming similar standard deviations.

Research question two. What impact will the educational intervention have on knowledge related to children's oral health? The mean knowledge scores increased over time (pre to post-test) across all study participants (Table 8). Similar to measuring frequency of OHAs, several have also assessed knowledge related children's oral health among their studies (AlYousef et al., 2013; Golineaux et al., 2013; Herndon et al., 2010; Douglass et al., 2009; Nammalwar and Rangeeth, 2012; Prakash et al., 2006; Schaff-Bass et al., 2006; Yousef, 2011). For example, participants' knowledge scores increased in Schaff-Blass et al., (2006) study from 65 at baseline to 76 at post-test. Similarly, knowledge scores increased among medical interns in

Yousef, (2011) study. Among all studies, increased knowledge, and or having background knowledge related to children's oral health was associated with increased confidence to perform OHAs.

Douglas et al., (2009) provided the following recommendations to improve children's oral health knowledge within the healthcare curriculum: 1) Improve the quantity and quality of oral health educational content, 2) mandate that oral health education become a part of the curriculum, 3) and have evidenced-based oral health education. Similarly, Herndon et al., (2010), Nammalwar and Rangeeth, (2012), Prakash et al., (2006), all stressed the need of continuing education courses to improve knowledge and confidence of oral health practices. Creating a platform for oral health education is beneficial for all health professionals regardless whether they have or have not received prior oral health educational content.

Research question three. What impact will the educational intervention have on confidence in performing oral health assessments? There was a significant main effect between subjects on comfort performing OHAs. In fact, the mean confidence score on performing OHAs was slightly higher at post-test for the control group than the experimental group (Table 10). However, all studies in the literature supports the hypothesis that, increased knowledge related to children's oral health is associated with increased confidence in advising parents and performing OHAs (AlYousef et al., 2013; Associates, 2008; Bhat et al., 2012; Caspary et al., 2008; Douglass et al., 2009; Golinveaux et al., 2013; Herndon et al., 2010; Lewis et al., 2009; Lochib et al., 2014; Nammalwar & Rangeeth, 2012; Prakash et al., 2006; Rozier et al., 2003; Schaff-Blass et al., 2006; Yousef, 2011).

Research question four. What impact will the educational intervention have on confidence in discussing children's oral health with parents? Similar to the previous findings, there was a significant main effect across all participants on confidence advising parents (Table 11). Additionally, there was a "ceiling-effect" with this variable due to the maximum score (20) a participant could receive. Participants in both groups had scores ranging from 15.73-16.24 at pre-test, and 16.53-17.83 at post-test. Moreover, in the study conducted by Yousef (2011), 91% of participants reported comfort in counseling parents on children's oral health at post-intervention compared to 25% of participants at pre-intervention. Again, having the knowledge and resources increases confidence to perform desired behaviors. This hypothesis has been observed throughout the literature and in the present study.

In general, knowledge, and confidence scores increased overtime for both the control and experimental groups. In some cases, there was a slight trend towards differences between groups (control and experimental) however, with a small sample size observing statistical significant difference and interactions between groups was undetectable. In addition to having a small sample, the researchers hypothesize that the pre-test survey could have provoked an overall awareness and conscious reflection related to current children's oral health-related practices. As a result, the participants may have become more cognizant of their daily inter-office routine over the four-week period, which would have caused the post-survey responses to increase in the control group.

CHAPTER VI

CONCLUSIONS

Literature has shown that inadequate oral health education related to children is scarce within the curriculum of health professionals (Caspary et al., 2008; Lewis et al., 2004; Lewis et al., 2009; Lochib et al., 2014; Murthy & Mohandas, 2010; Prakash et al., 2006). The literature also suggests that inadequate knowledge related to children's oral health, impacts the confidence for healthcare providers to perform OHAs, and provide anticipatory guidance to parents (AlYousef et al., 2013; Associates, 2008; Bhat et al., 2012; Douglass et al., 2009; Golinveaux et al., 2013; Herndon et al., 2010; Lewis et al., 2004; Lewis et al., 2009; Lochib et al., 2014; Murthy & Mohandas, 2010; Nammalwar & Rangeeth, 2012; Prakash et al., 2006; Rabiei et al., 2012; Rozier et al., 2003; Schaff-Blass et al., 2006; Yousef, 2011). Throughout the literature several cross-sectional and case control studies have been conducted; however, only a few have incorporated educational interventions. Additionally, few studies have been conducted within the nursing profession (Golinveaux et al., 2013; Hallas & Shelley, 2009; Rabiei et al., 2012). More importantly, evidence of a theoretical framework to support previous educational interventions is unknown. Lastly, this was the first known randomized experimental design to measure frequency of performing OHA, knowledge related to children's oral health, confidence in performing OHA and providing anticipatory guidance to parents.

The primary aim of this study was to determine if a theory-based educational intervention would increase the frequency of performing OHAs among APRNs, RNs, and LPNs. Other aims of the study were to determine if the theory-based educational intervention would improve knowledge, and increase comfort related to performing OHAs and providing anticipatory

guidance to parents. A snowball sample of APRNs, RNs, and LPNs were randomized into control and experimental groups for this study.

