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Measuring Determinants of Oral Health Behaviors in Parents of Low-Income Preschool Children

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MA, Walden University, 2008

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Dissertation Submitted in Partial Fulfillment

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Abstract

Dental decay is a preventable disease, but it remains the most unmet healthcare need of American children. Untreated dental decay has adverse and long-lasting effects on a child's quality of life. Healthy oral habits among preschool children are essential for a healthy permanent dentition and are achieved primarily by 3 oral health–related behaviors: proper dental hygiene, a healthy noncariogenic diet, and regular dental visits. This quantitative study, based on the theory of planned behavior, explored the relationship between these 3 oral health behaviors and 4 determinants: attitude, subjective norms, perceived behavioral control, and intention, using a 71-item questionnaire. The study utilized convenience sampling. A total of 436 parents or caregivers of children enrolled in the North East Independent School District Early Childhood Education program participated in this study; 81.5% were low-income, and 66% reported Hispanic identity. The relationship between variables was evaluated using multiple regression analysis. This study indicated that attitude alone toward a healthy diet and dental hygiene was not a significant predictor of behavior, but the attitude toward dental attendance was significant. Subjective norm, perceived behavior control, and intentions individually and combined were significant predictors of all 3 behaviors, except for subjective norm towards hygiene. Meaningful social change can be achieved by identifying and understanding the underlying motives that evoke planned and deliberate oral health behaviors among parents of preschool children. Targeted messages and cost-effective early interventions can be developed to prevent the onset of dental disease and improve the quality of life for low-income children.

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Acknowledgments

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I would also like to thank the American Public Health's Oral Health Section for its continued support and encouragement. Thank you for always pushing me to do more and to raise my standards to be the best public health professional I could be.

Dedication

I would like to dedicate this research to all the public health and oral health professional who have tirelessly dedicated their lives to preventing and reducing the burden of oral disease in all populations.

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Chapter 1: Introduction to the Study

Background

Oral health is vital to a person's overall well-being. Oral health is essential to all aspects of life, and it supports one's ability to speak, smile, smell, taste, and chew. Oral disease is also referred to as *dental disease* and encompasses a variety of conditions such as dental caries, gum disease, oral cancer, and other conditions affecting the mouth (Centers for Disease Control, 2011b). The focus of this research was how parental behaviors affect dental decay, also referred to as *dental caries*, among preschool children. Dental caries is mostly a preventable childhood disease (Ng & Chase, 2013). Dental caries remains the most unmet health care need among U.S. children (Newacheck, Hughes, Hung, Wong, & Stoddard, 2000). Using the National Health and Nutrition Examination Survey, the National Institute of Dental and Craniofacial Research reported that dental caries (tooth decay) remain the most prevalent chronic disease in both children and adults (National Institutes of Health, 2014). The Centers for Disease Control states that dental caries affects children in the United States more than any other chronic infectious disease (Centers for Disease Control and Prevention, 2014). According to the American Academy of Pediatrics, early childhood caries is five times more common than asthma and seven times more common than hay fever in U.S. children. The National Institute of Dental and Craniofacial Research estimates that almost half of U.S. children experience dental decay by age 11 years (The National Institute of Dental and Craniofacial Research, 2012). Low-income children have a higher rate of untreated dental decay than their higher income counterparts do, and this group is predominantly minority

children (Anderson, Martin, Burdick, Flynn, & Blaney, 2010; Lukes, 2010). Neglect of dental decay results in pain and adversely affects a child's development and the quality of life of the child and the family (Abanto et al., 2011; Boeira et al., 2012; Low, Tan, & Schwartz, 1999).

Three oral health–related behaviors are primarily responsible for reducing dental decay in children. Dental attendance can prevent dental caries through prophylactic measures such as applying dental sealants and fluoride varnish, and restorative measures treat the results of dental disease. (Lee, Bouwens, Savage, & Vann, 2006). A healthy noncariogenic diet that includes drinking fluoridated water and limiting sweetened foods can also reduce the rate of decay in preschool children (Mohebbi, Virtanen, & Vehkalahti, 2012). Comprehensive home oral hygiene which includes parental assistance brushing with fluoridated toothpaste twice a day has been shown to reduce dental caries and gingivitis in preschool children (Ismail, Lim, Sohn, & Willem, 2008; Martens, Vanobbergen, Willems, Aps, & De Maeseneer, 2006; Sankeshwari, Ankola, Tangade, & Hebbal, 2012; Zhou, Yang, Lo, & Lin, 2012).

The aim of this research study was to gain a better understanding of the social and behavioral determinants of oral health behaviors among parents of preschool children. Prevention-centered management strategies to reduce the high rate of dental decay in vulnerable populations are needed (Milgrom & Chi, 2011). Targeted evidence-based prevention models can be successfully developed by identifying the underlying determinants that guide parental oral health behaviors With the goal of reducing the rate of dental decay in all U.S. children, the information gathered through this study can be

used to promote public policy and support proposed policies that address financial and nonfinancial barriers to dental care, a healthy noncariogenic diet, and adequate oral hygiene.

I discuss the rationale and purpose of the study in the following chapter. I also summarize the background and scope of the study. I then present a brief synopsis of the disparity and prevalence associated with dental caries, including an etiology of dental caries. I provide a short narrative of the North East ISD Prekindergarten Program. After, I review the program's role in the oral health of its participants, and I then explain the research problem and how it relates to the purpose of the study. This discussion leads into a discussion of the specific research questions and hypotheses. I briefly discuss the theoretical foundation and the nature of the study. I then define terms and assumption as they relate to the context of the study. The scope, boundaries, and limitations are also included in this section, followed by the study's potential social implications.

According to the American Dental Association (2013a), tooth decay is the destruction of tooth enamel, the outer layer of teeth. Bacteria found in plaque produces acid, and this acid eventually wears down the enamel and forms a small hole in the tooth enamel; this is a dental cavity. Folayan, Sowole, Owotade, and Sote (2010) noted that dental caries is multifactorial, involving more than 50 factors associated with the disease occurring from infancy through adulthood. In preschool children, oral health is determined mainly by three behavioral factors: (a) oral hygiene habits; (b) exposure to sugared snacks and drinks; and (c) receipt of preventive dental measures, such as

professional fluoridation and sealants (Declerck et al., 2008; Van den Branden, Van den Broucke, Leroy, Declerck, & Hoppenbrouwers, 2013).

Untreated dental decay negatively affects many areas of a child's life (Locker, 2007). Neglected dental decay in children can result in many other conditions including, but not limited to, pain, impaired speech development, failure to thrive, learning difficulties, school absences, inability to concentrate, and reduced self-esteem (Edelstein, 2002; Losso, Tavares, Silva, & Urban Cde, 2009). The adverse effects of untreated dental disease often continue through adulthood (White et al., 2012). Dental decay in primary dentition has also been shown to be the most reliable predictor for dental decay in the permanent dentition (Ekback, Ordell, & Unell, 2012; Nelson, Lee, Albert, & Singer, 2012).

Locker (2007) found that children from low-income families have a poorer oral health–related quality of life score than non-low-income children have. As the severity of the disease increases, so does the score corresponding to a poor quality of life. This finding was supported by a prospective study conducted by Easton, Landgraf, Casamassimo, Wilson, and Ganzberg (2008), which indicated overall children with dental caries have a lower quality of life.

Some advances have been made in dental service use (Horowitz, 1992; Isong et al., 2012; Renson, 1986; Splieth & Meyer, 1996; Wall, Vujicic, & Nasseh, 2012). An increase in the use of preventive dental sealants has also occurred (Lam, 2008). Dental decay remains the most unmet health care need among U.S. children even though it is an entirely preventable disease (American Academy of Pediatrics, 2014; Edelstein & Chinn,

2009; Newacheck et al., 2000). The Centers for Disease Control and Prevention (2011b) affirmed that more than 25% of U.S. children ages 2 to 5 years have untreated dental decay. Between 1999 and 2004, the National Health and Nutrition Examination Survey estimated that 42% of children ages 2 to 11 years had dental caries experience (The National Institute of Dental and Craniofacial Research, 2012).

Certain populations have higher risk than others; specifically, 80% of dental caries occurs in 20% of the U.S. population (Dye et al., 2007). Minority children and those living in families with lower incomes experience a higher rate of decay (Dye, Li, & Thorton-Evans, 2012). Latinos and African American children have a higher rate of dental decay and visit the dentist less often than white children do (Pourat & Finocchio, 2010).

Insurance factors are also greatly attributed to the use of dental health services; children who lack dental coverage often do not receive needed dental care services (Fisher-Owens et al., 2012). Medicaid is a joint federal and state program that finances health coverage for low-income children and provides preventive dental services (U.S. General Accounting Office, 2001). This prevention service, Early and Periodic Screening, Diagnostic, and Treatment (EPSDT), calls for states to provide children and adolescents younger than 18 years with access to periodic and comprehensive dental services, which include relief of pain and infections, restoration, and maintenance (U.S. General Accounting Office, 2001). Comprehensive dental treatment is required to treat the results of the dental disease (Lee et al., 2006).

The aim of this research study was to gain a better understanding of the determinants of oral health behaviors in parents of preschool children. By identifying the determinants that drive planned and deliberate oral health behaviors, mainly oral hygiene habits, a noncariogenic diet and dental attendance, cost-effective programs to promote oral health, and evidence-based prevention models, can be successfully developed. As a result, the rate of oral diseases and their associated adverse effects can be reduced, and the quality of life of preschool children and families will improve.

Problem Statement

In this study, I addressed the following research question: Are these four specific detriments related to use of dental services, a healthy noncariogenic diet, and oral hygiene?

- Attitude.
- Subjective norms.
- Perceived behavior control.
- Intention.

The oral health of children has been a significant public health concern for many decades. In 2010, the U.S. Surgeon General Regina M. Benjamin referred to poor oral health as a silent epidemic (Benjamin, 2010). She was referring to the disproportionate rate by which dental disease affects disadvantaged communities, especially racial and ethnic minority children. In 2003, the former Surgeon General Richard H. Carmona also released a report entitled “A National Call to Action to Promote Oral Health” (U.S. Department of Health and Human Services, 2003). This report urged community leaders,

volunteers, health care professionals, researchers, and policy makers to collaborate to promote oral health and reduce disparities. *Oral health* was identified as a Leading Health Indicator of Healthy People 2020 (HP2020) (U.S. Department of Health and Human Services, 2012). One objective of HP2020 is to reduce the number of preschool children, 3 to 5 years of age, who have dental caries in their primary teeth. Currently, 33.3% of preschool children 3 to 5 years of age experience dental decay. The goal of HP2020 is to reduce the rate of dental caries experience in children by 10% to 30%. The rate of untreated decay is 23.8% for 3- to 5-year-olds. The goal of HP2020 is to reduce the rate by 10% to 21.4%. Improving access to preventive services is also a goal of HP2020; only 26.7% of Medicaid-eligible children ages 2 to 18 years received a preventive dental exam; the goal of HP2020 is to increase the use of preventive dental services by 10% to 29.4%.

Several studies have been conducted examining the factors associated with the use of oral health services by families. The most common barriers that families face include a lack of access to dental care and financial barriers (Chi & Milgrom, 2009; Fisher-Owens et al., 2012). In this study, I focus on families of 4-year-old children enrolled in prekindergarten. Some of the children are also enrolled in Head Start, the majority of this population has state-sponsored dental insurance, and some children have had a dental screening offered through the Head Start program (Vogel et al., 2011). Children in Head Start have a lower rate of comprehensive dental service use compared with their non-Head Start counterparts and, as a result, they have a higher rate of dental decay than children not enrolled in the program (Anderson et al., 2010; Goldberg, Lewis,

& Ferguson, 2011; Kopycka-Kedzierawski, Bell, & Billings, 2008). Similar to the study previously cited involving Head Start children, it was revealed that 95% of children had a dental check-up in the past year, and 87% of children have government-sponsored insurance (Moiduddin, Aikens, Tarullo, West, & Xue, 2012). Milgrom, Weinstein, Huebner, Graves, and Tut (2011) reported that even though most children are receiving a dental screening identifying decay, they are not receiving the necessary comprehensive dental care to treat the decay.

Purpose of the Study

The goal of this study was to explore the determinants of oral health behaviors among parents of low-income, preschool children to develop appropriate interventions to reduce the disproportionate rate of untreated dental caries in this population by changing behaviors that contribute to the disease and to evoke positive, planned, deliberate behaviors that prevent the disease. The specific determinants investigated through this quantitative study using a survey were the components of the Theory of Planned Behavior: attitudes, intentions, subjective norm, and perceived behavior control (Ajzen, 1991). Attitude relates to an evaluation of behavior by the individual; subjective norm refers to what others who are important to the individual believe the individual should do; perceived behavior control is the individual's perceived ease or difficulty toward performing a particular behavior (Ajzen, 1991). The analysis conducted through this study seeks to investigate whether these determinants have a relation to three specific oral health behaviors necessary to a healthy primary dentition: a healthy noncariogenic diet, oral hygiene habits, and regular dental attendance. Targeted educational programs[i] and

policies can be developed by an understanding of the determinants of oral health behaviors.

A better understanding of the multiple sociocultural factors that influence oral health behaviors is also needed. Mofidi, Zeldin, and Rozier (2009) examined the issues related to the oral health of preschool children in North Carolina. The researchers concluded that knowledge, attitudes, practices, and suggestions for parents are critical to improving the health of this vulnerable population. The study concluded that further research is required in other regions of the country to build on the findings. Fisher-Owens et al. (2012) also stressed that the role of mutable sociocultural factors and their influence on health must be fully understood to be able to design more holistic interventions that truly improve the health of the most vulnerable groups.

Research Questions

The study was guided by Four research questionsguided the study, each with a corresponding hypothesis. Hypotheses are declared in an alternative form and a null form.

RQ1: Are the attitudes of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage, and program eligibility?

H_a1A: Attitudes of preschool parents are associated with dietary habits.

$H_0$1A: Attitudes of preschool parents are not associated with dietary habits.

H_a1B: Attitudes of preschool parents are associated with oral hygiene habits.

$H_0$1B: Attitudes of preschool parents are not associated with oral hygiene habits.

H_a1C: Attitudes of preschool parents are associated with dental use.

$H_0$1C: Attitudes of preschool parents are not associated with dental use.

RQ2: Are the subjective norms of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?

H_a2A: Subjective norms of preschool parents are associated with dietary habits.

$H_0$2A: Subjective norms of preschool parents are not associated with dietary habits.

H_a2B: Subjective norms of preschool parents are associated with oral hygiene habits.

$H_0$2B: Subjective norms of preschool parents are not associated oral hygiene habits.

H_a2C: Subjective norms of preschool parents are associated with dental use.

$H_0$2C: Subjective norms of preschool parents are not associated with dental use.

RQ3: Are the perceived behavior control of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States., number of

children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?

H_a3A: Perceived behavior control of preschool parents are associated with dietary habits.

$H_0$3A: Perceived behavior control of preschool parents are not associated with dietary habits.

H_b3B: Perceived behavior control of preschool parents are associated with oral hygiene.

$H_0$3B: Perceived behavior control of preschool parents are not associated with oral hygiene habits.

H_c3C: Perceived behavior control of preschool parents are associated with dental use.

$H_0$3C: Perceived behavior control of preschool parents are not associated with dental use.

RQ4: Are the intentions of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?

H_a4A: Intentions of preschool parents are associated with dietary habits.

$H_0$4A: Intentions of preschool parents are not associated with dietary habits.

H_a4B: Intentions of preschool parents are associated with oral hygiene habits.

$H_0$4B: Intentions of preschool parents are not associated with oral hygiene habits.

H_a4C: Intentions of preschool parents are associated with dental use.

$H_0$4C: Intentions of preschool parents are not associated with dental use.

The independent variables in my study were the components of the Theory of Planned Behavior (TPB): attitudes, intentions, subjective norms, and perceived behavior control. The purpose of this study was to determine the relationship between these independent variables and the dependent variables, specifically three oral health behaviors necessary to a healthy primary dentition: noncariogenic dietary habits, oral hygiene habits, and dental attendance. I collected basic demographic information such as the caretaker's age, relationship to the child, educational level, the origin of birth, years in United States, number of children in the home, as well as the child's age, gender, origin of birth, the language spoken at home, race, and dental insurance coverage. Program eligibility information was collected, such as whether the child was unable to speak or comprehend English, whether the child was eligible for free or reduced lunch, whether the child or parent were homeless, whether the child had a parent who is in or has been in the armed forces, whether the child was or has been in the conservatorship of the Department of Family and Protective Services, and whether the child was also enrolled in the Head Start program.

Theoretical Foundation

TPB was used to conduct this research study. The TPB was developed by Ajzen (1991). The TPB examines the relationship(s) between an individual's beliefs, attitudes, intentions, behaviors, and perceived control over their behavior (Glanz, Rimer, & Lewis,

2005). The TPB was introduced by Ajzen in 1985 through an article entitled "From Intentions to Actions: A Theory of Planned Behavior". This theory is an extension of the theory of reasoned action, which was originally proposed by Ajzen and Fishbein in 1975 (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). The TBP differs from the Theory of Reasoned Action, in that it considers the association between perceived and actual control over the behavior under consideration (Ajzen, 1985, p. 12). This theory emphasizes that human action is guided by social pressures and a sense of control, not only by personal attitudes (Cooke & Sheeran, 2004).

Using the TPB, the aim of this study was to identify determinants of oral health behavior. This population had the opportunity and resources necessary to follow through on the intention. A large percentage of participants in this study had state-sponsored insurance such as Medicaid or S-CHIP coverage. Also, the majority of respondents indicated that their children had received a dental exam. This theory was well suited for this study because it may contribute to identifying the determinants of oral health–related behaviors.

Nature of the Study

I used an inductive approach using quantitative inquiry to examine the relationship between oral health-related behaviors in parents of preschool children ages 4 to 5 years and the components of TPB. The independent variables of the study were the components of the TPB: attitudes, intentions, subjective norms, and perceived behavior control. The purpose of this study was to determine the relationship between these independent variables and the dependent variables, specifically three oral health

behaviors necessary to a healthy primary dentition: a healthy noncariogenic diet, oral health hygiene habits, and dental attendance. Improving oral health by changing behavior requires a precise understanding of the determinants that drive oral health–related behaviors.

A quantitative survey was used to conduct this research study. The survey was published by Van den Branden et al. (2013). Van den Branden developed the survey to measure the oral health behaviors and its determinants in the parents of 5-year-old children, and the instrument was in Dutch. The survey was translated from Dutch into English by an experienced staff member of the Van den Branden research team and then checked for the correct translation of particular oral (health)–related terms by another member of the research group. For this study, I translated the survey into Spanish. The Spanish translation was reverse translated back into English to verify the accuracy of the translation. The survey measures three behaviors related to oral health among children: dietary habits, oral hygiene, and dental attendance and their associated determinants: attitude, subjective norms, perceived behavioral control, and intention. Van den Branden et al. support that this instrument can be used for use with other populations. Qualified participants were the guardian or the parent of preschool children ages 4 to 5 years. I analyzed data using Statistical Package for Social Sciences (SPSS) version 21.

Definitions

The independent variables of the study are the components of the TPB: attitudes, intentions, subjective norm, and perceived behavior control. Attitude relates to an evaluation of behavior by the individual; subjective norm refers to what other people who

are important to the individual feel the individual should do; perceived behavior control is the individual's perceived ease or difficulty toward performing a particular behavior and how in control they are of their environment (Ajzen, 1991). This study identifies if these determinants have an association with the dependent variables, three specific oral health behaviors necessary to a healthy primary dentition: health noncariogenic dietary habits, oral hygiene habits, and dental attendance. Dental attendance refers to the use of dental services.

Regular dental visits can prevent dental disease through prophylactic measures such as applying dental sealants and fluoride varnish, and restorative measures to treat the results of dental disease (J. Lee et al., 2006). A healthy noncariogenic diet that includes drinking fluoridated water and limiting the amount of sweetened foods can also reduce the rate of decay in preschool children (Mohebbi et al., 2012). Good home oral hygiene has also been shown to reduce dental disease in preschool children, it is recommended that children's teeth be brushed twice a day by an adult using fluoridated toothpaste (Ismail et al., 2008; Martens et al., 2006; Sankeshwari et al., 2012; Zhou et al., 2012).

Active and arrested carious lesion: Lesions are classified according to their activity, such as active and arrested lesions, a lesions which are progressing is described as an active caries lesion, a lesion that formed years previously and has stopped further progression is classified as an arrested or inactive caries lesion. (U.S. National Library of Medicine, 2013).

Anterior: mandibular and maxillary centrals, laterals, and cuspids, anterior also indicates teeth and tissues located toward the front of the mouth (American Dental Association, 2013b).

Attitude: relates to the evaluation of a behavior by an individual (Ajzen, 1991)

Bacteria: microorganisms sometimes called "germs" capable of producing disease under certain conditions (P. Casamassimo & Holt, 2004).

Carbohydrates: sugars and starches found in many foods, which are cariogenic (P. Casamassimo & Holt, 2004).

Caries experience: refers to the sum of filled, unfilled cavities, and any missing teeth as a result of tooth decay (U.S. National Library of Medicine, 2013).

Caries risk assessment: an evaluation process to identify individuals who are at risk for a high rate of caries, need more oral health supervision, or preventive intervention (U.S. National Library of Medicine, 2013).

Cariogenic: causing decay (P. Casamassimo & Holt, 2004).

Cavity (carious lesion): hollow area or hole in the tooth enamel caused by bacterial acids (P. Casamassimo & Holt, 2004).

Decay: decomposition of tooth structure, also referred to as a cavity or carious lesion (American Dental Association, 2013b).

Deciduous dentition: the deciduous or primary teeth in the dental arch (mouth) also referred to as baby teeth or milk teeth (American Dental Association, 2013b).

Demineralization: loss of tooth enamel during the beginning stages of dental disease; may appear as a small white (chalky) area on the tooth surface (P. Casamassimo & Holt, 2004).

Dental attendance: the use of preventive and restorative dental services (J. Lee et al., 2006).

Dental caries (dental decay, tooth decay or 'cavities'): a multifactorial, preventable disease, that begins below the surface of the tooth affecting the mineralized tissue, aetiology is related to interactions over time between tooth substance, certain micro-organisms, and dietary carbohydrates producing plaque acids (U.S. National Library of Medicine, 2013).

Dental home: the ongoing relationship between a dentist and a patient, which includes comprehensive oral health care, beginning no later than age one, pursuant to ADA policy (American Dental Association, 2013b), a dentist which provides primary, preventive, and maintenance oral health services to a patient on a regular basis (P. Casamassimo & Holt, 2004).

Dental sealant: thin, plastic resin that is placed on chewing surfaces of back teeth (molars and premolars) with pits and grooves (primarily the chewing surfaces of teeth) to protect the tooth surfaces from collecting food debris and bacteria from attacking the enamel, causing decay (U.S. National Library of Medicine, 2013).

Dental visits (dental attendance, dental service use): routine use of the oral health care delivery system, with the purpose of providing an opportunity for clinical preventive

services and early detection of oral diseases (National Center for Chronic Disease Prevention and Health Promotion, 2013).

Dentist: A person trained to practice dentistry, provides regular checkups of teeth and gums, provides restoration of teeth damaged or lost by decay, trauma or other reasons, using a wide variety of techniques and materials (U.S. National Library of Medicine, 2013).

Dentistry: the evaluation, diagnosis, prevention and/or treatment (nonsurgical, surgical or related procedures) of diseases, disorders and/or conditions of the oral cavity, by a dentist, (American Dental Association, 2013b).

Dentition: teeth in the dental arch or mouth (American Dental Association, 2013b).

Early and Periodic Screening, Diagnosis, and Treatment (EPSDT): a federal program that provides comprehensive health care to Medicaid-eligible children under age 21, through periodic screenings to identify physical (including vision, hearing and dental) and mental conditions (U.S. Department of Health and Human Services, 2013).

Early childhood caries: dental decay of the primary teeth (‘baby’ or ‘first’ teeth) of infants and young children often resulting in the rapid destruction of tooth tissue (U.S. National Library of Medicine, 2013), in an infant or child, the presence of one or more decayed teeth, missing teeth (resulting from caries), or filled tooth surfaces (P. Casamassimo & Holt, 2004).

Early, initial or incipient lesion: the first stage of a caries lesion on enamel that can be detected with the naked eye, often appears white or opaque (a white-spot) (U.S. National Library of Medicine, 2013).

Enamel: calcified, hard, glossy tissue covering dentin of the crown of the tooth (outside of the tooth) (American Dental Association, 2013b).

Evidence-Based Dentistry: an approach to dentistry that requires integration of systematic assessments of clinically relevant scientific data (American Dental Association, 2013b).

Federal Poverty Level (FPL): a specific level of poverty used as the income standard for certain categories of beneficiaries, HHS Poverty Guidelines are available online at http://aspe.hhs.gov/poverty/13poverty.cfm#guidelines (U.S. Department of Health and Human Services, 2013).

Filling/filled: a term used for the replacement of lost tooth structure by using a material such as metal, alloy, plastic or porcelain (American Dental Association, 2013b).

Fluoride: a mineral compound of the element fluorine, used to reduce dental decay (U.S. National Library of Medicine, 2013).

Fluoride varnish: lacquer containing 5 percent sodium fluoride that is painted on teeth to reduce tooth decay (P. Casamassimo & Holt, 2004).

Home oral hygiene: following recommendations that children's teeth be brushed twice a day by an adult using fluoridated toothpaste (Ismail et al., 2008)

Incisors: teeth located in the front of the mouth (P. Casamassimo & Holt, 2004).

Local anesthesia: a treatment to remove pain sensation over a specific area of the anatomy without loss of consciousness (American Dental Association, 2013b).

Low income - an individual or family with an income determined to be below the income official poverty line defined by the Office of Management and Budget and revised annually in accordance with section 673(2) of the Omnibus Budget Reconciliation Act of 1981. [Title V, Sec. 501 (b)(2)]

Molar: large, broad teeth in the back of the mouth (posterior to the premolars) on either side of the jaw, used for grinding and chewing (American Dental Association, 2013b)

Oral: relating to the mouth (American Dental Association, 2013b).

Oral cavity: the mouth (in the mouth) (U.S. National Library of Medicine, 2013).

Oral disease: a range of disease and conditions including dental caries, periodontal disease, oral cancers, dental erosion, and dental fluorosis (Watt, 2005).

Oral health diet: a diet that includes drinking fluoridated water and limiting the amount of sweetened foods and beverages in order to reduce the rate of decay (Mohebbi et al., 2012).

Patient: an individual who has established a professional relationship with a dentist for themselves, or as a parent or guardian of a child for the delivery of oral health care (American Dental Association, 2013b).

Pediatric dentist: specialist whose practice is limited to the dental treatment of children from birth through adolescence (formerly known as a pedodontist) (American Dental Association, 2013b).

Permanent dentition: the second set of teeth (32 in number) that erupt into the mouth after the loss of the primary teeth (P. Casamassimo & Holt, 2004).

Plaque: sticky material that accumulates on teeth composed largely of bacteria and bacterial derivatives (American Dental Association, 2013b), the primary cause of caries and periodontal disease when dental hygiene is neglected (P. Casamassimo & Holt, 2004).

Perceived behavior control: the individual's perceived ease or difficulty toward performing a specific behavior (Ajzen, 1991).

Preventive dental services: procedures aimed at preventing and monitoring dental health problems, disease, or personal risk factors (U.S. Department of Health and Human Services, 2013).

Primary teeth (deciduous teeth): the first set of teeth (20 in number) that erupt in the mouth, around ages 6 to 10 months (baby teeth, milk teeth) (P. Casamassimo & Holt, 2004).

Rampant caries: several active carious lesions in the same patient, may involve surfaces of teeth which customarily do not experience dental caries (smooth surfaces of anterior teeth), sometimes referred to by the causative factors of the disease such as bottle or nursing caries, baby caries, early childhood caries, radiation caries or drug-induced caries (U.S. National Library of Medicine, 2013).

Saliva: liquid secretions from glands in the mouth (P. Casamassimo & Holt, 2004).

State Children's Health Insurance Program (S-CHIP): a health care program for uninsured low-income children, administered by Federal-State matching block grant (U.S. Department of Health and Human Services, 2013).

Streptococcus mutans: bacteria found in the mouth associated with caries experience (P. Casamassimo & Holt, 2004).

Subjective norm: what others important to the individual feel the individual should do (Ajzen, 1991).

Assumptions

Some assumptions were made in this research study. First, it was assumed that the respondents answered truthfully. The survey instrument was designed in such a way that it allowed participants to answer honestly and objectively. The respondents were assured that their anonymity and confidentiality would be preserved. The respondents of the study were volunteers, and they were duly informed that they could refuse to answer any item on the survey, and they were free to withdraw from the study at any time without any ramifications. Secondly, it was assumed that the sample population was representative of the sample being analyzed, and the sample size was appropriate and verified by post hoc power analysis. Thirdly, it was assumed that the instrument which was chosen would be successful in defining the key determinants of parental oral health behavior, primarily action or inaction of three specific oral health-related behaviors. Some children in the study were also enrolled in Head Start. Many Head Start children nationwide are also minorities and come from low-income families.

Scope and Delimitations

The scope of the study was narrowed and focused by several delimitations. First, the population was homogeneous in that the majority of the participants were minorities, and the majority of families in the program live below the Federal Poverty Guideline and qualify for the Free or Reduced Lunch Program. Second, the scope of this study targeted the parents of children enrolled in the North East Independent School District Early Childhood Education Prekindergarten Program, and the child was 4 years of age on or before September 1st, 2015. Third, almost all the children in this study had dental insurance accessible to them to access preventive dental care, therefore, may not experience the same access to care issues that other children may experience. No other issues or barriers to care were included in this study.

Qualified participants were the parents of children eligible for the North East Independent School District Early Childhood Education Prekindergarten Program. InTo qualify for the program, the child must reside within the North East ISD boundaries. Texas also requires that a child be 4 years old on or before September 1st, and meet one of the following eligibility criteria:

1. Be unable to speak and comprehend the English language

2. Be educationally disadvantaged, which means a student eligible to participate in the national free or reduced-price lunch program

3. Be homeless, as defined by 42 United States Code (U.S.C.) Section 1143a, regardless of the residence of the child, of either parent of the child, or of the child's guardian or other person having lawful control of the child

4. Be the child of an active-duty member of the armed forces of the United States, including the state military forces or a reserve component of the armed forces, who is ordered to active duty by proper authority; or is the child of a member of the armed forces of the United States, including the state military forces or a reserve component of the armed forces, who was injured or killed while serving on active duty

5. Be in, or have been in, the conservatorship of the Department of Family and Protective Services (DFPS) following an adversary hearing held as provided by Section 262.201, Family Code

6. The child was 4 years of age on or before September 1st, 2015.

Limitations

There are some limitations to this study. The study utilized convenience sampling. Therefore, it is not suitable to apply this research to larger populations, only suggestions based on the results of the study are appropriate. The survey instrument was limited because intentions and behaviors were measured on the same instrument, not allowing sufficient time between both measurements. The study was conducted over a short period of time. Therefore, it only provided a snapshot of the state of affairs. Because the survey was lengthy, respondents might have become fatigued or disinterested in carefully reading questions. Also, because the survey was self-administered, there was no way of telling if the respondents answered truthfully or if they answered based on social desirability. Lastly, the survey was not administered in a controlled environment. Therefore, outside factors may have influenced responses.

Reasonable efforts were made to lessen the effect of limitations. Participants were allowed to take the survey home to complete at their convenience. The respondents were notified that there would be multiple days available to complete the survey to accommodate a participant that was short on time so that the participant could choose to complete the survey on a different day or make arrangements to complete the survey at a convenient time.

Significance

Multiple studies have been conducted investigating the factors associated with the high rate of dental decay in preschool children (Adams, Hyde, & Gansky, 2009; Anderson et al., 2010; Chinn, 2011; Goldberg et al., 2011; Kopycka-Kedzierawski et al., 2008; Kranz, Rozier, Zeldin, & Preisser, 2011; Milgrom et al., 2011; Miller, Kameka, & Young-Whiting, 2012; Montero, Douglass, & Mathieu, 2003; Siegal, Marx, & Cole, 2005; Siegal, Yeager, & Davis, 2004). This study was unique in that it applied the TPB to the oral health behaviors to low-income parents of preschool children. The aim of this study was to gain a better understanding of the determinants of three very critical oral health behaviors of this at-risk population: dental attendance, oral hygiene, and a healthy noncariogenic diet. The components of the TPB can be beneficial in predicting intention and planned deliberate behaviors.

By identifying these factors, cost-effective programs to promote oral health and evidence-based prevention models can be successfully developed. Oral health care services are underutilized; more than 25% of American children ages of 2 to 5 have untreated dental caries. Results can be used to develop educational material for parents in

the areas of TPB that most influence these health behaviors. Study outcomes can be used to advance the use of oral health care services for all children to reduce the rate of untreated decay. The information gathered can also be utilized to advocate for new public policy and support proposed policies and programs that address financial and nonfinancial barriers to dental care. Relevant data is needed to provide policymakers with the information necessary to advocate for oral health policy and to demonstrate a maximum return on public health and clinical care investments.

In a study, designed to assess the relationship between parents' dental attitudes and the rate of dental caries in their 3 to 5-year-old children, Skeie, Espelid, Riordan, and Klock (2008) made a definitive conclusion that attitudes of parents are shown to be associated with the rate of dental decay in their early childhood children. Skeie et al. (2008) went on to say; the relationship is, in fact, so strong that nonbiological determinants deserve to be considered when developing preventive dental strategies. In another study analyzing parental attitudes, 501 parents were interviewed before and after their child's treatment for ECC, results showed that once the decay was treated, an improved quality of life for the child and parent was reported (Cunnion et al., 2010).

Summary

Dental decay is the most common chronic childhood disease among U.S. children, although it is a mostly preventable disease. Left untreated the disease has a negative effect on a child's quality of life. Low-income and minority children have a higher rate of decay than other children. By utilizing the Theory of Planned Behavior, this quantitative study aims to gain a better understanding of the determinants of oral health behaviors of

preschool parents. By identifying the determinants that affect oral health behaviors, mainly oral hygiene habits, a healthy noncariogenic diet, and dental attendance, cost-effective programs to promote oral health, and evidence-based prevention models can be successfully developed. The information gathered through this study can be utilized to develop and improve public policy and support proposed policies that address financial and nonfinancial barriers to dental care and reduce the rate of dental neglect in all American children. As a result, the rate of dental disease and its associated negative effects will be reduced, and the quality of life of low-income, minority families will improve. Discussed in the following chapter is a review of existing literature surrounding the topic of children's oral health, including the prevalence, risk factors, and proven prevention methods.

Chapter 2: Literature Review

Introduction

Dental decay is entirely preventable, yet it is the most unmet health care need among U.S. children (Newacheck et al., 2000). The health of a child's mouth is an essential part of his or her overall health (U.S. Department of Health and Human Services, 2000). Certain populations have higher risk than others; specifically, 80% of dental decay in children occurs in 20% of U.S. children (U.S. General Accounitng Office, 2000). Dental attendance, effective oral hygiene, and healthy dietary habits can prevent this disease.

The purpose of this study was to measure the determinants of oral health behaviors among parents of low-income children. Some of the children in this study were also enrolled in the Head Start program. Children enrolled in the federally funded Head Start program have a higher rate of untreated dental decay than their non-Head Start counterparts do (Anderson et al., 2010; Lukes, 2010). The aim of this study was to gain a better understanding of the intentions and the follow-through of oral health behaviors critical to a healthy primary dentition.

The purpose of this literature review was to gather available and current research relating to disparities in children's oral health and the associated known risk factors that contribute to the high rate of decay in this population. Also included in this literature review is an assessment of current preventive dental techniques, existing interventions, and best practices. In addition, I describe a thorough consideration of the relationship between dental disease and poor quality of life issues.

The literature review is opened with an explanation of the etiology of dental decay and early childhood caries, followed by an explanation of the progression of the disease if left untreated. Also considered is the effect that untreated dental decay has on the lives of children and the relationship between the disease, overall health, and well-being. This leads into a discussion about the oral health status of U.S. children, followed by a summary of current theories and philosophies associated with the prevention of dental disease. In addition, I include a description of the complex social, cultural, and environmental factors associated with dental disease. This literature search includes an assessment of populations at high risk for dental disease and the disproportionate rate of decay in these populations. Finally, I examine the current literature outlining barriers to care, including insurance coverage, the role of the caregiver, and the role of the medical community in preventing dental disease.

