

CHILDCARE CENTER DIRECTORS' ORAL HEALTH LITERACY AND
ATTITUDES TOWARDS PEDIATRIC ORAL HEALTH

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A Thesis Presented to the Faculty of the College of Dental Medicine of Nova
Southeastern University in Partial Fulfillment of the Requirements for the Degree of

MASTERS OF SCIENCE IN DENTISTRY

June 2014

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By

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A thesis submitted to the College of Dental Medicine of Nova Southeastern
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Dedication

I would like to dedicate this thesis to my loving wife and daughter. The sacrifices they made for me to accomplish this milestone cannot be explained in words. Thank you Aparna and Siya for being so supportive and allowing me to accomplish my goals. Your encouragement fuels my desire to be a better pediatric dentist each and every day!

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ABSTRACT

CHILDCARE CENTER DIRECTORS' ORAL HEALTH LITERACY AND ATTITUDES TOWARDS PEDIATRIC ORAL HEALTH

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Goal and Objectives. The main goal of this study is to assess childcare center directors (CCCDs) oral health literacy, knowledge, and attitudes towards pediatric oral health. We also determined the associations between CCCDs oral health literacy, knowledge, attitudes towards pediatric oral health, and 1) number of oral health preventive strategies (OHPS) implemented in their child care center (CCC), and 2) intent to adopt OHPS in the future. **Background.** Childcare utilization has substantially increased over the past decade with children enrolled in these centers spending substantial amount of time. CCCs, a non-traditional setting, can be used to actively promote pediatric oral health. However, before this setting can be used to promote oral health, a better understanding of

Florida CCCDs' oral health literacy, knowledge, and attitudes on pediatric oral health is needed. **Methods.** In this cross-sectional study we used a 45-item pre-tested questionnaire to survey Florida CCCDs working primarily in licensed CCCs through survey monkey online portal. Descriptive, bivariate statistics and multivariate regression analyses were conducted using SAS analysis software. **Results.** Of the 877 CCCD participants, 90% did not train staff about traumatic dental injuries, 87% did not have an oral health consultant, and 82% did not promote enrollees to brush their teeth after meals or snacks. Mean oral health literacy (12.3 ± 2.3) and attitude levels (16.8 ± 2.7) were high, however mean oral health knowledge (1.6 ± 2.0) was low. CCCDs with more years of experience ($p=0.01$), who work at Head Start CCCs ($p<0.0001$), and have more positive attitudes ($p<0.0001$), were more likely to have implemented OHPS in their centers compared to their counterparts. Non-White CCCDs ($p=0.03$), those with more positive attitudes ($p=0.001$), and who reported to have already implemented one or more OHPS ($p=0.002$) were more willing to implement OHPS in the future compared to their counterparts. **Conclusions.** No significant associations between oral health literacy, knowledge and number of OHPS implemented were observed. Similarly, oral health literacy, oral health knowledge was not associated with intent to implement OHPS in the future. CCCDs with more positive attitudes towards pediatric oral health had implemented more OHPS within their CCCs, and also were willing to implement more OHPS in the future compared to their counterparts.

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Chapter 1: Introduction

1.1 Overview

The quality of effective non-parental child care has emerged as both a public issue and a key concern among policy makers in the United States. In comparison to previous generations, the utilization of child care facilities has dramatically increased.[1] In 1977, 13% of children under the age of five in the United States had been enrolled in a child care facility at least one time.[2] By 1985, this number had increased, with 23.1% of U.S. children being enrolled in a child care facility. Over the next 9 years, the trend of increased child care center utilization continued with only slight decreases in the years of 1991 and 1994.[2] By 1994, 29.4% of U.S. children had been enrolled in a childcare facility at least once by the age of five.[2]

Congruently, with this trend of increased childcare utilization, there was also an increase of women in the labor force in the United States. In 1955, only one-sixth of married women with children under the age of 6 were in the American labor force.[3] By 1980, almost 50% of the 11 million married women with children under the age of six were in the labor force.[3] From the years of 2002-2007, the number of childcare facilities in the United States increased by 8.7%.[4] With increase in number of childcare facilities and consequently more number of children being enrolled in these centers, the revenues associated to these facilities due to providing services to children also increased. In 2002, the child care industry produced 22 billion dollars in revenue in the American economy. By 2007, that number had increased to revenue of 30 billion dollars annually.[4] In 2011, 32.7 million children were enrolled in a childcare facility.[5] In

that same year, 61% of all preschoolers (ages 0-4 years of age) participated in childcare.[5] These data indicates that a vast number of parents in the workforce with preschool children have made America's families more dependent on childcare than previous generations. This dependence has increased public awareness about health, early care and education within childcare centers as an issue of public policy.[1, 6]

The American Academy of Pediatric Dentistry (AAPD) has recognized the importance and impact of oral health promotion within childcare centers (CCCs) and the increased utilization of these facilities for daily care.[7] Early childhood caries (ECC) remains a public health concern for many pre-school age children.[8] In 2004, 28% percent of children two to five years of age had ECC with over four million children affected nationwide.[8] This fact is of significance to the childcare centers because in 2007 alone, 55% of children aged 3-6 years old were enrolled within these facilities.[9] It is recognized by the AAPD that childcare centers along with early education providers play an important role in educating children and parents about early childhood caries.

The AAPD advocates for involvement of community members such as childcare center directors in educating children and parents about oral health prevention. The AAPD recognizes that CCCs can play a role in decreasing a child's risk of developing ECC with early oral health promotion strategies.[7] In 2011, the AAPD released a report titled "Policy on Oral Health in Child Care Centers" that provides guidance to child care centers, pediatric dentists, other health care professionals, legislators and policy makers in regards to oral health activities and oral health promotion in out-of-home childcare settings. The AAPD through this policy encourages CCCs to implement oral health preventive strategies (OHPS) that can reduce a child's risk of developing early

childhood caries (ECC) while being enrolled in a CCC.[7] Though different organizations such as the AAPD have formed policies for CCCs, majority of the ordinance to policies followed by CCCs due to repercussion pertains to local and state laws.[1]

In the state of Florida, oral health regulations for CCCs from the state are predominantly absent[10]. The only oral health regulation for the state's CCCs pertain to toothbrush availability and storage in regards to night time child care.[11] This regulation states that toothbrushes of children in the CCCs cannot be shared with one another and must be stored separately not allowing the toothbrushes to contact one another. [11] In 2011, the Pew Charitable Trusts assessed all 50 states in regards to eight sound policy approaches to ensure dental health and access to care for disadvantaged children.[12] The state of Florida along with 4 other states received an "F" grade and had achieved only 2 of the 8 oral health policy benchmarks.[12] Clearly, Florida is lagging behind in implementing good oral health promotion policies for children in comparison to the rest of the United States.

Childcare centers may provide a unique, innovative setting to improve oral health promotion within the state. But, in order to find out whether CCCs can be used as an appropriate setting for better oral health promotion, more information is needed about Florida childcare center directors (CCCDs); those persons in charge of their respective childcare centers, and the child care centers itself. Therefore, it is important to determine Florida CCCDs' overall willingness to implement oral health care prevention strategies in their centers and get a better understanding of CCCDs oral health knowledge, oral health literacy, and attitudes towards pediatric oral health. By understanding CCCDs' oral

health knowledge, oral health literacy, and attitudes towards pediatric oral health, pediatric dental professionals can assess whether more education is needed for the leaders of these centers.

1.2 History of Childcare in the United States

The original purpose of childcare facilities was “child minding or child watching”.[13] “Child minding” was a form of babysitting. The child was supervised by a responsible adult to ensure that the child was safe throughout the day.[14] In the 1840’s, childcare first began in the city of Boston, to care for children of widows and wives of seamen that had to work to support their families.[14] The main purpose of day nurseries was to keep kids well-nourished and safe throughout the day.[14] The idea of educating and developing the child in a childcare setting at that time was not a primary focus.[14] In the early 1900’s, nursery schools became a setting for social development for middle and upper class children.[14] Children would meet weekly for a couple of hours and socialize with another under the guidance of skilled teachers.[14] By the end of the 1960’s, child development experts realized the merit of using childcare for educational development of poor children .[14] It was at this time that the concept of “Head Start”, a federal childcare program to promote good early habits for disadvantaged children was established.[14] “Head Start” provides an early learning environment for disadvantaged children. Currently, this program promotes children’s growth in language and literacy, approaches to learning, physical development and health, and social/emotional development.[15] As society has progressed, childcare has become a staple in life for many working parents regardless of their social status. A very high proportion (55%) of pre-school children are in child care regardless of state of residence,

age, or level of income of the caregiver.[16] As family dynamics continue to change in the 21st century, it is possible that so too will the utilization of child care settings and the role that they play in the American society.

1.3 Parenting and Childcare Centers

Equal rights for women and poor global economies have forced both parents to work. A rise of dual working parents by choice has led to a rise in the use of childcare facilities in the United States.[17, 18] The demand for childcare centers has increased due to working mother's needs and parents' desires for earlier educational opportunities for their children.[5] Eighty-eight percent of all preschoolers of working mothers are likely to be in a child care center.[5] According to the 2011 Spring U.S. census report, 10.9 million pre-school children lived with employed mothers, an increase from 8.2 million estimated in the 1985 census report.[17] Children enrolled in childcare spend on average 36 hours per week in that setting.[5] Children of employed mothers spent approximately 15 hours more per week in childcare than children of non-employed mothers.[5] National data shows that by the age of 5 nearly 75% of children in the United States have been enrolled in non-parental childcare at least one time.[16] Parents who experienced non-parental childcare as children have a more favorable attitude of placing their own children in childcare in the future.[19] All these findings indicate that the use of child care facilities is increasing and that this trend may continue to rise at high rates as new generations emerge.

Parenting at home has changed dramatically in comparison to previous generations in the United States. In 1958, 57% of children under age 6 with working mothers were supervised throughout the day at home.[20] In 1967, approximately two-

thirds of children had one parent home full time and about one-third had both parents working.[20] By 1977, this number of home supervised children had dramatically decreased to only 29%.[20] By the year 2009, the scenario reversed. In 2009, approximately two-thirds of children had both parents working and only one-third of children had one parent home full time.[20] There is an increased rate of single parents in the U.S.[18, 21] In 1980, 77% of children 0-17 years of age lived with two married parents.[9] By 2012, only 64% of children 0-17 years of age lived with two married parents.[9] Between 1980 and 2011, the proportion of births to unmarried women rose for women of all age groups in the United States.[9] In 2010, almost 50% of all first births in the United States were to unmarried women.[9] Parents of younger age are moving away from extended family members and there are more time limitations for parents now due to work.[18] Parents are spending more time working than in the past to provide for basic needs for children as there is more demand for a comfortable style of living[18]. In 2005, parents on average were spending 6.4 % of their yearly family income on child care services.[20] By 2009, this number had increased to 7.7% of their yearly family income.[20]

As parents are spending more energy at work, there is limited parental energy and psychological resources for their children at home.[22] In 2004, a national survey of board certified pediatric dentists revealed that 88% of them believed that parenting has “absolutely or probably” changed during their lifetime.[23] The stress of society is making it harder for parents to parent their children. Parenting occurs in the framework of society and thus parenting problems reflect societal difficulties.

Parenting may have an influence on child's development.[18, 21] Parenting can influence the knowledge and skills of a child [18, 21]. As society continues to evolve, childcare facilities may play a pivotal role as a helpful adjunct of positive influence to children for parents in the future.[21]

1.4 Childcare Centers' Roles and Functions

Childcare is defined as any care for a child in whom the care comes from somebody other than their mother.[14] The roles and functions of childcare depend on the needs of the parent and child. Historically, childcare has served two purposes: babysitting and preschool education.[14] Babysitting focuses on the mother's needs while preschool education focuses on the benefits to the child.[14] Increased demands of working mothers and parents' desires for early educational opportunities for their children have caused an increase in childcare center utilization.[5] Childcare can often be described by the age of the children being cared for within the facility such as infant, toddler, preschool or school age centers.[14] Center based care is generally divided into either a childcare program, a preschool, a nursery, or a Head Start program.[24] The definition of childcare settings can be very broad. Some parents may rely upon "informal" settings such as a relative or family member that watches the child throughout the workday.[24] Others may rely upon more "formal" settings such as licensed family childcare homes or licensed childcare centers.[24]

Many view childcare as a setting that provides chances for nurturing, proper nutrition, promotion of health, safety and learning.[25] The function of a childcare center often depends upon the standards in which the center adheres to in these various

categories.[26] Childcare centers that adhere to more standards may be expected to be of a higher quality than those who do not.[26] Childcare standards are benchmarks for particular tasks within a childcare center.[26] Standards are different than guidelines or recommendations as they ask for universal compliance.[26] Childcare standards are supported generally by scientific or epidemiological data and supported by experts in the field.[26] According to Hofferth, “Licensing means that family childcare homes and centers must meet certain minimum health, safety, and (sometimes) programmatic standards before they can serve a specific number of children.”[24] Licensed center based childcare are generally held to the same standards as family childcare homes with additional program standards criteria depending upon the state in which they are located.[24]

Research has shown that children that have attended childcare programs that met a higher number of standards, showed better outcomes in social, health and cognitive development.[21, 25, 27, 28] The quality of childcare can have a lifelong effect in a person’s life.[29] The quality and effectiveness of childcare continues to be an important public issue in the United States. As more research occurs on childcare centers, more standards may be recommended and CCCs roles and functions in society may continue to change

1.5 Standards, Benchmarks and Health Prevention Programs in Child Care Centers

Different public and private organizations continue to promote high quality and affordable childcare within communities throughout the United States.[7, 26, 29] Organizations such as the National Association for the Education of Young Children (NAEYC), Office of Head Start Administration for Children and Families (OHS), American Academy of Pediatrics (AAP), American Academy of Pediatric Dentistry, American Dietetic Association, American Public Health Association (APHA), Child Care Aware of America and Child Welfare League of America (CWLA) have established standards, guidelines and/or policies for child care centers.[25, 30] These organizations along with others have collaborated together to form many joint standards for child care facilities. These entities are continually striving to promote American children's well-being within childcare centers.