The results of this study confirmed that minimum knowledge related to children's oral health occurs within formal professional education. The findings also suggest that APRNs, RNs, and LPNs are working in various geographic locations in diverse settings. This finding supports the rationale that nurses serve larger patient populations in various settings compared to physicians and dentists (Hallas & Shelley, 2009). In a survey conducted by Allen et al., (2008), an estimated 45% of PNs provided care in underserved areas, 66% provided care to children with Medicaid, and 25% provided care to children with no coverage (Allen et al., 2008). Therefore, nurses are ideal practitioners to meet oral health needs of children at an early age.

Overall, the study results imply that a level of awareness related to children's oral health occurred due to the following: increased children's oral health knowledge; improved confidence related to performing OHAs; and increased confidence in providing anticipatory guidance to parents. Researchers hypothesize that the pre-test survey could have raised a level of awareness with respect to children's oral health thereby, impacting the responses in the post-test survey.

Policy Implications

The current study supports the American Academy of Pediatrics (AAP) early oral health policy and dental home policy statements regarding children's oral health. These policy statements provide recommendations for reducing children's sugar intake, starting with suggestions for breast and bottle-feeding, age appropriate tooth brushing behaviors, fluoride considerations, and precautionary measures (AAP, 2014). More importantly, the AAP policy statements recommend a dental home and first dental visit be established by 12 months of age (Council, 1997). Furthermore, the following recommendations are established for pediatric

providers: 1) Encourage the establishment of a dental home to parents and caregivers, 2) administer OHAs periodically to all children, 3) discuss anticipatory guidance, 4) motivate at-home oral health behaviors, 5) provide appropriate referral to a dental provider, 6) build and maintain a collaborative relationship with a local dental provider (Council, 1997; Segura et al., 2014).

The current study was able to measure the majority of recommendations provided in the AAP policy. There was an overall improvement from pre to post-test within each group (control and experimental) on the following variables: knowledge related to children's oral health, confidence providing anticipatory guidance to parents, and confidence performing OHAs.

Overall, healthcare professionals such as APRNs, RNs and LPNs embrace the value of performing OHAs during well-child visits. Through performing an OHA, these providers are able to advise parents and provide dental referrals when needed. On March 1, 2015, an update occurred to the Medicaid billing procedures that allows non-dental professionals to therapeutically apply and bill Medicaid for fluoride varnish application on children 3 years and under (Virginia Oral Health Coalition [VA-OHC], 2016). In Virginia, this includes the following health care professionals: Pediatric and family nurse practitioners, nurses (RN and LPN), physicians, and physician assistants. The diagnostic code for this procedure is V07.31 (prophylactic fluoride varnish administration) and the procedure code is (99188) (VA-OHC, 2016). This updated billing procedure provides guidance to non-dental professionals related to preventive services that should also be accompanied with every well-child visit such as OHA, oral health anticipatory guidance, and dental referral if needed (VA-OHC, 2016) (Appendix E).

Lastly, this study further confirmed the need for the incorporation of more hours of children's oral health education into the curriculum of non-dental professionals. Overall, nurse

practitioners reported having more oral health training in their formal education compared to RNs or LPNs. This could be due to the number of additional curriculum hours associated with an advanced degree, and/or specialized pediatric training. However, while many NPs reported having prior oral health training experiences, the number of hours received was less than three. Hallas et al., (2009), provided the following recommendations for incorporating oral health education into the curriculum of non-dental professionals: define best strategies for accomplishing educational goals for non-dental professionals, utilize resources established by AAP for oral health training, promote oral health training programs for practicing providers, and partner with national medical, nursing, and dental professional associations.

This current study focused on practicing nurse professionals because the researchers wanted to obtain the current oral health-related practices and measure the effectiveness of an educational intervention adopted by the AAP. Furthermore, many colleges and universities have adopted the interprofessional education collaborative model (IPEC); therefore, many students are learning together about health. As a result, the number of reported hours related to oral health training, and children's oral health knowledge should increase.

Limitations

While the researcher tried to minimize limitations through utilizing a randomized experimental control design, some limitations still exist in this study.

- All of the participants in the final sample were females. While this is a limitation, it can also be argued that due to the profession being predominately female it impacts the accessible population of males. Male registered nurses and nurse practitioners make-up 9% of the nursing profession (U.S. Census Bureau, 2013).

- Selection bias occurred because individuals were not randomly selected from the accessible target population. Participants self-selected to participate in the study by responding to the recruitment announcement.
- A non-probability snowballing sampling frame was used to obtain participants for the study. The snowball recruitment technique requires research participants to identify other potential subjects. In this study, participants who emailed the researcher regarding study participation were asked to share the research study opportunity with fellow nursing colleagues. This type of sampling frame could have impacted the results due to the potential to share sensitive study information with other participants in the study. For example, study participants were provided detailed instructions throughout the study regarding the sensitivity of sharing information with others however, sharing of information between pre and post-test surveys could have occurred. Perhaps sharing of information could have contributed to the findings of no significant differences between groups.
- No stratification based on the profession, and knowledge level of the participants. There were more NPs, and LPNs than RNs. Nurse Practitioners are advanced practitioners requiring more education and training than LPNs. The curriculum of NPs specializing in pediatrics likely included children's oral health. This and may have been the basis for the majority of participants reporting prior oral health training. Stratifying the sample in the future where different levels of nursing education is included, could ensure equal distribution between groups.
- Recruitment period could have impacted the total number of participants. The researcher anticipated responses for study participation to occur within a two week