Literature Search Strategy

I used several search engines to conduct a literature search. These included PubMed, CINAHL (Cumulative Index to Nursing and Allied Health Literature), OvidSP, HAPI, and Google Scholar. The search terms that I used to conduct the literature search included the following: *dental disease, early childhood caries (ECC), baby bottle tooth decay, cavities, dental cavities, dental decay, dental pain, oral health disparities, dental disparities, dental appointments, preventive dental methods, dental programs, results of dental disease, children's dental health, access to dental care, fluoride varnish, dental disease risk factors, determinants of dental disease, oral health behaviors, oral hygiene behaviors, Theory of Planned Behavior, Early Head Start, Head Start,* and *validated*

dental questionnaires. I used these terms independently and, in many cases, in combination with each other. I made an effort to include literature published within 5 years of the time of the search. Some literature published more than 5 years ago was included to provide historical perspective or it contained an original idea that was later expanded.

I used the University of Texas Health Science Center at San Antonio Library and Walden University library to access journal articles. I used a partnership between the San Antonio Department of Public Health and the University of Texas Health Science Center at San Antonio to access journals not available for online download.

Theory of Planned Behavior

The TPB examines the relationship(s) between an individual's beliefs, attitudes, intentions, behaviors, and perceived control over their behavior (Glanz et al., 2005). The TPB was introduced by Icek Ajzen in 1985 through an article entitled "From intentions to actions: A theory of planned behavior" (Ajzen, 1985). This theory is an extension of the Theory of Reasoned Action (TRA), which was originally proposed by Icek Ajzen and Martin Fishbein in 1975 (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). The TPB differs from the TRA, in that it takes into account the association between perceived and actual control over the behavior under consideration (Ajzen, 1985, p. 12). This theory emphasizes that human behaviors is guided by social pressures and a sense of control, not only by personal attitudes (Cooke & Sheeran, 2004).

Ajzen (1985) explained that a person would make an effort to perform a behavior if they felt that the result of being successful is worth the risk of failure. The perceived

possibilities of success or failure are also factors in choosing to perform the behavior. Ajzen also clarifies that a person is more likely to carry out the behavior if they feel that others feel they should perform the behavior. In addition to effort, individuals have a greater chance of reaching the behavior goal if they have adequate control over internal and external factors.

The intention to perform a given behavior is central in both the original TRA and TPB. The intentions or motivational factors that influence behavior are indications of how much effort individuals are willing to exert, the stronger the intention to engage in behavior the more likely it will be fulfilled (Ajzen, 1991). However, Ajzen stressed that the behavioral intention could develop into the behavior only if the behavior is under volitional control, that is if a person can decide at will to perform or not perform the behavior. Non-motivational factors, such as having the required opportunities and resources to complete a behavior represent a person's actual control over the behavior. This theory is appropriate for this study because the participants have the required opportunities such as dental coverage and access to care to complete a behavior.

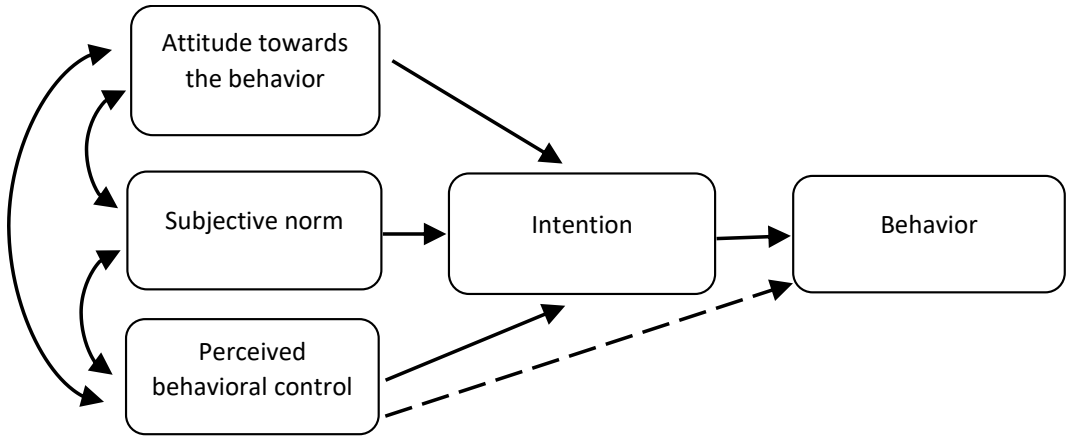

Figure 1. Theory of planned behavior. Adapted from *Organizational Behavior and Human Decision Processes* by I. Ajzen, 1991. Amherst, MA: Academic Press Inc.

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Van den Branden's Study Based on the Theory of Planned Behavior

Based on the Theory of Planned Behavior, Van den Branden et al. (2013) aimed to develop a valid and reliable instrument to measure oral health behavior and their determinants in the parents of 5-year-old Flemish children. The parents of 1157 children completed the questionnaire measuring three oral health behaviors and their determinants. The three oral health behaviors analyzed were dietary habits, dental hygiene, and dental attendance. The four determinants investigated for possible significance were attitude, perceived subjective norm, perceived behavior control, and intention.

The questionnaire consisted of 58 items assessing behaviors and determinants. The questionnaire contained 18 items measuring determinants of dietary habits, five items measured attitude, three items measured norms of the partner, five items measured subjective norms of others, four items measured perceived behavioral control, and one

item measured intention. Oral hygiene behavior was measured using 17 items, four items measuring perceived behavioral control, four items measured subjective norms of family and friends, four Items measured subjective norms of experts and partners, four items measured attitude and one item measured intentions. Dental attendance was measured using 16 items, four items measuring perceived behavior control, four items measuring beliefs about immediate outcomes, five items measuring subjective norms, two items measuring beliefs about long-term outcomes and one item measuring intention. Specific items measured behavior. Dietary habits were measured with four items; answers were reported on a 5-point scale ranging from ‘never’ to ‘more than once a day.' items centered on consumption of sugared in-between snacks and drinks and consumption of sugared snacks and drinks at night. Oral hygiene behaviors were measured with two items; answers were reported on a four-point scale ranging from ‘never’ to ‘twice a day or more’ and centered on the frequency of brushing and frequency of helping with brushing. Dental use was measured by asking: When was the child last seen by a dentist. The answer was reported on a four-point scale ranging from ‘never’ to ‘six months ago or less.'

The results of Van den Branden et al. (2013) study indicated that the determinants outlined in the TPB were significant predictors of oral health behaviors.The study indicated that the survey instrument was both valid and reliable in the Dutch language. For each of the three oral health-related behaviors exploratory factor analyses (EFA), using Principal Components and Varimax rotation was conducted on half the dataset to identify the factor structure. PASW Statistics 17 was used for each of the three behaviors

separately. The factor solution was grounded on criteria of eigenvalue greater than 1 and on inspection of the scree plot. The criteria for EFA included that factor loadings were preferably above 0.5 with a gap between cross-loadings of at least 0.1. Cross-loadings should not be higher than 0.3 and factor membership must be both meaningful and useful. The authors used reliability testing with Cronbach's alpha to decide whether an item should be removed. Confirmatory factor analyses (CFA) was performed on the other half of the sample to obtain a cross-validation, this was done using the LISREF 8.7 program. The adequacy of the model fit was evaluated with the chi-square test statistic, the goodness-of-fit index (GFI), adjusted goodness-of-fit index, comparative fit index and the root mean squared error of approximation (RMSEA). To improve the model fit, the authors choose to allow error variances between the items to correlate; they based this on the modification of indices. Internal consistency was tested using Cronbach's alpha. Also analyzed were Pearson correlations between scales. Multiple regression analyses were applied to evaluate whether the scales measuring attitude, subjective norms, and perceived behavior control could predict intentions and if the intention and perceived behavior control could predict the behavior. A scale scorefor every participant was constructed by calculating the mean of the items that measured the same underlying factor, using PASW Statistic 17.

Overview of Dental Decay in Children

A healthy dentition during childhood is essential for the future overall health of a child. "The mouth is an obvious portal of entry to the body, and oral health reflects and influences general health and wellbeing" (Boggess & Edelstein, 2006, p. 169). Left

untreated dental decay in children can lead to pain, impaired speech development, failure to thrive, learning difficulties, school absences, inability to concentrate, and reduced self-esteem (Edelstein, 2002). Dental decay affects more than the teeth of a child.

Early childhood caries (ECC) is a form of widespread, rampant dental decay. This disease affects the deciduous (baby teeth), maxillary (upper), anterior teeth (front), of infants and young children. The disease eventually spreads to other parts of the mouth, resulting in the eventual decay of the entire primary dentition (Ersin, Eronat, Cogulu, Uzel, & Aksit, 2006; Nissan & Khoury-Absawi, 2009). *Nursing bottle caries*, a term previously used to describe the disease does not adequately describe the nature of the disease. The term early childhood caries ECC is a more appropriate diagnostic term to describe dental decay in very young children based on the complex social and behavioral interactions that drive its development (Hallett & O'Rourke, 2003). An early decayed deciduous or primary tooth in the mouth of a preschool child threatens the three surrounding teeth; the two adjacent teeth on either side and the one vertical tooth on the opposing arch of the mouth (Afroughi, Faghihzadeh, Khaledi, & Motlagh, 2010). Severe early childhood caries (S-ECC) is a more advanced version than ECC. S-ECC often requires treatment in the form of dental surgery and often includes sedating the child. Although dental surgery merely treats the outcomes of the disease and does not address the causative factors of the disease itself or have an impact on slowing the disease process (Schroth & Cheba, 2007).

ECC is a significant public health concern, which affects millions of families. According to the Centers for Disease Control (2011b) tooth decay affects more than one-

fourth of U.S. children 2–5 years of age and half of those 12–15 years of age. The rate is higher for low-income children. About half of all children and two-thirds of adolescents 12–19 years of age from lower-income families have had decay (Brown et al., 2006; Kawashita et al., 2009).

ECC and S-ECC have an adverse effect on a child's quality of life. A healthy primary dentition is necessary to the health of the permanent dentition (Skeie et al., 2008). The prevention of childhood caries is an important prerequisite for a healthy adult dentition. Past caries experience is a significant predictor of future caries experience (Kawashita et al., 2009; Sisson, 2007; Skeie, Raadal, Strand, & Espelid, 2006). Skeie et al. (2006) discovered through a longitudinal study that there is a significant relationship between decay (at least two surfaces) in the primary, second molars, and decay in the primary dentition at age 5 and the permanent dentition at age 10. This study illustrates the lasting effect of preventing and treating decay in the primary dentition of the permanent teeth. Dental problems, in early childhood, are a forecaster not only for dental pain but also for impaired growth and cognitive development, this is because of the disruption dental pain has on the life of a child (Gussy, Waters, Walsh, & Kilpatrick, 2006). Children with dental caries also have slow growth in regards to height and weight between birth and 61 months of age (Kay, Northstone, Ness, Duncan, & Crean, 2010).

Dental decay negatively affects many areas of a child's life (Locker, 2007). Locker (2007) found that children from low-income families have a poorer oral health-related quality of life score than non-low income children. As the severity of the disease increased, so did the score corresponding to a poor quality of life. A prospective study

conducted by Easton et al. (2008) indicated, overall, children with dental caries have a lower quality of life. Children who believed that they had attractive teeth, also believed that they had better grades in school, a more attractive body shape, more friends, more money, and better health than their peers who believed they had an unattractive smile. The perception of an attractive smile corresponded to other positive views, in a study of 216 children 9 to 13 years of age (Bos, Hoogstraten, & Prahl-Andersen, 2008). A second study also confirmed a less desirable dental appearance not only has a negative impact on a child, but also a negative impact on a parent's Oral Health Related Quality of Life (OHRQoL) (Do & Spencer, 2007).

The ability to learn is an important component of a child's quality of life and is negatively affected by dental decay. A study, involving 2871 North Carolina children, concluded that poor oral health in children is an identifiable predictor of poor school performance (Blumenshine, Vann, Gizlice, & Lee, 2008). R. Williamson, Oueis, Casamassimo, and Thikkurissy (2008) utilizing the Standard Behavioral Assessment Instrument (SBAI) to compare the observed behavior of caries-free children and caries-active children, concluded that caries-active children had many more behavior problems than caries-free children did. The study population included 60 caries-active children and 60 caries-free children, ages 30 months to 60 months. The study also reported that children with active carious lesions had significantly higher scores than caries-free children in anxiety/depression, sleep problems, aggressive behavior, externalizing, attention deficit and hyperactivity disorder.

Untreated dental caries in the primary dentition affects the health of a child beyond the oral cavity. Occurrences of middle ear infections and respiratory tract infections are associated with an increased rate of early childhood caries (Alaki, Burt, & Garetz, 2008). Clarke et al. (2006) conducted a study which suggested that early childhood caries may be associated with iron deficiency anemia, a serious condition because iron deficiency has a lasting effect on the growth and development of a child.

In a prospective cohort study of 739 children, Tickle, Blinkhorn, and Milsom (2008) concluded that children with caries had an increased risk of experiencing oral pain; pain in caries-free children is rare. The same study also surmised that one in five children, with caries in their primary molar teeth, reported dental pain from one of their permanent molar teeth in a one-year period. Children with decay in their primary molar teeth at an early age correlate with a high risk of dental extractions. In this study, 26% of children with caries at the onset of the study had extractions compared to 3% of those that were caries free at recruitment. A second study conducted in Maryland supported the findings of Tickle et al. (2008). This study reported that 8% of the children enrolled in the Maryland Head Start program had cried because of dental pain (Vargas, Monajemy, Khurana, & Tinanoff, 2002). Self-reported pain is the preferred way to measure pain. It is not always achievable or accurate in preschool children because of limited communication skills. Because of this limiting factor, the number of children experiencing pain may be underestimated (Easton et al., 2008).

While analyzing the Dental Discomfort Questionnaire, Versloot, Veerkamp, and Hoogstraten (2006) reported that toddlers with dental caries do not always complain of

pain or discomfort. It was theorized that this is because they do not have a clear understanding of a toothache or the ability to verbalize it. Toddlers do not always have the ability communicate pain in words, but the effect of pain does manifest itself in their behavior. Versloot et al. (2006) showed that three behaviors are predictive of the presence of a toothache: puts away something nice to eat, chews on one side of the mouth, and reaches for the cheek while eating. The author of this study also suggests that identifying children with pain should be a priority because these children are at risk of future pain caused by tooth decay (Versloot et al., 2006). In another Maryland study, this time examining the dental pain of school-aged children, the results were consistent with Tickle et al. (2008) and Vargas, Isman, and Crall (2002) previous study. This study utilized the Survey of Oral Health Status of Maryland Children (Vargas, Macek, Goodman, & Wagner, 2005). The survey included 2411 kindergarten and third-grade children. Of those surveyed, 28.2% of children with dental caries experience reported pain.The study concluded that families covered by Medicaid, low educational attainment, or eligible for free and reduced meals had a greater likelihood of experiencing dental pain.

According to the Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion (Centers for Disease Control, 2011b), more than 25% of US children between the ages of 2 to 5 are affected by tooth decay.Certain ethnic groups also have a higher rate of decay, for example, 4 to 6-year-old Mexican-American children have a 40% rate of decay compared to 25% of non-Hispanic whites. Healthy People 2020 Objectives for Improving Health (U.S. Department of

Health and Human Services, 2012) included reducing the number of young children aged 3 to 5 years with dental caries experience in their teeth. The HP2020 report states that 33.3% of children age 3 to 5 years had dental caries experience in at least one primary tooth in 1999-2004. The goal set in this report was to reduce the rate of dental caries experience to 30%. Another objective in HP2020 is aimed at reducing the rate of untreated decay in children aged 3 to 5 years old from 23.8% to 21.4%. HP2020 estimates that 23.8% of children aged 3 to 5 years have untreated decay. In 2000 Healthy People 2010 Objectives for Improving Health were issued, included in the report were 467 objectives in 28 focus areas. One of the priority areas in the report was oral health. The goal of the report was to improve access to dental services, to reduce the overall rate of oral disease, and to decrease the rate of more complex craniofacial diseases (U.S. Department of Health and Human Services, 2012).

The progress made meeting those goals are mixed, according to a study examining the progress of the oral health of U.S. children and adolescents, since the release of the Healthy People 2010 objectives (Tomar & Garcia, 2009). Tomar and Garcia (2009) concluded that although the rate of caries had decreased in certain populations aged 6-19, the rate of decay among 2- to 4-year-olds increased from 18% in 1988-1994 to 24% in 1999-2004. In another study, analyzing the increase, stratified by poverty status as measured by HP 2010, it was reported that a significant increase in decay only occurred in 2 to 4-year-old children. These children were not classified as being poor or living in poverty. This was attributed to a substantial increase of dental sealants in poor children from 3% to 21%, the largest percentage point increase in the

oral health-related HP2010 measures (Dye & Thornton-Evans, 2010). The HP2010 report concluded that dental disease in the general populations continues to grow. It was estimated that this preventable disease affected 40% of all children age 2-11 (Edelstein & Chinn, 2009).

Tinanoff and Reisine (2009) analyzed a report sponsored by the National Institute of Health examining data from the National Health and Nutrition Examination Survey (NHANES III) from 1988-1994. The analysis showed a high number of decayed-filled-teeth (dft) in U.S. preschool children. The data indicated that dental caries is highly prevalent in poor and near poor children, which are children that are at or close to meeting the criteria for living in poverty. Tinanoff and Reisine (2009) also reported there had been a decline in caries among children in older age groups, similar to the study by Tomar and Garcia (2009), but in children under five years old the rate of dental disease has increased.Poor and near poor children who have experience decay have a larger number of teeth affected. Dental caries in U.S. preschool children in most cases remains untreated (Tinanoff & Reisine, 2009). In a supporting study of 58,463 children, Armfield (2007) concluded that children from more socioeconomically disadvantaged areas had a greater likelihood having decayed teeth.

Over the past six decades, a number of advances have been made in reducing dental caries and extending dental care coverage to the general population (Davis, Deinard, & Maiga, 2010; Guendelman, Angulo, Wier, & Oman, 2005; Hughes, Damiano, Kanellis, Kuthy, & Slayton, 2005; Marthaler, 2004). Despite these improvements, early childhood caries (ECC) remain one the most prevalent chronic diseases in children

(Centers for Disease Control, 2011b; Gussy et al., 2006; Newacheck et al., 2000). Brickhouse, Unkel, Porter, and Lazar (2007) estimated that 4 to 5 million children suffer from tooth decay.

Children enrolled in Head Start often have a higher rate of dental visits than children not enrolled in Head Start. In a study published in the Journal of Dental Hygiene, it was reported that the number of Head Start children who had visited the dentist within the last year was 79% compared to 36% who were not enrolled in Head Start (Lukes, 2010). In a study to assess the oral health status of New Hampshire Head Start children, it was noted that 31% of children enrolled in the Head Start program had untreated dental decay. The study also stated that Ohio reported 28% and Maryland 52%; the rate of caries experience was higher for Head Start enrolled children in all three states than non-Head Start children (Anderson et al., 2010).

According to a study examining the accessibility of healthcare, Medicaid and S-CHIP have been able to increase the availability of healthcare coverage to low-income children in the past few years, but children of the working poor and the foreign born remain at high probability of being uninsured (Guendelman et al., 2005). In the Surgeon General's report, *National Call to Action to Promote Oral Health,* it was estimated that 47 million Americans lack health insurance, yet 108 million Americans lack dental insurance (U.S. Department of Health and Human Services, Spring 2003). Fisher and Mascarenhas (2009) study estimated 42% of Medicaid-eligible children, which translates to 8.8 million Medicaid-eligible children in the United States, did not have a dental visit and 4.8 million of these children were covered by Medicaid. Concluded in another study

analyzing the National Survey of Children's Health, for those children that were at or below 200% of the federal poverty level, 62.5% had a preventive dental visit in the last year. This study estimated that there were 16.3 million children (22.8%) that had no dental insurance; this number included both groups of children regardless of Medicaid eligibility (Lewis, Mouradian, Slayton, & Williams, 2007). In a broader U.S. population-based study comparing medical and dental outcome for insured and uninsured Medicaid-eligible children, it was determined that approximately 40% of Medicaid eligible school children with no medical or dental insurance have a higher rate of decay than those children with dental and medical insurance. The study conducted by Brickhouse et al. (2007) concluded that children enrolled in S-CHIP or Medicaid were 1.7 times more likely to have untreated dental decay and children with Medicaid had 16% more decay that children with S-CHIP. According to another study of 533 Medicaid-enrolled children, not all children on Medicaid are not at high risk for caries (Churchill, Williams, & Villareale, 2007). In this study, of the 533 enrolled children analyzed 345 had, at least, one dental procedure, preventive or restorative. Of those 345 children 30 children or 9%, incurred 64% of the entire dental expenditures for the whole study group. Of the group with higher, more extensive dental expenses, 33% were not aware that their Medicaid benefits included dental coverage. The children's whose parents were unaware that their child's insurance included dental coverage were more likely to have greater dental expenditures than parents who were aware that their child's insurance included dental coverage.

The language spoken at home, is a contributing factor to a child's oral health status, access to dental care, and the use of dental services (Flores & Tomany-Korman, 2008). This contributing factor was supported in a study published in The Journal of the American Academy of Pediatrics; it was recognized that ethnic and racial minority children from non-English speaking households experience various unique disparities in oral health such as access to dental care and use of dental services (Flores & Tomany-Korman, 2008). The finding of this study showed that 20% English-speaking-white-households lacked dental insurance and 39% of Hispanics non-English-speaking households lacked dental insurance. Kenney, McFeeters, and Yee (2005) conducted a study to measure the levels of dental care and unmet dental needs among low-income children. The analysis concluded that over half of low-income children, without dental health insurance, did not receive any preventive dental care visits. Children with private health insurance that did not include dental coverage had a rate of dental disease similar to those without any health insurance coverage at all. Furthermore, children of parents whose mental health status classified as poor were more than twice as likely to have untreated dental disease. Kenny et al. (2005) concluded from the analysis that increasing access to dental benefits is a powerful mean to improving the overall oral health of children. In a more recent study, Fisher and Mascarenhas (2009) analyzed data from 2491 Medicaid eligible children living below poverty 2 to 16 years of age who participated in the 1999-2004 National Health and Nutrition Examination Survey (NHANES). Of this group, 40% of children that were eligible for Medicaid were uninsured. Although children 2 to 8 years of age enrolled in Medicaid were more likely to have a medical

examination than uninsured children were, they were no more or less likely to have had a dental exam in the last year. The trend changed for children over the age of 9 to the age of 16; this population was more likely than uninsured children to have had a dental exam than their uninsured counterparts.

Pourat and Finocchio (2010) reasoned that poor oral health has significant implications for the healthy growth and development of children. This study concluded that children with Medicaid, especially Latinos and African Americans, experience high rates of tooth decay. However, they visit dentists less often than privately insured children. The trend continued with Latino and African American children with private insurance. Minority children were also less likely than white children were to visit the dentist and have longer intervals between dental visits. The study highlighted that these findings raise concerns about Medicaid's ability to address disparities in dental care access (Pourat & Finocchio, 2010).

Many studies have documented the disproportionate rates of dental decay in young children. It was estimated in a study conducted by Beltran-Aguilar et al. (2005) that 80 percent of dental disease occurs in 25 percent of the population. Warren et al. (2008) also reported similar findings. Also 80% of dental decay in the low-income population remains untreated according to R. Williamson et al. (2008). In a study, by D. D. Williamson, Narendran, and Gray (2008), two cross-sectional surveys were conducted to assess trends in dental disease experience in the primary dentition of third-grade children. The results of the study revealed that dental caries had decreased significantly from 59% of third graders having decay to 54% having decay between the years of 1991

and 1998. Despite the decline in the rate of caries, there were still intergroup disparities especially in low SES children, supporting the need for the development of preventive strategies. Tomar and Reeves (2009) examined the rate of change in children's oral health and also determine that although there was a decline in the rate of dental caries in permanent teeth, most of the decline was in the non-Hispanic, white population, living at 200% of the federal poverty level. Tomar and Reeves (2009) concluded that greater awareness of the importance of young children's oral health is undoubtedly needed to reverse this trend.

Social and Demographic Determinants Associated With Children's Oral Health

Folayan et al. (2010) noted that dental caries is a multifactorial disease involving over fifty factors associated with the disease. Fisher-Owens et al. (2007) developed a conceptual model based on a comprehensive review of oral health literature which analyzed the complex and interactive causes of dental disease: child, family, and community influences on oral health outcomes of children. The triad was adapted from Keyes and Fitzgerald (1962), and the concentric oval design was adapted from the National Committee on Vital and Health Statistics (National Committee on Vital and Health Statistics, 2002). P. S. Casamassimo, Thikkurissy, Edelstein, and Maiorini (2009) theorize to achieve a full understanding of the human, and economic costs of this (ECC) disease surveillance measures need to include objective measures of disease. These measures would encompass a broad range, from dysfunction to death. P. S. Casamassimo et al. (2009) also suggest that the effects this disease has on a child's development such as the child's ability to learn, and the effects on family's quality of life all need to be

examined. Economics must be meaningfully assessed to describe the consequences this preventable disease has on the life of a child, such as the financial burdens it places on families, communities, and the healthcare system.

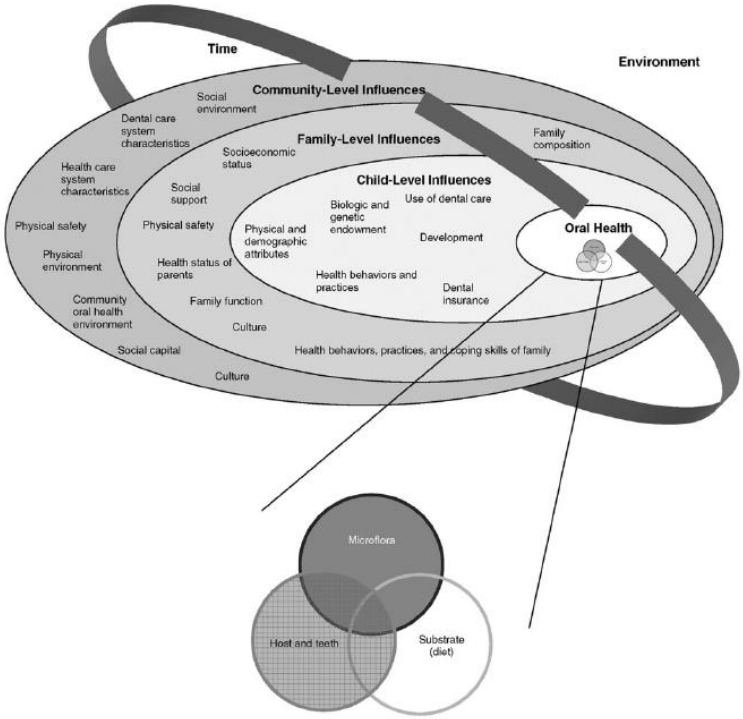

Figure 2. Fisher-Owens SA, Gansky SA, Platt LJ, et al. (2007). Influences on children's oral health: A conceptual model. *Pediatrics,120*(3), e510–e520. Retrieved from *http://pediatrics.aappublications.org/cgi/content/full/120/3/e510*

Individual health behaviors affect caries experience, but it is also necessary to understand the social and behavioral determinants of the disease as well. Human behaviors are intricate according to Sisson (2007), and oral health behaviors are influenced by various social, economic, and environmental conditions. In a study conducted by Hallett and O'Rourke (2006), it was concluded that social factors had an

influence on ECC, yet it also found that certain behavioral factors such as bottle-sipping during the day and allowing a child to go to bed at night while nursing a bottle also were also determinants of ECC. Demonstrated in another study, social risk factors including ethnicity, gender, and maternal age were determents for ECC (Marshall et al., 2005). Finlayson, Siefert, Ismail, and Sohn (2007) categorized psychosocial factors that influence oral health behaviors into cognitive elements, such as, oral health knowledge, benefits, attitudes, and feelings. Elements were then categorized into broader social factors, such as, living conditions that influence the extent to which oral health promoting behaviors are practiced and the outcomes of adherence to these behaviors.

Tagliaferro, Pereira, Meneghim, and Ambrosano (2006) conducted a long-term study on caries risk assessment; the study included 206 children. The study collected socioeconomic, demographic, behavioral characteristics and clinical characteristics. The study concluded that the best predictor for caries in the permanent dentition were caries in the deciduous dentition. Other caries risk factors identified include health history, salivary flow, fluoride exposure, diet, oral hygiene, socioeconomic status, and mothers' caries history (Trueblood, Kerins, & Seale, 2008). Aida, Ando, Aoyama, Tango, and Morita (2006) study results were similar to the other studies in that it showed similar socio-demographic characteristics which have been determined to be risk factors for inequalities in dental caries in children to include; gender, socioeconomic status, and place of residence.

Other social factors also have an influence on prevalence and severity of ECC. In a cross-sectional study of 2,515 children, it was determined that ECC was significantly

higher in children from single parent families, children with young mothers, and in children whose birth order was greater than fourth (Hallett & O'Rourke, 2003). This same study also concluded that mothers with a decreased level of education had a correlation to children with dental decay. In a randomized control study conducted with first-time mothers, it was also concluded that children were 2.3 times more likely to suffer from dental decay if they were being raised by a single parent, than children from two-parent families (Keirse & Plutzer, 2010).

A study out of New Zealand involving 835 individuals determined that poor maternal oral health when children are young was a risk indicator for caries experience for children later in adulthood. The study examined children at age 5 and then again at age 32 the study showed that adult children had a greater rate of decay if their mothers rated their ownoral health as “poor” when their children were young (Shearer, 2010). In another study examining the relationship between caregiver’s and child’s caries prevalence, among disadvantaged African Americans, it was determined, that a high rate of caries among caregivers had a significant impact on the rate of caries among the children (Reisine, Tellez, Willem, Sohn, & Ismail, 2008).

Studies support that mothers have a significant impact on early access to dental health (Muirhead, Quinonez, Figueiredo, & Locker, 2009). In a study, of 396 mother-child pairs, conducted by Kawashita et al. (2009) it was concluded that children were at a lower risk of having dental disease if their mothers had insurance, drank alcohol, were familiar with dental terminology, brushed their teeth more, ate less between meals, and exhibited less DMFT (decayed missing filled teeth). It was concluded by Kawashita et al.

(2009) that a reduced rate of dental caries was more significant if a mother possessed certain positive child rearing skills than a mother's related health behavior. A positive association existed between children that did not feed in bed, ate less in-between meals, drank sports drinks less frequently, and children that practiced good dental hygiene care at home. A positive association was also related to children that were female and firstborn. This study is of vital importance because it identified the influence of specific child rearing health behaviors to advance the overall dental health of children, such as having professional preventive dental care. Kawashita et al. (2009) study supported the notion that to be effective emphases on specific child-rearing behaviors, not on the health behaviors of the mothers themselves is most effective.

A supporting cross-sectional study of Hispanic mother-child pairs in a low-income community revealed that maternal, untreated decay had a direct correlation to a child's untreated decay. Children of mothers with untreated decay had twice the amount of untreated decay compared to children of mothers without untreated decay. Decay increased in severity by three surfaces, in comparison to children whose mother did not have untreated decay (Weintraub, Prakash, Shain, Laccabue, & Gansky, 2010). Schroth, Harrison, and Moffatt (2009) also found that boys are at a higher risk for decay, in a study of children accessing services in a community dental health clinic. Interestingly enough Schroth and Cheba (2007) study did not find that children from single parent homes have a higher rate of decay, this study showed a lower rate of decay contrasting Hallett and O'Rourke (2003), Keirse and Plutzer (2010), and Locker (2007) studies. The association between single parent homes needs to be explored further. Schroth and Cheba

(2007) also found that no use of oral health care services before 24 months of age, low monthly household income, and a history of failed dental appointments were consistent with other studies showing a significant association with dental decay. This is in line with the Milgrom et al. (2011) study, which suggested that interventions should begin before the child enters the Head Start program at age 3.

Homeless children also are a higher risk of dental decay than other non-homeless children, according to DiMarco, Ludington, and Menke (2010). In this study of 120 homeless families, nearly half of the children experienced dental caries. This study also identified the access barriers affecting this population, the top three being; mental health, oral health beliefs, and victimization. In this setting, the results of the study indicated that shelter based care was effective in improving the overall oral health of this population. Revealed in a study of children with a history of maltreatment, abused and neglected young children had a higher rate of dental decay than the general population (Valencia-Rojas, Lawrence, & Goodman, 2008). It was also suggested that protective agencies had a shielding effect on children's oral health. This discovery is of importance because it supports the recommendation that protective services should consider the possibility of dental neglect in physical and sexual abuse cases.

Cultural beliefs and experiences also influence a young child's access to dental care (Hilton, Stephen, Barker, & Weintraub, 2007). Muirhead et al. (2009) attributed the underuse of dental care to the belief that many working poor regard dental care as a luxury rather than a necessity. In addition, parents feel that treating diagnosed dental decay in preschool-aged children is not important since the decay is in baby teeth; this

attitude could be a contributing factor to dental caries being the most common chronic disease of children throughout the world. In a qualitative study using 20 in-depth interviews, Wong, Perez-Spiess, and Julliard (2005), investigated Chinese parent's belief and perspectives about caries, oral healthcare, and dental treatment. This study also reported similar findings. Wong et al. (2005) outlined five negative themes: fear of dental anesthesia (local anesthesia, shots), parents lack dental education as children, lack of social support in seeking dental treatment, inadequate oral hygiene knowledge, and cultural beliefs that did not support the preservation of the baby teeth.

Additional studies also concluded that there is a misunderstanding in perceived oral health compared with overall physical health which affects all levels of socioeconomic status (Sanders & Slade, 2006). Less pronounced is the attitude among those adults with private dental insurance that had visited a dentist within the last year. Sanders suggested that improved access to dental care might help to lessen the deficit in perceived oral health compared with general health.

Hilton et al. (2007) conducted a qualitative study of four different ethnic groups: African-American, Chinese, Latino, and Filipino. The results of the study showed that lack of knowledge and beliefs about dental caries in primary teeth were barriers. This study also concluded that dental fear significantly influenced use of preventive dental care. In a survey carried out involving rural Latino immigrants it was revealed that perceptions of oral disease were strongly connected with cultural beliefs, for example, some of the study participants attributed the shape of the baby bottle nipple as the source of decay, others associated decay with the lack of calcium (Horton & Barker, 2008).

A study by Nunn, Dietrich, Singh, Henshaw, and Kressin (2009) found that there are different levels of ECC among different immigrant groups. Nunn et al. (2009) compared the rate of dental decay in urban Boston children of immigrant parents to US children. The study concluded that there was a lower rate of dental decay in Boston children of immigrant parents than in U.S. children of immigrant parents. This study suggests that it is necessary to understand the variety of cultural pressures, both positive and negative that may affect oral health.

In a survey conducted to gauge the attitudes of Early Head Start staff, it was determined that 73% of surveyed staff felt that it was of high importance for Early Head Start children to receive dental care. Only 49% of this preschool staff placed a high value on primary teeth (Siegal et al., 2005). Dissatisfaction and perceived quality of care are factors in mothers seeking dental care for their children (Milgrom, Spiekerman, & Grembowski, 2008). This study utilized a mixed-method survey and found that the level of dissatisfaction among mothers of Medicaid-enrolled children was low. Rudeness by the dental staff and inadequate pain management were the two primary factors sighted by the participants.

Common childhood illnesses can also have a bearing on the oral health of a child. Systemic antibiotic use during the child's first year of life had a positive correlation with a considerably greater risk of ECC in relation to children that did not use antibiotics (Alaki, Burt, & Garetz, 2009). In addition, Alaki et al. (2009) research also surmise that children 13 to 18 months of age who used systemic antibiotics also showed a significantly greater risk of ECC. In a study of 3-year-old children with asthma, it was

determined that this population have a significantly higher rate of decay than their non-asthmatic counterparts did (Stensson et al., 2010). Of the 70 children involved in the study, 61% of the children had dental caries, compared with 36% in the non-asthmatic group.

Secondhand smoke has also been associated with a higher risk of primary tooth decay (Shenkin & Warren, 2009). Parents who smoked had children with a higher rate of dental decay. This was evident in a cross-sectional study which collected data from 1250, 3-year-old and 1283, 5-year-old children; the study was aimed at analyzing the association between residing with a smoker and caries experience in young children. The study reported that parental smoking was a significant predictor using univariable logistic regression analysis, caries prevalence being the dependent variable, in 5-year-old children. (Leroy, Hoppenbrouwers, Jara, & Declerck, 2008).