The influence of childcare centers for "school readiness" and the development of criteria within childcare centers for cognitive, emotional, and social development have been studied in the past.[13] In 1991, The National Institute of Child Health and Human Development performed a longitudinal study to examine the outcomes of children that were enrolled in CCCs that met recommended standards for cognitive, language and social development. These standards were formed through a collaborative effort by the American Public Health Association (APHA) and the American Academy of Pediatrics (AAP).[25] In this particular study, researchers studied standards that were established by the two organizations collectively. These standards consisted of optimal child-staff ratios (ratios depended on age of children in the center), specific group sizes of different aged children, formal childcare provider training in child development and caregiver

education (either certification or a college degree for caregivers). Five major findings were of significance in this study. First, most childcare centers observed did not meet all 4 optimal standards. Compliance to these standards ranged from 10% compliance for 6 months of age enrollees to 34% compliance for 36 month enrollees. Second, the authors found associations between the number of standards met by childcare centers and positive child outcomes in relation to cognition, language and social competence.[25] Third, CCCs that met recommended child-staff ratios, caregiver training, and education had better outcomes in cognitive development of children in their centers.[25] Fourth, children in CCCs that met more standards had better school readiness and language comprehension scores. Fifth, fewer behavior problems were noted in children at 36 months of age that attended CCCs that met more standards. This research helped to validate these standards as a framework for higher quality education within childcare centers.

Ordinance by CCCs to proven standards however can be a dilemma for many advocates in the field of childcare.[25] Standards from expert organizations can be very different in comparison to individual states' regulations of childcare centers. For example in the previous study, the AAP and APHA recommended that children under the age of 15 months should have no more than a ratio of 3 children for every 1 provider. However, among different states, regulations on ratios can vary from 3:1 to 12:1 for the same age group.[25] The AAP and APHA recommended that group sizes of certain age children should not exceed 6 children per group. However, some states had group sizes that ranged from 6-20 children per group.[25] In the state of Florida, the regulations on

child to staff ratios vary from 4-20 children depending on the age of the group being cared for.[11]

Nutrition is another key component that has been studied in childcare center settings. Obesity continues to be a problem in the United States. Obesity has affected over 20% of children aged 2-5 years in the United States.[31] Different CCCs are held to different nutritional standards.[31, 32] Head Start programs are held to federal standards while most other childcare facilities are regulated mainly by states' standards.[32] Head Start centers follow more strict standards such as the Child and Adult Care Food Program (CACFP) regulated by the federal government. Participating centers must adhere to CACFP meal pattern requirements to get reimbursed by the federal government for meals that they provide to low socioeconomic status children.[32] Each state in the U.S. sets its own standards for nutrition for non-Head Start CCCs. These standards are enforced by making sure at least the minimum enforcement of the standards is occurring within these centers.[31] In the state of Florida, minimum nutritional regulations for CCCs are more concerned towards food and child safety than proper nutrition.[10, 11] For example, minimum Florida nutritional regulations do not allow bottle propping of any kind for infants. Also, clean drinking water should be available to all enrollees.[11] However, there are no limitations on frequency of eating, availability of sugar sweetened beverages in CCCs, and fruits and vegetables are not required in Florida CCCs.[10]

Licensed child care centers have higher standards than licensed family homes.[31] The American Dietetic Association has set benchmarks for all childcare centers for proper nutrition within their facilities. Feeding practice standards such as providers sit with children during meals, providers eat meals together, meals are served family style,

and providers help children recognize their internal hunger and satiety cues are some of the benchmarks or standards set by this association.[32] In 2013, Dev and colleagues assessed childcare providers' feeding practices to see if they met the standards put forth by the American Dietetic Association for childcare centers.[32] This cross-sectional study revealed that Head Start providers meet more feeding practice benchmarks than non-Head Start providers.[32] The authors believe that possible reasons for this higher compliance could be due to the stricter nutritional Head Start standards for these centers and that Head Start staff may have increased nutrition training opportunities.[32] In regards to early childhood caries (ECC), nutrition has been studied within childcare centers. Kim and colleagues in their study looked at 4 major nutritional standards and one related topic to determine whether states had included these standards within their childcare center regulations. [10] The four standards and related topic studied were published in a 2002 report titled *Caring for Our Children: National Health and Safety Performance Standards—Guidelines for Out-of-Home Child Care Programs (CFOC)*. The four standards and related topic researched for prevalence within state regulations were frequency of eating, fruit and vegetable intake, drinking water is freely available, and whether sugar sweetened beverages were allowed in the center (related topic, not a standard).[10] This study found that nutrition and oral health content within state regulations for childcare centers was low in regards to prevention of ECC.

Research has shown that majority of states lack proper regulations for physical activity and healthy eating within CCCs.[31] The nutrition and physical activity self-assessment for childcare (NAPSACC) guidelines were developed to promote healthy weight in children in childcare facilities.[33] In 2009, McWilliams et. al studied the

adherence of NAPSACC guidelines within childcare centers in North Carolina.[27] Their cross sectional study looked at 96 child care centers from 33 counties across North Carolina to compare the expectations of the guidelines and the actual behaviors within these child care centers. The authors found that though these guidelines have been established for nutrition and physical activity in childcare centers, only 13.7% of the childcare centers in their study met the appropriate guideline of 120 minutes of active playtime per day.[27] The authors found that 40% of centers restricted active play as a form of punishment for their enrollees.[27] They also concluded that no state has a set of standards comparable to the depth of detail in the NAPSACC guidelines.[27] This result provided a useful start to discussion for improvement of existing standards within state regulations and a need for a more comprehensive set for physical activity.[27]

Clearly, within the various arenas of early learning, nutrition, and health promotion, there are discrepancies between standards set forth by experts in childcare policy and state regulations upon child care centers. As childcare center utilization continues to increase, more focus on incorporation of better standards within state regulations is needed. Previously mentioned organizations along with the general public will play a vital role in the enforcement of these standards and policies within child care centers.

1.6 Early Childhood Caries

Dental caries is defined as an infectious microbial disease of the teeth that results in localized dissolution and destruction of calcified tissues.[34] Early childhood caries (ECC) is defined as the existence of 1 or more carious teeth (noncavitated or cavitated lesions), missing (due to caries), or filled tooth surfaces in any primary tooth in a child under the age of 6 years.[8] To lead to this destruction of teeth, 3 major events must occur prior to acquiring the disease of ECC.[35] The first event that must occur is that an individual must be primarily infected by *Streptococcus mutans* (*S. mutans*), virulent bacteria with acidogenic properties.[35] Second, high levels of pathological *S. mutans* must be present in the oral cavity.[35] Research has shown that in children with ECC, *S. mutans* levels regularly exceeded 30% of the total bacterial population in dental plaque samples taken from those individuals.[36] Pathological *S. mutans* levels can be increased in the oral cavity by frequent and prolonged exposure to sugars such as sucrose.[35] The third event that must occur is rapid demineralization of the enamel until a cavitation forms within the tooth.[35]

A child can acquire *S. mutans* at an early age from either vertical transmission or horizontal transmission.[37, 38] Vertical transmission occurs when the caretaker of a child transmits *S. mutans* strains from their oral cavity to the child.[34, 35, 37] This can occur while sharing utensils or even through affectionate kisses to the child. Vertical transmission is highly dependent on the frequency of exposure of virulent bacteria to the child, levels of pathological bacteria present in the caretaker's oral cavity, and the minimum infective dose transmitted to the child.[34] If any of these three factors are disrupted, vertical transmission of pathological bacteria is less likely to occur.[39]

Horizontal transmission has been demonstrated to occur among siblings and children within CCCs.[38, 40] Tedjosansongko and colleagues found in their study of ECC children within CCCs, that maternal transmission of *S. mutans* occurred in 33% of the children, paternal transmission in 8%, and horizontal transmission from fellow childcare enrollees in 58% of the infected individuals.[40] In another study, it was demonstrated that horizontal transmission among fellow childcare enrollees is possible.[38] As childcare utilization and enrollment continues to increase in the United States; there is a potential for more children to be infected by ECC through horizontal transmission.

ECC is a preventable disease and early recognition is important to prevent its devastating morbid consequences. ECC is known to cause pain, infection, disturbances in sleep, school concentration, speech, and eating habits.[41] Many underserved infants and toddlers are hospitalized due to this disease.[41] Hospital emergency departments are often faced with the daunting task of managing dangerous consequences of untreated ECC in a non-dental setting.[42] This places increased stress and costs on the American healthcare system for an otherwise preventable disease.[42] Psychological, social, physical and functional well-being of a child are all affected by ECC.[43] Children with ECC are more likely to have low body weight and height compared to children without the disease.[43] ECC has been shown to cause insufficient development of children that have no other medical problems.[43] Some research has shown that severe ECC may be associated with iron deficiency in children.[44] Children that experience ECC have a higher likelihood of caries in their permanent dentition.[45] Filstrup and colleagues found that children with ECC have an overall lower quality of life than children without the disease.[46]

Children in the age range of 12 months to 30 months of age have distinct caries patterns that differ from older children.[34] ECC usually presents as smooth surface carious lesions on the maxillary anterior teeth.[35] Thus, this disease can be easily identified by non-dental personnel.[47] Infants and toddlers of the preschool age that experience early childhood caries are more likely to experience dental caries in their other primary teeth and future permanent teeth.[45, 48] Dental professionals are trained to look for these distinct patterns and identify any child that may be of high caries risk to try and prevent these unfortunate outcomes. Furthermore, anticipatory guidance can be provided to caretakers of these children to reduce a child's likelihood to be affected by this disease.[8]

In 2004, the prevalence of ECC in US children aged 2-5 years old was estimated to be 27.9%. Majority of this children belonged to the lower socioeconomic status (SES).[49] Children that were below 100% of Federal Poverty Level (FPL) had a caries prevalence of 54.3%.[49] Children that were greater than or equal to 200% above FPL had lower caries prevalence in comparison to children of lower income households.[49] However, 32.3% of these children had caries.[49]

In 2000, the United States Surgeon General called dental caries "the nation's silent epidemic".[50] ECC is the single most common chronic disease of childhood in America.[51] ECC is 5 times more common than dental asthma and 7 times more common than hay fever.[51] In 2010, 23% of all children in the United States under age 4 had a least one dental caries.[52] In 2010, by the 2nd grade, almost 50% of U.S. children had experienced dental caries in at least one or more teeth.[52] Clearly, ECC continues to be a major burden for American society and an issue of public health concern.

1.7 Oral Health Promotion in Childcare Centers

Oral health promotion focuses on creating a supportive environment that will help sustain good health and assist individuals and communities in avoiding oral disease.[53] Oral disease in children consists of not only ECC but other diseases such as periodontal disease, oral cancer, oral mucosal lesions, and oral trauma.[54] Oral health promotion at an early age is critical to the formation of proper oral habits for a lifetime.[55] Thus, the American Academy of Pediatric Dentistry (AAPD) supports early referral by CCC personnel and the establishment of a “dental home” for each child in the U.S. by the age of 1.[56] The “dental home” includes all components of oral health that result from the interaction of the patient, parents, dentists, dental professionals, and non-dental professionals.[56] The dental home is derived from the American Academy of Pediatrics (AAP) definition of a medical home which states that pediatric primary health care is best delivered where comprehensive, continuously accessible, family-centered, coordinated, compassionate, and culturally-effective care is available and delivered or supervised by qualified child health specialists.[56] Children of highest risk of experiencing dental disease should be referred to the dentist.[57] If a dental home is not available and no dentist can be found to accept a very young child, the child’s pediatrician should act as a dental home until a dental home can be established.[57]

The use of fluoride both systemically and topically has been an integral part of oral health promotion within communities and in CCCs.[58] Fluoride has many caries protective mechanisms of action. Fluoride can inhibit the demineralization of sound enamel and help repair demineralized enamel.[58] Fluoride also can inhibit dental caries by disrupting the metabolic activity of *S. mutans* thus lowering the levels of pathogenic

bacteria within the oral cavity.[58] Research has shown that topical fluoride varnish along with dental professional counseling is effective in reducing ECC incidence.[59] Fluoridation of community drinking water may provide both a topical and systemic effect on the dental enamel of teeth.[58] Fluoridation of community drinking water also provides the most economical way of delivering fluoride to vast numbers of people within different communities.[58] Eighty percent of states require water to be available in CCCs per states' regulations.[60] In 2013, Middleton and colleagues found that 84% of CCCs had water in their classrooms. However, of these classrooms only 50% had water accessible to the children of the CCCs. [60]

Proper oral hygiene and tooth brushing after meals is an important oral health promotion concept.[7] As stated earlier, pathogenic *S. mutans* levels can increase in the oral cavity when exposed to frequent and prolonged exposure to sugars such as sucrose.[35] Thus, proper oral hygiene and tooth brushing is essential for good oral health promotion. In 2009, Gartsbein et al. evaluated oral hygiene policies within Toronto daycare centers.[61] They found that 83% of Toronto CCCs do not have an oral hygiene policy and 11% would not allow children to brush their teeth within their center.[61] The authors concluded that a policy on safe tooth brushing within CCCs is needed for better oral health promotion.[61]

Proper nutrition and nutritional habits are important within CCCs. In 2012, Kim and colleagues evaluated oral health related nutritional contents within states' regulations for CCCs.[10] Their results showed that 46 states had regulations on frequency of eating, 30 states had regulations on food menus to include fruits and vegetables, 44 states had regulations on freely accessible drinking water (not specifying whether the water had to

be fluoridated or not), 21 states required 100% fruit juice to be served to enrollees, and only 7 states did not allow sugar sweetened beverages to be served in their CCCs. [10] They concluded that state regulations need to be improved on oral health nutritional content. Furthermore, they stated that even if proper regulations are in place, more research is needed to see if CCCs are implementing oral health standards supported by public health organizations.[10]