- period. This was based on projected interest for the topic, and the incentive for participating. There was a four week lapse between the recruitment of the first and final participant. To retain the individuals who committed to the study, the researcher deemed it appropriate to conclude recruitment at four weeks.
- The final sample size (33) used in this study was a limitation. The total number of participants (33) did not provide sufficient power to detect effects and interactions between groups. A post hoc power analysis was computed using the effect sizes from the current study to determine the projected sample size needed to obtain significant interaction effects in future studies. The frequency of OHAs variable was chosen because it was the main hypothesis in this study. The interaction effect for the repeated measures ANOVA on frequency of OHA was used to first determine the power obtained. Based on the partial eta square of .018 (which equals an effect size $f = .135$), $p = .447$, $N = 32$, and the correlation between frequency at pretest and posttest of $r = .917$, the power was computed to be .999. After obtaining this information, a new *a priori* power analysis revealed that at least 61 participants would be needed at both pretest and posttest to achieve $p < .05$, given the effect size f (0.135), alpha (0.05), power (.999), and r (.917) from the current study.
 - Pre-testing sensitization could have occurred during completion of the pre-test survey. The pre-test survey could have sensitized participants in the control group in unanticipated ways thereby, impacting post-test survey responses. However, based on internal validity principles this is not a threat to a two-group design. As mentioned previously, researchers posit that the pre-test survey could have increased awareness and provoked reflection on current oral-health related practices among the nurses.

Moreover, one of the overarching goals of this project was to improve oral health-related practices among nurses.

- Self-reported data was also a limitation to this study. Often times when data is self-reported, the threat of social desirability increases. Social desirability is when participants respond to questions in a particular way because of the uncertainty of being evaluated.

Future Research

Based on the results of this study, the following are recommendations for future research:

- Obtain a sample size that will provided between group differences and increase power in a future study. The goal of an experimental design is to observe differences between groups as well as within groups.
- Test all of the five constructs of SCT used in the current study to determine if these constructs influence behavior change with respect to frequency of performing OHAs.
- Consider using a comparison versus control group; this would be more practical in an academic setting. For example, comparing two pediatric nurse practitioner programs, and/or Bachelor of Science in nursing programs.
- Organize a continuing education course that can be implemented at a state, national or local nursing professional association meeting. This would allow for pre-test data collection from individuals who register for course ahead of time and a follow-up post-test data collection after course delivery. This method would also provide an opportunity to obtain a larger population sample.
- Obtain a sample of pediatric residents, nursing students, and medical students; explore differences between all three groups with respect to knowledge related to

children's oral health to support the need for modifications within the respective professional curricula.

Future Research Questions

Based on the results of the study, the following research questions will be explored:

1. Will the experimental and control group reflect similar differences between groups at four months from post-test observation?
2. What are some incentives health care professionals would like to receive for participating in continuing education courses? Is continuing education credit enough? If so, what amount of continuing education credit would be acceptable for study participation?
3. How frequently are non-dental professionals billing preventive dental services through Medicaid insurance? What were the common preventive dental services billed through Medicaid from 2012-2016?
4. What are recent nursing graduates (RN and LPN) perceptions of preparation for performing OHAs during well-child visits?
5. What is the baseline knowledge of children's oral health when registered nurses enter advanced degree programs such as DNP/PNP?

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APPENDIX A

QUESTIONNAIRE FROM THE UNIVERSITY OF IOWA STUDY

Survey Targeting Iowa Pediatricians

This survey is about your experience with oral health issues while in school, during training and in practice as well as potential interest in providing oral health-related services to young children in the future. This study is being conducted as part of a master's thesis in Pediatric Dentistry and Dental Public Health at the University of Iowa College of Dentistry. If you have any questions or comments, please contact Dr. Yousef AlYousef at 319-400-8964 or write to: Department of Pediatric Dentistry, College of Dentistry, Iowa City, IA 52242.

Please fill out information as completely as possible. For questions requiring percentages or approximate numbers please provide your best estimate. After completion please return in the envelope provided to: 201 S. DSB, Department of Pediatric Dentistry, College of Dentistry, Iowa City, IA 52242. Thank you for your help. We appreciate your contribution!

1. **Gender:**Female Male 2. **Age:** _____ years3. **Total years of professional practice/experience:** _____ years4. **Please indicate your profession:**Pediatrician Family Physician Nurse Practitioner Physician Assistant Other (specify) 5. **In which setting do you spend the MAJORITY of your time:**University Medical Center Community Hospital Private Practice-Solo Private Practice-Group Staff Model HMO Public Health/Community Health Center Other (specify) _____ 6. **Approximate total number of patient you see in a week:** _____ patients7. **Approximate total number of children (age 0-3 years) you see in a week:**
_____ patients

8. **Your area of primary practice can best be described as:**

- Urban (25,000-larger population)
 Suburban (10,000-24,999 population)
 Rural (0-9,999 population)

9. **What PERCENTAGE of your patients participate in the following insurance programs:**