Dietary Factors Associated with Children's Oral Health

Exposure to sugary food and beverages has a biological role in the development of decay in the primary dentition. The frequency of this exposure is determined by attitude, culture, behavior, and the social environment of the caregiver and the child (Ismail et al., 2008). This was reinforced by the results of a study published in the Journal of Public Health Dentistry which reported that exposure to beverages which contain added sugar is detrimental to children's oral health, regardless of when it is consumed (during meals, or as in-between meal snacks). The same research study showed that starchy foods with added sugar are less detrimental if consumed at mealtime than if consumed as in-between meal snacks. In addition, this study also suggested that 100%

fruit juice is better for a child's oral health than beverages with added sugar as far as dental decay is concerned (Marshall et al., 2005). Ismail et al. (2008) and Marshall et al. (2005) study results were also consistent with Palmer et al. (2010) study examining the relationship of diet and caries-associated bacteria in S-ECC. This study reported that there is a strong association between S-ECC and in-between meal beverage consumption, the study included fruit juice, milk, and sugar-sweetened beverages. It was also determined that drinking juice and milk with a meal was not a risk factor and drinking milk only in-between meal resulted in a lower level of new carious lesions, suggesting that milk has a caries-protective quality. This same study also determined that the strongest association with S-ECC was eating and drinking at bedtime and during the night (Palmer et al., 2010). Kolker et al. (2007) and Johansson and Lif Holgerson (2011) study also supported the notion that children who drank milk had fewer caries than children who drank other sugared beverages.

The amount of sugared beverage consumption is significantly different between high and low socioeconomic status families (Hamasha, Warren, Levy, Broffitt, & Kanellis, 2006). Determined in a prospective longitudinal study comparing the oral heath behavior between low and high socioeconomic status (SES) families with children from low SES often consume more soft drinks and sugary powder based beverages than non-low SES children. This habit puts these children at high risk for developing decay (Hamasha et al., 2006). In another longitudinal study specifically investigating children ages 0 to 24 months of age, it was suggested that the amount of sugar-sweetened beverages consumed is strongly associated with future caries development (Warren et al.,

2009). Armfield (2007) also suggested the high rate of decay in children of low SES was strongly associated with a cariogenic diet, meaning a diet high in sugar.

Prolonged breastfeeding increases caries rates in children (Freeman & Stevens, 2008). In a study of pre-school aged children, the duration of breastfeeding was strongly associated with the rate of rampant dental decay (Folayan et al., 2010). This study concluded children who are breastfed for more than 18 months have a higher rate of decay. That decay increases 10% every additional month they are exclusively breastfed.

The habits related to ECC were outlined in a study conducted over 33 months involving 139 children. The top four factors putting children at risk for caries were: putting children to bed with a bottle, parents having problems brushing children's teeth, holding sugary liquids in the mouth for prolonged periods of time (because of the increases time fermentable carbohydrates are allowed to bathe the teeth, increasing acid attack potential), and ethnicity, primarily minority children (Tiberia et al., 2007).

In a study of 3- to 5-year-old children utilizing multinomial regression models, Kolker et al. (2007) found that age, soda consumption, powdered drinks and sports drinks were positively associated with dental decay. Ismail, Sohn, Lim, and Willem (2009) also found that soda has a positive association with dental decay. A cross-sectional study of children ranging in ages from 6 months to 24 months verified this finding (Warren et al., 2008). Warren et al. (2008) suggested that there are certain factors that are significantly associated with the presence of dental caries in 18-month-old children and older; regular use of fluoridated toothpaste, the presence of *mutans streptococci* (MS) in the child's saliva, presence of visible plaque on the incisors or molars, use of a sippy cup, and the

sugared beverage consumption. In this study, dental caries incidence was higher in Hispanic children, but the relationship in this particular study was not significant. In another study by Warren et al. (2009), a longitudinal study of the same high-risk population also suggests that early colonization by MS and intake of sugar-sweetened beverages have a direct relationship to ECC in high-risk populations (Warren et al., 2009). Research has also revealed that preschool aged children who have had a decrease in the intake of daily calcium, which has been replaced by sugary drinks, mainly soda, increased the incidence of dental decay (Briefel & Johnson, 2004). A study of 4-year-old children in China confirmed there was a strong relationship between excessive sugar intake and dental decay (Qin, Li, Zhang, & Ma, 2008).

Oral Hygiene Factors Associated with Children's Oral Health

Oral hygiene behavior is also associated with dental decay. In another study conducted by Kasila, Poskiparta, Kettunen, and Pietila (2006), improper tooth brushing has been shown to be a causative factor of tooth decay. In this study, school-aged children brushed their teeth the recommended amount, but because their technique was incorrect, it was not effective. Levin and Currie (2010) also conducted a study on how the home environment affects tooth brushing. Levin and Currie (2010) concluded that the family and home environment were key factors involved in home oral health care. Levin and Currie (2010) also found that if children were regularly brushing their teeth by age 12, they were more likely to continue brushing their teeth, throughout their teenage years. Revealed in another study of 1362 fifth and sixth graders, in childhood, behaviors are rather stable, particularly healthy practices. Therefore if, a child learns healthy behaviors

early in life, lapses of bad behaviors, such as during teenage years, are temporary rather than permanent (Tolvanen, Lahti, Poutanen, Seppä, & Hausen, 2010). It has been shown that the presence of visible dental plaque, because of non-brushing or poor brushing and the regular consumption of sugary drinks are associated with not only a higher rate of dental decay in preschool children but more severe decay (Declerck et al., 2008; Johansson, Holgerson, Kressin, Nunn, & Tanner, 2010). Flossing deciduous teeth once a day has also been shown to be effective in reducing dental caries (Grembowski, Spiekerman, & Milgrom, 2009; Wiener, Crout, & Wiener, 2009; Young, Lyon, & Azevedo, 2010).

It has been reported that there is a qualitative correlation between the levels of *mutans streptococci* and the level of education in mothers; mothers are most likely the transmitters of the oral flora causing early childhood caries in their children (Ersin et al., 2006). C. Lee, Tinanoff, Minah, and Romberg (2008) concluded that there is a positive correlation between the amount of plaque on the child's teeth and the related *mutans streptococci* colonization. Meurman and Pienihakkinen (2010) study also revealed that MS detected in the oral biofilm at 18 months correlated with the caries increment at 5 years of age. Warren et al. (2008) also came to a similar conclusion when studying the connection between MS and pregnant women and their children, the rate of MS of mothers and their children had a positive relationship on caries development. Taste genes have been associated with dental caries (Wendell et al., 2010).

The National Institute of Health (NIH) recommends that babies teeth be cleaned once a day, preferably before bedtime to help keep baby teeth healthy (US Department of

Health and Human Services, 2012). NIH also recommends that parents brush their child's teeth until the age of 6 or 7. The NIH also encourages parents to supervise young children as they brush at least twice a day, and children should always brush with a pea-size amount of fluoridated toothpaste (National Institutes of Health, 2013).

Factors Associated with Dental Attendance and Use

The maintenance of children's oral health is multifaceted; professional routine dental care, self-care, and community-based measures are all critical factors in improving and maintaining children's oral health. Many barriers that prevent children from receiving dental care have been documented. In a study, conducted by Siegal et al. (2005), the perceptions of access to dental care in the Head Start population were analyzed. It was concluded that the perceptions of Head Start staff, dentist, and caregivers are all notably different. This study discovered that 28% of the Head Start children in the study had decay; of that 28%, 11% could not access care. The two largest factors affecting access to oral health care according to the parents or caregivers was the cost of care and/or lack of insurance (34%). Other factors included dental office issues, such as not finding a dentist that treats young children and getting an appointment. The study concluded that only 7% of the general dentist and 29% of the pediatric dentist accept children under the age of 5 with Medicaid. The primary response given by the dentist, responding to questions regarding their perception of negative factors affecting children receiving care were poor appointment attendance.

There are many access-to-oral-health issues faced by low-income preschool families. In a study examining the oral health status and access-to-care for Head Start

Children in Suffolk County, six main barriers were identified. The most prevalent issue reported was having trouble finding a dentist that accepted their insurance (28%). Other obstacles were: insurance did not cover the procedure, the dentist did not see young children, could not keep an appointment because of work and no transportation (Goldberg et al., 2011).A qualitative study by Lopez del Valle, Riedy, and Weinstein (2005) examining the beliefs of rural Puerto Rican women also concluded that the dental experiences of a mother influence their seeking preventive dental and treatment visits for their child. A qualitative study investigating the relationship between a parent's past dental experience and its impact on the dental treatment of their children acknowledged that a parent's or caregiver's own negative memories resulted in delaying dental treatment for themselves and their children (Smith & Freeman, 2010). Lopez del Valle et al. (2005) also concluded that, in many cases, caregiver's perceptions are often inconsistent with maximizing children's oral health, justifying the development of culturally appropriate community based oral health programs.

Sohn, Taichman, Ismail, and Reisine (2008) conducted a similar study of African American caregivers. Sohn et al. (2008) sought to compare caregiver's perceptions of their children's oral health status with clinical findings. The study was aimed at determining if there was a relationship between the caregiver's attitude, beliefs, and knowledge concerning dental caries development, and the perception of the dental health of their children. The study indicated that, in fact, the relationship between a caregiver's perception of their child's oral health might have implications for the use early oral health care service for prevention and early intervention as opposed to utilizing services later in

the life of the child for restorative and surgical care. Sohn et al. (2008), therefore, suggested that efforts should be aimed at improving the dental health of caregivers, in an attempt to reduce the rate of decay in this high-risk population.

In another study by Kelly, Binkley, Neace, and Gale (2005) oral health beliefs was a primary psychosocial factor associated with use of oral health services for African American and White caregivers of Medicaid-enrolled children in Kentucky. Other factors mentioned in this study included norms of caregiver responsibility, positive caregiver dental experiences, and educational attainment. The groups that utilized dental health services reported having a higher educational level than those that did not utilize services. Another health belief shared by this group included believing that oral health is a part of overall health and an understanding of how professional preventive dental care plays a role in maintaining good oral health. The study by Kelly et al. (2005) also concluded that the groups both shared some structural barriers such as transportation, school absence policy, discriminatory treatment, and difficulty locating dental providers who accept Medicaid. It has also been shown that there is a significant inverse correlation between the level of a parent's defensiveness about their own oral health and the level of decay found in the mouths of their children according to Tang, Quinonez, Hallett, Lee, and Whitt (2005). This same study showed a parent or caregiver's stress level has also demonstrated to be associated with the caries rate of children between the ages of 4 and 5 years old.

In a multivariate analysis study aimed at determining the factors associated with dental care service use, it was concluded that minority, young, and uninsured children

were less likely to have utilized dental care services for preventive dental care than their peers (U. Isong & Weintraub, 2005). In an examination of The National Survey of Children's Health Liu, Probst, Martin, Wang, and Salinas (2007) determined rural children are less likely to have dental insurance and were less likely to receive preventive dental care even after accounting for insurance status. In the analysis of the National Survey of Children's Health and Area Resources, File, C. Lee et al. (2008) uncovered that 22.1% of children lacked dental insurance coverage and 26.9% had not had a preventive dental visit. C. Lee et al. (2008) study also revealed that US born minority children were more likely to be uninsured, with foreign-born children having the greatest chance of being uninsured. Rural children also were more likely to be uninsured than urban children. This was also supported in a case report published in the Journal of Dentistry for Children; it concluded that the absence of insurance coverage is associated with limited access to care in rural children (Waldman & Perlman, 2005). In an analysis of the 1996-2000 Medical Expenditure Panel Survey, conducted by the Agency for Healthcare Research and Quality, it was deducted that despite S-CHIP large numbers of low-income children go without needed dental care, especially disease preventing preventive dental care (Liao, Ganz, Jiang, & Chelmow, 2010).

The enrollment of a child in state-sponsored insurance such as Medicaid in some cases does not ensure a child will have a lower rate of untreated dental decay. In a study, by Buescher et al. (2003), it was determined that African American children enrolled in Medicaid use dental services much less than white children enrolled in Medicaid. Racial differences in oral health status and the use of health services are also a contributing

factor to oral diseases in American children (Buescher et al., 2003). In yet another two-part regression study, it was noted that children enrolled in Medicaid or S-CHIP have a 17% higher rate of untreated dental decay than children not enrolled in S-CHIP or Medicaid. The same study showed that children enrolled in S-CHIP had 16% fewer dental caries than those enrolled in Medicaid (Brickhouse, Rozier, & Slade, 2008). Poorer children often do not have access to care, even though many are covered by Medicaid (Blackwelder & Shulman, 2007). A 1996 report, by the Inspector General of the Department of Health and Human Services, showed that only 1 in 5 Medicaid – eligible children received dental services in 1993 (General-DHHS, 1996). In a survey including 2821 Medicaid eligible children, it was determined that enrollment in Medicaid insurance enhanced the use of medical services but did not improve the use of dental services (Fisher & Mascarenhas, 2007). It was, therefore, suggested by Fisher and Mascarenhas (2007) that access to Medicaid insurance does not advance access to dental health services for poor children. In some cases, families cannot find a dentist that accepts their Medicaid coverage (Decker, 2011). Another study examining dental attendance concluded that many children that do have a Medicaid dentist available to them often do not attend their appointments. It was theorized that parents in this population have many economic and personal disruptions in their lives, which lead to nonattendance at dental appointments for their children (Casaverde & Douglass, 2007). The medical and dental community may also contribute to the lack of importance placed on dental visits. In a study conducted involving 300 pediatricians and 300 general dentists, it was discovered that only 5% and 12% respectively were advising parents of infant patients to visit a

dentist by age 1 (Brickhouse, Unkel, Kancitis, Best, & Davis, 2008). Marshall et al. (2005) and Stensson et al. (2010) both arrived at a similar conclusion. The results suggested that varied and outdated views about oral healthcare, such as the appropriate age of the first dental visit, vary from 6 months to age 5. In an article published in the Journal of the American Academy of Pediatrics, measuring clinical advice offered to children enrolled in Medicaid and State Children's Health Insurance programs, it was concluded that 48% of the children did not receive preventive clinical advice (Perry & Kenney, 2007).

Chemical and Mechanical Prevention Strategies

The prevention of dental decay is the primary goal of the dental professional, not only is it cheaper on the system it is in the patient's best interest (C. R. Roberts, Warren, & Weber-Gasparoni, 2009). Increasing children's exposure to fluoride and improving access to preventive dental care are methods that have been proven to reduce the rate of dental decay in children (Reisine et al., 2008). In another two-year community randomized control trial of 1275 children 6 months to 5 years of age, fluoride varnish along with oral health counseling showed to have positive results in reducing the rates of dental disease (Lawrence et al., 2008). Mobley, Marshall, Milgrom, and Coldwell (2009) suggest that the role of science needs to be taken into account when designing prevention programs. The study also indicated that research is lacking in the area of this infectious disease, dental decay, and its effects on the youngest population, therefore, the translation of studies into implementation strategies needs to be addressed.

Different preventive measures have been shown to be highly acceptable; some of these include brushing with fluoridated toothpaste, the application of fluoride varnish, and xylitol in food for children (Adams et al., 2009). Fluoridated water is effective in reducing dental decay in children (Armfield, 2010; Centers for Disease Control, 2011a; de Silva-Sanigorski et al., 2011; Downer, Drugan, Foster, & Tickle, 2011; Evans, Hsiau, Dennison, Patterson, & Jalaludin, 2009; Foster, Downer, Lunt, Aggarwal, & Tickle, 2009; Iida & Kumar, 2009; Kanagaratnam, Schluter, Durward, Mahood, & Mackay, 2009; Rabb-Waytowich, 2009; Sagheri, McLoughlin, & Clarkson, 2009). In 1999, the Association of State and Territorial Dental Directors approved communities receiving optimally fluoridated water as one of the seven indicators measured in the National Oral Health Surveillance System in an effort to track the progress of dental health initiative in the Nation (Malvitz, Barker, & Phipps, 2009). Preconceptions about water quality may be a limiting factor for adequate fluoride exposure in some Latino communities (Scherzer, Barker, Pollick, & Weintraub, 2010). The American Dental Association supports fluoride varnish as an evidence-based clinical recommendation for caries prevention. In a study conducted by Autio-Gold (2008), it was concluded that fluoride varnish is effective in arresting early dental decay in the primary dentition. The study indicated that fluoride varnish is an efficient, non-surgical approach to treating incipient decay in children, based on the results of 81.2% of active carious lesions in the study group became inactive after treatment with fluoride varnish. Other interventions such as home nutritional advice during the first year of a child's life are effective in reducing caries incidence and severity (Feldens, Giugliani, Duncan, Drachler Mde, & Vitolo, 2010).

An earlier two-year randomized control trial conducted in 2006 also sought to identify the effectiveness of various fluoride varnish treatment frequencies with parent/caregiver oral health counseling versus only counseling in preventing early childhood caries in young caries-free children ages 6 months to 44 months (Weintraub et al., 2006). The study findings support the use of fluoride varnish in this population of caries-free high-risk young children when added to caregiver's counseling to reduce childhood caries incidence. The World Health Organization's (WHO) Bulletin, Special Theme on Oral Health, identifies the effective use of fluoride and addressing the oral health of children and youth through health promotion at schools, as a priority area to improve oral health worldwide (Petersen, 2008, 2009). With this in mind a study on the provision of fluoride varnish treatments by medical and dental professional, showed that overall access and use of treatments increased, but there were still pockets with medical and dental professional shortages were the use was not available (Okunseri, Szabo, Garcia, Jackson, & Pajewski, 2010). The study concluded that allowing Medicaid medical providers to apply fluoride to teeth allows improved access to care and suggested that future policies should incorporate measures that specially address geographic healthcare provider shortages. In a national study to measure pediatricians' attitudes and practices related to the oral health of children birth to 3 years old, 90% of pediatricians said that they believe they should examine the teeth of their patients for caries and educate families on the importance of oral health (Lewis, Teeple, Robertson, & Williams, 2009). Yet in practice only 54% of pediatricians reported examining the teeth of more

than half of their patients under age three, the most common barrier listed by participants was a lack of training.

The authors of a longitudinal study suggested that prevention methods should also focus on the rate and reduction of *mutans streptococci*, since this has been a predictor of caries in young children (Warren et al., 2009). The authors of the study also suggested that prevention methods should address reducing the numbers of sugary beverages since this behavior has also been attributed to dental caries risks in children.

Dental sealants are also effective in reducing dental decay (Beauchamp et al., 2008). The U.S. Surgeon General report on oral health reports that sealants applied on school-age children can reduce dental decay by as much as 70% (U.S. Department of Health and Human Services, 2000). In 2002 a literature review of pit and fissure sealant was conducted, the report included 1,465 peer-reviewed publications from 1971 to October 2001 and indicated that pit and fissure sealants are safe and effective in reducing dental decay (Simonsen, 2002). Dental Sealants were identified in a report by the Association of State and Territorial Dental Directors (ASTDD) to identify best practices that address the oral health care needs or infants, toddlers, and preschool children (Association of State and Dental Territorial Dental Directors (ASTDD) Best Practices Committee, 2003).

Behavioral and Environmental Intervention Strategies

A 30-year study to test the efficiency of an oral health promotion program concluded that the most effective approach to reducing dental decay in children was to provide anticipatory guidance beginning during pregnancy (Plutzer & Spencer, 2008).

This randomized control trial was developed for women expecting their first child. Mothers received dental health education information during their pregnancy, then again when the child was 6-month-old, then again at 12 months of age. Four hundred and forty-one women remained in the study; the rate of ECC in the test group was 1.7% and 9.6% in the control group. Plutzer and Spencer (2008) concluded that an oral health promotion program with repeated rounds of anticipatory guidance, which begins during pregnancy was remarkably successful in reducing decay in young children. Wong et al. (2005) study also supported the notion that early intervention and delivery of culturally sensitive care are effective approaches to preventing and delaying the progression of dental decay. In a study, examining the cost-effectiveness of early dental visits Lee suggest that to be effective in reversing dental disease oral health professionals must begin preventive interventions within the first year of life (J. Lee et al., 2006). Lee concluded that if effective measures are applied early in the life a child it might be possible to prevent dental disease.

Fontana et al. (2011) conducted a study for the purpose of identifying risk factors for the progression of dental caries in toddlers, in a primary healthcare setting. The rationale behind the study was if risk factors could be identified cost-effective objectives for preventive care and targeted referral strategies could be developed. This study of 329 Indiana toddlers identified family caries experience, transmission-related behaviors, dietary factors, health beliefs, and lower income as risk factors for caries progression. Fontana et al. (2011) suggested that intensive patient counseling or motivational interviews with parents to change specific behaviors was most effective in reducing

caries prevalence in children. Less consistent were antimicrobial interventions, efforts to modify diets, and traditional dental health education.

Studies have shown prekindergarten education has a positive influence on the reduction of health behavior risk factors by enhancing educational attainment. The Head Start program is a type of early education program. In a study by Muennig, Schweinhart, Montie, and Neidell (2009), 37 years of follow-up data was used from a randomized controlled trial to determine if there was a link between early educational prevention and adult health. Of the 123 children studied, those enrolled in a preschool program had a higher rate of dental visits as adults; the study concluded that early interventions are a significant public health strategy. Muennig et al. (2009) deducted that the Head Start program provides a venue in which these vulnerable children have access to dental care. Head Start is governed by a set of performance standards, some of which relate directly to the oral health needs of the children enrolled (Office of Head Start, 2012). Although children enrolled in Head Start centers are more likely to receive health evaluations and screenings, Head Start children were also more likely to have untreated dental decay (Gupta et al., 2009). Motivational interviewing with Head Start families by trained Head Start staff is effective in increasing the number of completed dental appointments (Cook, Richardson, & Wilson, 2013).

In the state of Washington, an Access to the Baby and Childhood Dentistry (ABCD) program was proven successful in increasing the likelihood of Medicaid children having, at least, one preventive dental care visit and the likelihood of the child receiving dental care (Lewis et al., 2009). The program was aimed at helping reduce

barriers to early and regular anticipatory dental care for young children. Another program Into the Mouths of Babes (IMB) which is a medical office-based preventive dental care program for infants up to 36 months also was shown to be effective (Pahel, Rozier, Stearns, & Quinonez, 2011). Children that participated in the IMB program received an oral evaluation and a fluoride varnish application in a medical office setting. Regression analysis compared subgroups of children who received six IMB visits between the ages of 3 months and 35 months. Participation in the program resulted in a cumulative decrease of 49% in caries-related dental treatment at 17 months of age.

Integrating infant oral health training into pre-doctoral dental school curriculums is valuable in increasing care (Weber-Gasparoni, Kanellis, & Qian, 2010). It was reported, when students are exposed to this type of training they are more willing to see very young children once they establish their dental practices. Nurses can also be trained to understand the concepts related to oral health and identify factors that make children vulnerable to oral disease and can be a valuable part of the dental healthcare team (M. M. Davis et al., 2010; Mattheus, 2010). Nursing interventions have been suggested as a strategy to reach at-risk children because the pediatric nurse is often the first person parents, and children encounter when they enter the healthcare environment (Marrs, Trumbley, & Malik, 2011). Binkley, Garrett, and Johnson (2010) suggested that a possible intervention to increase oral health care use by Medicaid-enrolled children was the use of a dental care coordinator. In the Binkley et al. (2010) study the use of dental care was reported to be 43% when a dental care coordinator was utilized compared to 26% when families only received the standard Medicaid member services.

In a cross-sectional study analyzing the factors associated with free dental health service use in 1303 Mexican preschool children, it was concluded that better access to preventive and rehabilitative care could have a favorable effect on untreated dental decay (Medina-Solis et al., 2006). Medina-Solis et al. (2006) suggested that better access would translate to early intervention and expedite referrals to dental services for children that need more complex care. In another study examining the use of free dental service in New England children, it was determined that the provision of free preventive care was effective in reducing dental decay (Maserejian, Trachtenberg, Link, & Tavares, 2008). Sisson (2007) stated that some of the main hindrances in health and oral health care are social inequalities and an incomplete understanding of those inequalities. One suggestion made in this study suggests public health programs need to target the social settings in which financial burdens exist. Monetary factors should include the cost of dental care, but also include the cost incurred while trying to access care. The study theorized that this is particularly the case for low-income, uneducated, minority groups, and those living in rural communities.

Schroth et al. (2009), also suggested that counseling about dietary practices, counseling about home oral hygiene, and fluoride interventions are beneficial. To be truly beneficial, this intervention should be combined with community buy-in, and always incorporate community primary care providers and other neighborhood healthcare providers. Mobley et al. (2009) also suggested that dental and other health care providers can educate and provide guidance to pregnant women, parents, and families which encourage healthy eating behaviors. In addition, advocacy for governmental policies and

programs is needed. Specifically, attention to decreasing the financial and educational barriers to achieving healthy diets, which are often not accessible to families living in poverty in urban and rural areas, is needed.

Edelstein and Chinn (2009) elaborated on the environmental factors that will need to be addressed to encourage widespread adoption. Among those suggestions were the use of social medicine, expanding knowledge of caries risk and its management, trends in oral health disparities and the demography that drives those disparities, parents perceived needs for and barriers to dental care, dentistry's relationship to medicine as a profession, and dental services capacity. Caries assessment tools are valuable in identifying at-risk populations (Ramos-Gomez, Crystal, Ng, Tinanoff, & Featherstone, 2010). ECC prevention guidelines have been used as a tool, but according to Petti (2010), components of these guidelines must be adjusted and specifically modeled around ECC because of the particular characteristics of the disease to make them a useful tool for obtaining a long-term uniform reduction of ECC incidence.

Education and motivation alone are not enough to achieve long-term change according to Chapple and Hill (2008). Tolvanen et al. (2010) state in their study, that although knowledge can be improved and attitudes can be changed, behavior is more complex, therefore, more challenging to modify. In a study exploring the behavioral pathways explaining oral health disparity in children it was suggested that properly designed oral health education programs may improve oral health behaviors, but those programs must educate and motivate parents with specific advice as opposed to delivering general information (Gao et al., 2010). With these suggestions in mind this

paper aims to measure the determinants of key oral health behaviors in the parents of this vulnerable population, in an effort to better develop evidence-based prevention programs and strategies.

Critique of Methods

The model of this research project was based on a previous study conducted by Van den Branden et al. (2013). This population in this research project was similar to the Van den Branden et al. study; the population was the parents of preschool children. This research project utilized the survey instrument also utilized by the Van den Branden et al. group. Although the Van den Branden study included a larger population size *n*=1157, other comparable studies have utilized a population similar to the scale of this proposed research project.

Weatherwax, Bray, Williams, and Gadbury-Amyot (2014) conducted a study utilizing 181 Head Start children. This study also utilized the TPB in a similar manner; to identify possible relationships between the parent's socio-demographic characteristics, knowledge and the 4 determinants defined in the TPB to the oral health status of Head Start children. A cross-sectional analysis of the current evidence the of role social, behavioral, and community determinants have on dental caries show that these are significant predictors for dental decay in children, and further research was encouraged, therefore this study was based on that recommendation (Ismail et al., 2009).

Similar data collection and analysis techniques were used in another study analyzing the association between mother-related health behaviors and dental caries in 3-year-old children (Kawashita et al., 2009). This study utilized a comparable population

size of *n*=396 mother-child pairs and also used a self-administered survey. Multiple logistic regression analyses were performed on dental caries' presence as the dependent variable with independent variables from the results of the survey.

Summary

The studies discussed in this literature review examine the challenges low-income preschool families face maintaining good oral health. Some of the most common determinants recorded in the literature include financial barriers and access to dental care. In addition, the research supports three primary behaviors which are mostly responsible for a healthy dentition in children: healthy noncariogenic diets, good oral hygiene habits, and regular dental attendance. This review also explored the factors associated with barriers related to these behaviors and studies the literature supporting these behaviors in reducing dental decay on young children.

These three behaviors rely mostly on the follow-through of the parent. This study seeks to identify the relationship(s) between an individual's beliefs, attitudes, intentions, behaviors, and perceived control over the oral health behaviors using the Theory of Planned Behavior. A study of this kind has not been conducted within the low-income, minority preschool population. The intent of this study was to gain a better understanding of the determinants and their relationship to the oral health behaviors. Although clinical efforts are useful in preventing and treating dental decay, use of dental services and follow through on recommended oral health practices are necessary in order to reduce the rate of decay in the Head Start population. By identifying these factors, cost-effective programs to promote oral health and evidence-based prevention models can be

successfully developed. Study outcomes can be used to advance the use of oral health care services for all children to reduce the rate of untreated decay. The information gathered can also be utilized to advocate for new public policy and support proposed policies and programs that address financial and nonfinancial barriers to dental care. Relevant data is needed to provide policymakers with the information necessary to advocate for oral health policy and to demonstrate a maximum return on public health and clinical care investments.

A description of how the study was conducted is discussed in detail in the following chapter. This includes an explanation of the research methods, including the design and rational. The population selection and rationale for the selection are also discussed. In addition, the following chapter discusses the survey instrument in detail as well as the data analysis plan.

Chapter 3: Research Method

Introduction

The purpose of this study was to explore the determinants of oral health behaviors among parents of low-income preschool children to develop appropriate interventions to reduce the disproportionate rate of dental decay in this population. The specific determinants that I sought to investigate were the components of TPB (Ajzen, 1991): attitudes, intentions, subjective norm, and perceived behavior control. The aim of the study was to investigate whether these determinants are associated to three specific oral health behaviors important to a healthy primary dentition: oral health dietary habits, oral health hygiene, and dental attendance. A better understanding of the determinants of oral health behaviors will allow for tailored educational programs and oral health policies to be developed.

Included in this chapter is a discussion of the research design and methodology. I review the research design, the justification for the selection of the design, along with the central concepts that drove the research. I also outline the research logistics in this section. I then discuss a review of the methodology; this includes identification of the population and an explanation of population selection, sampling strategy, and participant criteria. I also thoroughly describe the data collection instrument and the source of the data collection instrument. A complete narrative of the data analysis plan and the justification behind the selection is reviewed. The role of the researcher and any relevant ethical issues is disclosed in this section. I also examine the subject of data

trustworthiness and the threats to external and internal validity, transferability, dependability, and credibility of the data.

Research Design and Rationale

This study was based on a nonexperimental, correlational research design. The research method that I used in this study was a quantitative approach. Creswell (2009) noted that a quantitative study is a means of testing a theory by examining the relationship between variables. The independent variables in this study were attitudes, intentions, subjective norm, and perceived behavior control. The dependent variables of the study were three specific behaviors essential to a child's oral health: noncariogenic dietary habits, oral health hygiene, and dental attendance. Mediating variables such as the caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage, and program eligibility were self-reported by the respondent. The relationship of the components of the TPB are compared to three specific dental health behaviors. The study was guided by four research questions:

RQ1: Are the attitudes of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?

*H*a1A: Attitudes of preschool parents are associated with dietary habits.

*H*01A: Attitudes of preschool parents are not associated with dietary habits.

*H*a1B: Attitudes of preschool parents are associated with oral hygiene habits.

*H*01B: Attitudes of preschool parents are not associated with oral hygiene habits.

*H*a1C: Attitudes of preschool parents are associated with dental use.

*H*01C: Attitudes of preschool parents are not associated with dental use.

RQ2: Are the subjective norms of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?

*H*a2A: Subjective norms of preschool parents are associated with dietary habits.

*H*02A: Subjective norms of preschool parents are not associated with dietary habits.

*H*a2B: Subjective norms of preschool parents are associated with oral hygiene habits.

*H*02B: Subjective norms of preschool parents are not associated oral hygiene habits.

*H*a2C: Subjective norms of preschool parents are associated with dental use.

*H*02C: Subjective norms of preschool parents are not associated with dental use.

RQ3: Are the perceived behavior control of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of

children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?

*H*a3A: Perceived behavior control of preschool parents are associated with dietary habits.

*H*03A: Perceived behavior control of preschool parents are not associated with dietary habits.

*H*b3B: Perceived behavior control of preschool parents are associated with oral hygiene.

*H*03B: Perceived behavior control of preschool parents are not associated with oral hygiene habits.

*H*c3C: Perceived behavior control of preschool parents are associated with dental use.

*H*03C: Perceived behavior control of preschool parents are not associated with dental use.

RQ4: Are the intentions of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?

*H*a4A: Intentions of preschool parents are associated with dietary habits.

*H*04A: Intentions of preschool parents are not associated with dietary habits.

*H*a4B: Intentions of preschool parents are associated with oral hygiene habits.

*H*04B: Intentions of preschool parents are not associated with oral hygiene habits.

*H*a4C: Intentions of preschool parents are associated with dental use.

*H*04C: Intentions of preschool parents are not associated with dental use.

The data for this study was collected using a structured questionnaire. The questionnaire was developed by Van den Branden et al. (2013). The authors of the instrument have provided permission to use the survey (Appendix A). The questionnaire was designed by to measure the oral health behavior and its determinants in the parents of preschool children between the ages of 4 to 5 years old. The questionnaire measures three behaviors related to oral health among children: oral health dietary habits, oral hygiene and dental attendance and their associated determinants: attitude, subjective norms, perceived behavioral control and intention. The questionnaire was guided by the principles of the TPB. The instrument contains items measuring attitudes, subjective norms, perceived behavior control, and intentions. The questionnaire consists of 18items measuring determinants of dietary habits, five items measured attitude, three items measured norms of the partner, five items measured norms of others, four items measured perceived behavioral control and one item measured intention. Oral hygiene behavior was measured using 17 items, four items measuring perceived behavioral control, four items measured norms of family and friends, four items measured norms of experts and partners, four items measured attitude and one Item measured intentions. Dental attendance was measured using 16 items, four items measuring perceived behavior control, four items measuring beliefs about immediate outcomes, five items measuring norms, two items measuring beliefs about long-term outcomes and one item measuring

intention. Behaviors were then measured with specific items. Dietary habits were measured with four items; answers were reported on a 5-point scale ranging from ‘never’ to ‘more than once a day.' items centered on consumption of sugared in-between snacks and drinks and consumption of sugared snacks and drinks at night. Oral hygiene behaviors were measured with two items; answers were reported on a four-point scale ranging from ‘never’ to ‘twice a day or more’ and centered on the frequency of brushing and frequency of helping with brushing. Dental use was measured by asking: When was the child last seen by a dentist? The answer was reported on a four-point scale ranging from ‘never’ to ‘six months ago or less.'

The results of Van den Branden et al. (2013) study indicated that the determinants outlined in the TPB were significant predictors of oral health behaviors. In addition, the study indicated that the survey was both valid and reliable in the Dutch language. For each of the three oral health related behaviors exploratory factor analyses (EFA), using Principal Components and Varimax rotation was conducted on half the dataset to identify the factor structure. PASW Statistics 17 was used for each of the three behaviors separately. The factor solution was grounded on criteria of eigenvalue greater than 1 and on inspection of the scree plot. The criteria for EFA included that factor loadings were preferably above 0.5 with a gap between cross-loadings of at least 0.1. Cross-loadings should not be higher than 0.3 and factor membership must be both meaningful and useful. The authors used reliability testing with Cronbach’s alpha to decide whether an item should be removed. Confirmatory factor analyses (CFA) was performed on the other half of the sample to obtain a cross-validation, this was done using the LISREF 8.7 program.

The adequacy of the model fit was evaluated with the chi-square test statistic, the goodness-of-fit index (GFI), adjusted goodness-of-fit index, comparative fit index and the root mean squared error of approximation (RMSEA). To improve the model fit, the authors choose to allow error variances between the items to correlate; they based this on the modification of indices. Internal consistency was tested using Cronbach's alpha and ranged from 0.52 to .80. Also analyzed were Pearson correlations between scales. Multiple regression analyses were applied to evaluate whether the scales measuring attitude, subjective norms, and perceived behavior control could predict intentions and if the intention and perceived behavior control could predict the behavior. Furthermore, a scale score was constructed for every participant, by calculating the mean of the items that measured the same underlying factor, using PASW Statistic 17.

The authors support that this instrument can be utilized for use with other populations. The questionnaire was used initially in the Dutch language by the authors of the instrument. The instrument was then translated from Dutch into English by an experienced staff member of the research team and then checked for the correct translation of particular oral (health) related terms by a member of the Dutch research team for the purpose of publishing in English. The survey was translated into Spanish by the researcher. The translated survey was then reverse transcribed and reviewed for accuracy.

A foreseeable time restraint was that this program was a 9-month program. Therefore, data had to be collected between the months of September and May. The North East Independent School district authorized data collection only between

September 25th, 2015 and May 8th, 2016 (Appendix D). The District also stipulated that data could not be collected during the first week or last three weeks of the Semester. There was no other foreseeable time constraint associated with the research study.

The quantitative design of the research allows the researcher to compare the variables to explain and predict a phenomena or theory. The aim was to gain an in-depth understanding of the determinants associated with oral health behaviors. The quantitative survey was valuable because it allowed the researcher to produce reliable data that can be generalized to larger populations.