In 2011, Kranz and Rozier assessed oral health standards within states' regulations for CCCs.[62] They found that 36 states include oral health content in their regulations but majority of the oral health content is in regards to storage of toothbrushes within the facility.[62] Majority of states do not include oral health standards supported by public health organizations such as the AAPD, AAP and APHA in their regulations.[10] The authors concluded that more research is needed in CCCs' compliance to oral health standards set by public health organizations and not states' regulations.[62]

Oral health promotion and access to care for disadvantaged children has been studied within Head Start centers (HSCs). HSCs are federally funded CCCs for lower socioeconomic status children. Southward et al. demonstrated that questioning of parents by child care personnel about parental history of a dental abscess or identifying visible plaque on children's teeth helped identify children who needed dental referral or early prevention within HSCs.[47] Kopycka-Kedzierawski and colleagues demonstrated the high prevalence of ECC within HSCs.[63] Mathu-Muju et al. demonstrated that early Head Start staff are supportive of medical personnel performing early preventive dental care.[64]

Research has confirmed that reducing a child's caries risk factors and increasing a child's protective factors results in a reduction of dental caries over a lifetime.[65] Risk factors such as high microbial burden, poor dietary habits, and plaque accumulation on teeth place children at a higher risk for ECC.[55, 66] Optimizing protective factors such as increasing fluoride exposure, improving oral hygiene, and placement of dental sealants help to reduce a child's caries risk.[55, 66] Thus, reducing risk factors and establishing good preventive practices within child care centers is an integral part of oral health promotion within these facilities. CCCs may be an innovative setting for oral health promotion. More information is needed on whether CCCs are implementing oral health promotion standards in their centers. Research has shown that the child care setting has been used as a "protective factor" in other areas of health promotion.[21] Gupta and colleagues found that more policies to initiate health consultation, health screening, and health education are needed in childcare centers.[67]

In the past, the focus to reduce caries risk factors and increase protective factors through lifestyle changes for children has mainly been done through interaction with parents/guardians of children.[55] In the United States, children enrolled in childcare are spending on average 33 hours per week in childcare centers.[16] This proposal seeks to shift current oral health research and subsequent programming to a focus that includes child care center directors (CCCDs), i.e., those persons caring for children for a large portion of the day. As the dependence on CCCs increases, CCCDs may be asked to play an even more important role in oral health promotion within America's communities.

1.8 AAPD “Policy on Oral Health in Childcare Centers”

In 2011, the American Academy of Pediatric Dentistry (AAPD) adopted its “Policy on Oral Health in Child Care Centers”. The policy provides guidance to child care centers, pediatric dentists, other health care professionals, legislators and policy makers in regards to oral health activities and oral health promotion in out-of-home child care settings.[7] The AAPD through this policy encourages child care centers to implement *oral health preventive practices or strategies (OHPS)* that can reduce a child’s risk of developing early childhood caries (ECC).[7] The AAPD policy points are as follows:

American Academy of Pediatric Dentistry (AAPD) Policy Points

- 1) **All CCCs are encouraged to utilize oral health consultation, preferably by a pediatric dentist, at least once a year and as needed.** Seven broad terms have been identified to be important in any oral health promotion program.[62] An oral health consultant should educate and advise within the childcare facility of how to screen for needed dental care, how to appropriately refer for dental care, when to refer for a child’s 1st dental visit, tooth brushing practices, fluoride use, bottle use, and types of oral health education in each program.[62] Health care consultants work with child care providers to help them adhere to national health and safety performance standards (NHS) established by the American Academy of Pediatrics, American Public Health Association, and National Resource Center for Health and Safety in Child Care.[26] The NHS standards recommend that any type of health consultant visit child care centers monthly if they serve children under the age of 2, quarterly if they serve children over the age of 2, and annually for family child care homes.[26]

- 2) **CCCs should promote the concept of the dental home by educating their personnel as well as the parents on the importance of oral health and provide assistance with establishment of a dental home no later than 12 months of age of the child.** The dental home includes all components of oral health that result from the interaction of the patient, parents, dentists, dental professionals, and non-dental professionals.[56] The dental home is derived from the American Academy of Pediatrics (AAP) definition of a medical home which states that pediatric primary health care is best delivered where comprehensive, continuously accessible, family-centered, coordinated, compassionate, and culturally-effective care is available and delivered or supervised by qualified child health specialists.[56] Children of highest risk of experiencing dental disease should be referred to the dentist.[57] If a dental home is not available and no dentist can be found to accept a very young child, the child's pediatrician should act as a dental home until a dental home can be established.[57]
- 3) **CCCs should maintain a dental record, starting at age 12 months with yearly updates, as part of the child's health report. It should address the child's oral health needs including any special instructions given to the care givers.** The AAPD recommends that children and parents going to a dental home receive when applicable a clinical oral examination, caries risk assessment, prophylaxis with topical fluoride treatment, anticipatory guidance/counseling, radiographic assessment, treatment of dental disease/injury and treatment of developing malocclusions.[55] All of these components are documented in the dental record.[55]

- 4) **CCCs should have written up-to-date comprehensive procedures to prepare for, report and respond to medical and dental emergencies.** Pacheco and colleagues found that elementary school teachers are not well versed in how to handle a dental emergency.[68] An oral health consultant should advise child care centers of the availability of dental emergency services and the importance of not delaying treatment in dental trauma cases.[69] Child care personnel should be educated by an oral health consultant about after hour dental emergency services, storage media for avulsed teeth, critical timing for replantation of avulsed teeth, and current concepts of management of fractured teeth.[70] All of this information could be placed in a manual developed by the oral health consultant and CCCD.[71]
- 5) **CCCs should sponsor on-site, age appropriate oral health education programs for the children that will promote good oral hygiene and dietary practices, injury prevention, and the importance of regularly scheduled dental visits.** An oral care program that educates and allows children to brush after meals or snacks in the CCC would be beneficial.[61] This would educate children that are not brushing at home about the importance of proper tooth brushing.[61] Supervised oral hygiene programs in CCCs have shown to improve oral health outcomes of enrollees.[61] Child care centers should limit the frequency of consumption of fermentable carbohydrates (foods with sucrose) as these are a major dietary factor affecting dental caries prevalence.[45] Limiting the number of children on the playground at one time and providing more structured small-group activities may reduce injuries in child care centers.[72]

- 6) **CCCs should provide in-service training programs for personnel regarding oral hygiene concepts, proper nutrition choices, link between diet and dental caries, and children's oral health issues including proper initial response to traumatic injuries along with dental consequences.** Personnel with an understanding of these concepts are at a greater advantage in caring for children. An oral health consultant should provide in service training programs for child care workers in all of these concepts.[71] Child care workers should focus educational efforts toward increasing parent awareness that sensitive teeth and difficulty chewing are signs of serious oral health problems.[47]
- 7) **CCCs should encourage parents to be active partners in their children's health care process and provide an individualized education plan, one that is sensitive to cultural values and beliefs, to meet every family's needs.** Written material should be available and, at a minimum address oral health promotion and disease prevention and the timing of dental visits.
- 8) **CCCs should familiarize parents with the use of and rationale for oral health procedures administered through the program and obtain advance parental authorization for such procedures.**
- 9) **CCCs should incorporate an oral health assessment as part of the daily health check of each child.** Child care staff should be trained by an oral health consultant to assess presence of plaque on children's teeth daily.[47] This is a realistic approach by non-dental personnel to identify children at high caries risk with limited or no access to dental care and could be used as a daily oral health assessment.[47]

- 10) CCCs should promote supervised or assisted oral hygiene practices at least once daily after a meal or a snack.**
- 11) CCCs should provide well-balanced and nutrient dense diets of low caries risk.**
- 12) CCCs should have clean, optimally fluoridated drinking water available for consumption throughout the day.**
- 13) CCCs should not permit infants and toddlers to have bottles/sippy cups in the crib or to carry them while walking or crawling while under the child care center's supervision.**
- 14) CCC's should minimize saliva sharing activities to help decrease an infant's or toddler's acquisition of cariogenic microbes.**

1.9 Specific Aims and Hypotheses

According to the 2011 PEW report, access to dental care for children in the state of Florida is a major issue.[12] In addition to improving access to dental care among these children, promoting oral health in various non-health care settings is recommended to improve oral health among children. One such innovative method to promote oral health is to use a non-traditional non-health care setting like a child care center. Child care centers provide a unique non-traditional setting to promote oral health in the state of Florida. Investigating oral health promotion for children in child care settings requires more information about CCCD's oral health literacy, knowledge of preventive practices, and attitudes towards pediatric oral health.

Therefore, the main goal of this study is to assess CCCDs oral health literacy, knowledge of dental preventive practices, and attitudes towards pediatric oral health. In addition, we determine the following two aims and test different hypotheses stated below.

The specific aims (and hypotheses) of this study were:

AIM 1: To examine the association between child care center directors (CCCDs) oral health literacy, oral health knowledge, attitudes toward pediatric oral health, and the number of oral health preventive strategies (OHPS) already implemented.

H₁: There will be a positive relationship between oral health literacy and number of OHPS already implemented.

H₀: There will be no relationship between oral health literacy and number of OHPS already implemented.

H₂: There will be a positive relationship between oral health knowledge and number of OHPS already implemented.

H₀: There will be no relationship between oral health knowledge and number of OHPS already implemented.

H₃: There will be a positive relationship between attitudes toward pediatric oral health and number of OHPS already implemented.

H₀: There will be no relationship between attitudes toward pediatric oral health and number of OHPS already implemented.

AIM 2: To examine the association between CCCDs level of oral health literacy, oral health knowledge, attitudes toward pediatric oral health, and the intent to adopt OHPS at CCCs controlling for OHPS already implemented.

H₁: Directors with high levels of oral health literacy will have greater intent to adopt any new preventive strategies.

H₀: Directors with high levels of oral health literacy, high levels of pediatric oral health knowledge, more positive attitudes towards pediatric oral health, and lower number of barriers to implement oral health prevention strategies will have no difference in intent to adopt any new preventive strategies.

H₂: Directors with high levels of oral health knowledge will have greater intent to adopt oral health preventive strategies in the future.

H₀: Directors with high levels of oral health knowledge will have no difference of intent to adopt oral health preventive strategies in the future.

H₃: Directors with more positive attitudes towards pediatric oral health will have greater intent to adopt oral health preventive strategies in the future.

H₀: Directors with more positive attitudes towards pediatric oral health will have no difference of intent to adopt oral health preventive strategies in the future.

Chapter 2 Methodology

2.1 Design

A cross-sectional, correlational research design was used to examine the relationships between selected demographic variables (i.e., years of experience as a CCCD, age, ethnicity, race, highest level of formal education, personal income, and whether the CCCD had children) and the independent variables, (oral health literacy of CCCDs, oral health knowledge of CCCDs, CCCDs' attitudes towards pediatric oral health, and barriers faced by CCCDs to promote oral health) and the dependent variables (higher number of OHPS already implemented, and intent to adopt OHPS in the next year). This design was used to explore the relative contributions of the independent variables to the dependent variable. This study was approved by the Institutional Review Board (IRB) at NSU.

2.2 Setting

The Florida Department of Children and Families maintains an updated mailing and email list of all licensed child care centers in Florida. This information is available to the public on their state website. We administered our survey through SurveyMonkey® (www.surveymonkey.com), an online survey management tool. After IRB approval, the 45-item online survey was pilot tested with 10 CCCDs to determine if there were any typological or operational errors. The pilot testers' comments and recommendations were integrated into the surveys. The survey was also sent to 5 public health specialists who have more years of experience in developing surveys and in similar area of research to improve the face and content validity of the survey questionnaire.

2.3 Target Population

The population of interest for this study was all licensed Florida CCCDs. This cross sectional study targeted a convenience sample of licensed Florida child care center directors with complete e-mail addresses registered on the Florida Department of Children and Families Child Care Data Master List. As of July 2013, there were 6,788 licensed child care centers registered in the state of Florida (per Department of Children and Families Child Care Data Master List). However, an updated list of email addresses was available for 5,174 licensed Florida child care center directors (CCCDs). Though our target population did not represent all licensed CCCDs registered in the state of Florida, we believed targeting CCCDs that had provided e-mail addresses was more feasible to attain our study objectives. We believed this convenience sample closely represented the master list of all licensed Florida CCCDs.

2.4 Power analysis and sample size

A priori power analysis was used for this study. Since the research instruments used in this study had not been previously used with the study population of CCCDs, an a priori power analysis was conducted. In order to estimate an adequate and appropriate sample size for the study to test the null hypothesis, a power analysis for regression analyses was conducted using G*Power software package[73]. Estimated sample size for this study using G*Power was comparable with those listed in Cohen's (1988) sample size tables. Cohen's (1992) effect size measures are well known and his conventions of "small," "medium," and "large" effects proved to be useful. G*Power is completely

compatible with Cohen's measures and to display the effect size conventions appropriate for the type of test selected.

For this study, alpha (α) was set at the conventional level of .05, and beta (β) at the conventional level of .20, or four times alpha given the relative seriousness of committing a type I or type II error. As a result, the desired power was calculated as $1 - \beta = .80$. The choice of effect size that was considered appropriate was based on the related research results published previously and cost-benefit considerations in applied research. The proposed sample size was based on the a priori power analysis with 1 covariate (i.e., number of strategies already implemented) and four major study variables (i.e., oral health literacy, oral health knowledge, attitudes in regard to pediatric oral health, and barriers faced in promoting oral health). In order to detect a medium effect size ($f = .15$ or $R^2 = 13\%$) (with power of .80), a sample size of 62 was needed for regression analyses.

2.5 Instrumentation

Demographic characteristics (e.g., age, gender) and the selected independent variables (i.e., oral health literacy, oral health knowledge, attitudes toward pediatric oral health, barriers and facilitators faced to promote oral health) were measured by a 45-item instrument developed by the researcher with the inclusion of several validated scales created by other researchers. This can be seen in the Appendix.