- Medicaid/Title XIX _____ %
 Hawk-I/SCHIP _____ %
 No Insurance _____ %
 Private Insurance _____ %
 Unknown _____ %
 Other (Medicare etc. _____ %

10. **How many CREDIT hours of INSTRUCTION (approximately) did you attend on topics specifically related to DENTAL HEALTH in:**

- Professional school (e.g. medicine nursing) _____ hours
 Residency or Fellowship _____ hours
 Continuing Education Courses (in last 5 years) _____ hours

11. In your opinion:	Yes	No	Don't Know
a) Bacteria that cause cavities can be transmitted from a mother to her child	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) White spots on the teeth may indicate early decay	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Kids can develop cavities by drinking juice from a sippy cup throughout the day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Children should have their teeth brushed by an adult until they are in 2nd or 3rd grade	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Brushing with fluoride tooth paste prevents cavities; while brushing without fluoride toothpaste is less effective	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Children's (age 0-3) teeth should be brushed with fluoride toothpaste	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Children (age 0-3) should have their 1st dental visit no later than 12 months of age	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. Please indicate HOW OFTEN you see the following problems (either as a primary complaint or as an incidental finding) in children (age 0-3):	At least Once a Week	At least Once a Month	At least Once in 6 Months	At least Once a Year	At least Once Every few Years	Never
a) A lot of cavities in a single child	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) a few decayed teeth in a single child	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Traumatic mouth injury	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Pain related to untreated cavities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Tooth abscesses (e.g. swollen face gum boil)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13. How FREQUENTLY during well child visits do you or your staff perform the following tasks for children (age 0-3):

	MOST (100-75%) of the time	USUALLY (50-74%) of the time	SOMETIMES (49% or less) of the time	NEVER (0%) of the time
a) Lift the upper lip to view the child's 4 upper front teeth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Examine a child's teeth for signs of dental decay	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Counsel parents on the importance of regular tooth brushing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Counsel parents on the importance of going to a dentist	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Discuss the importance of fluoride toothpaste use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Inquire whether a child is taking a bottle to bed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Inquire about the				

mother's dental health				
h) Refer to a dentist in the area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14. Have you heard of Fluoride Varnish? Yes No

Fluoride varnish is brushed onto the teeth to STRENGTHEN them, PREVENT cavities and REVERSE early decay. It takes less than a minute to apply and can be done by auxiliary staff. A packet of fluoride varnish cost less than 50 cents per patient.

15. Would you consider routinely applying fluoride varnish to high risk children during their well child visit?

- Yes** → a) I would be willing to do so regardless of compensation
b) I would have to get paid a compensation of \$10-20
c) I would have to get paid a compensation of \$20-40
d) I would have to get paid a compensation of \$40-60
e) I would have to get paid \$_____please specify

No → No amount could induce me to apply fluoride varnish for the following reason(s)
(Check all that apply):

	YES	NO
a) I already have too much to do during a well child visit	<input type="checkbox"/>	<input type="checkbox"/>
b) Parents do not value this procedure	<input type="checkbox"/>	<input type="checkbox"/>
c) I do not see enough dental decay to warrant providing fluoride varnish	<input type="checkbox"/>	<input type="checkbox"/>
d) It is difficult to integrate these services into my practice routine	<input type="checkbox"/>	<input type="checkbox"/>
e) I do not know enough about it to make an education decision at this time	<input type="checkbox"/>	<input type="checkbox"/>
f) Lack of child cooperation makes fluoride varnish application too difficult	<input type="checkbox"/>	<input type="checkbox"/>
g) It is the dentist's responsibility	<input type="checkbox"/>	<input type="checkbox"/>

16. Would you be **INTERESTED** in participating in a continuing education course that addresses the following topics for children (age 0-3): (Check all that apply)

	YES	NO
a) Fluoride varnish application	<input type="checkbox"/>	<input type="checkbox"/>
b) Caries risk assessment	<input type="checkbox"/>	<input type="checkbox"/>
c) Counseling parents on oral health-related topics	<input type="checkbox"/>	<input type="checkbox"/>
d) Other (specify)	<input type="checkbox"/>	<input type="checkbox"/>
e) Not interested in dental-related courses at this time	<input type="checkbox"/>	<input type="checkbox"/>

17. How COMFORTABLE do you feel in advising parents of children (0-3) on the following:	Very Uncomfortable	Somewhat Uncomfortable	Neutral	Somewhat Comfortable	Very Comfortable
a) Child oral hygiene	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Fluoride toothpaste use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Dietary recommendations to prevent cavities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Regular dental check-ups	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

18. How COMFORTABLE do you feel doing the following for children (0-3):	Very Uncomfortable	Somewhat Uncomfortable	Neutral	Somewhat Comfortable	Very Comfortable
a) Examine teeth for tooth decay	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Identify tooth decay	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Identify other signs of oral pathology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Evaluate risk factors for tooth decay	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Decide if a child needs a referral to a dentist	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

19. What CRITERIA do you use for deciding what children (age 0-3) you will REFER to a dentist for care during a well-child visit?