Table 1

Variables Corresponding to Research Questions and Survey Item

Variable category	Research question	Survey items
Independent variables		
Attitude toward dietary habits	RQ1: Are the attitudes of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage, and program eligibility?	5 dietary items, 21–25
Attitude toward oral hygiene	RQ1: Are the attitudes of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?	4 oral hygiene items, 51–54
Attitude toward dental use	RQ1: Are the attitudes of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?	6 dental utilization items, 60–63, 69, and 70

Subjective norms toward dietary habits	RQ2: Are the subjective norms of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?	8 dietary items, 26–33
Subjective norms toward oral hygiene	RQ2: Are the subjective norms of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States , number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?	8 oral hygiene items, 43–50
Subjective norms toward dental use	RQ2: Are the subjective norms of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States , number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?	5 dental use items, 64–68
Perceived behavior control toward dietary habits	RQ3: Are the perceived behavior control of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?	4 dietary items, 34–37
Perceived behavior control toward oral hygiene	RQ3: Are the perceived behavior control of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?	4 oral hygiene items, 39–42
Perceived behavior control toward dental use	RQ3: Are the perceived behavior control of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?	4 dental use items, 56–59

Intentions toward dietary habits	RQ4: Are the intentions of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?	1 dietary item, 38
Intentions toward oral hygiene	RQ4: Are the intentions of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?	1 oral hygiene item, 55
Intentions toward dental use	RQ4: Are the intentions of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?	1 dental uses item, 71
Dependent variables		
Dietary habits	RQ1: Are the attitudes of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility? RQ2: Are the subjective norms of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility? RQ3: Are the perceived behavior control of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?	Items 14–17

	RQ4: Are the intentions of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?	
Oral hygiene habits	RQ1: Are the attitudes of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility? RQ2: Are the subjective norms of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility? RQ3: Are the perceived behavior control of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility? RQ4: Are the intentions of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?	Items 18–19
Dental utilization	RQ1: Are the attitudes of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility? RQ2: Are the subjective norms of preschool parents associated with dietary habits, oral hygiene habits,	Item 20

	and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility? RQ3: Are the perceived behavior control of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility? RQ4: Are the intentions of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?	
Mediating variables		
Respondent age Relationship to the child Respondent educational level Origin of birth Years in the United States Number of children <18 years in the family Child's age Child's gender Child's origin of birth Language spoken at home Child's ethnicity Child's dental insurance coverage Program eligibility	RQ1: Are the attitudes of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility? RQ2: Are the subjective norms of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility? RQ3: Are the perceived behavior control of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility? RQ4: Are the intentions of preschool parents associated with dietary habits, oral hygiene habits,	Items 1–13 Item 1, respondents age Item 2, relationship to child Item 3, educational level Item 4, origin of birth Item 5, years lived in United States Item 6, number of children <18 years in the family Item 7, child's age Item 8, child's gender Item9, child's origin of birth Item 10, language spoken at home Item 11, child's ethnicity Item 12, child's dental coverage Item 13, program eligibility

	and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?

Methodology

Qualified participants for this study were the parents of preschool children between the ages of 4 to 5 years old, enrolled in the North East Independent School District Early Childhood program. The sample size was 1,118 participants. I used convenience sampling. This was done by distributing surveys to the parents of 1118 preschool children enrolled in one of the 17 prekindergarten programs administrated by the North East Independent School District (NEISD). The District administers prekindergarten programs at the following elementary school campuses: Canyon Ridge, Oak Meadow, Olmos, Dellview, Ridgeview, Roan Forest, Redland Oaks, Wilshire, Northern Hills, El Dorado, Serna, East Terrell Hills, Harmony Hills, Oak Grove, Fox Run, Montgomery, and Walzem. A priori power analysis demonstrated that with a 5% margin of error, 95% confidence interval, and 50% of minimum response rate, the recommended adequate sample size should be at least 287 persons (Raosoft calculator, http://www.raosoft.com/samplesize.html).

The surveys were made available in English and Spanish. Participants must comprehend either English or Spanish to participate. If study participants could read and write in either English or Spanish, the survey would be completed independently. If the participant was not able to read or write, the survey would be read verbatim to the participant. The researcher would then notate the verbal answers given by the participant

on the survey. One survey was completed per child. If a parent had two children enrolled in the program, a separate survey was completed for each child. The participant must have been willing to complete a 5-10-minute survey. The total number of participants were limited by the number of respondents. The survey was made available to all 1,118 families. It was estimated that approximately 50% of the families would agree to participate, approximately 559 participants. The survey was to conducted within a three-week period, actual data collection took four weeks.

Prior to any disclosure of information, a consent form in either English or Spanish was provided to the parent of each child. The consent form clearly stated the nature of the study, the risk and benefits of being in the study, payment, privacy, and contact information in case the participants has questions in the future. The study participants were also informed that they may choose not to participate or refuse to answer any item on the survey, or ask for clarification on any item. The parents of children could decide not to participate in the study or could decide not to complete a survey after reviewing it.

The researcher planned on visiting each of the 17 campuses to obtain approval from the campus principal. Once the school principal gave approval to conduct research on the campus, an email was sent to each prekindergarten teachers explaining the project. The researcher included a consent form along with each survey. The consent form explained that by returning the survey, agreement to participate in the study was implied. No signature was required on the consent form. An envelope was attached to each survey with instructions to place the completed survey in the envelope and then seal the envelope. The questionnaire and the envelope did not have any identifiable information.

Basic demographic information was collected. The caretaker's age, relationship to the child, educational level, the origin of birth, years in United States, the number of children in the home, as well as the child's age, gender, the origin of birth, language spoken at home, race, dental insurance coverage and program eligibility was self-reported by the respondent.

The survey was self-administered. A formal report outlining the results of the study will be provided to the Director of the Department of Planning and Research at NEISD. There will be no debriefing or follow-up procedures for the participants in this study. The role of the researcher in this study was to provide surveys to all potential participants and coordinate the respondents' participation. The researcher in this study had no personal relationships with any of the respondents or any of the teachers or administrators of the participating campuses. The researcher previously worked for the local Health Department, which administers a dental health program that provides dental screenings and education to some NEISD schools.

The completed surveys were removed from the sealed envelope and are being stored securely. The completed surveys are being kept in a locked file cabinet in the researcher's home office. The key to the cabinet will only be accessible to the researcher. The envelopes were discarded.

Data Analysis Plan

The survey contained 71 items. Items 1-13 were categorical demographic variables, asking the caretaker's age, relationship to the child, educational level, the origin of birth, years in U.S., number of children in the home, child's age, gender, the

origin of birth, the language spoken at home, race, dental insurance coverage and program eligibility. The rest of the survey incorporates items to measure the four components of the TPB, attitudes, subjective norms, perceived behavior control, intentions and self-reported behavior for each of the three oral health behaviors of interest (dietary habits, oral hygiene habits, and dental attendance). Items 14-20 self-reported behaviors relating to three oral health behaviors. Dietary habits, mainly limiting the child's consumption of sugary in-between meals and snacks were measured with four self-reported items measuring this behavior. The four items (14–17), indicating the consumption of in-between drinks, consumption of in-between means, snacks at night, and drink at night were continuous variables measured on a 5-point Likert scale ranging from 'never' to 'more than twice a day'. Oral hygiene behaviors were measured with two self-reported items (18 and 19), the first item examining the frequency of brushing using a 4-point Likert scale ranging from 'never' to 'twice a day or more', the second examining the frequency of helping to brush, ranging from 'never' to 'every day'. Dental attendance was measured using one self-reported item (20) asking when the child was last seen by the dentist with responses measured on a 4-point Likert scale ranging from 'never' to 'six months ago or less.'

The 51 belief-based continuously variable items (21-71) measured the beliefs proceeding these determinants of these oral health behaviors, three of those items measured intention, responses will be measured on a 5-point Likert scale ranging from 'strongly disagree' to 'strongly agree'. Items 21–38 addressed dietary habits, five items (21-25) measured attitude toward the beliefs; eight items (26-33) measured subjective

norm; 4 items (34-37) measured PBC. Intention toward dietary habits was measured with one item (38) ‘I will make sure that my child does not receive sugary snacks (food or drinks) too often. Items 39-55 addressed oral hygiene, four items (39-42) measured PBC, 8 items (43-50) measured subjective norm, 4 items (51-54) measured attitude toward the behavior. One item (55) measured intention toward oral hygiene, ‘In our family, we intend to make sure that our child’s teeth get brushed properly every day.’ Items 56-71 addressed dental attendance, 4 items (56 – 59) measured PBC, 6 items measured attitudes toward dental attendance, 4 of these 6 items (60-63) measured attitudes about immediate outcomes, 2 of the 6 items (69-70) measured attitudes about long-term outcomes, 5 items (64-68) measured subjective norm. One item (71) measured intention toward dental attendance, ‘We intend to take our child twice a year to the dentist for a check-up’.

The sample metric data was screened for linearity, independence of residuals, homoscedasticity, multicollinearity, residuals, and normality. There was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.910. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There were no studentized deleted residuals greater than ±3 standard deviations, no leverage values greater than 0.2, and values for Cook's distance above 1. There assumption of normality was met, as assessed by Q-Q Plot. Measures of central tendency including means and standard deviations, as well as frequencies and percentages, were calculated to describe

the sample characteristics multiple regression analysis was applied to evaluate whether the scales measuring attitude, subjective norms, and PBC could predict intentions, and to determine if intention and PBC could predict behavior. Statistical Package for Social Sciences (SPSS) Version 21 was used to analyze the data (a=0.05). For every participant, a scale score was constructed by calculating the mean of the items that measured the same underlying factor (e.g. attitude toward dental attendance).

Table 2

Statistical Procedure per Research Questions

Research questions	Hypotheses	Variables	Statistical procedures
RQ1: Are the attitudes of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?	H_a1A: Attitudes of preschool parents are associated with dietary habits. $H_0$1A: Attitudes of preschool parents are not associated with dietary habits. H_a1B: Attitudes of preschool parents are associated with oral hygiene habits. $H_0$1B: Attitudes of preschool parents are not associated with oral hygiene habits. H_a1C: Attitudes of preschool parents are associated with dental use. $H_0$1C: Attitudes of preschool parents are not associated with dental use.	IV: Attitude toward dietary habits Attitude toward oral hygiene habits Attitude toward dental use DV: Dietary habits Oral Hygiene habits Dental use	Multiple linear regression
RQ2: Are the subjective norms of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken	H_a2A: Subjective norms of preschool parents are associated with dietary habits. $H_0$2A: Subjective norms of preschool parents are not associated with dietary habits. H_a2B: Subjective norms of preschool parents are	IV: Subjective norms toward dietary habits Subjective norms toward oral hygiene habits Subjective norms toward dental use DV:	Multiple linear regression

at home, race, dental insurance coverage and program eligibility?	associated with oral hygiene habits. $H_0$2B: Subjective norms of preschool parents are not associated oral hygiene habits. H_a2C: Subjective norms of preschool parents are associated with dental use. $H_0$2C: Subjective norms of preschool parents are not associated with dental use.	Dietary habits Oral Hygiene habits Dental use	
RQ3: Are the perceived behavior control of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?	H_a3A: Perceived behavior control of preschool parents are associated with dietary habits. $H_0$3A: Perceived behavior control of preschool parents are not associated with dietary habits. H_b3B: Perceived behavior control of preschool parents are associated with oral hygiene. $H_0$3B: Perceived behavior control of preschool parents are not associated with oral hygiene habits. H_c3C: Perceived behavior control of preschool parents are associated with dental use. $H_0$3C: Perceived behavior control of preschool parents are not associated with dental use.	IV: Perceived behavior control toward dietary habits Perceived behavior toward oral hygiene habits Perceived behavior control toward dental use DV: Dietary habits Oral Hygiene habits Dental use	Multiple linear regression
RQ4: Are the intentions of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?	H_a4A: Intentions of preschool parents are associated with dietary habits. $H_0$4A: Intentions of preschool parents are not associated with dietary habits. H_a4B: Intentions of preschool parents are associated with oral hygiene habits. $H_0$4B: Intentions of preschool parents are not	IV: Intentions toward dietary habits Intentions toward oral hygiene habits Intentions toward dental use DV: Dietary habits Oral Hygiene habits Dental use	Multiple linear regression

	associated with oral hygiene habits. H_a4C: Intentions of preschool parents are associated with dental use. $H_0$4C: Intentions of preschool parents are not associated with dental use.

Threats to Validity

The research project was designed with an effort to minimize the threats to internal and external validity. The population selection was chosen to reduce threats to external validity. The demographic information collected verified that the population selected was representative of low-income populations. It was not possible to survey all of the low-income parents of children enrolled in a preschool program. It was also not feasible to study all of this population at the state or county level. The population selected was one school district with a prekindergarten enrollment of 1,118 children. The sample population was representative of the sample being studied, and the sample size was appropriate. In an effort to reduce the threat to validity all of the preschool families in the North East Independent School District were asked to participate in the study. Efforts were made to eliminate threats to internal validity. To reduce instrumentation threat due to experimental arrangement, all participants were given a standardized data collection instrument using the same distribution and collection methods. The timeframe for information gathering was kept to a minimum to reduce threats to internal validity due to history or maturation. All information from the 17 survey sites was gathered within a four week period. Internal validity was addressed by giving each participant several

opportunities to complete the survey during the four-week period. The survey was distributed early in the second semester of the school year. Statistical regression was used to eliminate extreme scores.

Ethical Concerns

Ethical concerns were also addressed. Prior to any disclosure of information, a consent form was provided and reviewed with each respondent (Appendix 1). The consent form clearly stated the nature of the study, the risk and benefits of being in the study, payment, privacy, and contact information in case the participants had questions in the future. The participant was informed that they could choose not to participate, withdraw from the study at any time, and refuse to answer any item on the survey or ask for clarification on any particular item.

Participants in the study were assured confidentiality. The consent form nor the surveys were labeled with any identifiable information. The consent form stated that by completing the survey consent to participate in the study was implied. The survey was self-administered. If a participant required that the survey be read to them, this would have been done at a pre-arranged location at the campus that allows for privacy and no interruptions. The role of the researcher in this study was to provide surveys to participants and coordinate the respondents' participation. The researcher in this study had no personal relationships with any of the respondents or any of the teachers or administrators of the participating campuses. The researcher previously worked for the local Health Department, which administered a dental health program that provides

dental screenings, fluoride varnish, dental sealants, and education to some NEISD campuses.

The completed surveys were removed from the sealed envelope and stored securely. The completed surveys are stored in a locked file cabinet in the researcher's home office. The key to the cabinet is accessible only to the researcher. The envelopes had no identifiable information and were discarded. All documentation will be shredded 5 years (60 months) after the initial data collection.

The quantitative nature of the survey was valuable in that it allowed the researcher to produce reliable data that can be generalized to a larger population. Generalizations should be made with caution from the sample to the wider population. The structured survey allowed for the collection of specific and targeted data. The information gathered in the study can be used to develop a better understanding of the determinants of oral health behaviors in low-income parents of preschool children. By identifying the determinants which affect oral health behaviors, mainly oral hygiene habits, a noncariogenic diet and dental attendance, cost-effective programs to promote oral health and evidence-based prevention models can be successfully developed. As a result, the rate of dental disease and its associated negative results will be reduced, and the quality of life of preschool families will improve. I received final Walden University IRB approval # 04-02-15-0044400 on January 8th, 2016.

Summary

Dental caries in children is a significant public health concern because of the negative impact the disease has on the children's quality of life. It is well documented

that three behaviors can eliminate this disease in most preschool children; a healthy noncariogenic diet, good oral hygiene, and regular preventive dental visits. These three behaviors are controlled by the child's caretaker, in most cases the child's parents. The purpose of this study was to understand the determinants of these three important oral health behaviors using the Theory of Planned Behavior. The Theory of Planned Behavior has been a useful tool in evaluating health behaviors. The justification for the research methodology is discussed in the following chapter which includes identification of the population, and an explanation of population selection, sampling strategy, and participant criteria. The reliability of the data collection instrument and the source of the data collection instrument are also thoroughly described. A complete narrative of the data analysis plan was reviewed along with the justification for the selection. In addition to supporting the credibility of the research project, the role of the researcher and any relevant ethical issues are disclosed in the following section. The subject of data trustworthiness, the threats to external and internal validity, transferability, dependability, and credibility of data are also examined.

Chapter 4: Presentation of the Results and Findings

Introduction

The purpose of this study was to investigate the determinants of oral health behaviors among parents of low-income preschool children. By identifying these determinants appropriate interventions to reduce the disproportionate rate of untreated dental caries in this population can be developed. A better understanding of determinants can guide interventions that change behaviors that contribute to the disease and evoke positive, deliberate, planned behaviors that prevent the disease. The specific determinants investigated through this quantitative study by means of a survey instrument were the components of the TPB: attitudes, intentions, subjective norm, and perceived behavior control (Ajzen, 1991). Attitude toward oral health behaviors relates to how an individual evaluates a specific oral health behavior; subjective norm toward oral health refers to what others who are important to the individual believe the individual should do with regard to these actions; perceived behavior control of oral health behaviors is the individuals perceived ease or difficulty toward performing the particular oral health behavior (Ajzen, 1991). I investigated the determinants' relation to three specific oral health behaviors necessary to a healthy primary dentition: noncariogenic dietary habits, oral health hygiene habits, and regular dental attendance. A better understanding of the determinants of oral health behavior will allow for tailored educational programs and interventions targeted at changing behavior to be developed, which will be aimed at low-income parents and caregivers of preschool children.

In this section, I provide a detailed description of data collection and data analysis. I also discuss the time frame of data collection, response rate, and recruitment strategies. I explain discrepancies in data collection as described in Chapter 3. I then present descriptive and demographic characteristics of the sample. I consider the representation of the sample to the larger population and external validity.. I then report the results of univariate analysis, and I outline. descriptive statistics characterizing the sample. I also consider statistical assumptions appropriate to multiple linear regression. Statistical analysis of findings is organized by research questions. Items 34, 35, 39, 40, 41, 51, 52, 54, 56, 57, 61, and 62 were reverse coded for the multiple linear analysis.

Data Collection

The community partner approved my research request on September 25th, 2015. I received final Walden University IRB approval # 04-02-15-0044400 on January 8th, 2016. I initiated data collection on January 11th. Data collection occurred from January 11th, 2016 - January 29th, 2016, using convince sampling technique. Qualified participants for the study were the caregivers or parents of preschool children mostly age 4 to 5 years old, enrolled in the North East Independent School District Early Childhood program. The initial sample size was n=1,118 participants. The study utilized convenience sampling. The survey instrument (Appendix B and C) was distributed to the parents of n=1,118 preschool children enrolled in one of the 17 Prekindergarten programs administrated by the North East Independent School District (NEISD). The district administers prekindergarten programs at the following elementary school campuses: Canyon Ridge, Oak Meadow, Olmos, Dellview, Ridgeview, Roan Forest, Redland Oaks,

Wilshire, Northern Hills, El Dorado, Serna, East Terrell Hills, Harmony Hills, Oak Grove, Fox Run, Montgomery, and Walzem. The researcher visited each of the 17 campuses to obtain approval from the campus principal. After approval was received an email was sent to each prekindergarten teacher explaining the project and the date the dropbox, goodie bags and survey instruments would be delivered to the school. A priori power analysis demonstrated that with a 5% margin of error, 95% confidence interval, and 50% of minimum response rate, the recommended adequate sample size should be at least *n*=287 persons (Raosoft calculator, http://www.raosoft.com/samplesize.html), the actual sample size was *n*=436..

Thirteen demographic items were collected on the instrument: caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, child's age, gender, origin of birth, the language spoken at home, race, dental insurance coverage and program eligibility was self-reported by the respondent. These 13 demographics are included as covariates. Out of the 1,118 children enrolled in the program, 436 returned the completed survey, a response rate of 38.9%.

The age of the respondents ranged from age 14 to age 72 (Table 3). Of the respondents, 86.9% reported being the child's mother (Table 4) with 76.6% not have a college degree (Table 5). 44.0% of respondents reported being born outside of the United States (Table 6) with 33.5% reported being in the United states more than 4 years but not their entire life, and 12.4% reported being in the United States less than 4 years (Table 7). 85.1% reported having more than one child in the home (Table 8). The majority of the children 97.5% were 54 months to 65 months old (4 ½ - 5 ½ years old) (Table 9). The

gender of the children was evenly distributed at 49.3% male and 50.2% female (Table 10). The majority of children 89.7%, reported being born in the United States (Table 11) and 64.7% of the households spoke English at home, 40.8% of households reported speaking Spanish at home, and 4.8% reported not speaking English or Spanish in the home (Table 12). Other languages spoken at home were Arabic, American Sign Language, Chin, Dutch, Farsi, German, Guajarati (Indian), Gujarati (Hindi), Hiligaynon, Hindi, Japanese, Kannada, Korean, Malayalam, Persian, Romanian, Russian, Tagalog, Telugu, Thai, Urdu, Vietnamese and Zomi. The majority of the children 65.4%, reported being Hispanic (Table 13). The most common dental coverage indicated was Medicaid at 55.3% (Table 14). The most common criteria for eligibility was free and reduced lunch at 63.3% followed by 16.3% unable to speak or comprehend English and 15.4% enrolled in Head Start (Table 15). The majority of children, 81.3%, had one or more low-income identifier (Table 16).

The research project was designed to minimize the threats to internal and external validity. The population selection was chosen to reduce threats to external validity. Thirteen pieces of demographic information were collected to verify that the population was representative of low-income communities. The sample in this research project was representative of the population in this preschool program. Generalizations should be made with caution from the sample to the wider population. Experimental fatigue may have been a factor due to the length of the survey instrument. Since the completion of the survey instrument was voluntary, volunteer bias may reduce the homogeneity of the

characteristics between my sample and the general population threatening the external validity.

If a caregiver did not read English or Spanish, it was determined in chapter 3 that the survey would be read to them. None of the participants requested this, although *n*=57 reported speaking another language as well as English or Spanish and *n*=21 (4.8%) that reported not speaking English or Spanish. It is unknown how the *n*=21 participants that did not speak English or Spanish completed the survey instrument.

Table 3

Age of Respondent (Years) Frequencies

	Years	Frequency	Percentage	Valid percentage
Valid	14	1	.2	.2
	20	1	.2	.2
	21	2	.5	.5
	22	10	2.3	2.4
	23	12	2.8	2.9
	24	18	4.1	4.3
	25	18	4.1	4.3
	26	19	4.4	4.6
	27	18	4.1	4.3
	28	28	6.4	6.7
	29	21	4.8	5.1
	30	27	6.2	6.5
	31	20	4.6	4.8
	32	32	7.3	7.7
	33	28	6.4	6.7
	34	22	5.0	5.3
	35	24	5.5	5.8
	36	17	3.9	4.1
	37	19	4.4	4.6
	38	11	2.5	2.7
	39	11	2.5	2.7
	40	17	3.9	4.1

	41	11	2.5	2.7
	43	2	.5	.5
	44	4	.9	1.0
	45	3	.7	.7
	46	3	.7	.7
	47	3	.7	.7
	48	1	.2	.2
	50	1	.2	.2
	51	3	.7	.7
	55	1	.2	.2
	59	1	.2	.2
	60	1	.2	.2
	61	1	.2	.2
	63	1	.2	.2
	64	1	.2	.2
	66	1	.2	.2
	72	1	.2	.2
	Total	415	95.2	100.0
Missing	System	21	4.8	
Total		436	100.0	

Table 4

Relationship to Child Frequency

		Frequency	Percentage	Valid percentage
Valid	Mother	379	86.9	87.1
	Father	45	10.3	10.3
	Grandmother	8	1.8	1.8
	Grandfather	1	.2	.2
	Other	2	.5	.5
	Total	435	99.8	100.0
Missing	System	1	.2	
Total		436	100.0	

Table 5

Respondent Educational Level Frequencies

		Frequency	Percentage	Valid percentage
Valid	Did not finish high school	53	12.2	12.3
	Finished high school	113	25.9	26.2
	Some college or technical school	166	38.1	38.4
	Finished college	100	22.9	23.1
	Total	432	99.1	100.0
Missing	System	4	.9	
Total		436	100.0	

Table 6

Respondent Origin of Birth Frequencies

		Frequency	Percentage	Valid percent
Valid	United States	242	55.5	55.8
	Other	192	44.0	44.2
	Total	434	99.5	100.0
Missing	System	2	.5	
Total		436	100.0	

Table 7

Respondent Years in the United States Frequencies

		Frequency	Percentage	Valid percent
Valid	Less than 4 years	54	12.4	12.6
	More than 4 years but not entire life	146	33.5	34.0
	Entire life	229	52.5	53.4
	Total	429	98.4	100.0
Missing	System	7	1.6	
Total		436	100.0	

Table 8

Number of Children in the Family (Under age 18) Frequencies

		Frequency	Percentage	Valid percent
Valid	1	64	14.7	14.7
	2	176	40.4	40.5
	3	114	26.1	26.2
	4 or more	81	18.6	18.6
	Total	435	99.8	100.0
Missing	System	1	.2	
Total		436	100.0	

Table 9

Age of Child (Months) Frequencies

	Age of Child in Months	Frequency	Percentage	Valid percent
Valid	42	1	.2	.2
	51	2	.5	.5
	52	2	.5	.5
	53	2	.5	.5
	54	32	7.3	7.4
	55	37	8.5	8.6
	56	32	7.3	7.4
	57	36	8.3	8.4
	58	43	9.9	10.0
	59	19	4.4	4.4
	60	33	7.6	7.7
	61	29	6.7	6.7
	62	33	7.6	7.7
	63	36	8.3	8.4
	64	47	10.8	10.9
	65	42	9.6	9.8
	66	1	.2	.2
	67	1	.2	.2
	73	1	.2	.2
	76	1	.2	.2
	Total	430	98.6	100.0
Missing	System	6	1.4	

Total	436	100.0	

Table 10

Childs Gender Frequencies

		Frequency	Percentage	Valid percent
Valid	Male	215	49.3	49.5
	Female	219	50.2	50.5
	Total	434	99.5	100.0
Missing	System	2	.5	
Total		436	100.0	

Table 11

Child's Origin or Birth Frequencies

		Frequency	Percentage	Valid percent
Valid	United States	391	89.7	89.9
	Other	44	10.1	10.1
	Total	435	99.8	100.0
Missing	System	1	.2	
Total		436	100.0	

Table 12

Language(s) Spoken at Home

		Frequency	Percentage	Validpercent
Valid	No English Spoken at Home	153	35.1	35.2
	English Spoken at home	282	64.7	64.8
	Total	435	99.8	100.0
Missing	System	1	.2	
Total		436	100.0	

		Frequency	Percentage	Valid percent
Valid	Spanish not spoken at home	257	58.9	59.1
	Spanish spoken at home	178	40.8	40.9

	Total	435	99.8	100.0
Missing	System	1	.2	
Total		436	100.0	

		Frequency	Percentage	Valid percent
Valid	No other language than English or Spanish spoken	378	86.7	86.9
	Language other than English or Spanish spoken	57	13.1	13.1
	Total	435	99.8	100.0
Missing	System	1	.2	
Total		436	100.0	

		Frequency	Percentage	Valid percent
Valid	Do not speak English or Spanish	21	4.8	4.8
	Speak either English or Spanish	368	84.4	84.6
	Speaks both English and Spanish	46	10.6	10.6
	Total	435	99.8	100.0
Missing	System	1	.2	
Total		436	100.0	

		Frequency	Percentage	Valid percent
Valid	No English or other language spoken at home	132	30.3	30.3
	English or other language spoken	267	61.2	61.4
	Both English and Other Language Spoken at home	36	8.3	8.3
	Total	435	99.8	100.0
Missing	System	1	.2	
Total		436	100.0	

Table 13

Child's Ethnicity Frequency

		Frequency	Percentage	Valid percent
Valid	Not White	344	78.9	79.1
	White	91	20.9	20.9
	Total	435	99.8	100.0
Missing	System	1	.2	

Total		436	100.0	

		Frequency	Percentage	Valid percent
Valid	Not Hispanic/Latino	148	33.9	34
	Hispanic or Latino	287	65.8	66
	Total	435	99.8	100.0
Missing	System	1	.2	

		Frequency	Percentage	Valid percent
Valid	Not Black / African American	381	87.4	87.6
	Black / African American	54	12.4	12.4
	Total	435	99.8	100.0
Missing	System	1	.2	
Total		436	100.0	

		Frequency	Percentage	Valid percent
Valid	Not Native American or American Indian	433	99.3	99.5
	Native American or American Indian	2	.5	.5
	Total	435	99.8	100.0
Missing	System	1	.2	
Total		436	100.0	

		Frequency	Percentage	Valid percent
Valid	Not Asian or Pacific Islander	373	85.6	85.7
	Asian or Pacific Islander	62	14.2	14.3
	Total	435	99.8	100.0
Missing	System	1	.2	
Total		436	100.0	

		Frequency	Percentage	Valid percent
Valid	Not Other Ethnicity	427	97.9	98.2
	Other Ethnicity	8	1.8	1.8
	Total	435	99.8	100.0
Missing	System	1	.2	
Total		436	100.0	

Table 14

Child's Dental Coverage

		Frequency	Percentage	Valid percent
Valid	Medicaid	241	55.3	55.5
	CHIP	45	10.3	10.4
	Private Dental Insurance	95	21.8	21.9
	Other	14	3.2	3.2
	None Checked	39	8.9	9.0
	Total	434	99.5	100.0
Missing	System	2	.5	
Total		436	100.0	

Table 15

Program Eligibility Criteria Frequencies

Unable to speak/comprehend English		Frequency	Percentage	Valid percent
Valid	no	364	83.5	83.7
	yes	71	16.3	16.3
	Total	435	99.8	100.0
Missing	System	1	.2	
Total		436	100.0	

Eligible for free or reduced lunch		Frequency	Percentage	Valid percent
Valid	no	159	36.5	36.6
	yes	276	63.3	63.4
	Total	435	99.8	100.0
Missing	System	1	.2	
Total		436	100.0	

Parent or child are homeless		Frequency	Percentage	Valid percent
Valid	no	425	97.5	97.7
	yes	10	2.3	2.3
	Total	435	99.8	100.0
Missing	System	1	.2	
Total		436	100.0	

Parent in or former armed forces		Frequency	Percentage	Valid percent
Valid	no	37	86.9	87.1

	yes	56	12.8	12.9
	Total	435	99.8	100.0
Missing	System	1	.2	
Total		436	100.0	

Enrolled in Head Start	Frequency	Percentage	Valid percent
no	368	84.4	84.6
yes	67	15.4	5.4
Total	435	99.8	100.0
System	1	.2	
Total	436	100.0	

In conservatorship of Dept. FPS		Frequency	Percentage	Valid percent
Valid	no	427	97.9	98.2
	yes	8	1.8	1.8
	Total	435	99.8	100.0
Missing	System	1	.2	
Total		436	100.0	

Table 16

Self-reported Low Income Identifier(s)

		Frequency	Percentage	Valid percent
Valid	No low income identifier	80	18.3	18.4
	1 low income identifier	118	27.1	27.2
	2 low income identifiers	186	42.7	42.9
	3 low income identifiers	50	11.5	11.5
	Total	434	99.5	100.0
Missing	System	2	.5	
Total		436	100.0	

Association of Attitude to Healthy Diet, Oral Hygiene, and Dental Attendance

To approach RQ1: Are the attitudes of preschool parents associated with dietary habits, oral hygiene habits, and dental attendance while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of

children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility, a multiple linear regression analysis was conducted to evaluate the prediction of dependent variables: dietary habits, oral hygiene habits, and dental use. Pearson's correlation was used to determine linear relationships between the five independent variables measuring attitude about a healthy diet, the four independent variables measuring attitude about oral hygiene and the six independent variables measuring attitude toward dental attendance (see Table 41). Two separate multiple regression analysis were conducted for each of the three dependent variables (diet, dental hygiene and dental attendance) in research question RQ1, the first multiple regression model included only the dependent and independent variable (score) the second model includes the covariant (demographic) variables.

To measure attitude toward a healthy oral health diet, the first of three dependant variables in this research question, a mean score was calculated from the four items measuring self-reported dietary habits. The four items (14 – 17), indicated the consumption of in-between meal drinks, consumption of in-between meal snacks, snacks at night and drinks at night. The variables were measured on a 5-point Likert scale ranging from 'never' to 'more than twice a day'. There were five independent variables measuring IV1: Attitude toward dietary habits were items 21-25, "Less candy helps to prevent dental cavities", 22: "If we limit the amount of sugary snacks our child eats he/she will have healthier teeth later", 23: "Sugary food is damaging for teeth", 24:

"Sugary snacks make my child fat", 25: "Sweets hinder my child's appetite" (see Table 41).

Two linear regression models were utilized to address the dependent variable diet and attitude for RQ1, the first model included the diet score and five independent variables mentioned above, the second model also included the covariates (demographic information). The results of the first multiple linear regression model revealed attitude toward dietary habits (Table 17) not to be statistically significant predictor of the model $F(5, 388) = 1.435$, $p = .211$, adj. $R^2 = .006$. The alternative hypothesis H_a1A: Attitudes of preschool parents are associated with dietary habits, can be rejected utilizing this first model. The results of the second multiple linear regression model revealed RQ1-IV1: Attitude toward dietary habits (Table 17) to be statistically significant predictor of the model $F(35, 358) = 2.342$, $p = .000$, adj. $R^2 = .107$. The alternative hypothesis H_o1A: Attitudes of preschool parents are not associated with dietary habits while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in U.S., number of children in home, child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility, can be rejected utilizing this second model (see Table 38).

Table 17

Summary of Multiple Regression Analysis RQ1 Between Attitude and Diet

Variable	B	SEβ	B	*p*
Intercept (Model #1)	10.826	.952		
Less candy helps to prevent dental cavities	-.215	.323	-.059	.505

If we limit the amount of sugary snacks our child eats he/she will have healthier teeth later	.736	.342	.201	.032
Sugary food is damaging for teeth	-.154	.343	-.040	.655
Sugary snacks make my child fat	.063	.169	.024	.712
Sweets hinder my child's appetite	-.087	.181	-.031	.631
Intercept (Model #2)	7.855	5.635		
Less candy helps to prevent dental cavities	-.115	.313	-.031	.714
If we limit the amount of sugary snacks our child eats he/she will have healthier teeth later	.566	.341	.154	.097
Sugary food is damaging for teeth	-.188	.346	-.049	.586
Sugary snacks make my child fat	.179	.173	.068	.303
Sweets hinder my child's appetite	.128	.180	.046	.477
Age of Respondent	.006	.024	.014	.809
Relationship to child	.108	.327	.018	.741
Educational Level	.334	.179	.105	.063
Origin of Birth	.016	.509	.003	.974
Years in the United Stated	.868	.418	.201	.039
Number of Children under 18 in the family	-.015	.161	-.005	.927
Age of Child	-.015	.038	-.019	.705
Child's Gender	-.490	.302	-.082	.106
Chile's Origin of Birth	1.949	.683	.196	.005
English Spoken at Home	.785	.531	.122	.140
Spanish Spoken at Home	.259	.517	.042	.616
Other Spoken at Home	-1.258	.680	-.137	.065
Child's Ethnicity White	-.398	.450	-.055	.377
Child's Ethnicity Hispanic / Latino	-1.212	.464	-.192	.009
Child's Ethnicity Black / African American	.252	.463	.031	.586
Child's Ethnicity Native American or American Indian	4.620	2.685	.109	.086
Child's Ethnicity Asian / Pacific Islander	1.210	.610	.140	.048
Child's Ethnicity Other	-3.949	1.260	-.186	.002
Child's Dental Coverage	.095	1.342	.042	.943
Child is enrolled in Medicaid	-1.611	3.220	-.268	.617
Child is enrolled in CHIP	-2.286	2.002	-.248	.254
Child has Private Health Ins	-1.484	1.242	-.217	.233
Child has other Dental Coverage	-1.782	1.844	-.106	.334
No Dental Coverage	-2.208	2.766	-.209	.425
Child is Unable to Speak or Comprehend English	.320	.477	.038	.502
Child is eligible for Free or Reduced Lunch	-.155	.361	-.025	.668
Child or guardian are homeless	-.326	1.075	-.015	.762
Child has a parent in or has been in the Armed Forces	.361	.424	.048	.394
Child is enrolled in Head Start	.079	.433	.010	.856
Child is in or has been in conservatorship of Dept. of Family Protective Services	.437	1.198	.019	.715

To measure attitude toward dental hygiene, the second depentent variable in this research question, a mean score was calculated from the two items measuring self-reported dental hygiene habits. The two items (18-19), indicated the frequency of self-reported oral hygiene habits. The first item examined the frequency of brushing using a 4-point Likert scale ranging from ‘never’ to ‘twice a day or more’, the second examined the frequency of helping to brush, ranging from ‘never’ to ‘every day’. were measured on a 5-point Likert scale ranging from ‘never’ to ‘more than twice a day’. The four independent variables measuring IV2: Attitude toward oral hygiene habits were items 51 through 54, 51: “Buying a toothbrush and toothpaste for the whole family is expensive”, 52: “When my child brushes his/her teeth too much, they come loose”, 53: “The risk of dental cavities decreases when my child brushes his/her teeth every day”, 54: “Brushing teeth is annoying for a child” (See Table 41).