Oral health literacy was measured by a 3-item instrument “Screening questions for limited health literacy” developed by Chew et al. These questions were validated by Chew and colleagues.[74] However, only question 26 “Confident with forms” was used to assess health literacy. According to Chew et al, this question was adequate to

determine the health literacy of the target population. Higher mean scores for the oral health literacy domain denoted greater problems in reading. Chew et al found that the screening threshold for inadequate health literacy was any score at the level of “somewhat confident” or less.[74] At this level, the scale for inadequate health literacy had both specificity and sensitivity above 80%.[74]

Oral health knowledge was measured by questions adapted from a survey developed by Akpabio et al.[75] and questions developed by the researchers. This independent variable was measured using a summed variable with items 29, 30, and 31 (3 items). Higher mean scores for oral health knowledge domain denoted a higher level of pediatric oral health knowledge among CCCDs.

Attitudes toward pediatric oral health were measured by questions 32, 33, 34, and 35 (4 items). This scale had been validated from previous research by Mathu-Muju et al.[64] Responses to each item range from 1 (strongly disagree) to 5 (strongly agree). Higher mean scores for the attitudes domain denoted more positive attitudes towards pediatric oral health.

Barriers to implementation were measured by questions 37, 39, 40, and 41 (4 items) adapted from Mathu-Muju et al.[64], Taveras et al.[76], Gupta et al[77], and questions developed by the researchers. Responses to each item were in a check all that apply format. Higher mean scores for number of barriers denoted that CCCDs have more self-reported barriers in adopting OHPS in their centers.

Oral health prevention strategies already implemented were measured using a summed variable with items 15, 17, 18, 19, 20, 21, 23 and 25 (8 items). These 8 items were developed by the researchers.

Intent to implement oral health prevention strategy was measured by using items 43, 44, and 45; questions developed by the researchers. These questions asked if the CCCD planned to continue to implement OHPS in their center if already doing so (item 43), if the CCCD planned to implement more OHPS in their center, and if the CCCD planned to implement OHPS within the next year in their center.

2.6 Statistical data management and analysis

SAS statistical analysis software version 9.3 was used for data management and data analysis.

2.6.1 Data Management

Four new composite score dummy variables were created for oral health knowledge, oral health literacy, and attitudes related to pediatric dental health. A new composite variable for total number of oral health preventive strategies implemented in a child care center was also developed.

The knowledge composite score variable was developed by summing the scores of 3 questions, questions 29, 30, and 31 (There was one more question – knowing what dental home concept is). Question 29 was a true/false statement “Parents should start cleaning their child’s mouth at the age of 1.” with the correct answer being **false** (*parents should start cleaning a child’s mouth at minimum by the eruption of the first tooth*). Question 30 was a true/false statement “The first dental visit for a child should be at 2 years.” with the correct answer being **false** (a child’s first dental visit should be no later than 1 year of age). Finally, question 31 asked “Which one of the following is the most common childhood disease in children under 7 years of age” (answer choices were

asthma, hay fever, tooth decay or cavities, chicken pox) with **tooth decay or cavities** being the correct answer. The score may range from a minimum score of 0 to a maximum score of 3.

The oral health literacy composite score variable was developed by summing the scores of 3 opinion based questions, questions 26, 27, and 28. These questions used Likert Scale responses. Question 26 asked “How confident are you filling out dental health forms by yourself?” Respondents had 5 choices to select from: Extremely confident (5), Quite a bit confident (4), Somewhat confident (3), A little bit confident (2), and Not at all confident (1). Question 27 asked “How often do you have someone help you read dental health materials?” Respondents had 5 choices to select from: None of the time (5), A little of the time (4), Some of the time (3), Most of the time (2) and All of the time (1). In question 28, respondents were asked “How often do you have problems learning about your dental condition because of difficulty reading dental health materials?” Respondents had 5 choices to select from: None of the time (5), A little of the time (4), Some of the time (3), Most of the time (2), and All of the time (1). Higher scores indicated higher oral health literacy levels. The composite oral health literacy score ranges from a minimum score of 0 to a maximum score of 15.

The attitudes towards pediatric oral health composite score variable was developed by summing the scores of 4 opinion based questions, questions 32, 33, 34, and 35. These questions used Likert Scale responses. Respondents had 5 choices to select from for each question: Strongly agree (1), Agree (2), Not sure (3), Disagree (4), and Strongly disagree (5). In question 32, respondents were given the statement “Cleaning baby teeth is not that important because they fall out anyway” and asked to select their

opinion on this statement. In question 33, respondents were given the statement “My center has too many other activities to devote time to dental health” and asked to select their opinion on this statement. In question 34, respondents were given the statement “Teaching children younger than 3 years of age about dental health is too difficult” and asked to select their opinion on this statement. In question 35, respondents were given the statement “I don’t believe that the activities that we provide in the center will prevent cavities” and asked to select their opinion on this statement. Strongly agree was coded as 1, and strongly disagree was coded as 5 for each opinion statement. Because all the statements were developed with a negative connotation, a higher cumulative score would mean CCCDs had more positive attitudes towards promoting pediatric dental health. The composite oral health attitude score ranges from a minimum score of 0 to a maximum score of 20.

The oral health prevention strategies (OHPS) variable was developed by summing the scores of 8 questions (i.e., 15, 17, 18, 19, 20, 21, 23, 25). For all questions respondents were able to select either ‘yes’ or ‘no’ except for question 21, in which they had a third option of not sure. Question 15 asked “Does your child care center have an oral health consultant? (when we say oral health consultant we mean someone who reviews and observes your program practices regarding oral health)” In question 17, respondents were asked “Does your child care center maintain dental records for enrolled children?” In question 18, respondents were asked “Does your center offer in-service training or other educational programs to your staff on traumatic dental injuries”. In question 19, respondents were asked “Does your child care center have a dental emergency services manual?” In question 20, respondents were asked “Do you

commonly distribute to parents oral health promotion materials in your child care center?” In question 21, respondents were asked “Do you provide clean optimally fluoridated drinking water in your center throughout the day?” In question 23, respondents were asked “Do you promote the dental home concept by educating your staff and parents?” and finally in question 25, respondents were asked “Do children brush their teeth after meals or a snack while at your child care center?” ‘Yes’ responses to any of those questions were coded as 1 and ‘no’ responses were coded as 0. Scores for the OHPS range from a 0 to 8, this higher scores meaning greater use of oral health prevention strategies.

2.6.2 Data Analysis

In order to maintain accuracy of data entry, the data was cross checked for errors such as out of range values and missing data as well as outliers. A preliminary analysis was conducted in order to examine patterns in individual item scores and consisted of reviews of frequency distributions and histograms with superimposed normal curves, measures of central tendency (i.e., means and medians), and measures of variability (i.e., standard deviations, ranges) for all variables. Descriptive statistics were performed using frequencies, percentages, and means and standard deviations. Chi-square tests were used to analyze categorical data; t-tests were used to analyze parametric continuous data and Wilcoxon rank sum tests for nonparametric continuous data. The presence of collinearity between predictor variables was determined using multicollinearity diagnostic analysis.

Two regression models, one multivariate adjusted linear and the other multivariate adjusted logistic regression model were created. The linear regression model predicted higher number of OHPS implemented in CCCs as reported by CCCDs. The logistic regression model predicted CCCDs intent to implement OHPS in the next year. A two sided p-value of <0.05 was used as a test of significance.

Chapter 3: Results

3.1 Demographic Characteristics

The online survey was sent to 5,142 Florida CCCDs. Fifty three CCCDs opted out of the survey, and 263 emails ids were invalid. We received responses from 877 participants; an estimated overall response rate of 18.2% (877/4826).

Table 1. Demographic Characteristics of participating Florida Childcare Center Directors

| Gender | <i>n</i> | % |
|--|----------|-------|
| Female | 834 | 96% |
| Male | 32 | 4% |
| | | |
| Ethnicity | | |
| Not Hispanic or Latino | 698 | 81% |
| Hispanic or Latino | 160 | 19% |
| | | |
| Race | | |
| American Indian or Alaska Native | 0 | 0% |
| Asian | 9 | 1% |
| Black or African American | 187 | 22% |
| Native Hawaiian or Other Pacific Islander | 2 | 0.23% |
| White | 634 | 74% |
| Other | 27 | 3% |
| | | |
| Highest level of formal education completed | | |
| High school diploma/GED | 40 | 5% |
| Some College | 186 | 22% |
| Vocational/Technical College | 71 | 8% |
| College Degree | 402 | 46% |
| Post-graduate degree | 169 | 19% |
| | | |
| Income | | |
| 0-\$15,999 | 22 | 3% |
| \$16,000-\$29,999 | 166 | 20% |
| \$30,000-\$49,999 | 319 | 38% |
| \$50,000-\$69,999 | 122 | 14% |
| \$70,000 and above | 59 | 7% |
| Prefer not to answer | 147 | 18% |

| | | |
|--|-----|-----|
| | | |
| With children | | |
| Yes | 353 | 43% |
| No | 477 | 57% |
| | | |
| With children that visit dentist annually | | |
| Yes | 309 | 88% |
| No | 43 | 12% |

Table 1 describes the demographic characteristics of participants of this study. Majority of the participants were women (96%) and non-Hispanics (81%). The participants were predominantly White (74%); Black/African Americans made up 22% of the sample. Sixty-four percent of participants had either a college degree or above. More than 60% of the participants earned an annual income of \$50,000 or less, with just over 20% reporting to earn above \$50,000. Of the respondents, 43% reported to have children less than 18 years of age, with almost 88% of those with children reporting that their children visited the dentist annually at least once annually.

3.2 Characteristics of Participating Childcare Centers

The characteristics of Florida childcare centers where the survey respondents primarily work as childcare directors are described in Table 2. Almost 77% of the participating directors described the CCCs they work at as a preschool licensed by the Department of Children and Family services. Ten percent of participants reported that they worked in a school based childcare center, and 5% reported to work in a Head Start or Early Head start center. A majority of the participants reported that their center was funded through public and/or private sources. Approximately 40% and 12% of the

participants reported that their CCCs were funded exclusively through private and public sources, respectively.

Table 2. Characteristics of Childcare Centers of the participating Childcare Center Directors

| Description of Childcare Center | <i>n</i> | % |
|--|----------|-----|
| Department of Children and Families Licensed Preschool | 674 | 77% |
| Head Start or Early Head Start | 42 | 5% |
| School-Based Child Care Center | 87 | 10% |
| Other | | 8% |
| | | |
| Funding of childcare center | | |
| Publicly funded | 97 | 12% |
| Privately funded | 308 | 39% |
| Both public and private funded | 391 | 49% |

3.3 Implementation of Oral Health Prevention Strategies in Childcare Centers

Figure 1. Bar graph indicating percentage of childcare directors reporting to have implemented individual oral health prevention strategies

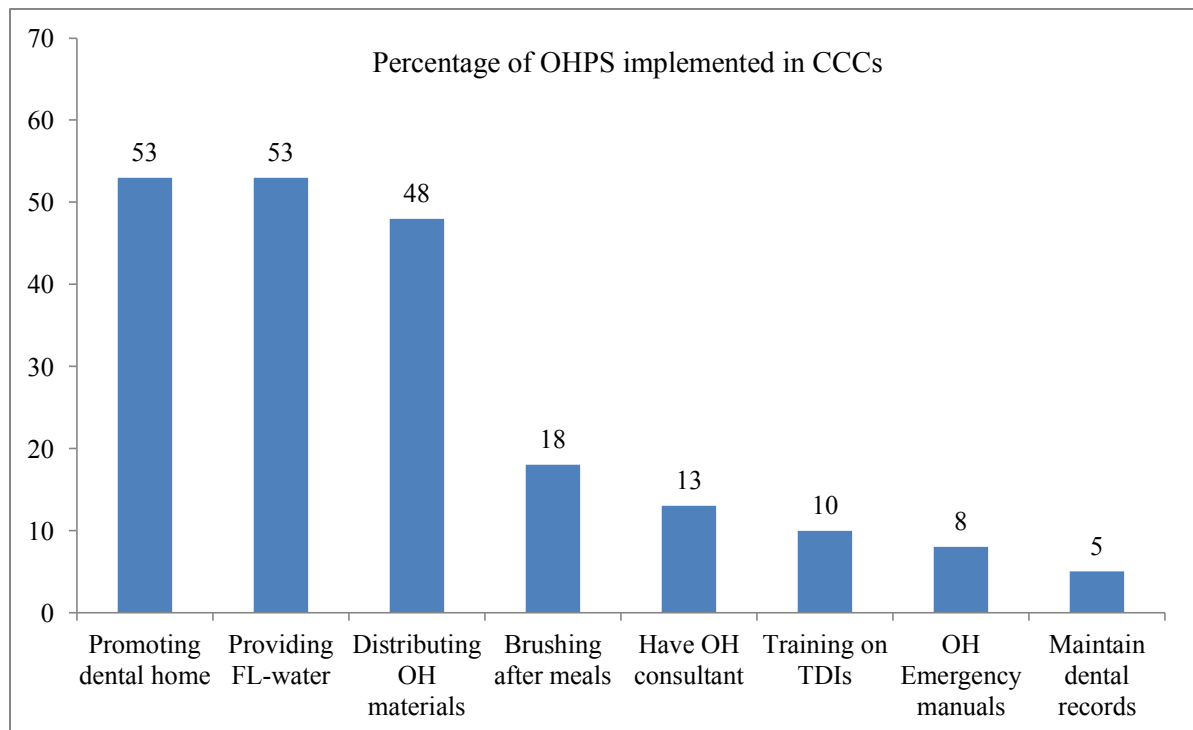


Table 3. Proportion of Participating Florida Childcare Center Directors adhering to American Academy of Pediatric Dentistry Oral Health Prevention Strategies

| Oral Health Prevention Strategies | <i>n</i> | % |
|---|-----------------|----------|
| Childcare centers with oral health consultant | 103 | 13% |
| Oral health consultation frequency | | |
| Once per week | 7 | 7.5% |
| Once per month | 7 | 7.5% |
| Once every 6 months | 33 | 34% |
| Once per year | 45 | 46% |
| I don't know | 5 | 5% |
| Childcare centers maintaining dental records for enrollees | 43 | 5% |
| Childcare centers offering in-service training or educational programs to staff on traumatic dental injuries | 80 | 10% |
| Childcare centers that have dental emergency services manual | 61 | 8% |
| Childcare centers distributing oral health promotion materials to parents | 385 | 48% |
| Childcare centers providing fluoridated water | | |
| Yes | 417 | 53% |
| No | 132 | 17% |
| Not sure | 235 | 30% |
| Childcare centers promoting dental home concept | 409 | 53% |
| Childcare centers that have children brush their teeth after meals or a snack | 140 | 18% |

Both Figure 1 and Table 3 describe the proportion of participants reporting to have implemented the AAPD's oral health prevention strategies in their CCCs they

primarily work at. In the Figure 1, we describe the most implemented oral health prevention strategy (OHPS) to the least implemented OHPS in the CCCs, as reported by the participants. As seen in the figure, the two most commonly reported OHPS to have been implemented were: promoting dental home by the participants to parents, and providing children with optimally fluoridated water. Some of the least implemented OHPS with less than 10% participants reporting to have implemented include: having oral health emergency manuals, and maintaining dental records. Less than 15% of participants reported that a designated oral health consultant visited their centers to promote oral health regularly (Table 3).