- I refer ALL children (12 months & older) I see to a dentist
- I refer ONLY if we see a problem (e.g. tooth decay, chipped tooth, draining fistula)
- I refer if we consider the child AT HIGH RISK for cavities (e.g. being on Medicaid)
- I RARELY refer children to the dentist
- I NEVER refer children to the dentist

20. Which of the following do you consider to be a BARRIER or NOT a BARRIER when referring children (age 0-3) for dental care:	BARRIER	NOT a BARRIER
a) Lack of locally available dentists	<input type="checkbox"/>	<input type="checkbox"/>
b) Finding a dentist willing to accept children on public insurance (e.g. Medicaid, Hawk-I)	<input type="checkbox"/>	<input type="checkbox"/>
c) Finding a dentist willing to accept children who are uninsured	<input type="checkbox"/>	<input type="checkbox"/>
d) Finding a dentist willing to accept children under the age of 3	<input type="checkbox"/>	<input type="checkbox"/>
e) Finding a dentist willing to accept children with developmental disability	<input type="checkbox"/>	<input type="checkbox"/>
f) Oral health is low priority for the families I see	<input type="checkbox"/>	<input type="checkbox"/>

21. When you make a dental REFERRAL for child (age 0-3) how FREQUENTLY do you or your staff:	MOST (100-75% of the time)	USUALLY (50-74% of the time)	SOMETIMES (49% or less of the time)	NEVER (0% of the time)
Give the caregiver the name of a dentist	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Call a dental office to make the appointment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Contact a coordinator service to help in making the appointment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Simply tell the caregiver the child needs to see a dentist	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Any additional comments:

APPENDIX B

ADAPTED QUESTIONNAIRE FROM IOWA STUDY USED IN QUALTRICS©

INFORMED CONSENT DOCUMENT OLD DOMINION UNIVERSITY

PROJECT TITLE: Application of a Theory-based Educational Intervention to Increase the Frequency of Performing Oral Health Assessments on Children among Pediatric Nurse Practitioners and Nurses.

INTRODUCTION: The purposes of this form are to give you information that may affect your decision of whether to say YES or NO to participation in this research, and to record the consent of those who say YES. **RESEARCHERS:** Susan J. Daniel RDH, PhD, School of Dental Hygiene, College of Health Sciences; Denise M. Claiborne BSDH, MS School of Dental Hygiene, College of Health Sciences; Linda Bennington RN, PhD School of Nursing, College of Health Sciences; Muge Akpinar-Elci MD, MPH, College of Health Sciences.

DESCRIPTION OF RESEARCH STUDY: Several studies have evaluated pediatric primary care provider practices related to children's oral health. However, none of the studies has evaluated the effectiveness of an educational intervention to increase provider practices of early prevention screenings. If you agree to participate, the study require completion of pre-and post-assessment surveys and an online continuing education course to determine the frequency of oral health assessments performance among pediatric nurse practitioners and pediatric nurses. The continuing education course will be available following the pre-assessment survey. If you say YES, only 2 hours of your time will be required over a period of 4 weeks. The complete study is online and all communication will occur via a valid email address that you will provide. Approximately, 60 other subjects will participate in this study.

EXCLUSIONARY CRITERIA: You should not have received formal training related to children's oral health within the last year that would keep you from participating in this study.

RISKS AND BENEFITS RISKS: If you decide to participate in this study, then you may face a risk of being identified through your email address (if a name is listed as their email address). The researcher tried to reduce these risks by asking subjects not to include name in email correspondences and removing all automated email signatures. Additionally, after the completion of initial survey, the researcher will ask subjects to input a unique de-identifier this will assist in tracking all completed items. And, as with any research, there is some possibility that you may be subject to risks that have not yet been identified.

BENEFITS: The main benefit to you for participating in this study is 1-hour of free continuing education units (CEU) and access to the course content for future reference. Others may benefit by having early oral health screenings thereby reducing the chances of undiagnosed and untreated dental disease.

NEW INFORMATION: If the researchers find new information during this study that would reasonably change your decision about participating, then they will give it to you.

CONFIDENTIALITY: The researchers will take reasonable steps to keep private information, such as questionnaires confidential. No identifiable information will be needed for completion of questionnaires or in the providing the continuing education course certificate. The results of this study may be used in reports, presentations, and publications; but the researcher will not identify you. Of course, your records may be subpoenaed by court order or inspected by government bodies with oversight authority.

WITHDRAWAL PRIVILEGE: It is OK for you to say NO. Even if you say YES now, you are free to say NO later, and walk away or withdraw from the study at any time. Your decision will not affect your relationship with Old Dominion University, or otherwise cause a loss of benefits to which you might otherwise be entitled.

VOLUNTARY CONSENT: By selecting “yes” to this form in the Qualtrics © software system, you are saying several things. You are saying that you have read this form or have had it read to you, that you are satisfied that you understand this form, the research study, and its risks and benefits. If you have any questions later on, then the researchers should be able to answer them: Susan J. Daniel, Responsible Primary Investigator at 757-683-5232.