Two linear regression models were utilized to address the dependent variable, oral hygiene, for RQ1. The first model included the oral hygiene score and four independent variables mentioned above, the second model also included the covariant (demographic information). The results of the multiple linear regression analysis revealed IV2: Attitude toward dental hygiene habits (Table 18), not to be statistically significant predictors to the model $F(4, 390) = 1.944$, $p = .102$, adj. $R^2 = .009$ (see Table 37). The alternative hypothesis H_a2A: Attitude of preschool parents are not associated with oral hygiene habits can be rejected utilizing this first model. The results of the second multiple linear regression model revealed RQ1-IV2: Attitude toward oral hygiene habits (Table 17) to be

statistically significant predictor of the model $F(34, 360) = 1.995$, $p = .001$, adj. $R^2 = .079$. The alternative hypothesis H_o1A: Attitudes of preschool parents are not associated with oral hygiene habits while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in U.S., number of children in home, child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility, can be rejected utilizing this second model.

Table 18

Summary of Multiple Regression Analysis RQ1 Between Attitude and Oral Hygiene

Variable	B	SEβ	β	*p*
Intercept (Model #1)	6.475	.358		
Recode 51 Buying a toothbrush and toothpaste for the whole family is expensive	.136	.058	.131	.019
Recode 52 When my child brushes his/her teeth too much, they come loose	-.048	.068	-.039	.481
The risk of dental cavities decreases when my child brushes his/her teeth every day	.018	.057	.016	.753
Recode 54 Brushing teeth is annoying for a child	.037	.049	.040	.442
Intercept (Model #2)	10.326	2.081		
Recode 51 Buying a toothbrush and toothpaste for the whole family is expensive	.119	.060	.115	.048
Recode 52 When my child brushes his/her teeth too much, they come loose	-.050	.071	-.040	.485
The risk of dental cavities decreases when my child brushes his/her teeth every day	.026	.059	.023	.662
Recode 54 Brushing teeth is annoying for a child	.050	.049	.054	.303
Age of Respondent	.018	.009	.118	.042
Relationship to child	-.511	.120	-.233	.000
Educational Level	-.057	.068	-.049	.401
Origin of Birth	.222	.185	.101	.231
Years in the United Stated	.315	.153	.199	.040
Number of Children under 18 in the family	-.090	.059	-.079	.127
Age of Child	-.029	.014	-.104	.042
Child's Gender	-.036	.112	-.016	.749
Chile's Origin of Birth	-.193	.255	-.053	.449
English Spoken at Home	-.164	.195	-.070	.402
Spanish Spoken at Home	.101	.192	.045	.598

Other Spoken at Home	.298	.254	.089	.241
Child's Ethnicity White	-.209	.168	-.079	.212
Child's Ethnicity Hispanic / Latino	-.235	.172	-.102	.172
Child's Ethnicity Black / African American	-.062	.170	-.021	.715
Child's Ethnicity Native American or American Indian	-1.378	.993	-.089	.166
Child's Ethnicity Asian / Pacific Islander	.190	.222	.060	.393
Child's Ethnicity Other	.139	.468	.018	.768
Child's Dental Coverage	-.406	.495	-.484	.413
Child is enrolled in Medicaid	-2.106	1.190	-.958	.078
Child is enrolled in CHIP	-1.389	.742	-.413	.062
Child has Private Health Ins	-1.065	.458	-.424	.021
Child has other Dental Coverage	-1.210	.678	-.204	.075
No Dental Coverage	-.282	1.019	-.072	.782
Child is Unable to Speak or Comprehend English	-.051	.179	-.016	.776
Child is eligible for Free or Reduced Lunch	.098	.135	.043	.469
Child or guardian are homeless	.115	.431	.014	.791
Child has a parent in or has been in the Armed Forces	.111	.157	.040	.479
Child is enrolled in Head Start	.146	.160	.048	.363
Child is in or has been in conservatorship of Dept. of Family Protective Services	.000	.447	.000	1.00

To measure attitude toward dental attendance, the third dependent variable in RQ1, one item measuring self-reported dental attendance was used. Dental attendance was measured using item 20 asking when the child was last seen by the dentist with responses measured on a 4-point Likert scale ranging from ‘never’ to ‘six months ago, or less. The six independent variables measuring IV3: Attitude toward dental attendance were (items 60 through 63 and items 69 and 70) 60: “For a child a visit to the dentist is not a terrible experience”, 61: “Going for a check-up at the dentist is a traumatic experience for a child”, 62: “Taking my child to the dentist is unpleasant”, 63: “Regularly taking your child to the dentist for check-ups, helps your child not be afraid of the dentist”, 69: “Regular visits to the dentist help my child's teeth to stay strong and healthy

longer", 70: "The risk of dental cavities decreases when you regularly take your child to the dentist for a check-up" (see Table 41).

Two linear regression models were utilized to address the third dependent variable, dental attendance, for RQ1 the first model included the self-reported dental attendance behavior and six independent variables mentioned above, additionally the second model included the covariant data (demographic information). The first model of multiple linear regression analysis revealed a statistically significant association between IV3: Attitude toward dental attendance: "For a child a visit to the dentist is not a terrible experience", 61: "Going for a check-up at the dentist is a traumatic experience for a child", 62: "Taking my child to the dentist is unpleasant", 63: "Regularly taking your child to the dentist for check-ups, helps your child not be afraid of the dentist", 69: "Regular visits to the dentist help my child's teeth to stay strong and healthy longer", 70: "The risk of dental cavities decreases when you regularly take your child to the dentist for a check-up", to be statistically significant predictors to the model (see table 19).

The results of the first multiple regression model statistically significantly predicted mean dental attendance, F (6, 391) = 3.339, p = .003, adj. R^2 = .034. The reverse coded variable: "Taking my child to the dentist is unpleasant", added statistically significantly to the prediction, $p < .05$. Regression coefficients and standard errors can be found in Table 19. The confidence interval for the significant variable associated with the regression analysis dose not contain 0, which means the null hypothesis, $H_0$1C: Attitudes of preschool parents are not associated with dental attendance, can be rejected.

The results of the second multiple linear regression model revealed attitude toward dental attendance (Table 17) to be statistically significant predictor of the model $F(36, 361) = 3.147$, $p = .000$, adj. $R^2 = .163$. The alternative hypothesis H_o1C: Attitudes of preschool parents are not associated with dental attendance while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in U.S., number of children in home, child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility, can be rejected utilizing this second model.

The sample metric data was screened for linearity, independence of residuals, homoscedasticity, multicollinearity, residuals, and normality. There was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as evaluated by a Durbin-Watson statistic of 2.091. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There were no studentized deleted residuals greater than ±3 standard deviations, no leverage values less than 0.2, and values for Cook's distance above 1. The assumption of normality was met, as assessed by Q-Q Plot.

Table 19

Summary of Multiple Regression Analysis RQ1 Between Attitude and Dental Attendance

Variable	B	SEβ	β	*p*
Intercept (Model #1)	2.447	.310		

For a child, a visit to the dentist is not a terrible experience	.060	.044	.076	.174
Recode 61 Going for a check-up at the dentist is a traumatic experience for a child	-.017	.056	-.020	.756
Recode 62 Taking my child to the dentist is unpleasant	.115	.053	.139	.030
Regularly taking your child to the dentist for check-ups, helps your child not be afraid of the dentist	.104	.057	.102	.068
Regular visits to the dentist help my child's teeth to stay strong and healthy longer	.060	.056	.062	.281
The risk of dental cavities decreases when you regularly take your child to the dentist for a check-up	-.079	.064	-.072	.219
Intercept (Model #2)	4.590	1.684		
For a child, a visit to the dentist is not a terrible experience	.048	.043	.060	.267
Recode 61 Going for a check-up at the dentist is a traumatic experience for a child	.020	.055	.024	.711
Recode 62 Taking my child to the dentist is unpleasant	.104	.051	.125	.044
Regularly taking your child to the dentist for check-ups, helps your child not be afraid of the dentist	.115	.055	.113	.038
Regular visits to the dentist help my child's teeth to stay strong and healthy longer	.037	.059	.039	.528
The risk of dental cavities decreases when you regularly take your child to the dentist for a check-up	-.080	.063	-.073	.205
Age of Respondent	.000	.007	.004	.946
Relationship to child	.041	.098	.022	.674
Educational Level	.069	.054	.069	.209
Origin of Birth	.227	.151	.121	.135
Years in the United Stated	.064	.124	.048	.604
Number of Children under 18 in the family	.020	.048	.021	.677
Age of Child	.011	.011	.045	.353
Child's Gender	-.037	.091	-.020	.684
Chile's Origin of Birth	-.292	.206	-.094	.159
English Spoken at Home	-.254	.159	-.127	.111
Spanish Spoken at Home	-.132	.156	-.069	.398
Other Spoken at Home	-.193	.208	-.067	.354
Child's Ethnicity White	.099	.135	.044	.465
Child's Ethnicity Hispanic / Latino	.098	.140	.050	.483
Child's Ethnicity Black / African American	-.067	.139	-.026	.629
Child's Ethnicity Native American or American Indian	-.227	.809	-.017	.780
Child's Ethnicity Asian / Pacific Islander	.176	.182	.065	.336
Child's Ethnicity Other	.901	.380	.135	.018
Child's Dental Coverage	-.929	.405	-1.299	.023
Child is enrolled in Medicaid	-1.946	.971	-1.035	.046
Child is enrolled in CHIP	-1.296	.605	-.449	.033
Child has Private Health Ins	-.506	.375	-.235	.178

Child has other Dental Coverage	.493	.555	.097	.375
No Dental Coverage	.680	.838	.205	.418
Child is Unable to Speak or Comprehend English	.015	.143	.006	.917
Child is eligible for Free or Reduced Lunch	.008	.108	.004	.939
Child or guardian are homeless	.481	.351	.067	.172
Child has a parent in or has been in the Armed Forces	.044	.128	.018	.735
Child is enrolled in Head Start	.199	.130	.077	.128
Child is in or has been in conservatorship of Dept. of Family Protective Services	.419	.361	.059	.246

Predictions were made for attitude and dental attendance controlling for IV1: Attitude toward dietary habits, IV2: Attitude toward oral hygiene habits, predictions were made for dental attendance for caretakers who strongly agreed “for a child to visit the dentist is not a terrible experience”, strongly disagreed “going for a check-up at the dentist is a traumatic experience for a child”, strongly disagree that “taking my child to the dentist is unpleasant”, strongly agreed that “regularly taking your child to the dentist for check-ups helps your child not be afraid of the dentist”, strongly agrees that “regular visits to the dentist help my child’s teeth to stay strong and healthy” and strongly agree that “the risk of dental cavities decreases when you regularly take your child to the dentist”. The multiple regression model statistically significantly predicted mean dental attendance at 3.683, 95% C.I. (3.536, 3.830) $p < .05$ suggesting that the more positive the attitude regarding dental attendance the more likely the child is to have visited the dentist within the last six months. The R^2 value of 0.056 associated with this regression model suggests that attitude toward dental attendance accounts for 6% of the variation in dental attendance, which means that 94% of dental attendance cannot be explained by the

attitude toward dental attendance alone (see Table 40). Demographic covariates were not included in this predictive analysis.

Association of Subjective Norm to Healthy Diet, Oral Hygiene, and Dental Attendance

To approach RQ2: Are the subjective norms of preschool parents associated with dietary habits, oral hygiene habits, and dental attendance while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility, a multiple linear regression analysis was conducted to evaluate the prediction of dependent variables: dietary habits, oral hygiene habits, and dental use. Pearson's correlation was used to determine linear relationships between the eight independent variables measuring subjective norm toward a healthy diet, the eight independent variables measuring subjective norm toward dental hygiene and the five independent variables measuring subjective norm toward dental attendance (see table 39). Two separate multiple regression analysis were conducted for each of the three dependent variables in research question RQ2, the first multiple regression model included only the dependent and independent variables, the second model included the covariant demographic variables.

To measure subjective norm toward a healthy diet, the first of three dependant variables in RQ2, a mean score was calculated from the four items measuring self-reported dietary habits. The four items (14 – 17), indicated the consumption of in-

between meal drinks, consumption of in-between meal snacks, snacks at night and drinks at night. The variables were measured on a 5-point Likert scale ranging from ‘never’ to ‘more than twice a day’. The eight independent variables measuring IV1: Subjective norm toward dietary habits were items 26-33, 26: “It's important to my partner that I give our child healthy snacks between meals (e.g. fruit instead of cookie)”, 27: “It's important to my partner that I limit the amount of snacks for our child”, 28: “My partner's opinion about our child's nourishment is important to me”, 29: “My parent's opinion about our child's nourishment is important to me”, 30: “My dentist advises me to give my child healthy snacks”, 31: “My family doctor gives me advice on healthy snacks for my child”, 32: “My dentist's opinion about our child's nourishment is important to me”, 33: “The teachers and administrators from the school feel it important that the children receive healthy snacks during playtime” (see Table 41).

For RQ2 two linear regression models were utilized to address subjective norm and the first dependent variable, healthy diet. The first model for RQ2 included the self-reported diet behavior score and eight independent variables mentioned above measuring subjective norm, additionally the second model included the covariant data (demographic information). The results of the first and second multiple linear regression models revealed a statistically significant association between IV1: Subjective norm toward dietary habits: 26) It's important to my partner that I give our child healthy snacks between meals (e.g. fruit instead of cookie), 27: “It's important to my partner that I limit the amount of snacks for our child”, 28: “My partner's opinion about our child's

nourishment is important to me", 29: "My parent's opinion about our child's nourishment is important to me", 30: "My dentist advises me to give my child healthy snacks", 31: "My family doctor gives me advice on healthy snacks for my child", 32: "My dentist's opinion about our child's nourishment is important to me", and 33: "The teachers and administrators from the school feel it important that the children receive healthy snacks during playtime", to be statistically significant predictors to the model (see Table 38).

The first multiple regression model statistically significantly predicted mean healthy diet, F (8, 385) = 3.420, p = .001, adj. R^2 = .047. Three variables added statistically significantly to the prediction, 28: "My partner's opinion about our child's nourishment is important to me", 29: "My parent's opinion about our child's nourishment is important to me" and 33: "The teachers and administrators from the school feel it important that the children receive healthy snacks during playtime" $p < .05$. Regression coefficients and standard errors can be found in Table 20. The confidence interval for this one variable associated with the regression analysis does not contain 0, which means the null hypothesis $H_0$2A: Subjective norms of preschool parents are not associated with dietary habits can be rejected.

The results of the second multiple linear regression model for RQ2 revealed subjective norm toward a healthy diet to be statistically significant predictor of the model $F(38, 355) = 2.767$, p = .000, adj. R^2 = .146. The alternative hypothesis $H_0$2A: Subjective norm of preschool parents are not associated with a healthy diet while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in U.S.,

number of children in home, child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility, can be rejected utilizing this second model.

The sample metric data was screened for linearity, independence of residuals, homoscedasticity, multicollinearity, residuals, and normality. There was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.395. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There were no studentized deleted residuals greater than ±3 standard deviations, no leverage values less than 0.2, and values for Cook's distance above 1. The assumption of normality was met, as assessed by Q-Q Plot.

Table 20

Summary of Multiple Regression Analysis RQ2 Between Subjective Norm and Healthy Diet

Variable	B	SEβ	β	*P*
Intercept (Model #1)	10.205	1.000		
It's important to my partner that I give our child healthy snacks between meals (e.g. fruit instead of cookie)	.079	.222	.023	.722
It's important to my partner that I limit the amount of snacks for our child	.006	.176	.002	.974
My partner's opinion about our child's nourishment is important to me	.931	.283	.250	.001
My parent's opinion about our child's nourishment is important to me	-.668	.193	-.228	.001
My dentist advises me to give my child healthy snacks	.028	.248	.008	.909
My family doctor gives me advice on healthy snacks for my child	.316	.247	.093	.202
My dentist's opinion about our child's nourishment is important to me	.187	.260	.051	.473

The teachers and administrators from the school feel it important that the children receive healthy snacks during playtime	-.435	.207	-.131	.036
Intercept (Model #2)	8.600	5.585		
It's important to my partner that I give our child healthy snacks between meals (e.g. fruit instead of cookie)	.323	.224	.095	.151
It's important to my partner that I limit the amount of snacks for our child	.029	.176	.010	.870
My partner's opinion about our child's nourishment is important to me	.850	.281	.228	.003
My parent's opinion about our child's nourishment is important to me	-.600	.188	-.204	.002
My dentist advises me to give my child healthy snacks	-.031	.249	-.009	.902
My family doctor gives me advice on healthy snacks for my child	.307	.243	.091	.207
My dentist's opinion about our child's nourishment is important to me	.230	.257	.063	.371
The teachers and administrators from the school feel it important that the children receive healthy snacks during playtime	-.449	.208	-.135	.031
Age of Respondent	.020	.023	.050	.380
Relationship to child	.117	.318	.020	.713
Educational Level	.259	.177	.081	.145
Origin of Birth	-.266	.504	-.044	.597
Years in the United Stated	.589	.413	.137	.155
Number of Children under 18 in the family	-.019	.159	-.006	.904
Age of Child	.000	.038	-.001	.990
Child's Gender	-.677	.300	-.113	.025
Chile's Origin of Birth	1.778	.674	.179	.009
English Spoken at Home	.685	.522	.107	.190
Spanish Spoken at Home	.367	.506	.060	.469
Other Spoken at Home	-.971	.672	-.106	.150
Child's Ethnicity White	-.703	.452	-.097	.120
Child's Ethnicity Hispanic / Latino	-1.295	.458	-.206	.005
Child's Ethnicity Black / African American	.299	.454	.037	.511
Child's Ethnicity Native American or American Indian	5.381	2.618	.127	.041
Child's Ethnicity Asian / Pacific Islander	1.249	.595	.144	.037
Child's Ethnicity Other	-4.620	1.241	-.217	.000
Child's Dental Coverage	-.325	1.310	-.142	.804
Child is enrolled in Medicaid	-2.100	3.165	-.349	.507
Child is enrolled in CHIP	-2.290	1.978	-.249	.248
Child has Private Health Ins	-1.289	1.241	-.188	.299
Child has other Dental Coverage	-1.049	1.812	-.062	.563
No Dental Coverage	-.788	2.695	-.075	.770
Child is Unable to Speak or Comprehend English	.243	.471	.029	.605
Child is eligible for Free or Reduced Lunch	-.134	.352	-.021	.703
Child or guardian are homeless	-.423	1.053	-.020	.688
Child has a parent in or has been in the Armed Forces	.365	.414	.048	.379
Child is enrolled in Head Start	.420	.426	.051	.326
Child is in or has been in conservatorship of Dept. of Family Protective Services	.401	1.167	.018	.731

Predictions were made for subjective norm and a healthy diet controlling for IV2: Subjective norm toward oral hygiene habits and IV3: Subjective norm toward dental attendance, predictions were made for dietary habits for caretakers who strongly agree "It's important to my partner that I give our child healthy snacks between meals (e.g., fruit instead of cookie)", strongly agree "It's important to my partner that I limit the amount of snacks for our child", strongly agree "My partner's opinion about our child's nourishment is important to me", strongly agree "My parent's opinion about our child's nourishment is important to me", strongly agree "My dentist advises me to give my child healthy snacks", strongly agree "My family doctor gives me advice on healthy snacks for my child", strongly agree "My dentist's opinion about our child's nourishment is important to me" and strongly agree "The teachers and administrators from the school feel it important that the children receive healthy snacks during playtime". The multiple regression model statistically significantly predicted mean healthy diet at 12.462, 95% C.I. (12.022, 12.901) $p < .05$ suggesting that the more positive the subjective norm regarding dental diet the more likely the child is to eat and drink less sugary foods between meals and before bed. The R^2 value of 0.055 associated with this regression model suggests that subjective norm toward a healthy diet accounts for 6% of the variation in a healthy diet, which means that 94% of a healthy diet cannot be explained by subjective norm of a healthy diet alone (see Table 40).

To measure subjective norm toward oral hygiene a mean score was calculated from the two items measuring self-reported dental hygiene habits. The two items (18-19), indicated the frequency of self-reported oral hygiene habits. The first item examined the frequency of brushing using a 4-point Likert scale ranging from ‘never’ to ‘twice a day or more’, the second examined the frequency of helping to brush, ranging from ‘never’ to ‘every day’. were measured on a 5-point Likert scale ranging from ‘never’ to ‘more than twice a day’. The eight independent variables measuring subjective norm toward dental hygiene were items 43 through 50: 43: “When it comes to oral hygiene, my friends' and acquaintance's opinion is very important to me”, 44: “When it comes to oral hygiene, my parent's opinion is very important to me”, 45: “Our friends and acquaintances feel it important that we help our child to brush his/her teeth twice a day”, 46: “My parents find it important that my child's teeth get brushed properly”, 47: “It's important to my family doctor that my child's teeth are brushed at an early age”, 48: “It's important to my child’s pediatrician that my child's teeth get brushed at an early age”, 49: “It's important to my dentist that my child's teeth get brushed at an early age”, 50: “When it comes to oral hygiene, my partner's opinion is very important to me” (see Table 41).

For oral hygiene behavior, the second of three dependent variable in RQ2, two linear regression models were utilized to address subjective norm and healthy diet. For RQ2 the first model included the self-reported oral hygiene behavior score and eight independent variables mentioned above measuring subjective norm, additionally the second model included the covariant data (demographic information). The results of the

first model were not statistically significant, the second multiple linear regression model revealed a statistically significant association between IV2: Subjective norm toward dental hygiene habits 43: “When it comes to oral hygiene, my friends' and acquaintance's opinion is very important to me”, 44: “When it comes to oral hygiene, my parent's opinion is very important to me”, 45: “Our friends and acquaintances feel it important that we help our child to brush his/her teeth twice a day”, 46: “My parents find it important that my child's teeth get brushed properly”, 47: “It's important to my family doctor that my child's teeth are brushed at an early age”, 48: “It's important to my child’s pediatrician that my child's teeth get brushed at an early age”, 49: “It's important to my dentist that my child's teeth get brushed at an early age”, 50: “When it comes to oral hygiene, my partner's opinion is very important to me”, to be statistically significant predictors to the model (see Table 38).

The first multiple regression model did not statistically significantly predicted mean oral hygiene, $F(8, 380) = 1.706$, $p = .095$, adj. $R^2 = .014$. None of the independent variables added statistical significance to the prediction, and collectively the model did not have a good fit. Regression coefficients and standard errors can be found in Table 21. The alternative hypothesis H_a2B: Subjective norms of preschool parents are associated with oral hygiene habits can be rejected, using this model. The second multiple regression model statistically predicted mean oral hygiene, $F(38, 350) = 2.120$, $p = .000$, adj. $R^2 = .099$. The alternative hypothesis H_o2B: Subjective norms of preschool parents are not associated with a healthy diet while controlling for caretaker’s age, relationship to

child, educational level, origin of birth, years in U.S., number of children in home, child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility, can be rejected utilizing this second model.

The sample metric data was screened for linearity, independence of residuals, homoscedasticity, multicollinearity, residuals, and normality. There was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.102. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There were 5 records (39, 153, 204, 210, 382, 396) identified as outliers with studentized deleted residuals greater than ±3 standard deviations were removed, no leverage values less than 0.2, and values for Cook's distance above 1. The assumption of normality was met, as assessed by Q-Q Plot.

Table 21

Summary of Multiple Regression Analysis RQ2 Between Subjective Norm and Oral Hygiene

Variable	B	SEβ	β	*p*
Intercept (Model #1)	6.196	.361		
When it comes to oral hygiene, my friends' and acquaintance's opinion is very important to me	-.002	.060	-.002	.974
When it comes to oral hygiene, my parent's opinion is very important to me	-.002	.070	-.002	.982
Our friends and acquaintances feel it important that we help our child to brush his/her teeth twice a day	.088	.063	.095	.165
My parents find it important that my child's teeth get brushed properly	.069	.080	.064	.387

It's important to my family doctor that my child's teeth are brushed at an early age	-.045	.129	-.034	.731
It's important to my child's pediatrician that my child's teeth get brushed at an early age	.006	.126	.004	.962
It's important to my dentist that my child's teeth get brushed at an early age	-.009	.114	-.006	.937
When it comes to oral hygiene, my partner's opinion is very important to me	.125	.066	.113	.059
Intercept (Model #2)	10.106	1.889		
When it comes to oral hygiene, my friends' and acquaintance's opinion is very important to me	-.022	.062	-.026	.721
When it comes to oral hygiene, my parent's opinion is very important to me	-.006	.069	-.007	.927
Our friends and acquaintances feel it important that we help our child to brush his/her teeth twice a day	.086	.063	.093	.173
My parents find it important that my child's teeth get brushed properly	.087	.079	.080	.270
It's important to my family doctor that my child's teeth are brushed at an early age	-.021	.128	-.016	.871
It's important to my child's pediatrician that my child's teeth get brushed at an early age	-.035	.127	-.027	.780
It's important to my dentist that my child's teeth get brushed at an early age	.006	.113	.004	.954
When it comes to oral hygiene, my partner's opinion is very important to me	.116	.066	.105	.081
Age of Respondent	.015	.008	.111	.055
Relationship to child	-.507	.109	-.255	.000
Educational Level	-.054	.061	-.051	.378
Origin of Birth	.139	.167	.070	.405
Years in the United Stated	.352	.138	.244	.011
Number of Children under 18 in the family	-.129	.054	-.125	.017
Age of Child	-.027	.013	-.109	.034
Child's Gender	-.040	.102	-.020	.697
Chile's Origin of Birth	-.045	.229	-.013	.844
English Spoken at Home	.004	.180	.002	.982
Spanish Spoken at Home	.248	.182	.121	.173
Other Spoken at Home	.228	.230	.075	.321
Child's Ethnicity White	-.172	.152	-.071	.259
Child's Ethnicity Hispanic / Latino	-.216	.157	-.104	.170
Child's Ethnicity Black / African American	-.050	.158	-.019	.751
Child's Ethnicity Native American or American Indian	-1.422	.905	-.102	.117
Child's Ethnicity Asian / Pacific Islander	.234	.205	.082	.254
Child's Ethnicity Other	.268	.423	.038	.527
Child's Dental Coverage	-.458	.447	-.601	.306
Child is enrolled in Medicaid	-2.145	1.074	-1.073	.047
Child is enrolled in CHIP	-1.377	.668	-.449	.040
Child has Private Health Ins	-1.115	.415	-.490	.008

Child has other Dental Coverage	-.895	.617	-.162	.148
No Dental Coverage	-.187	.924	-.053	.840
Child is Unable to Speak or Comprehend English	-.047	.162	-.016	.774
Child is eligible for Free or Reduced Lunch	-.028	.123	-.014	.819
Child or guardian are homeless	-.011	.387	-.002	.977
Child has a parent in or has been in the Armed Forces	.047	.143	.019	.741
Child is enrolled in Head Start	.006	.144	.002	.968
Child is in or has been in conservatorship of Dept. of Family Protective Services	-.130	.406	-.017	.748

Predictions were made for subjective norm and dental hygiene habits controlling for IV1: Subjective norm toward a healthy diet and IV3: Subjective norm toward dental attendance, predictions were made for oral hygiene habits for caretakers who strongly agree, “When it comes to oral hygiene, my friends' and acquaintance's opinion is very important to me”, strongly agree “When it comes to oral hygiene, my parent's opinion is very important to me”, strongly agree “Our friends and acquaintances feel it important that we help our child to brush his/her teeth twice a day”, strongly agree “My parents find it important that my child's teeth get brushed properly”, strongly agree “It's important to my family doctor that my child's teeth are brushed at an early age”, strongly agree “It's important to my child’s pediatrician that my child's teeth get brushed at an early age”, strongly agree “It's important to my dentist that my child's teeth get brushed at an early age”, strongly agree “When it comes to oral hygiene, my partner's opinion is very important to me”. The multiple regression model statistically significantly predicted mean hygiene habits at 7.416, 95% C.I. [7.257, 7.574] $p < .05$ suggesting that the more positive the subjective norm regarding oral hygiene habits the more likely the caregivers are to help brush their child’s teeth and the more often the child’s teeth will get brushed.

The R^2 value of 0.042 associated with this regression model suggests that subjective norm toward oral hygiene habits accounts for 4% of the variation in oral health habits, which means that 96% of oral hygiene habits cannot be explained by subjective norm of oral hygiene habits alone (see Table 40). Demographic covariates were not included in this predictive analysis.

To measure subjective norm toward attendance one item measuring self-reported dental attendance was used. Dental attendance was measured using one self-reported item (20) asking when the child was last seen by the dentist with responses measured on a 4-point Likert scale ranging from ‘never’ to ‘six months ago or less. The five independent variables measuring IV3: Subjective norm toward dental attendance were items 64 through 68: 64: “When it comes to visiting the dentist, my child’s pediatrician's opinion is important to me”, 65: “When it comes to visiting the dentist, my family doctor's opinion is important to me”, 66: “When it comes to visiting the dentist, my parent's opinion is important to me”, 67: “It's important to our pediatrician that we take our child at an early age to the dentist”, 68: “When it comes to visiting the dentist, my partner's opinion is important to me” (see Table 41).

The final dependent variable in RQ2, dental attendance was analyzed with two linear regression models to address subjective norm and dental attendance. For RQ2 the first model included self-reported dental attendance behavior and five independent variables mentioned above measuring subjective norm, additionally the second model included the covariant data (demographic information). The results of both the first and

second models were statistically significant. The results of the multiple linear regression analysis revealed a statistically significant association between IV3: Subjective norm toward dental attendance: 64: “When it comes to visiting the dentist, my child’s pediatrician's opinion is important to me”, 65: “When it comes to visiting the dentist, my family doctor's opinion is important to me”, 66: “When it comes to visiting the dentist, my parent's opinion is important to me”, 67: “It's important to our pediatrician that we take our child at an early age to the dentist”, and 68: “When it comes to visiting the dentist, my partner's opinion is important to me”, to be statistically significant predictors to the model ($p < .05$).

The first multiple regression model statistically significantly predicted mean dental attendance, F (5, 389) = 3.700, p= .003, adj. R^2 = .033. Two variable: 64: “When it comes to visiting the dentist, my child’s pediatrician's opinion is important to me” and 67: “It's important to our pediatrician that we take our child at an early age to the dentist” added statistically significantly to the prediction, $p < .05$. Regression coefficients and standard errors can be found in Table 22. The confidence interval for these two variables associated with the regression analysis does not contain 0, which means the null hypothesis $H_0$2B: Subjective norms of preschool parents are not associated with dental attendance can be rejected. The second multiple regression model also statistically significantly predicted mean dental attendance, F (35, 359) = 3.731, p= .000, adj. R^2 = .195. The alternative hypothesis H_o2B: Subjective norms of preschool parents are not associated with a dental attemdance while controlling for caretaker’s age, relationship to

child, educational level, origin of birth, years in U.S., number of children in home, child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility, can be rejected utilizing this second model.

The sample metric data was screened for linearity, independence of residuals, homoscedasticity, multicollinearity, residuals, and normality. There was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.032. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There were seven records (194, 235, 236, 341, 342, 343, 347) identified as outliers with studentized deleted residuals greater than ±3 standard deviations removed from the analysis, no leverage values less than 0.2, and values for Cook's distance above 1. The assumption of normality was met, as assessed by Q-Q Plot.

Table 22

Summary of Multiple Regression Analysis RQ2 Between Subjective Norm and Dental Attendance

Variable	B	SEβ	β	*p*
Intercept (Model #1)	2.670	.286		
When it comes to visiting the dentist, my child's pediatrician's opinion is important to me	.210	.094	.200	.025
When it comes to visiting the dentist, my family doctor's opinion is important to me	-.144	.089	-.148	.107
When it comes to visiting the dentist, my parent's opinion is important to me	-.075	.056	-.088	.180
It's important to our pediatrician that we take our child at an early age to the dentist	.196	.078	.163	.013

When it comes to visiting the dentist, my partner's opinion is important to me	-.020	.058	-.021	.729
Intercept (Model #2)	4.597	1.615		
When it comes to visiting the dentist, my child's pediatrician's opinion is important to me	.170	.089	.162	.056
When it comes to visiting the dentist, my family doctor's opinion is important to me	-.174	.083	-.179	.037
When it comes to visiting the dentist, my parent's opinion is important to me	-.070	.052	-.083	.180
It's important to our pediatrician that we take our child at an early age to the dentist	.208	.074	.172	.006
When it comes to visiting the dentist, my partner's opinion is important to me	.042	.055	.044	.450
Age of Respondent	.001	.007	.011	.837
Relationship to child	.101	.095	.054	.290
Educational Level	.094	.051	.097	.068
Origin of Birth	.155	.143	.085	.279
Years in the United Stated	.067	.117	.051	.564
Number of Children under 18 in the family	.001	.046	.001	.987
Age of Child	.017	.011	.072	.135
Child's Gender	.033	.087	.018	.706
Chile's Origin of Birth	-.169	.197	-.056	.391
English Spoken at Home	-.345	.151	-.178	.023
Spanish Spoken at Home	-.155	.149	-.083	.298
Other Spoken at Home	-.277	.194	-.100	.154
Child's Ethnicity White	.128	.131	.058	.326
Child's Ethnicity Hispanic / Latino	-.012	.134	-.006	.928
Child's Ethnicity Black / African American	-.056	.133	-.023	.674
Child's Ethnicity Native American or American Indian	-.237	.772	-.019	.759
Child's Ethnicity Asian / Pacific Islander	.274	.177	.104	.121
Child's Ethnicity Other	.737	.361	.114	.042
Child's Dental Coverage	-1.041	.386	-1.507	.007
Child is enrolled in Medicaid	-2.192	.923	-1.202	.018
Child is enrolled in CHIP	-1.368	.575	-.481	.018
Child has Private Health Ins	-.550	.357	-.265	.125
Child has other Dental Coverage	.523	.532	.107	.326
No Dental Coverage	.808	.798	.253	.312
Child is Unable to Speak or Comprehend English	-.099	.137	-.039	.471
Child is eligible for Free or Reduced Lunch	.161	.104	.085	.124
Child or guardian are homeless	.435	.331	.063	.190
Child has a parent in or has been in the Armed Forces	.062	.122	.027	.613
Child is enrolled in Head Start	.190	.124	.076	.125
Child is in or has been in conservatorship of Dept. of Family Protective Services	.169	.344	.025	.624

Predictions were made for subjective norm and dental attendance controlling for IV1: Subjective norm toward a healthy diet and IV2: Subjective norm toward dental hygiene habits, predictions were made for dental attendance for caretakers who strongly agree “When it comes to visiting the dentist, my child’s pediatrician's opinion is important to me”, strongly agree “When it comes to visiting the dentist, my family doctor's opinion is important to me”, strongly agree “When it comes to visiting the dentist, my parent's opinion is important to me”, strongly agree “It's important to our pediatrician that we take our child at an early age to the dentist” and strongly agree “When it comes to visiting the dentist, my partner's opinion is important to me”. The multiple regression model statistically significantly predicted mean dental attendance 3.483, 95% C.I. [3.347, 3.620] $p < .05$ suggesting that the more positive the subjective norm regarding dental attendance the more likely the child is to have visited the dentist in the last 6 months. The R^2 value of 0.045 associated with this regression model suggests that subjective norm toward dental attendance accounts for 5% of the variation in dental attendance, which means that 95% of dental attendance cannot be explained by subjective norm of dental attendance habits alone (see Table 40).

Association of Perceived Behavioral Control to Healthy Diet, Oral Hygiene, and Dental Attendance

To approach RQ3: Are the perceived behavioral control of preschool parents associated with dietary habits, oral hygiene habits, and dental attendance while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility, a multiple linear regression analysis was conducted to evaluate the prediction of dependent variables: dietary habits, oral hygiene habits, and dental use. Pearson's correlation was used to determine linear relationships between the four independent variables measuring perceived behavior control toward a healthy diet, the four independent variables measuring perceived behavior control toward dental hygiene and the four independent variables measuring perceived behavior control toward dental attendance (see table 39). Two separate multiple regression analysis were conducted for each of the three dependent variables in research question RQ2, the first multiple regression model included only the dependent and independent variables, the second model included the covariant demographic variables.