3.4 Childcare Center Directors' Oral Health Literacy Levels

Table 4. Childcare Center Directors' Oral Health Literacy Levels

| Oral Health Literacy | | |
|--|-----------------|----------|
| Confidence in filling out dental health forms | <i>n</i> | % |
| Extremely confident | 202 | 27% |
| Quite a bit confident | 160 | 22% |
| Somewhat confident | 167 | 23% |
| A little bit confident | 57 | 8% |
| Not at all confident | 151 | 20% |
| | | |
| Receive help reading dental health materials | | |
| None of the time | 580 | 79% |
| A little of the time | 65 | 9% |
| Some of the time | 64 | 9% |
| Most of the time | 18 | 2% |
| All of the time | 11 | 1% |
| | | |
| Face problems learning about dental condition because of difficulty reading dental health materials | | |
| None of the time | 551 | 76% |
| A little of the time | 83 | 11% |
| Some of the time | 68 | 9% |
| Most of the time | 12 | 2% |
| All of the time | 14 | 2% |

The participants' oral health literacy is described in Table 4. Almost one in four respondents reported they were not confident in filling out dental health forms, with close to 35% being either a little bit or somewhat confident in filling out dental health forms. Again, one in four participants reported they receive some help from people in understanding the content of dental health materials. One in four participants agreed that because they have difficulty in reading and understanding contents from dental health materials, they faced problems learning about dental health diseases and conditions, and other related dental health problems. The overall mean oral health literacy levels among participants was 12.3 ± 2.3 (mean \pm SD)

Table 5. Childcare Center Directors' Oral Health Knowledge related to Pediatric Oral Health

| Oral Health Knowledge | | |
|--|----------|----------|
| Start cleaning their child's mouth at the age of 1. | n | % |
| Yes | 603 | 82% |
| No * | 130 | 18% |
| | | |
| The first dental visit for a child should be at 2 years. | | |
| True | 476 | 65% |
| False * | 256 | 35% |
| | | |
| Most common childhood disease in children under 7 years of age | | |
| Asthma | 94 | 13% |
| Hay fever | 10 | 1% |
| Tooth decay or cavities * | 610 | 84% |
| Chicken Pox | 12 | 2% |
| | | |
| Staff personnel or CCCDs usually use while putting a child to sleep | | |
| Bottle of juice | 1 | 0.1% |
| Bottle of infant formula | 34 | 4% |
| Bottle of water * | 21 | 2% |
| All of the above | 17 | 2% |
| None of the above * | 668 | 76% |

* - Indicates correct answer

Participants were asked four knowledge based questions related to pediatric oral health. Less than 20% correctly answered “No” when asked if the age to start cleaning a child’s mouth was 1 year (Table 5). Only 35% correctly answered that the first dental visit should not be at 2 years. However when asked about the most common childhood disease, 84% correctly chose tooth decay as the correct answer. A close to 80% correctly answered either “none of the above [juice, infant formula or water]” or “bottle of water” as the usual choice/s they use while putting a child to sleep (Table 5). The overall mean knowledge score was 1.6 ± 2.0 (mean \pm SD).

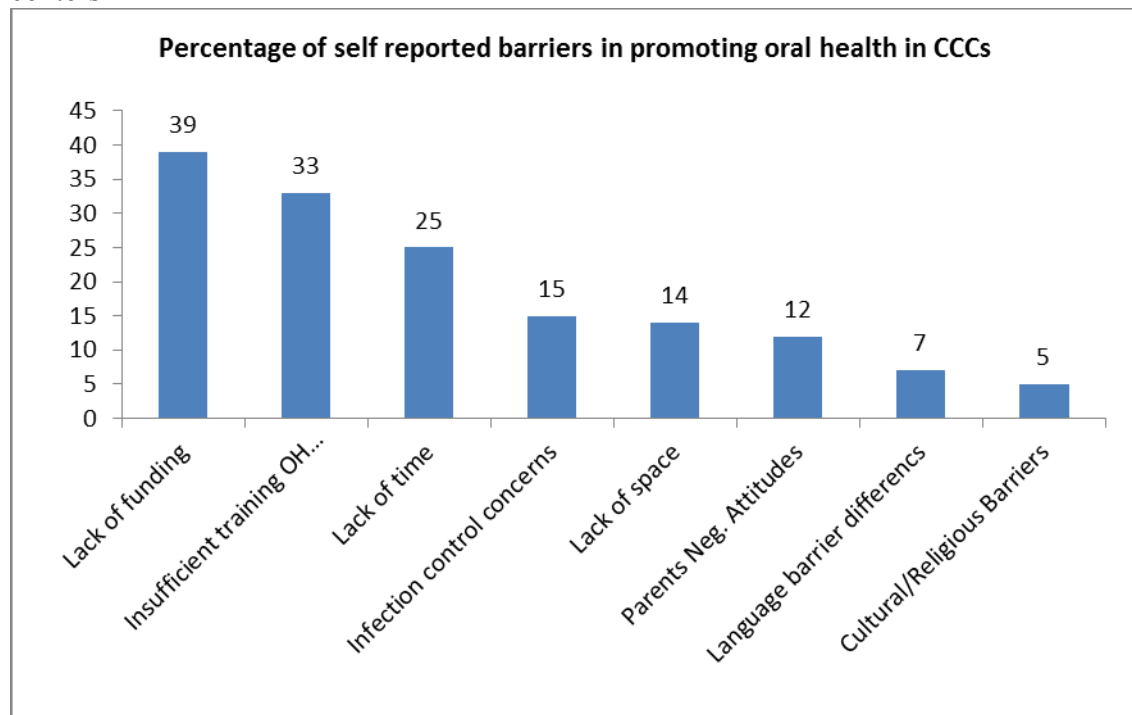
Table 6. Childcare Center Directors’ Attitudes about promoting Pediatric Oral Health

| Attitudes | n | % |
|---|----------|----------|
| Cleaning baby teeth is not that important | | |
| Strongly agree | 17 | 2% |
| Agree | 8 | 1% |
| Not sure | 24 | 3% |
| Disagree | 137 | 19% |
| Strongly disagree | 535 | 74% |
| Too many activities to devote time to dental health | | |
| Strongly agree | 16 | 2% |
| Agree | 48 | 7% |
| Not sure | 103 | 14% |
| Disagree | 298 | 41% |
| Strongly disagree | 255 | 35% |
| Teaching children younger than 3 years of age about dental health is too difficult | | |
| Strongly agree | 12 | 2% |
| Agree | 24 | 3% |
| Not sure | 55 | 8% |
| Disagree | 302 | 42% |
| Strongly disagree | 326 | 45% |
| Don’t believe the activities provided in the center will prevent cavities | | |
| Strongly agree | 17 | 3% |
| Agree | 63 | 9% |
| Not sure | 142 | 20% |
| Disagree | 244 | 34% |
| Strongly disagree | 245 | 34% |

A majority (93%) of the participants agreed that cleaning baby teeth was important to the overall health of the child (see Table 6). Almost 76% and 87% disagreed that there were too many activities in CCCs to focus on oral health, and that teaching children younger than 3 years about oral health was a difficult job, respectively. However, only 68% of the participants agreed that implementing dental health promotion activities in CCCs may prevent dental cavities. The overall mean attitude score was 16.8 ± 2.7 (mean \pm SD).

3.5 Barriers faced by Childcare Directors in promoting dental health

Figure 2. Barriers faced by child care directors in promoting dental health in child care centers



When asked if participants perceive any barriers in promoting dental health in their centers, 39% indicated that lack of funding as formidable factor, followed by

insufficient training of staff in oral health promotion (33%), lack of time to promote oral health (25%), infection control concerns (15%), lack of space (14%), parents negative attitudes toward promoting dental health in the center (12%), language barriers (7%), and cultural or religious barriers (Figure 2).

Only 47% (n=326) reported to have implemented oral health education programs or activities in their center, of which 90% (n=300) were willing to implement more oral health education programs or activities in the center (Table 7). Of those who said that they had not already implemented OHPS in their center (n=365), almost 90% (n=308) were willing to implement OHPS in their centers. A majority (67%) of them reported that they intend to implement OHPS in their center within a year.

Table 7. Florida Childcare Center Directors reporting to have implemented or intend to implement Oral Health Prevention Strategies in their centers

| | n | % |
|---|----------|----------|
| Already implemented oral health education programs/activities in center | | |
| Yes | 326 | 47% |
| No | 365 | 53% |
| Willing to implement oral health education programs/ activities in center | | |
| Yes | 308 | 90% |
| No | 34 | 10% |
| Willing to implement more oral health education programs/activities in center | | |
| Yes | 300 | 90% |
| No | 32 | 10% |
| Intend to implement oral health education/ promotion programs or activities for children in center within a year | | |
| Yes | 463 | 67% |
| No | 227 | 33% |

Table 8. Bi-variate comparison of Childcare Center Directors who truly implemented one or more Oral Health Prevention Strategies compared to those who did not

| Variables | Implemented | Not Implemented | Odds Ratio | 95% CI | p-value |
|--|------------------|------------------|------------|---------|--------------------|
| Demographic | | | | | |
| Age (mean \pm SD) | 48.7 \pm 10.6 | 48.1 \pm 10.3 | - | - | 0.4 |
| Years licensed CCCD (mean \pm SD) | 11.9 \pm 9.6 | 10.8 \pm 8.2 | - | - | 0.1 |
| Gender (Males vs. Females) | 75.0% | 73.5% | 1.1 | 0.5-2.4 | 0.9 |
| Race (Whites vs. Non-whites) | 74.1% | 70.4% | 1.2 | 0.9-1.7 | 0.3 |
| Ethnicity (Hispanics vs. Non-Hispanics) | 75.6% | 73.4% | 1.1 | 0.8-1.7 | 0.6 |
| Have children < 18 years (Yes vs. No) | 74.5% | 75.3% | 1.0 | 0.7-1.3 | 0.8 |
| Children visit dentist in last yr (Yes vs. No) | 79.6% | 76.7% | 1.2 | 0.6-2.5 | 0.7 |
| Income (\leq \$30,000 vs \$30,000 - \$49,999 vs. \geq \$50,000) | 78.7% | 72.9% | 77.9% | - | 0.3 |
| Highest formal education (College degree and above vs. Less than college degree) | 76.0% | 67.7% | 1.5 | 1.1-2.1 | 0.008* |
| | | | | | |
| Type of Center | | | | | |
| (Head Start vs. Non-Head Start) | 88.1% | 72.3% | 2.8 | 1.1-7.3 | 0.02* |
| Additional Characteristics of Participants | | | | | |
| Oral Health Knowledge | | | | | |
| Most common disease (caries vs. other diseases) | 82.1% | 52.4% | 4.2 | 3.0-5.7 | <0.0001* |
| Age when parents should clean child's mouth | 82.3% | 81.8% | 1.0 | 0.6-1.7 | 0.9 |
| First dental visit (By age 1 vs. not by age 1) | 82.8% | 81.1% | 1.1 | 0.8-1.7 | 0.6 |
| Age dental home be established (Yes vs. No) | 83.2% | 69.7% | 2.2 | 1.5-3.2 | <0.0001* |
| <i>Overall oral health knowledge</i> (mean \pm SD) | 1.66 \pm 0.98 | 1.54 \pm 0.98 | - | - | 0.2 |
| Oral Health Literacy | | | | | |
| Confidence in filling dh materials (mean \pm SD) | 3.33 \pm 1.46 | 3.05 \pm 1.46 | - | - | 0.04* |
| Help read dh materials (mean \pm SD) | 4.60 \pm 0.84 | 4.62 \pm 0.93 | - | - | 0.8 |
| Difficulty learning dental condition (mean \pm SD) | 4.58 \pm 0.86 | 4.53 \pm 0.95 | - | - | 0.5 |
| <i>Overall oral health literacy</i> (mean \pm SD) | 12.52 \pm 2.23 | 12.22 \pm 2.34 | - | - | 0.2 |
| Attitudes | | | | | |
| Cleaning teeth not important (mean \pm SD) | 4.61 \pm 0.81 | 4.63 \pm 0.79 | - | - | 0.9 |
| No time for dental activities in ctr (mean \pm SD) | 4.07 \pm 0.97 | 3.76 \pm 0.98 | - | - | 0.0013* |
| Teaching dh to < 3 yrs is too difficult (mean \pm SD) | 4.31 \pm 0.86 | 4.04 \pm 0.87 | - | - | 0.0013* |
| Acts won't prevent cavities (mean \pm SD) | 3.95 \pm 1.05 | 3.66 \pm 1.04 | - | - | 0.006* |
| <i>Overall attitudes</i> (mean \pm SD) | 17.0 \pm 2.70 | 16.1 \pm 2.40 | - | - | 0.0006* |
| | | | | | |
| Self-perceived implementation of OHPS (Yes vs No) | 91.7% | 74.0% | 3.9 | 2.5-6.2 | <0.0001* |

* Statistically significant

Table 8 shows the bivariate comparisons between participants who truly had implemented one or more OHPS compared to those who had not implemented any. No significant demographic characteristics (i.e.,) between the two groups were observed except for Participants educational status. Those who had implemented one or more OHPS were 1.5 times more likely to have obtained a college degree and above compared to those who had not implemented any ($p=0.0008$). Those who had implemented one or more OHPS were more likely to work in a head start or early head start center compared to those who had not implemented any (Odds ratio=2.8, 95% CI: 1.1-7.3, $p=0.02$). Again, those who had implemented one or more OHPS were more likely to correctly answer that tooth decay was the most common disease (Odds ratio=4.2, 95% CI: 3.0-5.7, $p<0.0001$), and that dental home needs to be established at least by age 1 (Odds ratio=2.2, 95% CI: 1.5-3.2, $p=0.02$), compared to those who did not implement any OHPS in their centers. However, there was no significant difference in overall knowledge between the two groups ($p=0.21$). A higher proportion of those who had implemented one or more OHPS (3.33 ± 1.46) reported to have higher mean confidence levels in reading dental health materials compared to those who had not implemented any (3.05 ± 1.46). This finding was statistically significant ($p=0.04$). However no statistically significant difference in the mean oral health literacy levels were observed between the groups ($p=0.9$). Mean positive attitude levels were significantly higher for most of individual attitude based statements among those who had already implemented one or more OHPS compared to those who had not implemented any. Mean overall positive attitudes in promoting dental health of children was significantly higher among those who had implemented (17.0 ± 2.70) compared to those who had not (16.1 ± 2.4) ($p=0.0006$).