COMPENSATION FOR ILLNESS OR INJURY: There are no perceived risks for illness or injury associated with this study. If you have any questions related to your risk of illness or injury, please contact: Susan J. Daniel, Responsible Primary Investigator at 757-683-5232. Additional points of contact are Dr. George Maihafer, the current IRB chair, at 757-683-4520, or the Old Dominion University Office of Research, at 757-683-3460. If at any time you feel pressured to participate, or if you have any questions about your rights or this form, then you should call Dr. George Maihafer, the current IRB chair, at 757-683-4520, or the Old Dominion University Office of Research, at 757-683-3460. And importantly, by signing below, you are telling the researcher YES, that you agree to participate in this study. The researcher should give you a copy of this form for your records.

Selecting "yes" or "no" to these conditions outlined in the consent will act as an electronic signature to this form.

- Yes
- No

1. **Have you received any formal training related to children’s oral health within the last year?**

- Yes
- No

2. **Have you practice in the field for at least once year in a community, private practice, or hospital setting?**
 - Yes
 - No

3. **Does your workload include providing care to children 0-3 years old?**
 - Yes
 - No

4. **Please indicate your gender below:**
 - Male
 - Female

5. **Please indicate your age below:**

6. **Please indicate your profession (for example, pediatric nurse practitioner, nurse practitioner, family nurse practitioner, midwife, licensed practical nurse, registered nurse etc.)**

7. **In which setting do you spend the Majority of your time (please select one):**
 - University medical center
 - Community hospital
 - Private practice-Solo
 - Private practice-Group
 - Staff model HMO
 - Public health/Community health center
 - Other (specify)

8. **Your area of primary practice can be best described as (please select one only):**
 - Urban (25,000-larger population)
 - Suburban (10,000-24,999 population)
 - Rural (0-9,999 population)

9. **In your formal educational training (nursing school or advanced nursing training), did you receive information related to children's oral health?**
 - Yes
 - No

10. **Please APPROXIMATE the number of hours received on information related to children's oral health.**
 - 3 or more hours
 - Less than 3 hours

11. **Approximate the number of child patients you see within a work-week:**

14. **Oral health assessments (OHAs) involves the following: lifting the lip, assessing the tongue, cheek and throat, identifying dental caries and pathology, discussing oral health behaviors and making proper referrals when applicable. How often do you perform OHAs on children (ages 0-3 years) during well-child visits:**

- Most of the time (100-75%)
 Usually (50-74% of the time)
 Sometimes (49% or less of the time)
 Never (0% of the time)

15. **How often do you perform OHAs on ALL children (ages 4-12) during well-child visits:**

- Most of the time (100-75%)
 Usually (50-74% of the time)
 Sometimes (49% or less of the time)
 Never (0% of the time)

16. How FREQUENTLY during well child visits do you or your staff perform the following tasks for children (age 0-3):	MOST (100-75%) of the time	USUALLY (50-74%) of the time	SOMETIMES (49% or less) of the time	NEVER (0%) of the time
a) Lift the upper lip to view the child's 4 upper front teeth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Examine a child's teeth for signs of dental decay	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Counsel parents on the importance of regular tooth brushing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Counsel parents on the importance of going to a dentist	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Discuss the importance of fluoride toothpaste use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Inquire whether a child is taking a bottle to bed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Inquire about the mother's dental health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

17. How COMFORTABLE do you feel in advising parents of children (0-3) on the following:	Very Uncomfortable	Somewhat Uncomfortable	Neutral	Somewhat Comfortable	Very Comfortable
e) Child oral hygiene	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Fluoride toothpaste use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Dietary recommendations to prevent cavities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h) Regular dental check-ups	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

18. How COMFORTABLE do you feel doing the following for children (0-3):	Very Uncomfortable	Somewhat Uncomfortable	Neutral	Somewhat Comfortable	Very Comfortable
f) Examine teeth for tooth decay	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Identify tooth decay	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h) Identify other signs of oral pathology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i) Evaluate risk factors for tooth decay	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j) Decide if a child needs a referral to a dentist	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

19. What CRITERIA do you use for deciding what children (ages 0-3) you WILL REFER to a dentist for care during a well-child visit:

- I refer ALL children (12 months and older) I see to the dentist
- I refer ONLY if I see a problem (e.g. tooth decay, chipped tooth, draining fistula)
- I refer if we consider the child AT HIGH RISK for cavities (e.g. being on Medicaid)
- I RARELY refer children to the dentist
- I NEVER refer children to the dentist

20. Which of the following do you consider to be a BARRIER or NOT a BARRIER when referring children (age 0-3) for dental care:	BARRIER	NOT a BARRIER
a) Lack of locally available dentists	<input type="checkbox"/>	<input type="checkbox"/>
b) Finding a dentist willing to accept children on public insurance (e.g. Medicaid, Hawk-I)	<input type="checkbox"/>	<input type="checkbox"/>
c) Finding a dentist willing to accept children who are uninsured	<input type="checkbox"/>	<input type="checkbox"/>
d) Finding a dentist willing to accept children under the age of 3	<input type="checkbox"/>	<input type="checkbox"/>
e) Finding a dentist willing to accept children with developmental disability	<input type="checkbox"/>	<input type="checkbox"/>
f) Oral health is low priority for the families I see	<input type="checkbox"/>	<input type="checkbox"/>

21. When you make a dental REFERRAL for child (age 0-3) how FREQUENTLY do you or your staff:	MOST (100-75% of the time)	USUALLY (50-74% of the time)	SOMETIMES (49% or less of the time)	NEVER (0% of the time)
Give the caregiver the name of a dentist	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Call a dental office to make the appointment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Contact a coordinator service to help in making the appointment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Simply tell the caregiver the child needs to see a dentist	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please feel free to provide any additional comments:

Please enter a valid email address (used in the initial correspondence to participate in the study) and your birth date and age. Enter a valid email address (the one used in contacting primary investigator for study participation) Birth date (mm/dd/yyyy)

Valid email address

Birth date

APPENDIX C
STUDY RECRUITMENT FLYER

WANT TO EARN 1 HOUR OF FREE CONTINUING EDUCATION CREDIT?