To measure perceived behavior control toward a healthy oral health diet, a mean score was calculated from the four items measuring self-reported dietary habits. The four items (14 – 17), indicated the consumption of in-between meal drinks, consumption of in-between meal snacks, snacks at night and drinks at night. The variables were measured

on a 5-point Likert scale ranging from ‘never’ to ‘more than twice a day’. The four independent variables measuring perceived behavior control toward diet were items 34-37: 34: “In our family, it is difficult to prevent our child from getting sugary snacks (drinks and food)”, 35: “It's often hard to say no to my child when he/she wants candy”, 36: “We succeed in giving healthy drinks to our child as in-between meal snacks”, 37: “We succeed in giving healthy snacks to our child as in-between meal snacks”.

The dependent variable in RQ3, healthy diet was analyzed with two linear regression models to address perceived behavior control and a healthy diet. For RQ3 the first model included self-reported healthy diet score and four independent variables mentioned above measuring perceived behavior control, additionally the second model included the covariant data (demographic information). The results of both the first and second models were statistically significant. The results of the multiple linear regression analysis between perceived behavior control toward a healthy diet behavior revealed 34: “In our family, it is difficult to prevent our child from getting sugary snacks (drinks and food)”, 35: “It's often hard to say no to my child when he/she wants candy”, 36: “We succeed in giving healthy drinks to our child as in-between meal snacks” and 37: “We succeed in giving healthy snacks to our child as in-between meal snacks” to be statistically significant predictors to the model ($p < .05$).

The first multiple regression model statistically significantly predicted mean healthy diet, F (4, 389) = 19.988, p = .000, adj. R^2= .162. Two variables: “In our family, it is difficult to prevent our child from getting sugary snacks (drinks and food)” and “It's

often hard to say no to my child when he/she wants candy", added statistically significantly to the prediction, $p < .05$. Regression coefficients and standard errors can be found in Table 23. The confidence interval for the variables associated with the regression analysis does not contain 0, which means the null hypothesis $H_0$3A: Perceived behavior control of preschool parents are not associated with dietary habits can be rejected. The second multiple regression model statistically significantly predilected a healthy diet, F (34, 359) = 3.720, p = .000, adj. R^2= .191. The confidence interval for the variables associated with the regression analysis does not contain 0, which means the null hypothesis $H_0$3A: Perceived behavioral control of preschool parents are not associated with dietary habits while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in U.S., number of children in home, child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility can be rejected.

The sample metric data was screened for linearity, independence of residuals, homoscedasticity, multicollinearity, residuals, and normality. There was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.589. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There were two (23, 56) studentized deleted residuals greater than ±3 standard deviations and removed, no

leverage values less than 0.2, and values for Cook's distance above 1. The assumption of normality was met, as assessed by Q-Q Plot.

Table 23

Summary of Multiple Regression Analysis Perceived Behavior Control and Healthy Diet

Variable	B	SEβ	β	*p*
Intercept (Model #1)	6.792	.789		
Recode 34 In our family, it is difficult to prevent our child from getting sugary snacks (drinks and food)	.386	.128	.171	.003
Recode 35 It's often hard to say no to my child when he/she wants candy	.530	.125	.240	.000
We succeed in giving healthy drinks to our child as in-between meal snacks	.323	.199	.100	.106
We succeed in giving healthy snacks to our child as in-between meal snacks	.262	.211	.076	.215
Intercept (Model #2)	4.958	5.400		
Recode 34 In our family, it is difficult to prevent our child from getting sugary snacks (drinks and food)	.305	.132	.135	.022
Recode 35 It's often hard to say no to my child when he/she wants candy	.467	.136	.211	.001
We succeed in giving healthy drinks to our child as in-between meal snacks	.317	.206	.098	.125
We succeed in giving healthy snacks to our child as in-between meal snacks	.264	.218	.077	.228
Age of Respondent	.013	.022	.032	.553
Relationship to child	.137	.309	.023	.657
Educational Level	.219	.172	.069	.205
Origin of Birth	.486	.486	.081	.318
Years in the United Stated	.652	.397	.151	.102
Number of Children under 18 in the family	-.009	.153	-.003	.956
Age of Child	-.001	.037	-.002	.975
Child's Gender	-.326	.290	-.054	.262
Chile's Origin of Birth	1.630	.651	.164	.013
English Spoken at Home	.374	.509	.058	.463
Spanish Spoken at Home	.254	.492	.041	.606
Other Spoken at Home	-1.027	.647	-.112	.113
Child's Ethnicity White	-.590	.430	-.081	.171
Child's Ethnicity Hispanic / Latino	-1.248	.439	-.198	.005
Child's Ethnicity Black / African American	.059	.437	.007	.893
Child's Ethnicity Native American or American Indian	4.738	2.562	.112	.065
Child's Ethnicity Asian / Pacific Islander	.967	.569	.112	.090
Child's Ethnicity Other	-3.366	1.197	-.158	.005

Child's Dental Coverage	-.255	1.296	-.111	.844
Child is enrolled in Medicaid	-1.390	3.081	-.231	.652
Child is enrolled in CHIP	-1.920	1.910	-.209	.315
Child has Private Health Ins	-.919	1.183	-.134	.438
Child has other Dental Coverage	-.205	1.799	-.012	.909
No Dental Coverage	-.564	2.682	-.054	.833
Child is Unable to Speak or Comprehend English	.213	.457	.025	.641
Child is eligible for Free or Reduced Lunch	-.065	.342	-.010	.849
Child or guardian are homeless	-.392	1.022	-.018	.702
Child has a parent in or has been in the Armed Forces	.283	.402	.037	.483
Child is enrolled in Head Start	.080	.408	.010	.845
Child is in or has been in conservatorship of Dept. of Family Protective Services	-.083	1.136	-.004	.942

Predictions were made for perceived behavior control and a healthy diet controlling for IV2: Perceived behavior control toward dental hygiene and IV3: Perceived behavior control toward dental attendance, predictions were made for a healthy diet for caretakers who strongly disagree “In our family, it is difficult to prevent our child from getting sugary snacks (drinks and food)”, strongly disagree “It's often hard to say no to my child when he/she wants candy”, strongly agree “We succeed in giving healthy drinks to our child as in-between meal snacks” and strongly agree “We succeed in giving healthy snacks to our child as in-between meal snacks”. The multiple regression model statistically significantly predicted mean healthy diet at 14.352, 95% C.I. [13.855, 14.850] $p < .05$ suggesting that the more positive the perceived behavior control regarding dental diet the more likely the child is to eat and drink less sugary foods between meals and before bed. The R^2 value of 0.171 associated with this regression model suggests that perceived behavior control toward a healthy diet accounts for 17% of

the variation in a healthy diet, which means that 83% of a healthy diet cannot be explained by perceived behavior control of a healthy diet alone (see Table 40).

To measure perceived behavior control toward dental hygiene a mean score was calculated from the two Items measuring self-reported dental hygiene behaviors. The two items (18-19), indicated the frequency of self-reported oral hygiene habits. The first item examined the frequency of brushing using a 4-point Likert scale ranging from ‘never’ to ‘twice a day or more’, the second examined the frequency of helping to brush, ranging from ‘never’ to ‘every day’. were measured on a 5-point Likert scale ranging from ‘never’ to ‘more than twice a day’. The four independent variables measuring perceived behavior control toward dental hygiene were items 39 through 42: 39: “We don't get our child to brush his/her teeth twice a day”, 40: “We don't have time to help our child brush his/her teeth twice a day”, 41: “It's time-consuming to check each day whether our child has brushed his/her teeth”, and 42: “We manage to brush our child's teeth every day” (see Table 41).

The dependent variable in RQ3, dental hygiene was analyzed with two linear regression models to address perceived behavior control and dental hygiene. For RQ3 the first model included self-reported dental hygiene score and four independent variables mentioned above measuring perceived behavior control, additionally the second model included the covariant data (demographic information). The results of both the first and second multiple linear regression analysis models were statistically significant between perceived behavior control toward dental hygiene behaviors revealed 39: “We don't get

our child to brush his/her teeth twice a day", 40: "We don't have time to help our child brush his/her teeth twice a day", 41: "It's time-consuming to check each day whether our child has brushed his/her teeth" and 42: "We manage to brush our child's teeth every day" to be statistically significant predictors to the model ($p < .05$).

The first multiple regression model statistically significantly predicted mean oral hygiene, $F(4, 381) = 25.356$, $p = .000$, adj. $R^2 = .210$. Two variables "We don't get our child to brush his/her teeth twice a day" and "We manage to brush our child's teeth every day" added statistically significantly to the prediction, $p < .05$. Regression coefficients and standard errors can be found in Table 24. The confidence interval for the variables associated with the regression analysis does not contain 0, which means the null hypothesis $H_0$3B: Perceived behavior control of preschool parents are not associated with oral hygiene habits can be rejected. The second multiple regression model statistically significantly predilected dental hygiene, $F (34, 351) = 6.256$, $p = .000$, adj. $R^2 = .317$. The confidence interval for the variables associated with the regression analysis does not contain 0, which means the null hypothesis $H_0$3B: Perceived behavioral control of preschool parents are not associated with dental hygiene habits while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in U.S., number of children in home, child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility can be rejected.

The sample metric data was screened for linearity, independence of residuals, homoscedasticity, multicollinearity, residuals, and normality. There was linearity as

assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.217. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There were nine records (39, 61, 139, 196, 202, 208, 382, 395, 400) identified as outliers with studentized residuals greater than ±3 standard deviations and removed, no leverage values less than 0.2, and values for Cook's distance above 1. The assumption of normality was met, as assessed by Q-Q Plot.

Table 24

Summary of Multiple Regression Analysis for Perceived Behavior Control and Dental Hygiene Habits

Variable	B	SEβ	β	*p*
Intercept (Model #1)	5.283	.278		
Recode 39 We don't get our child to brush his/her teeth twice a day	.309	.047	.388	.000
Recode 40 We don't have time to help our child brush his/her teeth twice a day	-.046	.065	-.043	.480
Recode 41 It's time-consuming to check each day whether our child has brushed his/her teeth	-.033	.045	-.038	.460
We manage to brush our child's teeth every day	.232	.048	.229	.000
Intercept (Model #2)	10.514	1.603		
Recode 39 We don't get our child to brush his/her teeth twice a day	.352	.046	.443	.000
Recode 40 We don't have time to help our child brush his/her teeth twice a day	-.074	.064	-.070	.246
Recode 41 It's time-consuming to check each day whether our child has brushed his/her teeth	-.013	.045	-.014	.778
We manage to brush our child's teeth every day	.240	.046	.236	.000
Age of Respondent	.013	.007	.097	.056
Relationship to child	-.468	.095	-.237	.000
Educational Level	-.202	.053	-.192	.000
Origin of Birth	.107	.145	.054	.461

Years in the United Stated	.115	.119	.080	.337
Number of Children under 18 in the family	-.094	.047	-.091	.045
Age of Child	-.023	.011	-.095	.034
Child's Gender	-.067	.090	-.034	.457
Chile's Origin of Birth	-.006	.200	-.002	.975
English Spoken at Home	-.076	.156	-.036	.627
Spanish Spoken at Home	.177	.153	.088	.248
Other Spoken at Home	.063	.199	.021	.752
Child's Ethnicity White	-.234	.131	-.098	.075
Child's Ethnicity Hispanic / Latino	-.239	.136	-.116	.080
Child's Ethnicity Black / African American	-.029	.136	-.011	.829
Child's Ethnicity Native American or American Indian	-.479	.774	-.035	.537
Child's Ethnicity Asian / Pacific Islander	.221	.174	.078	.203
Child's Ethnicity Other	-.243	.364	-.035	.506
Child's Dental Coverage	-.659	.384	-.871	.087
Child is enrolled in Medicaid	-2.584	.922	-1.305	.005
Child is enrolled in CHIP	-1.576	.575	-.516	.006
Child has Private Health Ins	-1.135	.356	-.506	.002
Child has other Dental Coverage	-.921	.529	-.169	.083
No Dental Coverage	.363	.793	.103	.647
Child is Unable to Speak or Comprehend English	-.093	.140	-.033	.507
Child is eligible for Free or Reduced Lunch	-.085	.105	-.041	.417
Child or guardian are homeless	-.158	.332	-.021	.636
Child has a parent in or has been in the Armed Forces	.016	.122	.006	.897
Child is enrolled in Head Start	-.067	.125	-.025	.590
Child is in or has been in conservatorship of Dept. of Family Protective Services	-.162	.343	-.022	.637

Predictions were made for perceived behavior control and oral hygiene habits controlling for IV1: Perceived behavior control toward a healthy diet and IV3: Perceived behavior control toward dental attendance, predictions were made for oral hygiene habits for caretakers who strongly disagree “We don't get our child to brush his/her teeth twice a day”, strongly disagree “We don't have time to help our child brush his/her teeth twice a day”, strongly disagree “It's time-consuming to check each day whether our child has brushed his/her teeth” and strongly agree “We manage to brush our child's teeth every

day". The multiple regression model statistically significantly predicted mean hygiene habits at 7.616, 95% C.I. [7.481, 7.750] $p < .05$ suggesting that the more positive the perceived behavior control regarding oral hygiene habits the more likely the caregivers are to help brush their child's teeth and the more often the child's teeth will get brushed. The R^2 value of 0.240 associated with this regression model suggests that perceived behavior control toward oral hygiene habits accounts for 24% of the variation in oral health habits, which means that 76% of oral hygiene habits cannot be explained by perceived behavior control of oral hygiene habits alone (see Table 37).

To measure perceived behavior control toward attendance one item measuring self-reported dental attendance was used. Dental attendance was measured using one self-reported item (20) asking when the child was last seen by the dentist with responses measured on a 4-point Likert scale ranging from 'never' to 'six months ago or less. The four independent variables measuring were items 56 through 59: 56: "We don't have time to take our child to the dentist", 57: "I don't see myself taking my child to the dentist", 58: "I do think of making an appointment with the dentist for my child", 59: "We manage to take our child to the dentist twice a year" (see Table 41).

The results of the multiple linear regression analysis for both models revealed a statistically significant association between IV3: Perceived behavior control toward dental attendance: 56: "We don't have time to take our child to the dentist", 57: "I don't see myself taking my child to the dentist", 58: "I do think of making an appointment with

the dentist for my child" an 59: "We manage to take our child to the dentist twice a year", to be statistically significant predictors to the model ($p < .05$).

The first multiple regression model statistically significantly predicted mean dental attendance, F (4, 389) = 31.353, $p = .000$, adj. $R^2 = .237$. Two variable "I don't see myself taking my child to the dentist" and "We manage to take our child to the dentist twice a year" added statistically significantly to the prediction, $p < .05$. Regression coefficients and standard errors can be found in Table 25. The confidence interval for the variables associated with the regression analysis does not contain 0, which means the null hypothesis $H_0$3C: Perceived behavior control of preschool parents are not associated with dental attendance can be rejected. The second multiple regression model statistically significantly predilected dental attendance, F (34, 359) = 6.446, $p = .000$, adj. $R^2 = .320$. The confidence interval for the variables associated with the regression analysis does not contain 0, which means the null hypothesis $H_0$3C: Perceived behavioral control of preschool parents are not associated with dental attendance while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in U.S., number of children in home, child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility can be rejected.

The sample metric data was screened for linearity, independence of residuals, homoscedasticity, multicollinearity, residuals, and normality. There was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson

statistic of 1.943. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There were four deleted records (194, 236, 343, 350) identified with studentized deleted residuals greater than ±3 standard deviations, no leverage values less than 0.2, and values for Cook's distance above 1. The assumption of normality was met, as assessed by Q-Q Plot.

Table 25

Summary of Multiple Regression Analysis for Perceived Behavior Control and Dental Attendance

Variable	B	SEβ	β	*p*
Intercept (Model #1)	1.197	.285		
Recode 56 We don't have time to take our child to the dentist	.077	.059	.071	.193
Recode 57 I don't see myself taking my child to the dentist	.150	.063	.131	.018
I do think of making an appointment with the dentist for my child	-.072	.037	-.089	.051
We manage to take our child to the dentist twice a year	.358	.044	.396	.000
Intercept (Model #2)	3.602	1.585		
Recode 56 We don't have time to take our child to the dentist	.092	.060	.084	.126
Recode 57 I don't see myself taking my child to the dentist	.111	.067	.097	.100
I do think of making an appointment with the dentist for my child	-.052	.038	-.065	.169
We manage to take our child to the dentist twice a year	.297	.046	.328	.000
Age of Respondent	-.001	.006	-.005	.923
Relationship to child	.032	.090	.017	.722
Educational Level	.034	.051	.035	.498
Origin of Birth	.110	.138	.059	.427
Years in the United Stated	.047	.114	.035	.678
Number of Children under 18 in the family	-.012	.044	-.012	.785
Age of Child	.009	.011	.039	.386
Child's Gender	-.063	.084	-.034	.455
Chile's Orgin of Birth	-.215	.189	-.069	.258
English Spoken at Home	-.177	.146	-.089	.228
Spanish Spoken at Home	-.110	.145	-.058	.449
Other Spoken at Home	-.207	.189	-.073	.273
Child's Ethnicity White	.133	.124	.059	.284
Child's Ethnicity Hispanic / Latino	.111	.129	.057	.392

Child's Ethnicity Black / African American	-.032	.128	-.013	.802
Child's Ethnicity Native American or American Indian	-.537	.750	-.041	.474
Child's Ethnicity Asian / Pacific Islander	.249	.167	.093	.136
Child's Ethnicity Other	.738	.350	.111	.036
Child's Dental Coverage	-.795	.373	-1.121	.034
Child is enrolled in Medicaid	-1.695	.900	-.908	.060
Child is enrolled in CHIP	-1.172	.561	-.409	.037
Child has Private Health Ins	-.473	.348	-.222	.174
Child has other Dental Coverage	.508	.509	.101	.318
No Dental Coverage	.684	.766	.209	.372
Child is Unable to Speak or Comprehend English	.020	.133	.008	.881
Child is eligible for Free or Reduced Lunch	.012	.100	.006	.904
Child or guardian are homeless	.259	.320	.037	.419
Child has a parent in or has been in the Armed Forces	.033	.118	.014	.779
Child is enrolled in Head Start	.155	.120	.061	.198
Child is in or has been in conservatorship of Dept. of Family Protective Services	.115	.333	.016	.729

Predictions were made for perceived behavior control and dental attendance controlling for IV1: Perceived behavior control toward a healthy diet and IV2: Perceived behavior toward dental hygiene habits, predictions were made for dental attendance for caretakers who strongly disagree “We don't have time to take our child to the dentist”, strongly disagree “I don't see myself taking my child to the dentist”, strongly agree “I do think of making an appointment with the dentist for my child”, and strongly agree “We manage to take our child to the dentist twice a year”. The multiple regression model statistically significantly predicted mean dental attendance 3.797, 95% C.I. [3.687, 3.906] $p < .05$ suggesting that the more positive the perceived behavioral control toward dental attendance, the more likely the child is to have visited the dentist in the last 6 months. The R^2 value of 0.255 associated with this regression model suggests that perceived behavior control toward dental attendance accounts for 26% of the variation in dental

attendance, which means that 74% of dental attendance cannot be explained by perceived behavior control of dental attendance habits alone (see Table 37).

Association of Intentions on Healthy Diet, Oral Hygiene, and Dental Attendance

To approach RQ4: Are the intentions of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility, a multiple and simple linear regression analysis were conducted to evaluate the association of dependent variables: dietary habits, oral hygiene habits, and dental use. Two models were utilized to measure the independent variable, intention, with and without covariates. Further analysis which were not specifically mentioned in the research questions but important to the methodology of the TPB were included; the analysis of intention in combinations with each of the other three independent variables: attitude, subjective norm and perceived behavior control.

The dependent variable in RQ4, healthy diet was analyzed using a simple linear regression model and a multiple linear regression model to address intention controlling for the covariates. For RQ4 the first model included the self-reported diet score and the one independent variable measuring intention toward diet, Item 38: "I intend to make sure that my child does not receive sugary snacks (food or drinks) too often". The simple linear regression model analyzing intention toward dietary habits was a statistically

significant predictor to the model ($p < .05$). The second model included the one independent variable mentioned above measuring intention and the covariant data (demographic information). The results of both the first and second regression analysis models were statistically significant ($p < .05$). The simple linear regression for the first model statistically significantly predicted mean healthy diet, F (1, 392) = 10.853, p = .001, adj. R^2 = .024. The multiple linear regression for the second model which included the covariates also statistically significantly predicted mean healthy diet, F (31, 362) = 2.682, p = .000, adj. R^2 = .117. The confidence interval for this one variable associated with the regression analysis does not contain 0, which means the null hypothesis $H_0$4A: Intention of preschool parents are not associated with dietary habits while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in U.S., number of children in home, child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility can be rejected.

Table 26

Summary of Regression Intention Toward Diet

Variable	B	SEβ	β	p
Intercept (Model #1)	10.076	.715		
I intend to make sure that my child does not receive sugary snacks (food or drinks) too often	.545	.165	.164	.001
Intercept (Model #2)	9.396	5.529		
I intend to make sure that my child does not receive sugary snacks (food or drinks) too often	.539	.164	.162	.001
Age of Respondent	.013	.023	.033	.565
Relationship to child	.092	.322	.015	.775
Educational Level	.323	.178	.101	.071
Origin of Birth	.006	.503	.001	.991
Years in the United Stated	.743	.413	.172	.073
Number of Children under 18 in the family	-.018	.159	-.006	.910

Age of Child	-.019	.038	-.025	.612
Child's Gender	-.521	.300	-.087	.083
Chile's Origin of Birth	1.796	.677	.181	.008
English Spoken at Home	.679	.526	.106	.197
Spanish Spoken at Home	.333	.512	.054	.516
Other Spoken at Home	-1.252	.672	-.137	.063
Child's Ethnicity White	-.425	.443	-.058	.339
Child's Ethnicity Hispanic / Latino	-1.421	.461	-.226	.002
Child's Ethnicity Black / African American	.093	.455	.012	.837
Child's Ethnicity Native American or American Indian	5.611	2.643	.133	.034
Child's Ethnicity Asian / Pacific Islander	1.005	.594	.116	.092
Child's Ethnicity Other	-4.365	1.245	-.205	.001
Child's Dental Coverage	-.165	1.326	-.072	.901
Child is enrolled in Medicaid	-1.900	3.183	-.316	.551
Child is enrolled in CHIP	-2.332	1.984	-.253	.241
Child has Private Health Ins	-1.446	1.229	-.211	.240
Child has other Dental Coverage	-1.424	1.831	-.085	.437
No Dental Coverage	-1.469	2.730	-.139	.591
Child is Unable to Speak or Comprehend English	.438	.475	.052	.357
Child is eligible for Free or Reduced Lunch	-.121	.356	-.019	.733
Child or guardian are homeless	-.415	1.065	-.020	.697
Child has a parent in or has been in the Armed Forces	.414	.420	.055	.325
Child is enrolled in Head Start	.261	.429	.032	.544
Child is in or has been in conservatorship of Dept. of Family Protective Services	.257	1.185	.011	.828

The dependent variable in RQ4, dental hygiene, was analyzed using a simple linear regression model and a multiple linear regression model to address intention. For RQ4 the first model included the self-reported hygiene score and the one independent variable, Item 38: “I intend to make sure that my child does not receive sugary snacks (food or drinks) too often” and the second model included the covariant data (demographic information). The results of both the first and second regression analysis models were statistically significant predictors to the model ($p < .05$). The simple linear regression for the first model statistically significantly predicted mean oral hygiene, F (1,

393) = 12.437, p = .000, adj. R^2 = .028. The multiple linear regression for the second model which included the covariates also statistically significantly predicted mean dental hygiene, F (31, 363) = 2.291, p = .000, adj. R^2 = .092. The confidence interval for this one variable associated with the regression analysis does not contain 0, which means the null hypothesis $H_0$4A: Intention of preschool parents are not associated with dental hygiene habits while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in U.S., number of children in home, child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility can be rejected.

Table 27

Summary of Multiple Regression Intention Toward Dental Hygiene

Variable	B	SEβ	β	*p*
Intercept (Model #1)	5.832	.352		
In our family, we intend to make sure that our child's teeth get brushed properly every day	.269	.076	.175	.000
Intercept (Model #2)	9.589	2.078		
In our family, we intend to make sure that our child's teeth get brushed properly every day	.226	.076	.147	.003
Age of Respondent	.016	.008	.111	.053
Relationship to child	-.511	.119	-.233	.000
Educational Level	-.017	.066	-.015	.792
Origin of Birth	.197	.183	.090	.281
Years in the United Stated	.316	.150	.200	.036
Number of Children under 18 in the family	-.089	.058	-.079	.126
Age of Child	-.025	.014	-.092	.070
Child's Gender	-.055	.111	-.025	.618
Chile's Origin of Birth	-.160	.251	-.044	.526
English Spoken at Home	-.141	.193	-.061	.465
Spanish Spoken at Home	.098	.190	.044	.606
Other Spoken at Home	.238	.249	.071	.340
Child's Ethnicity White	-.238	.164	-.090	.147
Child's Ethnicity Hispanic / Latino	-.237	.170	-.103	.164
Child's Ethnicity Black / African American	-.062	.169	-.021	.712

Child's Ethnicity Native American or American Indian	-1.193	.983	-.077	.225
Child's Ethnicity Asian / Pacific Islander	.209	.219	.066	.342
Child's Ethnicity Other	.131	.461	.017	.777
Child's Dental Coverage	-.389	.490	-.464	.428
Child is enrolled in Medicaid	-2.038	1.177	-.927	.084
Child is enrolled in CHIP	-1.371	.734	-.408	.063
Child has Private Health Ins	-1.061	.454	-.422	.020
Child has other Dental Coverage	-1.286	.672	-.217	.056
No Dental Coverage	-.326	1.010	-.084	.747
Child is Unable to Speak or Comprehend English	-.042	.177	-.014	.811
Child is eligible for Free or Reduced Lunch	.066	.132	.029	.619
Child or guardian are homeless	.114	.422	.014	.787
Child has a parent in or has been in the Armed Forces	.079	.156	.028	.615
Child is enrolled in Head Start	.110	.158	.036	.487
Child is in or has been in conservatorship of Dept. of Family Protective Services	-.095	.437	-.011	.827

The dependent variable in RQ4, dental attendance, was analyzed using a simple linear regression model and a multiple linear regression model to address intention. For RQ4 the first model included the self-reported dental attendance and the one independent variable measuring intention toward dental attendance, Item 71: “We intend to take our child to the dentist twice a year for a check-up”. The second model included the covariant data (demographic information). The results of both the first and second regression analysis models were statistically significant predictors to the model ($p < .05$). The simple linear regression for the first model statistically significantly predicted mean dental attendance, F (1, 397) = 12.971, $p = .000$, adj. $R^2 = .029$. The multiple linear regression for the second model which included the covariates also statistically significantly predicted mean dental attendance, F (31, 367) = 3.285, $p = .000$, adj. $R^2 = .151$. The confidence interval for this one variable associated with the regression analysis

does not contain 0, which means the null hypothesis $H_0$4A: Intention of preschool parents are not associated with dental attendance while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in U.S., number of children in home, child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility can be rejected.

Table 28

Summary of Multiple Regression Intention and Dental Attendance

Variable	B	SEβ	β	*p*
Intercept (Model #1)	2.408	.286		
We intend to take our child to the dentist twice a year for a check-up	.225	.062	.178	.000
Intercept (Model #2)	4.730	1.694		
We intend to take our child to the dentist twice a year for a check-up	.182	.060	.144	.003
Age of Respondent	-.003	.007	-.022	.692
Relationship to child	.041	.098	.022	.675
Educational Level	.090	.054	.090	.097
Origin of Birth	.230	.149	.123	.123
Years in the United Stated	.099	.123	.073	.424
Number of Children under 18 in the family	.012	.048	.012	.803
Age of Child	.010	.012	.041	.406
Child's Gender	-.030	.091	-.016	.742
Chile's Origin of Birth	-.234	.207	-.075	.258
English Spoken at Home	-.254	.159	-.127	.110
Spanish Spoken at Home	-.148	.156	-.077	.344
Other Spoken at Home	-.216	.204	-.076	.290
Child's Ethnicity White	.122	.135	.054	.367
Child's Ethnicity Hispanic / Latino	.059	.140	.030	.675
Child's Ethnicity Black / African American	-.090	.139	-.035	.519
Child's Ethnicity Native American or American Indian	-.211	.811	-.016	.795
Child's Ethnicity Asian / Pacific Islander	.165	.182	.061	.366
Child's Ethnicity Other	.804	.380	.120	.035
Child's Dental Coverage	-.945	.406	-1.323	.020
Child is enrolled in Medicaid	-1.923	.974	-1.023	.049
Child is enrolled in CHIP	-1.280	.607	-.443	.036
Child has Private Health Ins	-.426	.376	-.198	.258
Child has other Dental Coverage	.544	.555	.107	.328

No Dental Coverage	.734	.836	.222	.380
Child is Unable to Speak or Comprehend English	-.040	.144	-.015	.782
Child is eligible for Free or Reduced Lunch	.044	.108	.023	.683
Child or guardian are homeless	.411	.349	.058	.239
Child has a parent in or has been in the Armed Forces	.083	.128	.035	.517
Child is enrolled in Head Start	.173	.130	.067	.184
Child is in or has been in conservatorship of Dept. of Family Protective Services	.345	.361	.048	.340

When combining the independent variables to analyze diet, the results of the multiple linear regression analysis revealed IV1: Intention and attitude, intention and subjective norm, and intention and perceived behavior control toward dietary habits to be statistically significant predictors to the model ($p < .05$). When combining the independent variables to analyze dental hygiene, the results of the multiple linear regression analysis revealed IV2: Intention and attitude, intention and subjective norm, intention and perceived behavior control toward oral hygiene habits to be statistically significant predictors to the model ($p < .05$). When combining the independent variables to analyze dental attendance, the results of the multiple linear regression analysis revealed IV3: Intention and attitude, intention and subjective norm, and intention and perceived behavior control toward dental attendance to be statistically significant predictors to the model ($p < .05$). Pearson's correlation was used to determine a linear relationship between the independent variables measuring intention and attitude, intention and subjective norm, and intention and perceived behavior control toward a healthy dental diet. Pearson's correlation was used to determine a linear relationship between the independent variables measuring intention and attitude, intention and subjective norm,

and intention and perceived behavior control toward dental hygiene. Pearson's correlation was used to determine a linear relationship between the independent variables measuring intention and attitude, intention and subjective norm, and intention and perceived behavior control toward a healthy dental diet (see Table 39).

To measure intention and attitude toward a healthy oral health diet a mean score was calculated from the four items measuring self-reported dietary habits. The four items (14 – 17), indicated the consumption of in-between meal drinks, consumption of in-between meal snacks, snacks at night and drinks at night. The variables were measured on a 5-point Likert scale ranging from 'never' to 'more than twice a day'. The one independent variables measuring intention toward diet was item 38: 38: "I intend to make sure that my child does not receive sugary snacks (food or drinks) too often". The attitude variables included in the multiple linear regression measuring attitude toward a healthy diet were items 21-25: 21: "Less candy helps to prevent dental cavities", 22: "If we limit the amount of sugary snacks our child eats he/she will have healthier teeth later", 23: "Sugary food is damaging for teeth", 24: "Sugary snacks make my child fat", 25: "Sweets hinder my child's appetite" (see Table 41).

The results of the multiple linear regression analysis revealed a statistically significant association between intention and attitude toward a healthy diet 38: "I intend to make sure that my child does not receive sugary snacks (food or drinks) too often" and item 22: "If we limit the amount of sugary snacks our child eats he/she will have healthier teeth later" to be statistically significant predictors to the model ($p < .05$).

The sample metric data was screened for linearity, independence of residuals, homoscedasticity, multicollinearity, residuals, and normality. There was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.405. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There no studentized deleted residuals greater than ±3 standard deviations, no leverage values less than 0.2, and values for Cook's distance above 1. The assumption of normality was met, as assessed by Q-Q Plot. The multiple regression model statistically significantly predicted mean healthy diet, F (2, 420) = 7.077, p = .0001, adj. R^2 = .028. One variable, "I intend to make sure that my child does not receive sugary snacks (food or drinks) too often", added statistically significantly to the prediction, $p < .05$. Regression coefficients and standard errors can be found in Table 29.

Table 29

Summary of Multiple Regression Intention and Attitude Toward Diet

Variable	B	SEβ	β	*p*
Intercept	9.263	.904		
I intend to make sure that my child does not receive sugary snacks (food or drinks) too often	.461	.168	.141	.006
If we limit the amount of sugary snacks our child eats he/she will have healthier teeth later	.266	.187	.073	.154

To measure intention and subjective norm toward a healthy oral health diet a mean score was calculated from the four items measuring self-reported dietary habits.

The 4 items (14 – 17), indicated the consumption of in-between meal drinks, consumption of in-between meal snacks, snacks at night and drinks at night. The variables were measured on a 5-point Likert scale ranging from ‘never’ to ‘more than twice a day’. The one independent variables measuring intention toward diet was item 38: 38: “I intend to make sure that my child does not receive sugary snacks (food or drinks) too often”. The subjective norm variables included in the multiple linear regression measuring subjective norm toward a healthy diet were items 26-33: 26: “It's important to my partner that I give our child healthy snacks between meals (e.g. fruit instead of cookie)”, 27: “It's important to my partner that I limit the amount of snacks for our child”, 28: “My partner's opinion about our child's nourishment is important to me”, 29: “My parent's opinion about our child's nourishment is important to me”, 30: “My dentist advises me to give my child healthy snacks”, 31: “My family doctor gives me advice on healthy snacks for my child”, and 32: “My dentist's opinion about our child's nourishment is important to me” (see Table 41).

The results of the multiple linear regression analysis revealed a statistically significant association between intention and subjective norm toward a healthy diet behavior item 28: “My partner's opinion about our child's nourishment is important to me” and 38: “I intend to make sure that my child does not receive sugary snacks (food or drinks) too often” to be statistically significant predictors to the model ($p < .05$).

The sample metric data was screened for linearity, independence of residuals, homoscedasticity, multicollinearity, residuals, and normality. There was linearity as

assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.405. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There no studentized deleted residuals greater than ±3 standard deviations, no leverage values less than 0.2, and values for Cook's distance above 1. The assumption of normality was met, as assessed by Q-Q Plot. The multiple regression model predicted mean healthy diet with a statistical significance of, $F(2, 421) = 6.898$, $p = .001$, adj. $R^2 = .027$. One variable "My partner's opinion about our child's nourishment is important to me", added statistically significantly to the prediction, $p < .05$. Regression coefficients and standard errors can be found in Table 30.

Table 30

Summary of Multiple Regression Analysis Intention and Subjective Norm Toward Diet

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Variable	B	SEβ	β	*p*
Intercept	9.227	.895		
My partner's opinion about our child's nourishment is important to me	.322	.195	.086	.006
I intend to make sure that my child does not receive sugary snacks (food or drinks) too often	.413	.172	.125	.154

To measure intention and perceived behavior control toward a healthy oral health diet a mean score was calculated from the four items measuring self-reported dietary habits. The 4 items (14 – 17), indicated the consumption of in-between meal drinks, consumption of in-between meal snacks, snacks at night and drinks at night. The

variables were measured on a 5-point Likert scale ranging from ‘never’ to ‘more than twice a day’. The one independent variables measuring intention toward diet was item 38: “I intend to make sure that my child does not receive sugary snacks (food or drinks) too often”. The perceived behavior control variables included in the multiple linear regression measuring perceived behavior control toward a healthy diet were items 34-37: 34: “In our family, it is difficult to prevent our child from getting sugary snacks (drinks and food)”, 35: “It's often hard to say no to my child when he/she wants candy”, 36: “We succeed in giving healthy drinks to our child as in-between meal snacks”, and 37: “We succeed in giving healthy snacks to our child as in-between meal snacks” (see Table 41).

The results of the multiple linear regression analysis revealed a statistically significant association between intention and two variables measuring perceived behavior control toward a healthy diet : 34: “In our family, it is difficult to prevent our child from getting sugary snacks (drinks and food)”, 35: “It's often hard to say no to my child when he/she wants candy”, and 38: “I intend to make sure that my child does not receive sugary snacks (food or drinks) too often” added statistically significantly to the prediction, $p < .05$.