Table 9. Bi-variate comparison of Childcare Directors who reported to be willing to implement Oral Health Prevention Strategies in the future compared to those who are not willing

| Variables | Will implement | Will not implement | Odds Ratio | 95% CI | p-value |
|--|----------------|--------------------|------------|----------|----------|
| Demographic | | | | | |
| Age (mean ± SD) | 48.8 ± 10.4 | 47.3 ± 10.2 | - | - | 0.14 |
| Years licensed CCCD (mean ± SD) | 12.3 ± 10.1 | 10.4 ± 8.0 | - | - | 0.04* |
| Gender (Males vs. Females) | 3.8% | 4.1% | 0.93 | 0.4-2.4 | 0.87 |
| Race (Whites vs. Non-whites) | 69.3% | 80.5% | 0.55 | 0.3-0.9 | 0.008* |
| Ethnicity (Hispanics vs. Non-hispanics) | 17.0% | 19.6% | 0.84 | 0.5-1.4 | 0.48 |
| Have children < 18 yrs (Yes vs. No) | 42.8% | 44.8% | 0.92 | 0.6-1.3 | 0.66 |
| Children visit dentist in last yr (Yes vs. No) | 90.0% | 82.1% | 2.00 | 0.90-4.2 | 0.09 |
| Income (≤\$30,000 vs. \$30,000 - \$49,999 vs. ≥ \$50,000) | 25.1% | 46.7% | 28.2% | - | 0.86 |
| Highest formal education (College degree and above vs. Less than college degree) | 70.4% | 63.8% | 1.4 | 0.9-2.0 | 0.13 |
| | | | | | |
| Type of Center | | | | | |
| (Head Start vs. Non-Head Start) | 6.8% | 2.01% | 3.55 | 1.1-11.8 | 0.03* |
| | | | | | |
| Additional Characteristics of Participants | | | | | |
| Oral Health Knowledge | | | | | |
| Most common disease (caries vs. other diseases) | 84.9% | 78.5% | 1.53 | 0.9-2.4 | 0.07 |
| Age when parents should clean child's mouth | 18.3% | 18.4% | 0.99 | 0.6-1.6 | 0.98 |
| First dental visit (By age 1 vs. not by age 1) | 34.7% | 36.2% | 0.94 | 0.6-1.4 | 0.74 |
| Age when dental home be established (Yes vs. No) | 28.1% | 27.5% | 1.03 | 0.7-1.6 | 0.90 |
| Overall oral health knowledge (mean ± SD) | 1.66 ± 0.96 | 1.61 ± 1.02 | - | - | 0.58 |
| Oral Health Literacy | | | | | |
| Confidence in filling dh materials (mean ± SD) | 3.28 ± 1.45 | 3.43 ± 1.40 | - | - | 0.27 |
| Help read dh materials (mean ± SD) | 4.57 ± 0.87 | 4.63 ± 0.90 | - | - | 0.47 |
| Difficulty learning dental condition (mean ± SD) | 4.55 ± 0.85 | 4.57 ± 0.88 | - | - | 0.85 |
| Overall oral health literacy (mean ± SD) | 12.43±2.24 | 12.63 ± 2.42 | - | - | 0.35 |
| Attitudes | | | | | |
| Cleaning teeth not important (mean ± SD) | 4.65 ± 0.80 | 4.59 ± 0.76 | - | - | 0.40 |
| No time for dental activities in ctr (mean ± SD) | 4.18 ± 0.88 | 3.91 ± 0.91 | - | - | 0.0014* |
| Teaching dh to < 3 yrs is too difficult (mean ± SD) | 4.33 ± 0.86 | 4.14 ± 0.81 | - | - | 0.018* |
| Acts won't prevent cavities (mean ± SD) | 4.02 ± 1.03 | 3.66 ± 1.08 | - | - | 0.0003* |
| Overall attitudes (mean ± SD) | 17.20 ± 2.62 | 16.27 ± 2.42 | - | - | 0.0002* |
| | | | | | |
| Implemented one or more OHPS (Yes vs. No) | 87.1% | 71.1% | 2.7 | 1.7-4.3 | <0.0001* |

* Statistically significant

Table 9 shows the bivariate comparisons of participants who were willing to implement OHPS in the next year compared to those who were not willing. Significant differences were observed by years of experience as a CCCD and race. Participants with more years of experience were willing to implement OHPS in the next year compared to those who were not willing ($p=0.04$). Participants who were willing to implement OHPS in the next year were less likely to be Whites (OR=0.55, 95% CI: 0.3-09.9, $p=0.0008$) compared to those who were not willing. Participants who reported to that they would implement OHPS in the next year were more likely to work at Head Start centers compared to those who were not willing (OR=3.55, 95% CI: 1.1-13.1, $p=0.03$). No differences between the groups by oral health knowledge and oral health literacy levels were observed. Significant differences were however observed by attitude related to pediatric oral health. Participants who were willing to implement OHPS in the next year had overall high positive attitudes level compared to those who were not willing ($p=0.0002$). It was also observed that those willing were more likely to have already implemented one or more OHPS in their center compared those who were not willing (OR=2.7, 95% CI:1.7-4.3, $p<0.0001$).

The regression model predicting higher number of OHPS implemented in CCCs as reported by the responding Florida childcare center directors' was conducted (Table 10). The following variables were included in the model: age, years of experience, gender, race, ethnicity, income, education, type of CCC (Head Start vs. Non Head Start), overall oral health knowledge, oral health literacy, and attitudes towards pediatric oral health. It was found that participants who were younger, with more years of experience as a CCCD, males, non-Whites, Hispanics, lower income, and higher education (college

degree and above) were more likely to have implemented more number of OHPS in their centers. Participants working in a Head Start or Early Head child care center were significantly more likely to have implemented higher number of OHPS. Similarly those with more positive attitudes about promoting pediatric dental health, were more likely to have implemented a higher number of OHPS in their center.

Among these variables added into the model, (age, years of experience, gender, race, ethnicity, income, education, type of childcare center, oral health knowledge, oral health literacy, and oral health attitudes), the only significant variables were: years of experience ($p=0.01$), working in a Head Start or Early Head Start child care center ($p<0.0001$), and having more positive attitudes in promoting dental health ($p<0.0001$).

Table 10. Regression model predicting higher number of OHPS implemented by Florida Childcare Directors' in their Childcare Centers.

| Variables of interest | Parameter estimate | Standard error | <i>p</i> -value |
|--|--------------------|----------------|-----------------|
| Age (higher number) | -0.010 | 0.007 | 0.12 |
| Years experience as CCCD(higher number) | 0.018 | 0.007 | 0.01* |
| Gender (Males vs females) | 0.204 | 0.347 | 0.6 |
| Race (Whites vs Non-whites) | -0.248 | 0.146 | 0.1 |
| Ethnicity (Hispanics vs Non-Hispanics) | 0.240 | 0.165 | 0.1 |
| Income (Higher Income vs. Lower Income) | -0.021 | 0.091 | 0.8 |
| Education (College deg. and above vs < college deg.) | 0.069 | 0.139 | 0.6 |
| Type of CCC (Head Start vs. Non Head Start) | 2.454 | 0.324 | <.0001* |
| Oral health knowledge | 0.016 | 0.063 | 0.8 |
| Oral health attitudes | 0.142 | 0.026 | <.0001* |
| Oral health literacy | 0.039 | 0.030 | 0.2 |

* Statistically significant

The logistic regression model predicting participants' intent to implement OHPS in the next year was conducted (Table 11). The following variables were included in the model: age, years of experience, gender, race, ethnicity, income, education, type of CCC (Head Start vs. Non Head Start), overall oral health knowledge, oral health literacy, attitudes towards pediatric oral health, and previous implementation of one or more OHPS in the center. It was found that participants who were younger, with more years of experience as a CCCD, females, non-Whites, Hispanics, with lower income, and had higher education (college degree and above) were more likely to be willing to implement OHPS in the next year within the CCC they work. Those with more positive attitudes about promoting pediatric dental health were 1.2 times more likely to be willing to implement OHPS in the future. CCCDs who had already implemented one or more OHPS in their center were 2.3 times more willing to implement OHPS in the future.

Table 11. Logistic regression model predicting Florida Childcare Directors' intent to implement Oral Health Prevention Strategies in the next year.

| Variables of interest | Odds ratio | 95% CI | p-value |
|--|------------|-----------|---------------|
| Age (higher number) | 0.99 | 0.97-1.02 | 0.8 |
| Years experience as CCCD (higher number) | 1.01 | 0.98-1.04 | 0.5 |
| Gender (Males vs females) | 0.73 | 0.2-2.5 | 0.6 |
| Race (Whites vs Non-whites) | 0.54 | 0.3-0.93 | 0.03 |
| Ethnicity (Hispanics vs Non-Hispanics) | 0.71 | 0.4-1.3 | 0.3 |
| Income (Higher Income vs. Lower Income) | 1.01 | 0.7-1.4 | 0.9 |
| Education (College deg. and above vs < college deg.) | 1.4 | 0.9-2.3 | 0.2 |
| Type of CCC (Head Start vs. Non Head Start) | 1.5 | 0.4-6.8 | 0.6 |
| Oral health knowledge | 0.9 | 0.7-1.2 | 0.4 |
| Oral health attitudes | 1.2 | 1.1-1.3 | 0.001* |
| Oral health literacy | 0.9 | 0.8-1.01 | 0.2 |
| Already implemented one or more OHPS (Yes vs No) | 2.3 | 1.4-4.0 | 0.002* |

Among these variables added into the model, (age, years of experience, gender, race, ethnicity, income, education, type of childcare center, oral health knowledge, oral health literacy, oral health attitudes, existing one or more OHPS), the only significant variables were: race ($p=0.03$), and having more positive attitudes in promoting dental health ($p=0.001$), and having already implemented one or more OHPS in their center.

Discussion

Florida is lagging behind in pediatric oral health promotion.[12] Florida childcare centers may provide an innovative setting for better oral health promotion. However, a better understanding is needed about Florida CCCDs' oral health knowledge, oral health literacy and attitudes towards pediatric oral health before such a setting can be used. Therefore, we examined the association between Florida child care center directors (CCCDs) oral health literacy, oral health knowledge, attitudes toward pediatric oral health, and the number of oral health preventive strategies (OHPS) already implemented in Florida childcare centers. We also examined the association between CCCDs level of oral health literacy, oral health knowledge, attitudes toward pediatric oral health, and the intent to adopt OHPS at CCCs controlling for OHPS already implemented.

Of the eight OHPS that we did assess, our findings indicate that on average the participants had implemented only 2.1 ± 1.6 (mean \pm SD) OHPS in their centers. This indicates that oral health prevention and promotion activities are not predominantly practiced in Florida CCCs, at least based on the reporting participants. Therefore, the Florida CCCDs need to be educated on the importance of implementing oral health

prevention strategies within their CCCs. Majority of participants in our study reported having a predominant number of enrollees' ages 1-5 years in their centers. Oral health promotion at an early age can affect a child's oral health for a lifetime.

With only 13 percent of overall CCCDs having an oral health consultant, this provides dental professionals a valuable opportunity to get more involved within these centers of different communities. More evidence is needed of why there is a lack of oral health consultation within Florida childcare centers. One recommendation is for future research to focus on whether dental professionals are willing to be oral health consultants for childcare centers and whether they would do it pro bono or for a fee only. One suggestion to increase oral health consultation within CCCs is to incorporate oral health consultation into other healthcare professional education curriculums. Golinveaux and colleagues demonstrated the effectiveness of incorporating oral health consultation into a nurse practitioner program with great success.[78] They found that students were more confident to consult with patients about oral health after receiving this education.[78] Evidence based research has demonstrated the success of teledentistry by dentists for oral health assessments.[63] Another suggestion to increase the percent of OH consultation is to encourage retired or semi-retired general or pediatric dentists and dental hygienists within various communities in the state of Florida to become oral health consultants for these child care centers. Partnering with groups such as the "Association of Retiring Dentists" may be of value to CCCs.

With 47% of the participants in our study not promoting the dental home concept, leaves tremendous room for improvement in oral health promotion within Florida CCCs. This lack of promotion of the dental home concept does not coincide with opinions of

many experts in the field of dentistry. The concept of the dental home was introduced in 2002 in hopes to reduce the number of children with ECC.[79] The dental home concept is supported by many professional organizations such as the American Academy of Pediatric Dentistry, the American Dental Association, the American Academy of General Dentistry and the American Academy of Pediatrics.[57] Better coordination of concepts supported by expert dental organizations and promotion by childcare center directors' appears to be needed. Dental professionals, medical professionals and all other community members must find more effective ways to promote the dental home within these centers.