Your Participation in a Research Study is requested!

If interested in participating in this research study please contact the Primary Investigator at childoh@odu.edu for more information. Please do not disclose your name in the email. Just simply state, "I would like to participate."

Deadline to sign-up is June 15th

Course Title:

DON'T FORGET THE ORAL CAVITY!

**THE IMPORTANCE OF PERFORMING ORAL HEALTH ASSESSMENTS ON
CHILDREN AT EVERY**

WELL-CHILD VISIT

This interactive course is designed for pediatric primary health care providers.

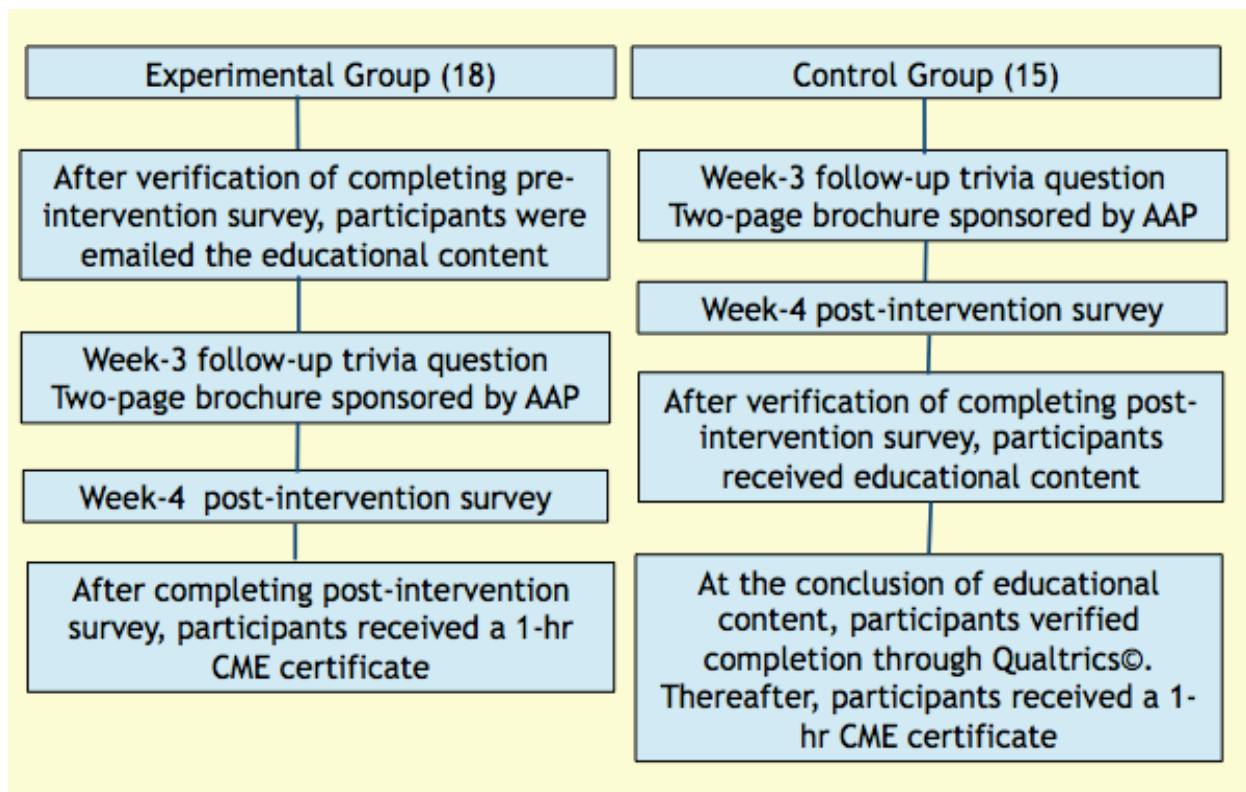
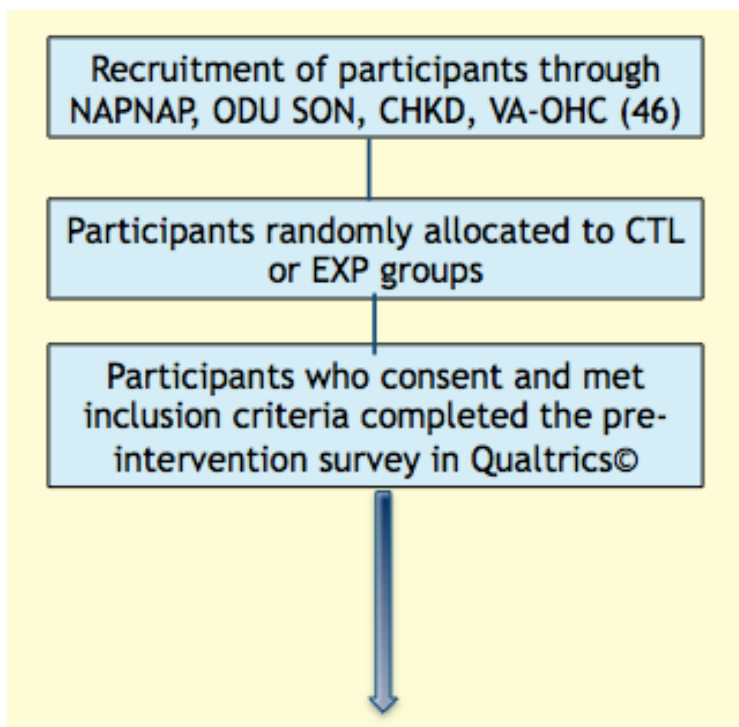
The course content includes:

- *Basic dental development and how to perform an oral health assessment*
- *Identification of dental caries and oral findings*
- *Discussing preventive dental care with parents*

IRB Approval # 16-063

APPENDIX D

FLOW CHART OF METHODOLOGY



APPENDIX E

VIRGINIA REIMBURSEMENT POLICY FOR FLUORIDE VARNISH



ORAL HEALTH PREVENTION IN PRIMARY CARE

Services and Reimbursement for Children 0 – 3

Fluoride Varnish

Non-dental health care professionals may apply and bill Medicaid for fluoride varnish application. In Virginia, this includes Physicians, Physician Assistants, Pediatric and Family Nurse Practitioners and Nurses (RN and LPN).

Medicaid providers are reimbursed for the procedure for a total of six applications from the age of six months up to the third birthday. Frequency of application is approximately every six months and should be accompanied by age appropriate preventive services as outlined in the Bright Futures/American Academy of Pediatrics Recommendations for Preventive Pediatric Health Care. The procedure will not be reimbursed on or after the child's third birthday.

Billing for Fluoride Varnish Application

Fluoride varnish application by medical providers is reimbursed by **Standard Fee for Service Medicaid and all Managed Care Medicaid plans**. Varnish billing is done in the same manner as medical procedures. Claims should be sent using the correct medical claim form or electronic invoice to the appropriate medical carrier. Use the procedure code assigned to the Fluoride Varnish procedure below.

Diagnosis Code	Procedure Code	Description	Reimbursement
V07.31 Prophylactic fluoride administration	99188	Topical fluoride varnish; therapeutic application for moderate to high caries risk patients	\$20.79

Preventive Services

Oral Health Risk Assessment and Screening

An oral health **risk assessment** and an exam of hard and soft tissues in the oral cavity should be performed beginning at the 6- month well child visit and continuing until a dental home can be established for each child.

Dental Referral

Referral for dental services should be made at the 12 month visit. This is consistent with the American Academy of Pediatric Dentistry's recommendation of the **age one dental visit**.

Oral Health Anticipatory Guidance

Information related to oral health including, oral hygiene, nutrition, fluoride exposure, non-nutritive sucking, injury prevention and the importance of dental visits should be discussed with parents or caregivers.

Oral Health Education and Training

Free online continuing medical education activities that teach practical oral health knowledge and skills are available at www.smilesforlifeoralhealth.org.

Additional online oral health training programs for physicians and other practice resources are available at www.aap.org/oralhealth.

For in-office training opportunities contact Karen Day, DDS, MS, MPH, at the Virginia Department of Health at **804-864-7824**, or at karen.day@vdh.virginia.gov.

To learn more about integrating oral health into your practice, or if you have any questions about oral health prevention services please contact Sarah Bedard Holland at **804-269-8721**, or at sholland@vaoralhealth.org.

ABOUT THE VIRGINIA ORAL HEALTH COALITION: The Virginia Oral Health Coalition (www.vaoralhealth.org) is a statewide alliance of individuals and organizations working to bring excellent oral health to all Virginians through policy change, public awareness and new initiatives. The Coalition's broad membership includes dental and medical professionals, educators, safety net clinics, community groups and charitable foundations, as well as advocates for children, veterans and older Virginians.



VITA

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EDUCATION

Global Health Certificate College of Health Sciences Center for Global Health Old Dominion University Norfolk, Virginia	December 2015
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Master of Science Dental Hygiene, Concentration: Education and Research G.W. Hirschfeld School of Dental Hygiene Old Dominion University Norfolk, Virginia	December 2011
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Bachelor of Science in Dental Hygiene (Accelerated BS-MS) G.W. Hirschfeld School of Dental Hygiene Old Dominion University Norfolk, Virginia	May 2010
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Bachelor of Science Concentration Psychology Old Dominion University Norfolk, Virginia	May 2010
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ACADEMIC APPOINTMENTS

2012-Present Lecturer- School of Dental Hygiene Old Dominion University Norfolk, VA.

2012 Adjunct Assistant Professor (May-June) - School of Dental Hygiene, Old Dominion University Norfolk, VA.

2011-2012 Adjunct Assistant Professor- Thomas Nelson Community College Department of Dental Hygiene, Williamsburg, VA.