The sample metric data was screened for linearity, independence of residuals, homoscedasticity, multicollinearity, residuals, and normality. There was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.493. There was homoscedasticity, as assessed by visual inspection of a plot

of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There no studentized deleted residuals greater than ±3 standard deviations, no leverage values less than 0.2, and values for Cook's distance above 1. The assumption of normality was met, as assessed by Q-Q Plot. The multiple regression model statistically significantly predicted mean healthy diet, $F(3, 418) = 25.321$, $p = .000$, adj. $R^2 = .154$. Two variables, "I intend to make sure that my child does not receive sugary snacks (food or drinks) too often", and "It's often hard to say no to my child when he/she wants candy" added statistically significantly to the prediction, $p < .05$. Regression coefficients and standard errors can be found in Table 31.

Table 31

Summary of Multiple Regression Analysis Intention and Perceived Behavior Control Toward Diet

Variable	B	SEβ	β	*p*
Intercept	7.712	.704		
I intend to make sure that my child does not receive sugary snacks (food or drinks) too often	.423	.147	.131	.006
Recode 34 In our family, it is difficult to prevent our child from getting sugary snacks (drinks and food)	.314	.123	.144	.154
Recode 35 It's often hard to say no to my child when he/she wants candy	.537	.119	.253	.000

Predictions were made for intention toward a healthy diet controlling for IV2: Intention toward dental hygiene and IV3: Intentions toward dental attendance for caretakers who strongly agree "If we limit the amount of sugary snacks our child eats he/she will have healthier teeth later", strongly agree, "My partner's opinion about our

child's nourishment is important to me", strongly disagree, "In our family, it is difficult to prevent our child from getting sugary snacks (drinks and food)", strongly disagree "It's often hard to say no to my child when he/she wants candy" and strongly agree "I intend to make sure that my child does not receive sugary snacks (food or drinks) too often". The multiple regression model statistically significantly predicted mean healthy diet at 14.281, 95% C.I. [13.793, 14.769] $p < .05$ suggesting that the more positive the intention and attitudes regarding dental diet the more likely the child is to eat and drink less sugary foods between meals and before bed. The R^2 value of 0.169 associated with this regression model suggests that intention toward a healthy diet accounts for 17% of the variation in a healthy diet, which means that 83% of a healthy diet cannot be explained by intention on a healthy diet alone. The confidence interval for this one variable associated with the regression analysis does not contain 0, which means the null hypothesis $H_0$4A: Intention of preschool parents are not associated with dietary habits can be rejected (see Table 37).

To measure intention and attitude toward dental hygiene a mean score was calculated from the two items measuring self-reported dental hygiene habits. The two Items (18-19), indicated the frequency of self-reported oral hygiene habits. The first item examined the frequency of brushing using a 4-point Likert scale ranging from 'never' to 'twice a day or more', the second examined the frequency of helping to brush, ranging from 'never' to 'every day'. were measured on a 5-point Likert scale ranging from 'never' to 'more than twice a day'. The one independent variable measuring intention

toward dental hygiene was item 55: 55: “In our family, we intend to make sure that our child's teeth get brushed properly every day”. The four independent variables measuring attitude toward oral hygiene habits were items 51 through 54: 51: “Buying a toothbrush and toothpaste for the whole family is expensive”, 52: “When my child brushes his/her teeth too much, they come loose”, 53: The risk of dental cavities decreases when my child brushes his/her teeth everyday” and 54: “Brushing teeth is annoying for a child” (see Table 38).

The results of the multiple linear regression analysis revealed a statistically significant association between intention and attitude toward a dental hygiene behavior for item 55: “In our family, we intend to make sure that our child's teeth get brushed properly every day” and item 21: “Buying a toothbrush and toothpaste for the whole family is expensive” to be statistically significant predictors to the model ($p < .05$).

The sample metric data was screened for linearity, independence of residuals, homoscedasticity, multicollinearity, residuals, and normality. There was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.147. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There were 12 (15, 39, 58, 61, 141, 149, 153, 197, 206, 212, 382, 399) studentized deleted residuals greater than ±3 standard deviations, no leverage values less than 0.2, and values for Cook's

distance above 1. There assumption of normality was met, as assessed by Q-Q Plot. The multiple regression model statistically significantly predicted mean healthy diet, F(2, 410) = 11.882, p = .000, adj. R^2 = .050. One variable, “In our family, we intend to make sure that our child's teeth get brushed properly every day” added statistically significantly to the prediction, $p < .05$. Regression coefficients and standard errors can be found in Table 32. The confidence interval for this one variable associated with the regression analysis does not contain 0, which means the null hypothesis $H_0$4A: Intention of preschool parents are not associated with dietary habits can be rejected.

Table 32

Summary of Multiple Regression Analysis Intention and Attitude Toward Dental Hygiene

Variable	B	SEβ	β	*p*
Intercept	5.616	.324		
In our family, we intend to make sure that our child's teeth get brushed properly every day	.297	.066	.220	.000
Recode 51 Buying a toothbrush and toothpaste for the whole family is expensive	.044	.043	.049	.312

To measure intention and subjective norm toward dental hygiene a mean score was calculated from the two Items measuring self-reported dental hygiene habits. The two Items (18-19), indicated the frequency of self-reported oral hygiene habits. The first item examined the frequency of brushing using a 4-point Likert scale ranging from ‘never’ to ‘twice a day or more’, the second examined the frequency of helping to brush, ranging from ‘never’ to ‘every day’. were measured on a 5-point Likert scale ranging from ‘never’ to ‘more than twice a day’. The one independent variable measuring

intention toward dental hygiene was item 55: 55: “In our family, we intend to make sure that our child's teeth get brushed properly every day”. The eight independent variables measuring subjective norm toward dental hygiene were items 43 through 50: 43: “When it comes to oral hygiene, my friends' and acquaintance's opinion is very important to me”, 44: “When it comes to oral hygiene, my parent's opinion is very important to me”, 45: “Our friends and acquaintances feel it important that we help our child to brush his/her teeth twice a day”, 46: “My parents find it important that my child's teeth get brushed properly”, 47: “It's important to my family doctor that my child's teeth are brushed at an early age”, 48: “It's important to my child’s pediatrician that my child's teeth get brushed at an early age”, 49: “It's important to my dentist that my child's teeth get brushed at an early age” and 50: “When it comes to oral hygiene, my partner's opinion is very important to me” (see Table 41).

The results of the multiple linear regression analysis revealed a statistically significant association between intention and subjective norm toward a dental hygiene behavior for item 55: “In our family, we intend to make sure that our child's teeth get brushed properly every day” to be statistically significant predictors to the model ($p < .05$).

The sample metric data was screened for linearity, independence of residuals, homoscedasticity, multicollinearity, residuals, and normality. There was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson

statistic of 2.173. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There were 12 (15, 39, 58, 61, 141, 149, 153, 197, 206, 212, 382, 399) studentized deleted residuals greater than ±3 standard deviations, no leverage values less than 0.2, and values for Cook's distance above 1. The assumption of normality was met, as assessed by Q-Q Plot. The multiple regression model statistically significantly predicted mean healthy diet, F(3, 410) = 9.264, p =.000, adj. R^2 = .057. One variable, “In our family, we intend to make sure that our child's teeth get brushed properly every day” added statistically significantly to the prediction, $p < .05$. Regression coefficients and standard errors can be found in Table 33. The confidence interval for this one variable associated with the regression analysis does not contain 0, which means the null hypothesis $H_0$4A: Intention of preschool parents are not associated with dietary habits can be rejected.

Table 33

Summary of Multiple Regression Analysis Intention and Subjective Norm Toward Dental Hygiene

Variable	B	SEβ	β	*p*
Intercept	5.465	.330		
In our family, we intend to make sure that our child's teeth get brushed properly every day	.256	.069	.190	.000
Our friends and acquaintances feel it important that we help our child to brush his/her teeth twice a day	.078	.045	.088	.084
When it comes to oral hygiene, my partner's opinion is very important to me	.052	.054	.049	.337

To measure intention and perceived behavior control toward dental hygiene a mean score was calculated from the two Items measuring self-reported dental hygiene behaviors. The two items (18-19), indicated the frequency of self-reported oral hygiene habits. The first item examined the frequency of brushing using a 4-point Likert scale ranging from ‘never’ to ‘twice a day or more’, the second examined the frequency of helping to brush, ranging from ‘never’ to ‘every day’. were measured on a 5-point Likert scale ranging from ‘never’ to ‘more than twice a day’. The one independent variable measuring intention toward dental hygiene was item 55: 55: “In our family, we intend to make sure that our child's teeth get brushed properly every day”. The four independent variables measuring perceived behavior control toward dental hygiene were items 39 through 42: 39: “We don't get our child to brush his/her teeth twice a day, 40: “We don't have time to help our child brush his/her teeth twice a day, 41: “It's time-consuming to check each day whether our child has brushed his/her teeth”, and 42: “We manage to brush our child's teeth every day” (see Table 41).

The results of the multiple linear regression analysis revealed a statistically significant association between intention and perceived behavior control toward a dental hygiene behavior 55: “In our family, we intend to make sure that our child's teeth get brushed properly every day”, item 39: “We don't get our child to brush his/her teeth twice a day”, and 42: “We manage to brush our child's teeth every day” to be statistically significant predictors to the model ($p < .05$).

The sample metric data was screened for linearity, independence of residuals, homoscedasticity, multicollinearity, residuals, and normality. There was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.164. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There were 7 (39, 58, 61, 149, 197, 382, 399) studentized deleted residuals greater than ±3 standard deviations, no leverage values less than 0.2, and values for Cook's distance above 1. The assumption of normality was met, as assessed by Q-Q Plot. The multiple regression model statistically significantly predicted mean healthy diet, $F(3, 414) = 40.819$, $p = .0005$, adj. $R^2 = .223$. Two variables, "We don't get our child to brush his/her teeth twice a day" and "We manage to brush our child's teeth every day" added statistically significantly to the prediction, $p < .05$. Regression coefficients and standard errors can be found in Table 34. The confidence interval for this one variable associated with the regression analysis does not contain 0, which means the null hypothesis $H_0$4A: Intention of preschool parents are not associated with dietary habits can be rejected.

Table 34

Summary of Multiple Regression Analysis Intention and Perceived Behavior Control Toward Dental Hygiene

Variable	B	SEβ	β	*p*
Intercept	4.670	.311		

In our family, we intend to make sure that our child's teeth get brushed properly every day	.085	.066	.059	.201
Recode 39 We don't get our child to brush his/her teeth twice a day	.290	.036	.359	.000
We manage to brush our child's teeth every day	.222	.047	.215	.000

Predictions were made for intention toward dental hygiene controlling for IV1: Intention toward a healthy diet and IV3: Intentions toward dental attendance for caretakers who strongly agree “In our family, we intend to make sure that our child's teeth get brushed properly every day”, strongly disagree “Buying a toothbrush and toothpaste for the whole family is expensive”, strongly agree “Our friends and acquaintances feel it important that we help our child to brush his/her teeth twice a day”, strongly agree, “When it comes to oral hygiene, my partner's opinion is very important to me”, strongly disagree “We don't get our child to brush his/her teeth twice a day”, and strongly agree “We manage to brush our child's teeth every day”. The multiple regression model statistically significantly predicted mean dental hygiene at 7.710, 95% C.I. [7.528, 7.892] $p < .05$ suggesting that the more positive the intention regarding dental hygiene the more likely the caregiver is to help brush their child’s teeth and the more often the child’s teeth will get brushed. The R^2 value of 0.213 associated with this regression model suggests that intention toward a healthy diet accounts for 21% of the variation in a healthy diet, which means that 79% of a healthy diet cannot be explained by intention toward oral hygiene alone. The confidence interval for this one variable associated with the regression analysis does not contain 0, which means the null hypothesis $H_0$4B:

Intention of preschool parents are not associated with dental hygiene habits can be rejected (see Table 41).

To measure intention and attitude toward attendance one item measuring self-reported dental attendance was used. Dental attendance was measured using one self-reported Item (20) asking when the child was last seen by the dentist with responses measured on a 4-point Likert scale ranging from ‘never’ to ‘six months ago or less. The one independent variable measuring intention toward dental attendance was 71: “We intend to take our child to the dentist twice a year for a check-up”. The six independent variables measuring attitude toward dental attendance were items 60 through 63 and items 69 and 70, 60: “For a child a visit to the dentist is not a terrible experience”, 61: “Going for a check-up at the dentist is a traumatic experience for a child”, 62: “Taking my child to the dentist is unpleasant”, 63: “Regularly taking your child to the dentist for check-ups, helps your child not be afraid of the dentist”, 69: “Regular visits to the dentist help my child's teeth to stay strong and healthy longer”, and 70: “The risk of dental cavities decreases when you regularly take your child to the dentist for a check-up” (see Table 41).

The results of the multiple linear regression analysis revealed a statistically significant association between intention and attitude toward a dental attendance item 71: “We intend to take our child to the dentist twice a year for a check-up”, 62: “Taking my child to the dentist is unpleasant”, and 63: “Regularly taking your child to the dentist for

check-ups, helps your child not be afraid of the dentist" to be statistically significant predictors to the model ($p < .05$).

The sample metric data was screened for linearity, independence of residuals, homoscedasticity, multicollinearity, residuals, and normality. There was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.075. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There were no studentized deleted residuals greater than ±3 standard deviations, no leverage values less than 0.2, and values for Cook's distance above 1. The assumption of normality was met, as assessed by Q-Q Plot. The multiple regression model statistically significantly predicted mean healthy diet, $F(3, 425) = 8.350$, $p = .000$, adj. $R^2 = .049$. Two variables, "We intend to take our child to the dentist twice a year for a check-up" and "Taking my child to the dentist is unpleasant" added statistically significantly to the prediction, $p < .05$. Regression coefficients and standard errors can be found in Table 35. The confidence interval for this one variable associated with the regression analysis does not contain 0, which means the null hypothesis H04A: Intention of preschool parents are not associated with dental attendance can be rejected.

Table 35

Summary of Multiple Regression Analysis Intention and Attitude Toward Dental Attendance

Variable	B	SEβ	β	*p*
Intercept	1.977	.311		
We intend to take our child to the dentist twice a year for a check-up	.149	.064	.118	.020
Recode 62 Taking my child to the dentist is unpleasant	.117	.039	.144	.003
Regularly taking your child to the dentist for check-ups, helps your child not be afraid of the dentist	.075	.049	.076	.128

To measure intention and subjective norm toward attendance one item measuring self-reported dental attendance was used. Dental attendance was measured using one self-reported item 20 asking when the child was last seen by the dentist with responses measured on a 4-point Likert scale ranging from ‘never’ to ‘six months ago or less. The one independent variable measuring intention toward dental attendance was item 71: “We intend to take our child to the dentist twice a year for a check-up”. The five independent variables measuring subjective norm toward dental attendance were items 64 through 68: 64: “When it comes to visiting the dentist, my child’s pediatrician's opinion is important to me”, 65: “When it comes to visiting the dentist, my family doctor's opinion is important to me”, 66: “When it comes to visiting the dentist, my parent's opinion is important to me”, 67: “It's important to our pediatrician that we take our child at an early age to the dentist”, and 68: “When it comes to visiting the dentist, my partner's opinion is important to me” (see Table 41).

The results of the multiple linear regression analysis revealed a statistically significant association between intention and subjective norm toward dental attendance item 71: “We intend to take our child to the dentist twice a year for a check-up, 64:

“When it comes to visiting the dentist, my child’s pediatrician's opinion is important to me”, and 67: “It's important to our pediatrician that we take our child at an early age to the dentist” to be statistically significant predictors to the model ($p < .05$).

The sample metric data was screened for linearity, independence of residuals, homoscedasticity, multicollinearity, residuals, and normality. There was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.073. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There were no studentized deleted residuals greater than ±3 standard deviations, no leverage values less than 0.2, and values for Cook's distance above 1. The assumption of normality was met, as assessed by Q-Q Plot. The multiple regression model statistically significantly predicted mean healthy diet, $F(3, 425) = 5.061$, $p = .002$, adj. $R^2 = .028$. One variable, “We intend to take our child to the dentist twice a year for a check-up” added statistically significantly to the prediction, $p < .05$. Regression coefficients and standard errors can be found in Table 36. The confidence interval for this one variable associated with the regression analysis does not contain 0, which means the null hypothesis H04A: Intention of preschool parents are not associated with dental attendance can be rejected.

Table 36

Summary of Multiple Regression Analysis Intention and Subjective Norm Toward Dental Attendance

Variable	B	SEβ	β	*p*
Intercept	2.222	.313		
We intend to take our child to the dentist twice a year for a check-up	.154	.071	.122	.032
When it comes to visiting the dentist, my child's pediatrician's opinion is important to me	.037	.069	.034	.586
It's important to our pediatrician that we take our child at an early age to the dentist	.080	.084	.064	.338

To measure intention and perceived behavior control toward attendance one item measuring self-reported dental attendance was used. Dental attendance was measured using one self-reported item 20 asking when the child was last seen by the dentist with responses measured on a 4-point Likert scale ranging from 'never' to 'six months ago or less. The one independent variable measuring intention toward dental attendance was item 71: "We intend to take our child to the dentist twice a year for a check-up". The four independent variables measuring behavior control toward dental attendance were items 56 through 59. 56: "We don't have time to take our child to the dentist", 57: "I don't see myself taking my child to the dentist", 58: "I do think of making an appointment with the dentist for my child", and 59: "We manage to take our child to the dentist twice a year" (see Table 41).

The results of the multiple linear regression analysis revealed a statistically significant association between intention and perceived behavior control toward dental attendance item 71: "We intend to take our child to the dentist twice a year for a check-up", 57: "I don't see myself taking my child to the dentist", and 59: "We manage to take

our child to the dentist twice a year" to be statistically significant predictors to the model (*p* < .05).

The sample metric data was screened for linearity, independence of residuals, homoscedasticity, multicollinearity, residuals, and normality. There was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.977. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There were 2 (236, 350) studentized deleted residuals greater than ±3 standard deviations, no leverage values less than 0.2, and values for Cook's distance above 1. The assumption of normality was met, as assessed by Q-Q Plot. The multiple regression model statistically significantly predicted mean healthy diet, $F(3, 422) = 48.134$, $p = .000$, adj. $R^2 = .250$. Three variables, 71: "We intend to take our child to the dentist twice a year for a check-up", 57: "I don't see myself taking my child to the dentist", and 59: "We manage to take our child to the dentist twice a year" added statistically significantly to the prediction, $p < .05$. Regression coefficients and standard errors can be found in Table 37. The confidence interval for this one variable associated with the regression analysis does not contain 0, which means the null hypothesis $H_0$4A: Intention of preschool parents are not associated with dietary habits can be rejected.

Table 37

Summary of Multiple Regression Analysis Intention and Perceived Behavior Control Toward Dental Attendance

Variable	B	SEβ	β	*p*
Intercept	1.625	.269		
We intend to take our child to the dentist twice a year for a check-up	-.221	.064	-.179	.001
Recode 57 I don't see myself taking my child to the dentist	.212	.051	.194	.000
We manage to take our child to the dentist twice a year	.445	.046	.493	.000

Predictions were made for intention toward dental attendance controlling for IV1: Intention toward a healthy diet and IV2: Intentions toward dental hygiene for caretakers who strongly agree “We intend to take our child to the dentist twice a year for a check-up”, strongly disagree “Taking my child to the dentist is unpleasant”, strongly agree “Regularly taking your child to the dentist for check-ups, helps your child not be afraid of the dentist”, strongly agree “When it comes to visiting the dentist my child’s pediatrician's opinion is important to me”, strongly agree “It's important to our pediatrician that we take our child at an early age to the dentist” , strongly disagree “I don't see myself taking my child to the dentist”, and strongly agree “We manage to take our child to the dentist twice a year”. The multiple regression model statistically significantly predicted mean dental hygiene at 3.847, 95% C.I. [3.721, 3.974] $p < .05$ suggesting that the more positive the intention regarding dental attendance the more likely the caregiver is to take the child to the dentist every 6 months. The R^2 value of 0.283 associated with this regression model suggests that intention toward a healthy diet accounts for 28% of the variation in a dental attendance, which means that 72% of a dental attendance cannot be explained by intention on dental attendance alone. The

confidence interval for this one variable associated with the regression analysis does not contain 0, which means the null hypothesis $H_0$4A: Intention of preschool parents are not associated with dental attendance can be rejected (see Table 40).

Table 38

Statistical significance of the model summary

Healthy Diet		
Attitude	F (5, 388) = 1.435, p = .211, adj. R^2 = .006	Not Significant
Attitude with Covariates	F (35, 358) = 2.342, p = .000, adj. R^2 = .107.	Significant
Subjective Norm	F (8, 385) = 3.420, p = .001, adj. R^2 = .047	Significant
Subjective Norm with Covariates	F (38, 355) = 2.767, p = .000, adj. R^2 = .146	Significant
Perceived Behavior Control	F (4, 389) = 19.988, p = .000, adj. R^2= .162	Significant
Perceived Behavior Control with Covariates	F (34, 359) = 3.720, p = .000, adj. R^2= .191	Significant
Intention	F (1, 392) = 10.853, p = .001, adj. R^2 = .024	Significant
Intention with Covariates	F (31, 362) = 2.682, p = .000, adj. R^2 = .117	Significant
Intention and Attitude	F (2, 420) = 7.077, p = .001, adj. R^2 = .028	Significant
Intention and Subjective norm	F (2, 421) = 6.898, p = .001, adj. R^2 = .027	Significant
Intention and Perceived Behavior Control	F (3, 418) = 25.321, p = .000, adj. R^2 = .154	Significant

Dental Hygiene		
Attitude	F (4, 390) = 1.944, p = .102, adj. R^2 = .009	Not Significant
Attitude with Covariates	F (34, 360) = 1.995, p = .001, adj. R^2 = .079	Significant
Subjective Norm	F (8, 380) = 1.706, p = .095, adj. R^2 = .014	Not Significant
Subjective Norm with Covariates	F (38, 350) = 2.120, p = .000, adj. R^2 = .099	Significant
Perceived Behavior Control	F (4, 381) = 25.356, p = .000, adj. R^2 = .210	Significant
Perceived Behavior Control with Covariates	F (34, 351) = 6.256, p = .000, adj. R^2= .317	Significant
Intention	F (1, 393) = 12.437, p = .000, adj. R^2 = .028	Significant
Intention with Covariates	F (31, 363) = 2.291, p = .000, adj. R^2 = .092	Significant
Intention and Attitude	F (2, 410) = 11.882, p = .000, adj. R^2 = .050	Significant
Intention and Subjective Norm	F (3, 410) = 9.264, p = .000, adj. R^2 = .057	Significant
Intention and Perceived Behavior Control	F (3, 414) = 40.819, p = .000, adj. R^2 = .223	Significant

Dental Attendance		
Attitude	F (6, 391) = 3.339, p = .003, adj. R^2 = .034	Significant
Attitude with Covariates	F (36, 361) = 3.147, p = .000, adj. R^2 = .163	Significant
Subjective Norm	F (5, 389) = 3.700, p= .003, adj. R^2 = .033	Significant
Subjective Norm with Covariates	F (35, 359) = 3.731, p= .000, adj. R^2 = .195	Significant
Perceived Behavior Control	F (4, 389) = 31.353, p = .000, adj. R^2 = .237	Significant
Perceived Behavior Control with Covariates	F (34, 359) = 6.446, p = .000, adj. R^2= .320	Significant
Intention	F (1, 397) = 12.971, p = .000, adj. R^2 = .029	Significant
Intention with Covariates	F (31, 367) = 3.285, p = .000, adj. R^2 = .151	Significant
Intention and Attitude	F (3, 425) = 8.350, p = .000, adj. R^2 = .049	Significant
Intention and Subjective Norm	F (3, 425) = 5.061, p = .002, adj. R^2 = .028	Significant
Intention and Previewed Behavior Control	F (3, 422) = 48.134, p = .000, adj. R^2 = .250	Significant

Table 39

Pearson Correlation of Independent Variables Summary

Pearson Correlations between variables measuring attitude and a healthy diet				
	Item 21	Item 22	Item 23	Item 24
Item 22	0.785			
Item 23	0.694	0.755		
Item 24	0.422	0.483	0.556	
Item 25	0.389	0.421	0.54	0.554

21) Less candy helps to prevent dental cavities, 22) If we limit the amount of sugary snacks our child eats he/she will have healthier teeth later, 23) Sugary food is damaging for teeth, 24) Sugary snacks make my child fat, 25) Sweets hinder my child's appetite

Pearson Correlations between variables measuring attitude and dental hygiene			
	Item 51	Item 52	Item 53
Item 52	0.419		
Item 53	0.188	0.191	
Item 54	0.293	0.253	0.052

51) Buying a toothbrush and toothpaste for the whole family is expensive, 52) When my child brushes his/her teeth too much, they come loose, 53) The risk of dental cavities decreases when my child brushes his/her teeth every day, 54) Brushing teeth is annoying for a child

Pearson Correlations between variables measuring attitude and dental attendance					
	Item 60	Item 61	Item 62	Item 63	Item 69
Item 61	0.334				
Item 62	0.344	0.601			

Item 63	0.245	0.199	0.134		
Item 69	0.085	0.143	0.177	0.343	
Item 70	0.295	0.277	0.223	0.333	0.438

60) For a child a visit to the dentist is not a terrible experience, 61) Going for a check-up at the dentist is a traumatic experience for a child, 62) Taking my child to the dentist is unpleasant, 63) Regularly taking your child to the dentist for check-ups, helps your child not be afraid of the dentist, 69) Regular visits to the dentist help my child's teeth to stay strong and healthy longer, 70) The risk of dental cavities decreases when you regularly take your child to the dentist for a check-up

Pearson's Correlations between variables measuring subjective norm and diet

	Item 26	Item 27	Item 28	Item 29	Item 30	Item 31	Item 32
Item 27	0.48						
Item 28	0.603	0.48					
Item 29	0.371	0.396	0.602				
Item 30	0.365	0.302	0.436	0.421			
Item 31	0.33	0.325	0.429	0.474	0.677		
Item 32	0.456	0.377	0.58	0.489	0.591	0.587	
Item 33	0.423	0.367	0.461	0.443	0.497	0.488	0.482

26) It's important to my partner that I give our child healthy snacks between meals (e.g. fruit instead of cookie), 27) It's important to my partner that I limit the amount of snacks for our child, 28) My partner's opinion about our child's nourishment is important to me, 29) My parent's opinion about our child's nourishment is important to me, 30) My dentist advises me to give my child healthy snacks, 31) My family doctor gives me advice on healthy snacks for my child, 32) My dentist's opinion about our child's nourishment is important to me, 33) The teachers and administrators from the school feel it important that the children receive healthy snacks during playtime

Pearson Correlations between variables measuring subjective norm and dental hygiene

	Item 43	Item 44	Item 45	Item 46	Item 47	Item 48	Item 49
Item 44	0.681						
Item 45	0.574	0.528					
Item 46	0.462	0.532	0.581				
Item 47	0.298	0.344	0.431	0.599			
Item 48	0.249	0.306	0.384	0.513	0.79		
Item 49	0.232	0.278	0.357	0.457	0.704	0.713	
Item 50	0.297	0.361	0.28	0.244	0.351	0.413	0.419

43) When it comes to oral hygiene, my friends' and acquaintance's opinion is very important to me, 44) When it comes to oral hygiene, my parent's opinion is very important to me, 45) Our friends and acquaintances feel it important that we help our child to brush his/her teeth twice a day, 46) My parents find it important that my child's teeth get brushed properly, 47) It's important to my family doctor that my child's teeth are brushed at an early age, 48) It's important to my child’s pediatrician that my child's teeth get brushed at an early age, 49) It's important to my dentist that my child's teeth get brushed at an early age, 50) When it comes to oral hygiene, my partner's opinion is very important to me

Pearson Correlations between variables measuring subjective norm and dental attendance

	Item 64	Item 65	Item 66	Item 67

Item 65	0.809			
Item 66	0.532	0.62		
Item 67	0.639	0.603	0.426	
Item 68	0.502	0.515	0.512	0.391

64) When it comes to visiting the dentist, my child's pediatrician's opinion is important to me, 65) When it comes to visiting the dentist, my family doctor's opinion is important to me, 66) When it comes to visiting the dentist, my parent's opinion is important to me, 67) It's important to our pediatrician that we take our child at an early age to the dentist, 68) When it comes to visiting the dentist, my partner's opinion is important to me

Pearson's Correlations between variables measuring perceived behavior control and diet

	Item 34	Item 35	Item 36
Item 35	0.597		
Item 36	0.086	0.041	
Item 37	0.077	0.058	0.667

34) In our family, it is difficult to prevent our child from getting sugary snacks (drinks and food), 35) It's often hard to say no to my child when he/she wants candy, 36) We succeed in giving healthy drinks to our child as in-between meal snacks, 37) We succeed in giving healthy snacks to our child as in-between meal snacks

Pearson's Correlations between variables measuring perceived behavior control and dental hygiene

	Item 39	Item 40	Item 41
Item 40	0.602		
Item 41	0.288	0.476	
Item 42	0.213	0.15	0.163

39) We don't get our child to brush his/her teeth twice a day, 40) We don't have time to help our child brush his/her teeth twice a day, 41) It's time-consuming to check each day whether our child has brushed his/her teeth, and 42) We manage to brush our child's teeth every day

Pearson's Correlations between variables measuring perceived behavior control and dental attendance

	Item 56	Item 57	Item 58
Item 57	0.566		
Item 58	0.071	0.118	
Item 59	0.3	0.35	0.253

RQ3 IV3a 56) We don't have time to take our child to the dentist, RQ3 IV3b 57) I don't see myself taking my child to the dentist, RQ3 IV3c 58) I do think of making an appointment with the dentist for my child and RQ3 IV3d 59) We manage to take our child to the dentist twice a year, to be statistically significant predictors to the model

Pearson's Correlations between variables measuring intentions and attitude toward a healthy diet

	Item 38	Item 21	Item 22	Item 23	Item 24
Item 21	0.363				
Item 22	0.359	0.785			
Item 23	0.412	0.694	0.755		

Item 24	0.364	0.422	0.483	0.556	
Item 25	0.321	0.389	0.421	0.54	0.554

38) I intend to make sure that my child does not receive sugary snacks (food or drinks) too often. The attitude variables included in the multiple linear regression measuring attitude toward a healthy diet were items 21-25: 21) Less candy helps to prevent dental cavities, 22) If we limit the amount of sugary snacks our child eats he/she will have healthier teeth later, 23) Sugary food is damaging for teeth, 24) Sugary snacks make my child fat, 25) Sweets hinder my child's appetite

Pearson's Correlations between variables measuring intention, subjective norm toward a healthy diet

	Item 38	Item 26	Item 27	Item 28	Item 29	Item 30	Item 31	Item 32
Item 26	0.354							
Item 27	0.296	0.48						
Item 28	0.391	0.603	0.48					
Item 29	0.271	0.371	0.396	0.602				
Item 30	0.308	0.365	0.302	0.436	0.421			
Item 31	0.268	0.33	0.325	0.429	0.474	0.677		
Item 32	0.377	0.456	0.377	0.58	0.489	0.591	0.587	
Item 33	0.282	0.423	0.367	0.461	0.443	0.497	0.488	0.482

38) I intend to make sure that my child does not receive sugary snacks (food or drinks) too often. The subjective norm variables included in the multiple linear regression measuring social norm toward a healthy diet were items 26-33: 26) It's important to my partner that I give our child healthy snacks between meals (e.g. fruit instead of cookie), 27) It's important to my partner that I limit the amount of snacks for our child, 28) My partner's opinion about our child's nourishment is important to me, 29) My parent's opinion about our child's nourishment is important to me, 30) My dentist advises me to give my child healthy snacks, 31) My family doctor gives me advice on healthy snacks for my child, and 32) My dentist's opinion about our child's nourishment is important to me

Pearson's Correlations between variables measuring intentions, perceived behavior control toward a healthy diet

	Item 38	Item 34	Item 35	Item 36	Item 37
Item 34	0.132				
Item 35	0.067	0.597			
Item 36	0.454	0.086	0.041		
Item 37	0.5	0.077	0.058	0.667	
Item 38	0.096	0.299	0.329	0.144	0.172

38) I intend to make sure that my child does not receive sugary snacks (food or drinks) too often. The perceived behavior control variables included in the multiple linear regression measuring perceived behavior control toward a healthy diet were items 34-37: 34) In our family, it is difficult to prevent our child from getting sugary snacks (drinks and food), 35) It's often hard to say no to my child when he/she wants candy, 36) We succeed in giving healthy drinks to our child as in-between meal snacks, and 37) We succeed in giving healthy snacks to our child as in-between meal snacks

Pearson's Correlations between variables measuring intentions and attitude toward dental hygiene

	Item 55	Item 51	Item 52	Item 53
Item 51	0.185			
Item 52	0.105	0.419		

Item 53	0.31	0.188	0.191	
Item 54	0.123	0.293	0.253	0.052

55) In our family, we intend to make sure that our child's teeth get brushed properly every day. The four independent variables measuring attitude toward oral hygiene habits were items 51 through 54: 51) Buying a toothbrush and toothpaste for the whole family is expensive, 52) When my child brushes his/her teeth too much, they come loose, 53) The risk of dental cavities decreases when my child brushes his/her teeth everyday and 54) Brushing teeth is annoying for a child

Pearson's Correlations between variables measuring intention and subjective norm toward dental hygiene

	Item 55	Item 43	Item 44	Item 45	Item 46	Item 47	Item 48	Item 49
Item 43	0.178							
Item 44	0.199	0.681						
Item 45	0.277	0.574	0.528					
Item 46	0.335	0.462	0.532	0.581				
Item 47	0.327	0.298	0.344	0.431	0.599			
Item 48	0.388	0.249	0.306	0.384	0.513	0.79		
Item 49	0.4	0.232	0.278	0.357	0.457	0.704	0.713	
Item 50	0.282	0.297	0.361	0.28	0.244	0.351	0.413	0.419

55) In our family, we intend to make sure that our child's teeth get brushed properly every day. The eight independent variables measuring subjective norm toward dental hygiene were items 43 through 50: 43) When it comes to oral hygiene, my friends' and acquaintance's opinion is very important to me, 44) When it comes to oral hygiene, my parent's opinion is very important to me, 45) Our friends and acquaintances feel it important that we help our child to brush his/her teeth twice a day, 46) My parents find it important that my child's teeth get brushed properly, 47) It's important to my family doctor that my child's teeth are brushed at an early age, 48) It's important to my child's pediatrician that my child's teeth get brushed at an early age, 49) It's important to my dentist that my child's teeth get brushed at an early age and 50) When it comes to oral hygiene, my partner's opinion is very important to me

Pearson's Correlations between variables measuring intention and perceived behavior control toward a dental hygiene

	Item 55	Item 39	Item 40	Item 41
Item 39	0.239			
Item 40	0.201	0.602		
Item 41	0.216	0.288	0.476	
Item 42	0.328	0.213	0.15	0.163

55) In our family, we intend to make sure that our child's teeth get brushed properly every day. The four independent variables measuring perceived behavior control toward dental hygiene were items 39 through 42: 39) We don't get our child to brush his/her teeth twice a day, 40) We don't have time to help our child brush his/her teeth twice a day, 41) It's time-consuming to check each day whether our child has brushed his/her teeth, and 42) We manage to brush our child's teeth every day

Pearson's Correlations between variables measuring intentions and attitude toward a dental attendance

	Item 71	Item 60	Item 61	Item 62	Item 63	Item 69
Item 60	0.256					

Item 61	0.245	0.334				
Item 62	0.189	0.344	0.601			
Item 63	0.325	0.245	0.199	0.134		
Item 69	0.394	0.085	0.143	0.177	0.343	
Item 70	0.567	0.295	0.277	0.223	0.333	0.438

71) We intend to take our child to the dentist twice a year for a check-up. The 6 independent variables measuring attitude toward dental attendance were items 60 through 63 and items 69 and 70, 60) For a child a visit to the dentist is not a terrible experience, 61) Going for a check-up at the dentist is a traumatic experience for a child, 62) Taking my child to the dentist is unpleasant, 63) Regularly taking your child to the dentist for check-ups, helps your child not be afraid of the dentist, 69) Regular visits to the dentist help my child's teeth to stay strong and healthy longer, and 70) The risk of dental cavities decreases when you regularly take your child to the dentist for a check-up

Pearson's Correlations between variables measuring intentions and subjective norm toward a dental attendance

	Item 71	Item 64	Item 65	Item 66	Item 67
Item 64	0.422				
Item 65	0.357	0.809			
Item 66	0.223	0.532	0.62		
Item 67	0.526	0.639	0.603	0.426	
Item 68	0.33	0.502	0.515	0.512	0.391