Our findings indicate that brushing after meals or a snack is occurring rarely within Florida CCCs. Eighty-two percent of participants reported that children within their centers do not brush their teeth after a meal or a snack. This finding is similar to previous findings by Gartsbein and colleagues in which 83% of Toronto daycare centers did not have an oral care policy in place.[61] Gartsbien and colleagues recommended that a policy that encourages and provides guidance on safe tooth-brushing procedures is needed within daycare centers.[61] In their study, they also found that 79% of centers were open to establishing an oral care policy.[61]

It is known that the greatest probability of a child experiencing a traumatic dental injury in the primary dentition is from the ages of 2-3 years of age.[55] This is a time of increased mobility with lack of coordinated movements for the child.[80] Thus, dental injuries can be common. As stated before, participants in our study reported that a predominant number of their enrollees are from the ages of 1-5 years (prior to matriculating into school). However, it is alarming that 90 percent of the participants

from our study did not provide in-service training or educational programs to staff on traumatic dental injuries. Congruently, 92 percent of the participants did not have a dental emergency manual for their centers. This poses a serious risk for the welfare of child care center enrollees in the state of Florida. Research has shown that timely management of traumatic dental injuries has better outcomes than those dental injuries not managed with current dental traumatology guidelines.[81] Furthermore, trauma to the primary dentition can have a lasting effect on the permanent dentition in certain instances if not treated.[80] Proper oral health consultation and development of effective training, educational programs, and dental trauma/safety manuals for CCCs may effectively remedy this problem for Florida childcare centers. CCCDs must be educated about the importance of providing this training for their staff within their centers.

In our study, a major self-perceived barrier for participants to promote oral health within their centers was a lack of funding. Other major self-perceived barriers selected by the participants were insufficient training on oral health promotion topics and a lack of time to promote oral health. Clearly, the participants perceive a need for training in oral health promotion and prevention. This offers the dental profession an opportunity once again to better train CCCDs and childcare center staffs within communities about oral health promotion.

Our research indicates that participants indicate that Florida Head Start CCCs implement a higher number of OHPS than non-Head Start CCCs. This finding is similar to previous findings found by Gupta et. al[67] They found Head Start centers to be more effective in providing oral health promotion within their centers in comparison to non-Head Start Centers.[67] One recommendation for further analysis or research would be

to determine how Head Start Florida CCCs are more successful in implementing more OHPS in their centers compared to non-Head Start Florida CCCDs.

The findings indicate that those participants with more positive attitudes towards pediatric oral health reported to have implemented more OHPS within their centers. Wallace et. al found that more positive attitudes predicts better behavior.[82] The authors also found that positive attitudes can predict better behavior when social pressure and perceived difficulty to perform a behavior are low.[82] Participants in our study with more positive attitudes towards pediatric oral health implemented more OHPS in their centers. Pertaining to Wallace et. al findings, it appears that it is essential to make oral health promotion within childcare centers with little difficulties and less social pressures. Childcare directors must be able to encourage oral health promotion within their centers without fear of repercussion from the public. Therefore, it seems plausible to say that it is critical for the dental profession to improve Florida CCCDs' attitudes towards pediatric oral health in order to achieve better oral health promotion within Florida CCCs. Research has shown that providing oral health education for individuals may have a positive effect on oral health knowledge and attitudes.[83] One recommendation to increase oral health education among Florida CCCDs is for public health organizations to provide webinars on the importance of oral health to these individuals. Another recommendation is to have the Florida Department of Children and Family Services conduct training workshops for CCCDs to improve their oral health knowledge. Weinstein and colleagues demonstrated that motivational interviewing can be effective at improving caregivers' preventive behaviors with high caries risk children.[84] Another recommendation to try to improve CCCDs' attitudes towards pediatric oral health and

implementation of OHPS is to have the Florida Department of Child and Family Services personnel both at state and local levels motivationally interview childcare directors. Motivational interviewing assesses whether a person is ready to change his or her behavior.[85] This process aims to move individuals from a lack of action to performing certain oral health promotional activities by providing the individuals with a menu of options for promoting oral health.[85] This method has been proven to improve preventive behaviors among caregivers of high caries risk children.[85] Future research may be needed to see if motivationally interviewing with CCCDs can encourage more OHPS to be implemented in Florida childcare centers.

Oral health prevention strategies for child care centers advocated by the AAPD may help to reduce ECC. One OHPS that is of particular importance is the advocacy of available fluoridated drinking water within childcare centers. Evidence has shown that fluoridated water consumption reduces dental caries by both its topical and systemic effects on enamel.[58, 86] Hashizume and colleagues demonstrated that children exposed to fluoridated water and fluoridated toothpaste at early ages had a decreased prevalence in dental caries.[86] In our study, 53% of participants reported providing fluoridated water to their enrollees. A possible reason for this lower number of participants promoting available fluoridated water in their centers may be due to a misunderstanding of fluoride's purpose and effects or a complete lack of knowledge of this important mineral.[87] The Florida Department of Child and Family Services should encourage legislation for higher standards within CCCs to promote fluoridated water consumption. By doing so, oral health for children in the state could be improved. Another evidence based preventive method that has shown to reduce dental caries in the

child population is fluoride varnish applications by dentists or dental hygienists.[59] High caries risk groups particularly benefit from the application of fluoride varnish every three months.[59] Fluoride varnish applications have shown to decrease the acidogenic potential of biofilms that cause dental caries.[88] Meta analyses of evidence based literature on fluoride varnishes have proved that fluoride varnishes do inhibit dental caries.[89] One recommendation to the Florida Department of Child and Family Services is to encourage CCCDs to allow fluoride varnish applications to occur within their centers or remind parents of their child to get a fluoride varnish application from their dentist regularly. This would be an innovative method to improve oral health promotion for children in the state of Florida. Another preventive strategy that could be incorporated into childcare center settings is sealant application by licensed dental professionals. Many school based sealant programs have shown to be effective in reducing dental caries. Forty four percent of all caries in the primary dentition is found in pits and fissures of teeth.[90] Pit and fissure sealants can be used as effective method to prevent dental caries.[90] The incidence of caries occurring after a tooth has been sealed after 12 months is very low (2.5%).[91] However, pit and fissure sealants continue to be underused.[90] One recommendation to improve on this utilization of sealants within Florida children is to encourage the AAPD and Florida Department of Child and Family Services to promote this evidence based preventive strategy within childcare centers.

In past generations, the dental profession has often been known to treat the outcome of dental disease rather than the cause. Young and Featherstone have advocated the use of caries management by risk assessment (CAMBRA) to change this previous mantra.[92] Proper oral health knowledge among the public and dental health

professionals is essential for this change to occur.[83] Research has shown that a lack of knowledge and confidence can act as a barrier for individuals to promote oral health.[93, 94] In our study, the mean overall oral health knowledge was low (1.6 ± 2.0). Until 2002, the AAPD recommended that a child's first dental visit be at the age of three years old.[79] This antiquated recommendation allowed for the disease process of ECC to remain undetected in high risk children for extended periods. Thus, the philosophy in the field of pediatric dentistry has changed over time to establish dental homes for children by the age of one.[55, 56] Whether or not CCCDs are staying up to date or being informed about current changes in pediatric dentistry may be an area that needs further investigation. Kim and Kaste recently demonstrated that children enrolled in childcare centers are utilizing preventive medical care at higher rates than preventive dental care.[95] They also found that preventive dental care was lower among 1 year old childcare enrollees than their 5 year old counterparts.[95] Only 35% of participants in our study answered correctly that a child's first dental visit should not be at two years of age. Caufield and colleagues demonstrated that the window of infectivity for acquiring *S. mutans* from primary exposure is between 19-33 months of age.[96] Some research has found that children who have early preventive dental visits have significantly fewer caries and dental expenses than those who do not visit the dentist at an early age.[97] Thus, it is critical that each child be seen by a dentist before this period to better assess the child's caries risk and try to reduce the prevalence of ECC in the United States. Another recommendation to improve this knowledge is for public health organizations to provide webinars for CCCDs to learn more about oral health and its effect on general health and well-being. Oral health knowledge may play a critical role in whether or not childcare

directors promote oral health prevention and earlier visits to the dentist.[83, 87] In our study, 33 percent of the participants reported insufficient training in oral health promotion as a barrier for oral health promotion within their centers. Thus, the AAPD along with other dental organizations must find more effective ways to educate CCCDs' in better oral health promotion. Golinveaux et. al demonstrated that education interventions can improve oral health knowledge.[78] It is important for dental professionals to try and change CCCDs' overall oral health knowledge for better oral health promotion within Florida CCCs.

In our study, overall mean oral health literacy levels were high and overall mean oral health knowledge levels of participants were low. This is contradictory to previous research in the field of health literacy.[98] Significant relationships between low health literacy levels and poor health knowledge have been shown.[98] Nutbeam divides health literacy into three main levels, functional, interactive and critical.[98, 99] Functional refers to basic reading and writing skills, interactive refers to a person's ability to act upon advice received from a healthcare professional, and critical refers to a person's ability to appraise information received critically and use it appropriately.[98] Our results reveal that participants appear to have high scores in all 3 levels. As stated earlier, until 2002, the AAPD recommended that a child's first dental visit should be at three years of age.[79] A possible reason for the inverse relationship of oral health literacy and knowledge in our study could be due to a lack of participants' understanding of current dental prevention philosophies. Two out of the four questions asked about oral health knowledge were age related in nature (see Table 5). Kim and Kaste have demonstrated in their research that medical preventive visits are happening more frequently than dental

preventive visits for 1 year old childcare enrollees.[95] With only 53 percent of participants promoting the dental home, opportunities exist for the AAPD, Florida Department of Child and Family Services, and local community public health officials to further educate CCCDs about the correct age to establish a child's dental home.

A limitation to our study was that we used a convenience sample of those CCCDs that provided an e-mail address to the Florida Department of Children and Family Services. We believe that our sample closely resembles the overall sample of licensed CCCDs within the state of Florida. We understand that all of our results are based upon self-reported behaviors and understanding of Florida CCCDs. Furthermore, we understand that these results may not be generalized to the entire U.S. population of CCCDs. We expect that those who responded to the survey were more interested and might have a higher knowledge about pediatric oral health than those who did not. Thus, we feel that these results could be over-estimates or best estimates of the overall Florida CCCD population. Another limitation to our study was that it was a cross sectional study of only licensed Florida CCCDs. Other CCCDs of family based childcare homes or non-parental relatives that provide care for children on a daily basis were excluded from this study. Further research of these CCCDs' oral health knowledge, oral health literacy and attitudes toward pediatric oral health would provide better insight of how all CCCDs are promoting oral health within their respective centers or homes. In our study, we assessed only eight of the 14 AAPD "Policy on Oral Health in Child Care Centers" points or OHPS listed previously in this document (refer to Chapter 1.8). We did not assess six policy points. Four of the policy points had multiple components, and would

have needed multiple questions to assess. With our mode of conducting survey was electronic, and a long survey would lose interest in CCCDs.

Conclusions

Our study findings indicate that there is a positive association between CCCDs' attitudes toward pediatric oral health and the number of oral health preventive strategies already implemented in Florida CCCs. However, oral health literacy and oral health knowledge were not significantly associated with the number of OHPS already implemented in Florida childcare centers. Similarly we observed a positive association between CCCDs' attitudes toward pediatric oral health and the intent to adopt OHPS at CCCs controlling for OHPS already implemented. No significant association between oral health literacy, oral health knowledge and the intent to adopt OHPS at CCCs controlling for OHPS already implemented was observed. Interestingly Head Start CCCDs reported to have implemented more OHPS in their centers than non-Head Start CCCDs. Non-white CCCDs were more likely to be willing to implement OHPS in the future compared to their counterparts. Finally we also observed that CCCDs who had already implemented OHPS in their centers were willing to implement OHPS within their centers in the future.

Appendix A

Florida Childcare Director Survey

- 1) How many years have you been a licensed childcare director? _____
- 2) What is your gender?
 - ☐ Male
 - ☐ Female
- 3) What is your age?
- 4) What is your ethnicity?
 - ☐ Hispanic or Latino
 - ☐ Not Hispanic or Latino
- 5) What is your race?
 - ☐ American Indian or Alaska Native
 - ☐ Asian
 - ☐ Black or African American
 - ☐ Native Hawaiian or Other Pacific Islander
 - ☐ White
 - ☐ Other _____
- 6) What is your highest level of formal education completed?
 - ☐ High School diploma/GED
 - ☐ Some College
 - ☐ Vocational/Technical College
 - ☐ College Degree
 - ☐ Post-graduate degree (e.g., master's, doctorate, law degree)
- 7) What is your personal income?
 - ☐ 0-\$15,999
 - ☐ \$16,000-\$29,999
 - ☐ \$30,000-\$49,999
 - ☐ \$50,000-\$69,999
 - ☐ \$70,000 and above
 - ☐ Prefer not to answer
- 8) Do you have children under the age of 18 of your own?
 - ☐ Yes
 - ☐ No

If no, skip to question 10.

9) Do your children visit the dentist annually for check-ups?

- ☐ Yes
- ☐ No

10) Which of the following best describes your child care center? (Check all that apply)

- ☐ Department of Children and Families Licensed Preschool
- ☐ Head Start or Early Head Start
- ☐ School-Based Child Care Center
- ☐ Other _____

11) What is the total number of children for each age group in your child care center?

| | Total number of children |
|------------------------------------|--------------------------|
| Toddlers (0 to 2 years) | |
| 3 to 4 year olds | |
| 5 years and above | |

12) In which county of Florida is your child care center located? _____

13) Is your child care center publically or privately funded?

- ☐ Publically funded
- ☐ Privately funded
- ☐ Both public and private funded

14) What percentage of children in your child care center are special needs children? _____

The following 11 questions are related to oral health education programs/activities in your center

15) Does your child care center have an oral health consultant? (When we say oral health consultant we mean someone who reviews and observes your program practices regarding oral health)

- ☐ Yes
- ☐ No

If no skip to question 17.

16) About how often does your oral health consultant visit your child care center?

- ☐ Once per week
- ☐ Once per month
- ☐ Once every 6 months

- ☐ Once per year
- ☐ I don't know

17) Does your child care center maintain dental records for enrolled children?

- ☐ Yes
- ☐ No

18) Does your center offer in-service training or other educational programs to your staff on traumatic dental injuries?

- ☐ Yes
- ☐ No

19) Does your child care center have a dental emergency services manual?

- ☐ Yes
- ☐ No

20) Do you commonly distribute to parents oral health promotion materials in your child care center?

- ☐ Yes
- ☐ No

21) Do you provide clean optimally fluoridated drinking water in your center throughout the day?

- ☐ Yes
- ☐ No
- ☐ Not sure

22) At what year of age do you think a child should establish a “dental home” with a dentist? (When we say dental home we mean an ongoing relationship with a dentist and patient inclusive of all aspects of oral health care)

23) Do you promote the dental home concept by educating your staff and parents?

- ☐ Yes
- ☐ No

24) Which **one** of the following do your personnel or you usually use while putting a child to sleep?

- ☐ Bottle of juice
- ☐ Bottle of infant formula
- ☐ Bottle of water
- ☐ All of the above
- ☐ None of the above

25) Do children brush their teeth after meals or a snack while at your child care center?

- ☐ Yes
- ☐ No

26) How confident are you filling out dental health forms by yourself?

- ☐ Extremely confident
- ☐ Quite a bit confident
- ☐ Somewhat confident
- ☐ A little bit confident
- ☐ Not at all confident

27) How often do you have someone help you read dental health materials?

- ☐ None of the time
- ☐ A little of the time
- ☐ Some of the time
- ☐ Most of the time
- ☐ All of the time

28) How often do you have problems learning about your dental condition because of difficulty reading dental health materials?

- ☐ None of the time
- ☐ A little of the time
- ☐ Some of the time
- ☐ Most of the time
- ☐ All of the time

29) Mothers should start cleaning her child's mouth at the age of 1.

- ☐ True
- ☐ False

30) The first dental visit for a child should be at 2 years.

- ☐ True
- ☐ False

31) Which one of the following is the most common childhood disease in children under 7 years of age?

- ☐ Asthma
- ☐ Hay fever
- ☐ Tooth decay or cavities
- ☐ Chicken Pox

32) Cleaning baby teeth is not that important because they fall out anyway.

- ☐ Strongly agree
- ☐ Agree

- ☐ Not sure
- ☐ Disagree
- ☐ Strongly Disagree

33) My center has too many other activities to devote time to dental health.

- ☐ Strongly agree
- ☐ Agree
- ☐ Not sure
- ☐ Disagree
- ☐ Strongly disagree

34) Teaching children younger than 3 years of age about dental health is too difficult.

- ☐ Strongly agree
- ☐ Agree
- ☐ Not sure
- ☐ Disagree
- ☐ Strongly disagree

35) I don't believe that the activities that we provide in the center will prevent cavities.

- ☐ Strongly agree
- ☐ Agree
- ☐ Not sure
- ☐ Disagree
- ☐ Strongly disagree

36) Please check any barriers you face in promoting children's oral health in your child care center.
(Check all that apply)

- ☐ Lack of funding
- ☐ Parents' negative attitudes towards child safety and oral health
- ☐ Parental cultural/religious barriers
- ☐ Language barriers differences
- ☐ Insufficient training on oral health promotion topics among center staff
- ☐ Lack of space
- ☐ Lack of time
- ☐ Infection control concerns
- ☐ Other (explain_____)
- ☐ I have no barriers

37) Please choose from the following items that currently assist you in promoting children's oral health in your child care center. (Please check all that apply)

- ☐ Adequate funding

- ☐ Parents' positive attitudes towards child safety and oral health
- ☐ Absence of parental cultural/religious barriers
- ☐ Absence of language differences
- ☐ Adequate training on oral health promotion topics
- ☐ Other (explain_____)
- ☐ I have no assistance

38) How confident are you in discussing with parents their child's oral health?

- ☐ Extremely confident
- ☐ Quite a bit confident
- ☐ Somewhat confident
- ☐ A little bit confident
- ☐ Not at all confident

39) How difficult is it for you to talk with parents about their child's oral health?

- ☐ Extremely difficult
- ☐ Quite a bit difficult
- ☐ Somewhat difficult
- ☐ A little bit difficult
- ☐ Not at all difficult

40) I don't have educational materials in languages other than English.

- ☐ Strongly agree
- ☐ Agree
- ☐ Not sure
- ☐ Disagree
- ☐ Strongly disagree

41) What do you think would be good strategies to promote oral health in your child care center? (Please check all that apply)

- ☐ Invite speakers to speak about the importance of oral health
- ☐ Web links and other resources to find credible dental health professionals for parents of younger children
- ☐ Offer educational events in the evenings/after work hours for parents
- ☐ Offer educational events in the evenings/after work hours for staff members
- ☐ Conduct smaller group activities/workshops for parents to discuss oral health preventive strategies
- ☐ Provide information in languages other than English and have interpreters at events
- ☐ Other (please specify) _____

42) Have you already implemented oral health education programs or activities in your center?

- ☐ Yes
- ☐ No

(If yes, go to Question 44)

(If no, please answer question 43)

43) Would you be willing to implement *any* oral health education programs or activities in your center.?

- ☐ Yes
- ☐ No

44) Would you be willing to implement more oral health education programs or activities in your center?
(Please do not answer if you answered question 43)

- ☐ Yes
- ☐ No

45) Do you intend to implement oral health education/promotion programs or activities for the children in your center within a year?

- ☐ Yes
- ☐ No

Thank you very much!

We appreciate your participation

Appendix B. Raw Data

Total raw data is not included in this document because the total numbers of observations were 877 with more than 60 columns of variables. As an example of our raw data, a screenshot of some raw data is shown below.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | | | | | | |
|---------------|--------|-----|-----------|------|-----------|--------|-----------|--------------|-----------|-----------|--------|-----------|----------|-----------|----------|----------|--|----|----|----|-----------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|--|--|--|--|--|
| yrs_licen_cod | gender | age | ethnicity | race | education | income | have_chil | child_dentis | dcflp_coc | hsehs_coc | sb_coc | othertype | tot_todd | tot_three | tot_five | county | Other (ple_coc_fundtype_cshon_prr_ohconsult_consult_t_dentalrec/traini | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 1 | 0 | 48 | 0 | 3 | 3 | 2 | 0 | 1 | 0 | 0 | | 11 | 15 | 5 | Hendry | 2 | 7 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 17 | 0 | 43 | 0 | 5 | 2 | 6 | 1 | 1 | 0 | 0 | | 7 | 11 | 0 | Brevard | 2 | 3 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 20 | 0 | 49 | 0 | 5 | 2 | 2 | 1 | 1 | 0 | 0 | | 11 | 15 | 20 | Escambia | 3 | 2 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 10 | 0 | 44 | 0 | 5 | 4 | 3 | 1 | 1 | 0 | 0 | 0 | 1 | | | 63 | Volusia | 1 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | 1 | 0 | 37 | 0 | 5 | 4 | 2 | 1 | 1 | 1 | 0 | 0 | | | 15 | Duval | 1 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | 2 | 0 | 49 | 1 | 5 | 2 | 3 | 0 | | 1 | 0 | 0 | | 58 | 35 | 66 | Miami-Dade | 2 | 5 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | 5 | 0 | 53 | 0 | 3 | 5 | 3 | 1 | 1 | 0 | 1 | 0 | | 72 | | | Columbia | 1 | 7 | 1 | Once ever | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | 8 | 0 | 55 | 0 | 5 | 5 | 5 | 0 | | 1 | 0 | 0 | | 12 | 9 | 8 | Sarasota | 3 | 70 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 20 | 0 | 54 | 0 | 5 | 3 | 2 | 0 | | 1 | 0 | 0 | | 3 | 5 | 22 | Pinellas | 1 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | 22 | 0 | | 0 | 5 | 4 | 6 | 1 | 1 | 1 | 0 | 0 | | 32 | 48 | 26 | Flagler | 3 | 5 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | 24 | 0 | 53 | 0 | 5 | 3 | 5 | 1 | 1 | 1 | 0 | 0 | | 10 | 90 | 85 | Pinellas | 2 | 5 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | 11 | 0 | 53 | 1 | 5 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | | 7 | 15 | 35 | Ley | 2 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | 4 | 0 | 41 | 0 | 3 | 4 | 2 | 1 | 0 | 1 | 0 | 0 | | 15 | 10 | 7 | Broward | 3 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | 15 | 0 | 46 | 1 | | 2 | 4 | 1 | 1 | 1 | 0 | 0 | 2 | 27 | 23 | | Pinellas | 3 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | 10 | 0 | 43 | 0 | 5 | 4 | 3 | 1 | 1 | 1 | 0 | 0 | | 16 | 60 | | Osceola | | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | 6 | 0 | 47 | 1 | 5 | 2 | 2 | 1 | 0 | 1 | 0 | 0 | | 23 | 36 | 11 | Miami-Dade | 2 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 | 6 | 0 | 42 | 1 | 5 | 4 | 3 | 1 | 1 | 0 | 0 | 1 | | 7 | 20 | 3 | Miami-Dade | 2 | 10 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19 | 5 | 1 | 34 | 1 | 5 | 4 | 6 | 0 | | 1 | 0 | 0 | | 40 | 40 | 30 | Miami-Dade | 3 | 3 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | 5 | 0 | 50 | 0 | 3 | 5 | 6 | 1 | 1 | 1 | 0 | 0 | | 20 | 25 | 30 | Palm Beach | 3 | 2 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21 | 4 | 0 | 42 | 1 | 5 | 4 | 5 | 1 | 1 | 1 | 0 | 0 | | 22 | 72 | 20 | Lee | 1 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22 | 8 | 0 | 43 | 0 | 5 | 4 | | 1 | 1 | 1 | 0 | 0 | | | 48 | | Orange | 3 | 5 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 23 | 17 | 0 | 49 | 1 | 5 | 4 | 4 | 0 | | 1 | 0 | 0 | | | 48 | | Miami-Dade | 3 | 34 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24 | 4 | 0 | 52 | 0 | | 2 | | 1 | 1 | 1 | 0 | 0 | | 0 | 24 | 25 | Orange | 2 | 5 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25 | 2 | 0 | 35 | 0 | 3 | 5 | 2 | 1 | 1 | 1 | 0 | 0 | | 8 | 3 | 8 | Duval | 1 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 26 | 7.5 | 0 | 46 | 0 | 5 | 4 | 3 | 1 | 1 | 0 | 0 | 0 | | 16 | 13 | 2 | Alachua | 2 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 27 | 14 | 0 | | 0 | 5 | 4 | 6 | 0 | | 1 | 0 | 0 | | 32 | 51 | 53 | Sarasota | 2 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 28 | 3 | 0 | 33 | 0 | 5 | 2 | 2 | 0 | | 0 | 0 | 0 | 1 | 0 | 0 | 44 | Manatee | 1 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 29 | 7 | 0 | 41 | 1 | 5 | 5 | 5 | 1 | 0 | 0 | 0 | 1 | | 38 | 36 | 16 | Miami-Dade | 2 | 3 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30 | 3 | 0 | 71 | 0 | 3 | 2 | 2 | 0 | | 1 | 0 | 0 | | 2 | 16 | | Volusia | 3 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 31 | 20 | 0 | 46 | 0 | 5 | 4 | 3 | 1 | 1 | 1 | 0 | 0 | | 21 | 30 | 30 | Santa Rosa | 3 | 3 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 32 | 5 | 0 | 45 | 0 | 3 | 2 | 2 | | | 1 | 0 | 0 | | 11 | 15 | 15 | Broward | 2 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 33 | 27 | 0 | 54 | 0 | 5 | 5 | 6 | 0 | | 1 | 1 | 0 | | 250 | 100 | | Hillsborot Palm Bea | 3 | 30 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 34 | 2 | 0 | 52 | 0 | 5 | 1 | 4 | 0 | | 1 | 0 | 0 | | 30 | 25 | 50 | Palm Beach | 2 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 35 | 7 | 0 | 35 | 1 | 5 | 4 | 2 | 1 | 1 | 1 | 0 | 0 | | 25 | 25 | 10 | Miami-Dade | 3 | 10 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 36 | 0.6 | 0 | 26 | 1 | 5 | 3 | 2 | 1 | 1 | 1 | 0 | 0 | | 12 | 25 | 0 | Polk | 2 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 37 | 12 | 0 | 38 | 0 | 5 | 1 | 3 | 1 | 0 | 1 | 0 | 0 | | 30 | 35 | 30 | Palm Beach | 3 | 2 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 38 | 12 | 0 | 50 | 0 | 3 | 4 | 5 | 0 | | 1 | 0 | 0 | | 37 | 48 | 9 | Miami-Dade | 2 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 39 | | 0 | 57 | 0 | 5 | 4 | 3 | | 1 | 1 | 0 | 0 | | 10 | 14 | 25 | Duval | 3 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 40 | 3 | 0 | 36 | 1 | 5 | 4 | 6 | 1 | 1 | 0 | 0 | 1 | | 23 | 22 | 5 | Miami-Dade | 3 | 2 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 41 | 22 | 0 | 54 | 0 | 5 | 4 | 3 | 0 | | 1 | 0 | 1 | 2 | 15 | 18 | 48 | Pinellas | 3 | 2 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 42 | 10 | 0 | 45 | 0 | 5 | 4 | 3 | 0 | | 1 | 0 | 0 | | 25 | 30 | 7 | Pinellas | 3 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 43 | 10 | 0 | 60 | 0 | 2 | 5 | 6 | 0 | | 1 | 0 | 0 | | | 91 | | Palm Beach | 2 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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