71) We intend to take our child to the dentist twice a year for a check-up. The five independent variables measuring subjective norm toward dental attendance were items 64 through 68: 64) When it comes to visiting the dentist, my child’s pediatrician's opinion is important to me, 65) When it comes to visiting the dentist, my family doctor's opinion is important to me, 66) When it comes to visiting the dentist, my parent's opinion is important to me, 67) It's important to our pediatrician that we take our child at an early age to the dentist, and 68) When it comes to visiting the dentist, my partner's opinion is important to me

Pearson's Correlations between variables measuring intentions and perceived behavior control toward a dental attendance

	Item 71	Item 56	Item 57	Item 58
Item 56	0.28			
Item 57	0.391	0.566		
Item 58	0.276	0.071	0.118	
Item 59	0.552	0.3	0.35	0.253

71) We intend to take our child to the dentist twice a year for a check-up. The four independent variables measuring behavior control toward dental attendance were items 56 through 59: 56) We don't have time to take our child to the dentist, 57) I don't see myself taking my child to the dentist, 58) I do think of making an appointment with the dentist for my child, and 59) We manage to take our child to the dentist twice a year

Table 40

Predictions of Independent Variables Summary

Healthy Diet		
		adj. R^2
Attitude	Not Significant	
Subjective Norm [a]	12.462, 95% C.I. (12.022, 12.901) $p < .05$	0.055
Perceived Behavior Control [b]	14.352, 95% C.I. [13.855, 14.850] $p < .05$	0.171
Intention [c]	14.281, 95% C.I. [13.793, 14.769] $p < .05$	0.169

a Subjective norm predictions were made for dietary habits for caretakers who strongly agree It's important to my partner that I give our child healthy snacks between meals (e.g., fruit instead of cookie), strongly agree It's important to my partner that I limit the amount of snacks for our child, strongly agree My partner's opinion about our child's nourishment is important to me, strongly agree My parent's opinion about our child's nourishment is important to me, strongly agree My dentist advises me to give my child healthy snacks, strongly agree My family doctor gives me advice on healthy snacks for my child, strongly agree My dentist's opinion about our child's nourishment is important to me and strongly agree The teachers and administrators from the school feel it important that the children receive healthy snacks during playtime

b. Perceived behavior control toward dietary habits, predictions were made for perceived behavior control for caretakers who strongly disagree In our family, it is difficult to prevent our child from getting sugary snacks (drinks and food), strongly disagree It's often hard to say no to my child when he/she wants candy, strongly agree We succeed in giving healthy drinks to our child as in-between meal snacks and strongly agree We succeed in giving healthy snacks to our child as in-between meal snacks

c. Intention predictions were made for caretakers who strongly agree If we limit the amount of sugary snacks our child eats he/she will have healthier teeth later, strongly agree, My partner's opinion about our child's nourishment is important to me, strongly disagree, In our family, it is difficult to prevent our child from getting sugary snacks (drinks and food), strongly disagree It's often hard to say no to my child when he/she wants candy strongly and strongly agree I intend to make sure that my child does not receive sugary snacks (food or drinks) too often

Dental Hygiene		
		adj. R^2
Attitude	Not Significant	
Subjective Norm [a]	7.416, 95% C.I. [7.257, 7.574] $p < .05$	0.042
Perceived Behavior Control [b]	7.616, 95% C.I. [7.481, 7.750] $p < .05$	0.24
Intention [c]	7.710, 95% C.I. [7.528, 7.892] $p < .05$	0.213

a Subjective norm predictions were made for oral hygiene habits for caretakers who strongly agree When it comes to oral hygiene, my friends' and acquaintance's opinion is very important to me, strongly agree When it comes to oral hygiene, my parent's opinion is very important to me, strongly agree Our friends and acquaintances feel it important that we help our child to brush his/her teeth twice a day, strongly agree My parents find it important that my child's teeth get brushed properly, strongly agree It's important to my family doctor that my child's teeth are brushed at an early age, strongly agree It's important to my child's pediatrician that my child's teeth get brushed at an early age, strongly agree It's important to my dentist that my child's teeth get brushed at an early age, strongly agree When it comes to oral hygiene, my partner's opinion is very important to me

b. Perceived behavior control toward oral hygiene habits, predictions were made for oral hygiene habits for caretakers who strongly disagree We don't get our child to brush his/her teeth twice a day, strongly disagree We don't have time to help our child brush his/her teeth twice a day, strongly disagree It's time-consuming to check each day whether our child has brushed his/her teeth and strongly agree We manage to brush our child's teeth every day

c. Intention predictions were made for caretakers who strongly agree In our family, we intend to make sure that our child's teeth get brushed properly every day, strongly disagree Buying a toothbrush and toothpaste for the whole family is expensive, strongly agree Our friends and acquaintances feel it important that we help our child to brush his/her teeth twice a day, strongly agree, When it comes to oral hygiene, my partner's opinion is very important to me, strongly disagree We don't get our child to brush his/her teeth twice a day, and strongly agree We manage to brush our child's teeth every day

Dental Attendance		
		adj. R^2
Attitude [a]		0.056
Subjective norm [b]	3.483, 95% C.I. [3.347, 3.620] $p < .05$	0.045
Perceived Behavior Control [c]	3.797, 95% C.I. [3.687, 3.906] $p < .05$	0.255
Intention [d]	3.847, 95% C.I. [3.721, 3.974] $p < .05$	0.283

a. Attitude predictions were made for dental attendance for caretakers who strongly agreed for a child to visit the dentist is not a terrible experience, strongly disagreed going for a check-up at the dentist is a traumatic experience for a child, strongly disagree that taking my child to the dentist is unpleasant, strongly agreed that regularly taking your child to the dentist for check-ups helps your child not be afraid of the dentist, strongly agrees that regular visits to the dentist help my child's teeth to stay strong and healthy and strongly agree that the risk of dental cavities decreases when you regularly take your child to the dentist

b. Subjective norm toward dental hygiene habits, predictions were made for dental attendance for caretakers who strongly agree When it comes to visiting the dentist, my child's pediatrician's opinion is important to me, strongly agree When it comes to visiting the dentist, my family doctor's opinion is important to me, strongly agree When it comes to visiting the dentist, my parent's opinion is important to me, strongly agree It's important to our pediatrician that we take our child at an early age to the dentist and strongly agree When it comes to visiting the dentist, my partner's opinion is important to me

c. Perceived Behavior Control predictions were made for dental attendance for caretakers who strongly disagree We don't have time to take our child to the dentist, strongly disagree I don't see myself taking my child to the dentist, strongly agree I do think of making an appointment with the dentist for my child, and strongly agree We manage to take our child to the dentist twice a year

d. Intention predictions were made for dental attendance for caretakers who strongly agree We intend to take our child to the dentist twice a year for a check-up, strongly disagree Taking my child to the dentist is unpleasant, strongly agree Regularly taking your child to the dentist for check-ups, helps your child not be afraid of the dentist, strongly agree When it comes to visiting the dentist my child's pediatrician's opinion is important to me, strongly agree It's important to our pediatrician that we take our child at an early age to the dentist , strongly disagree I don't see myself taking my child to the dentist, and strongly agree We manage to take our child to the dentist twice a year

Table 41

Summary of Items Measuring Dependent and Independent Variables

Item number	Dependent Variable	Independent Variable
14) How many times does your child eat sugary snacks (e.g. cookies, cake, candy) between the main meals? (only 1 answer possible):	Healthy Diet	
15) How many times does your child drink sugar-containing drinks (e.g. fruit juice, lemonade, soda) between the main meals? (only 1 answer possible):	Healthy Diet	
16) How many times does your child drink (other than water) in bed or at night? (only 1 answer possible)	Healthy Diet	
17) How many times does your child eat something just before bedtime or at night? (only 1 answer possible):	Healthy Diet	
18) Do you help your child while teeth brushing? (really helping, not only applying toothpaste on the toothbrush)	Dental Hygiene	
19) How often do your child's teeth get brushed?	Dental Hygiene	
20) When was the last time that your child visited a dentist?	Dental Attendance	
21) Less candy helps to prevent dental cavities	Healthy Diet	Attitude toward Diet
22) If we limit the amount of sugary snacks our child eats he/she will have healthier teeth later	Healthy Diet	Attitude toward Diet
23) Sugary food is damaging for teeth	Healthy Diet	Attitude toward Diet
24) Sugary snacks make my child fat	Healthy Diet	Attitude toward Diet
25) Sweets hinder my child's appetite	Healthy Diet	Attitude toward Diet
26) It's important to my partner that I give our child healthy snacks between meals (e.g. fruit instead of cookie)	Healthy Diet	Subjective Norm toward Diet
27) It's important to my partner that I limit the amount of snacks for our child	Healthy Diet	Subjective Norm toward Diet
28) My partner's opinion about our child's nourishment is important to me	Healthy Diet	Subjective Norm toward Diet
29) My parent's opinion about our child's nourishment is important to me	Healthy Diet	Subjective Norm toward Diet
30) My dentist advises me to give my child healthy snacks	Healthy Diet	Subjective Norm toward Diet
31) My family doctor gives me advice on healthy snacks for my child	Healthy Diet	Subjective Norm toward Diet

32) My dentist's opinion about our child's nourishment is important to me	Healthy Diet	Subjective Norm toward Diet
33) The teachers and administrators from the school feel it important that the children receive healthy snacks during playtime	Healthy Diet	Subjective Norm toward Diet
34) In our family, it is difficult to prevent our child from getting sugary snacks (drinks and food)	Healthy Diet	Perceived Behavior Control Toward Diet
35) It's often hard to say no to my child when he/she wants candy	Healthy Diet	Perceived Behavior Control Toward Diet
36) We succeed in giving healthy drinks to our child as in-between meal snacks	Healthy Diet	Perceived Behavior Control Toward Diet
37) We succeed in giving healthy snacks to our child as in-between meal snacks	Healthy Diet	Perceived Behavior Control Toward Diet
38) I intend to make sure that my child does not receive sugary snacks (food or drinks) too often	Healthy Diet	Intention toward Diet
39) We don't get our child to brush his/her teeth twice a day	Dental Hygiene	Perceived Behavior Control Toward Dental Hygiene
40) We don't have time to help our child brush his/her teeth twice a day	Dental Hygiene	Perceived Behavior Control Toward Dental Hygiene
41) It's time-consuming to check each day whether our child has brushed his/her teeth	Dental Hygiene	Perceived Behavior Control Toward Dental Hygiene
42) We manage to brush our child's teeth every day	Dental Hygiene	Perceived Behavior Control Toward Dental Hygiene
43) When it comes to oral hygiene, my friends' and acquaintance's opinion is very important to me	Dental Hygiene	Subjective Norm toward Dental Hygiene
44) When it comes to oral hygiene, my parent's opinion is very important to me	Dental Hygiene	Subjective Norm toward Dental Hygiene
45) Our friends and acquaintances feel it important that we help our child to brush his/her teeth twice a day	Dental Hygiene	Subjective Norm toward Dental Hygiene
46) My parents find it important that my child's teeth get brushed properly	Dental Hygiene	Subjective Norm toward Dental Hygiene
47) It's important to my family doctor that my child's teeth are brushed at an early age	Dental Hygiene	Subjective Norm toward Dental Hygiene
48) It's important to my child's pediatrician that my child's teeth get brushed at an early age	Dental Hygiene	Subjective Norm toward Dental Hygiene
49) It's important to my dentist that my child's teeth get brushed at an early age.	Dental Hygiene	Subjective Norm toward Dental Hygiene
50) When it comes to oral hygiene, my partner's opinion is very important to me	Dental Hygiene	Subjective Norm toward Dental Hygiene
51) Buying a toothbrush and toothpaste for the whole family is expensive	Dental Hygiene	Attitude toward Dental Hygiene
52) When my child brushes his/her teeth too much, they come loose	Dental Hygiene	Attitude toward Dental Hygiene
53) The risk of dental cavities decreases when my child brushes his/her teeth everyday	Dental Hygiene	Attitude toward Dental Hygiene

54) Brushing teeth is annoying for a child	Dental Hygiene	Attitude toward Dental Hygiene
55) In our family, we intend to make sure that our child's teeth get brushed properly every day	Dental Hygiene	Intention toward Dental Hygiene
56) We don't have time to take our child to the dentist	Dental Attendance	Perceived Behavior Control toward Dental Attendance
57) I don't see myself taking my child to the dentist	Dental Attendance	Perceived Behavior Control toward Dental Attendance
58) I do think of making an appointment with the dentist for my child	Dental Attendance	Perceived Behavior Control toward Dental Attendance
59) We manage to take our child to the dentist twice a year	Dental Attendance	Perceived Behavior Control toward Dental Attendance
60) For a child a visit to the dentist is not a terrible experience	Dental Attendance	Attitude toward Dental Attendance
61) Going for a check-up at the dentist is a traumatic experience for a child	Dental Attendance	Attitude toward Dental Attendance
62) Taking my child to the dentist is unpleasant	Dental Attendance	Attitude toward Dental Attendance
63) Regularly taking your child to the dentist for check-ups, helps your child not be afraid of the dentist	Dental Attendance	Attitude toward Dental Attendance
64) When it comes to visiting the dentist, my child’s pediatrician's opinion is important to me	Dental Attendance	Subjective Norm toward Dental Attendance
65) When it comes to visiting the dentist, my family doctor's opinion is important to me	Dental Attendance	Subjective Norm toward Dental Attendance
66) When it comes to visiting the dentist, my parent's opinion is important to me	Dental Attendance	Subjective Norm toward Dental Attendance
67) It's important to our pediatrician that we take our child at an early age to the dentist	Dental Attendance	Subjective Norm toward Dental Attendance
68) When it comes to visiting the dentist, my partner's opinion is important to me	Dental Attendance	Subjective Norm toward Dental Attendance
69) Regular visits to the dentist help my child's teeth to stay strong and healthy longer	Dental Attendance	Attitude toward Dental Attendance
70) The risk of dental cavities decreases when you regularly take your child to the dentist for a check-up	Dental Attendance	Attitude toward Dental Attendance
71) We intend to take our child to the dentist twice a year for a check-up	Dental Attendance	Intention toward Dental Attendance

Summary

The descriptive statistics indicate the response rate for this research study was 38.9%, with 81.3% of respondents reporting one or more low-income identifier. 65.4% of the respondents were Hispanic and 40.8% reported speaking Spanish. There were three dependent variables in this study; a healthy diet, oral hygiene, and dental attendance. There were four independent variables; attitude, subjective norm, perceived behavior control, and intention. Intention was measured in combination with attitude, subjective norm and perceived behavior control to creating a total of three separate independent variables associated with intention. These six independent variables, three intention variables. attitude, subjective norm and perceived behavior control, were measured against the three dependent variables. Pearson's correlation was used to determine a linear relationship between the six independent variables. Multiple linear regression analysis was conducted to evaluate the prediction of dependent variables: dietary habits, oral hygiene habits, and dental use. The study was guided by four research questions:

RQ1: Are the attitudes of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?

The alternative hypothesis H_a1A: Attitudes of preschool parents are associated with dietary habits, can be rejected.

The alternative hypothesis H_a1B: Attitude of preschool parents are associated with oral hygiene habits can be rejected.

The null hypothesis, $H_0$1C: Attitudes of preschool parents are not associated with dental attendance, can be rejected.

RQ2: Are the subjective norms of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?

The null hypothesis $H_0$2A: Subjective norms of preschool parents are not associated with dietary habits can be rejected.

The null hypothesis $H_0$2B: Subjective norms of preschool parents are not associated with oral hygiene habits can be rejected.

The null hypothesis $H_0$2C: Subjective norms of preschool parents are not associated with dental attendance can be rejected.

RQ3: Are the perceived behavior control of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?

The null hypothesis $H_0$3A: Perceived behavior control of preschool parents are not associated with dietary habits can be rejected.

The null hypothesis $H_0$3B: Perceived behavior control of preschool parents are not associated with oral hygiene habits can be rejected.

The null hypothesis $H_0$3C: Perceived behavior control of preschool parents are not associated with dental attendance can be rejected.

RQ4: Are the intentions of preschool parents associated with dietary habits, oral hygiene habits, and dental use while controlling for caretaker's age, relationship to child, educational level, origin of birth, years in United States, number of children in home, as well as the child's age, gender, origin of birth, language spoken at home, race, dental insurance coverage and program eligibility?

The null hypothesis $H_0$4A: Intention of preschool parents are not associated with dietary habits can be rejected.

The null hypothesis $H_0$4B: Intention of preschool parents are not associated with dental hygiene habits can be rejected.

The null hypothesis $H_0$4C: Intention of preschool parents are not associated with dental attendance can be rejected.

The following chapter summarizes and interprets the findings of this study. The limitations of the study are discussed as well as recommendations for future studies. The

implications for positive social change and recommendations for dental public health practice are discussed in the following chapter.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

Dental decay entirely preventable, yet in a report from the Center for Health Statistics, researchers found that approximately 23% of children aged 2 to 5 years had dental caries in their primary teeth. The report used data from the National Health and Nutrition Examination Survey 2011–2012 (Dye, Thornton-Evans, Li, & Iafolla, 2015). Dental use, dental hygiene, and a healthy diet are vital to a child's overall health and dental health (Dabawala, Suprabha, Shenoy, Rao, & Shah, 2016; Ghazal et al., 2015). Socioeconomic status is a strong indicator of these dental behaviors and the rate of dental disease, with poor children experiencing a higher rate of decay (Paula, Ambrosano, & Mialhe, 2015; Winter, Glaser, Heinzel-Gutenbrunner, & Pieper, 2015). Approximately 81.5% of the children in this study reported at least one low-income indicator. The majority (66%) of the respondents in this population identified the child as being Hispanic. Dye et al. (2015) also revealed that untreated tooth decay in primary teeth among children aged 2 to 8 years was twice as high for Hispanic and non-Hispanic black children compared with the rate for non-Hispanic white children. Matsuo, Rozier, and Kranz (2015) also found that of 70,089 students in North Carolina, Hispanic students had the highest prevalence of dental caries: 30.4% for White, 39.0% for Black, and 51.7% for Hispanic students. Left untreated, dental decay negatively affects a child's quality of life (Firmino et al., 2016; Guedes, Ardenghi, Piovesan, Emmanuelli, & Mendes, 2016; Li, Zhi, Zhou, Qiu, & Lin, 2015; Ribeiro et al., 2016).

The objective of this study was to gain a better understanding of the relationship between social determinates and oral health–related behaviors in the caretakers of 4-year-old children enrolled in a prekindergarten program. The participants in this study were predominantly low-income and Hispanic. The social determinants examined in this study were based on the components of the TPB (Ajzen, 1991): attitudes, intentions, subjective norm, and perceived behavior control. I analyzed the relationship between these social determinants and three specific oral health behaviors: healthy dietary habits, dental hygiene habits, and dental attendance.

Key Findings and Interpretation

The current literature supports that more is needed beyond oral health literacy (Burgette, Lee, Baker, & Vann, 2016). Albino and Tiwari (2016) recommends that future research should include understanding the determinants of oral health behavior change and the factors that stimulate intentional positive behaviors. There are many complex factors that affect oral health behaviors (Granville-Garcia et al., 2015; Trubey, Moore, & Chestnutt, 2015). The objective of this study was to gain a better understanding of the complex determinants of oral health behaviors.

The multiple regression models statistically significantly predicted the dependent variable in 30 of 33 cases as summarized in Table 38. The overall model for attitude toward a healthy diet and attitude toward oral hygiene was not significant when all of the individual independent variables were included in the model. Regression coefficients and standard errors can be found in Table 17-34. In 32 of the 33 cases at least one

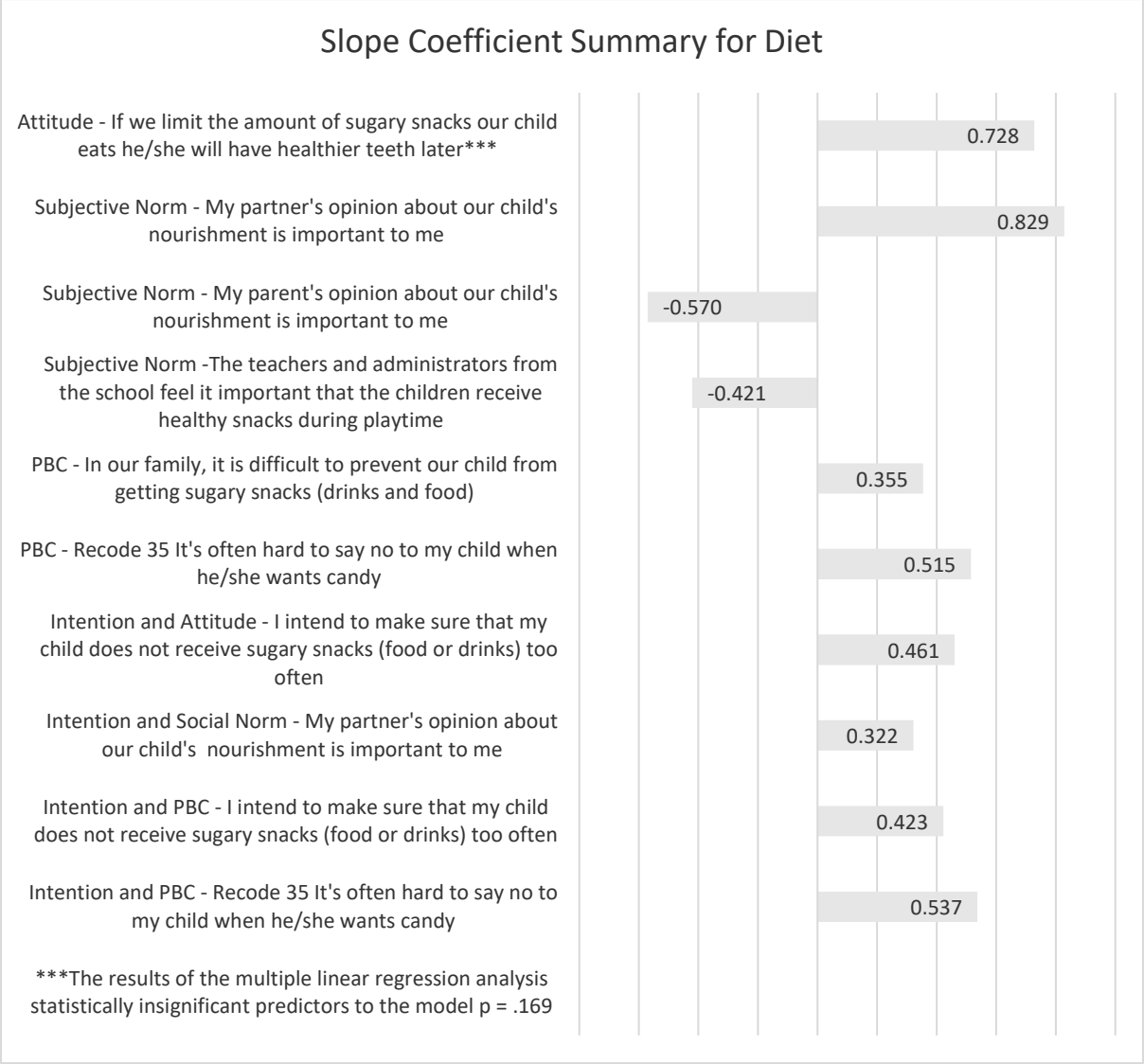
independent variable was statistically significant. In the model addressing subjective norm and oral hygiene habits none of the independent variables were statistically significant.

The behavior healthy diet was analyzed with six models, attitude, subjective norm, perceived behavior control, intention with attitude, intention with subjective norm and intention with perceived behavior control. For one model analyzing respondent's attitudes toward a healthy diet, the multiple regression indicate that the model was not statistically significant to predict a healthy diet. The other five models subjective norm, perceived behavior control and the three intention models were significant predictors of a healthy diet. There was a linear relationship between the dependent variable healthy diet and the independent variable measuring attitude "If we limit the amount of sugary snacks our child eats he/she will have healthier teeth later". There was also a linear relationship between the dependent variables measuring subjective norm, "My partner's opinion about our child's nourishment is important to me", "My parent's opinion about our child's nourishment is important to me" and "The teachers and administrators from the school feel it important that the children receive healthy snacks during playtime". For perceived behavior control there was a linear relationship between the variables "In our family, it is difficult to prevent our child from getting sugary snacks (drinks and food)" and "It's often hard to say no to my child when he/she wants candy". The variable measuring intention toward a healthy diet had a linear relationship when analyzed along with attitude, subjective norm and intention, "I intend to make sure that my child does not receive

sugary snacks (food or drinks) too often". The independent variable measuring perceived behavior control "It's often hard to say no to my child when he/she wants candy" showed a linear relationship when measured along with intention to follow through on a healthy diet.

The slope coefficient represented both a positive and negative change in the dependent variable; a healthy diet. Most notable being the independent variables associated with partner subjective norm. The coefficients indicated a positive association with the subjective norm related to partner norm, but a negative association related to caregiver's parents, child's teachers or school administrators. Within the limitations of this regression model these results of this study support healthy diet education could be most effective when it includes both of the child' parents of the other partner. Within the limitations of this regression model, there was a positive association between attitude toward long-term outcomes and a healthy diet, suggesting educational interventions focus on the long-term effect a healthy diet will have on the future oral health of a child. Perceived behavior control toward the ease of denying candy or sweets to children had a positive association on behaviors. Within the limitations of this regression study these results indicate that interventions should include how to manage children's nutritional behavior including restricting children's access to junk foods and encouraging children to eat healthy foods (usually fruits and vegetables). Intention was also strongly associated with a healthy diet, interventions could also focus on healthy meal/snack planning and preparation to support intentions.

Figure 3. Slope Coefficient Summary Healthy Diet



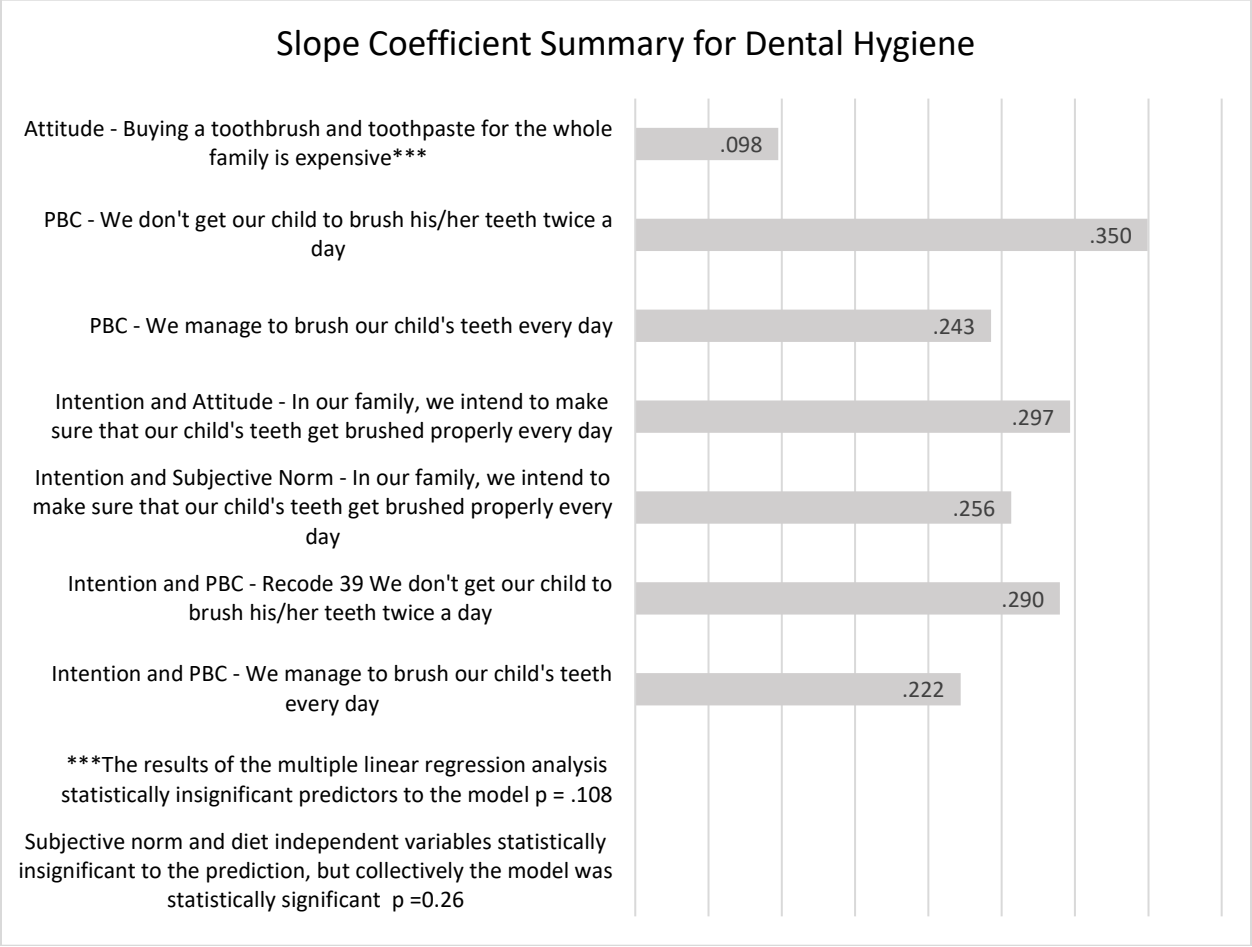
The behavior oral hygiene was analyzed using six models attitude, subjective norm, perceived behavior control, intention with attitude, intention with subjective norm and intention with perceived behavior control. Five models were significant predictors of

oral hygiene, subjective norm, perceived behavior control and the three intention models. One model, attitude toward oral hygiene was not significant. There was a linear relationship between the variable measuring attitude and oral hygiene, “Buying a toothbrush and toothpaste for the whole family is expensive”. When measuring subjective norm and oral hygiene there were no linear relationships between any of the variables. Variables with linear relationships when measuring perceived behavior control were: “We don't get our child to brush his/her teeth twice a day” and “We manage to brush our child's teeth every day”. The intention variable, “In our family, we intend to make sure that our child's teeth get brushed properly every day” showed a linear relationship when measured along with attitude and subjective norm, but not when measured with perceived behavior control. Although when measuring intention with perceived behavior control the variables “We don't get our child to brush his/her teeth twice a day” and “We manage to brush our child's teeth every day” did indicate a linear relationship.

The slope coefficient indicated a positive change in the dependent dental hygiene. The coefficients indicated the strongest positive association with perceived behavior control and perceived behavior control along with intention toward dental hygiene. Within the limitations of this regression model the results of this study support the importance of taking into account a parent’s perception of their ability to follow through with a given oral health behavior. Community interventions can include behavioral simulations and hands-on workshops focused on helping parents practice oral hygiene

behaviors The coefficients representing attitude and attitude along with intention indicated a positive association toward oral hygiene as well.

Figure 4. Slope Coefficient Summary for Dental Hygiene Behavior



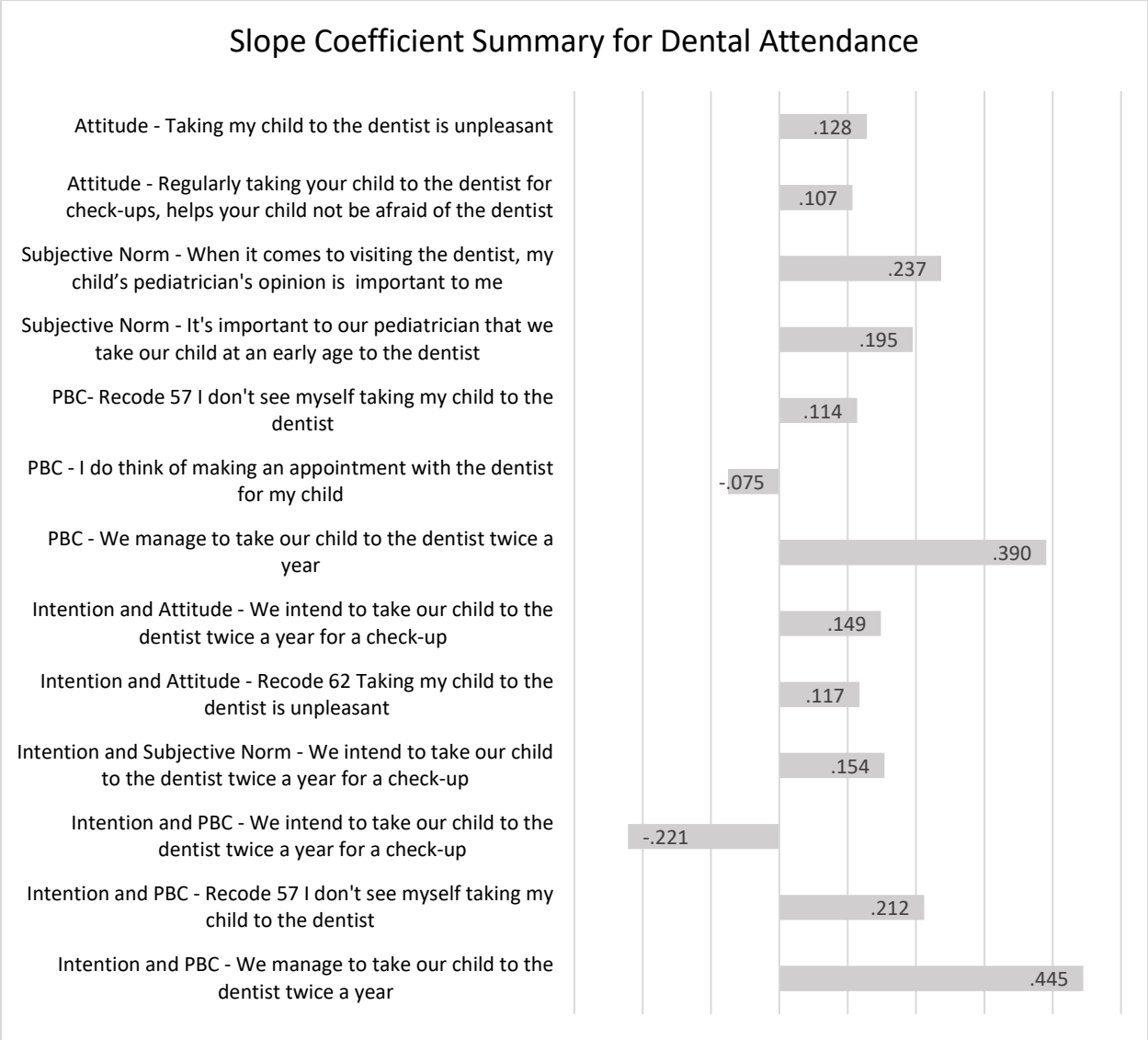
The behavior dental attendance was analyzed using six models attitude, subjective norm, perceived behavior control, intention with attitude, intention with subjective norm and intention with perceived behavior control. All six models were significant predictors of dental attendance. When measuring attitude, the variables “Taking my child to the dentist is unpleasant” and “Regularly taking your child to the dentist for check-ups, helps

your child not be afraid of the dentist" showed a linear relationship. When measuring subjective norm, the variables "When it comes to visiting the dentist, my child's pediatrician's opinion is important to me" and "It's important to our pediatrician that we take our child at an early age to the dentist". When measuring perceived behavior control the variables "I don't see myself taking my child to the dentist", "I do think of making an appointment with the dentist for my child" and "We manage to take our child to the dentist twice a year" showed a linear relationship. In all three cases, the variable measuring intention had a linear relationship when measured along with attitude, subjective norm and perceived behavior control. In addition, when measuring attitude and intention the variable "Taking my child to the dentist is unpleasant" showed a linear relationship, as well as two variables measuring perceived behavior control with intention "I don't see myself taking my child to the dentist" and "We manage to take our child to the dentist twice a year".

The slope coefficient indicated a positive and negative change in the dependent variable dental attendance. The coefficients indicated the strongest positive association between perceived behavior control alone and perceived behavior control along with intention toward dental attendance. The slope coefficient for the perceived behavior control and intention independent variable "We manage to take our child to the dentist twice a year" was positive (B= 0.445). For parents that did not agree with the statement "I don't see myself taking my child to the dentist" there was also a positive association (B= 0.212). Within the limitations of this regression model the results of this study indicate

that parents who feel they can visualize themselves taking their child to the dentist and feel they succeed in taking their child to the dentist are more likely to follow through on the behavior. The slope coefficient for the perceived behavior control and intention independent variable “We intend to take our child to the dentist twice a year” was negative (B= 0.221), indicating intention alone is not associated with a positive change in the behavior. The independent variable “We manage to take our child to the dentist twice a year” was also positive (B= 0.390) when measured without intention, indicating the strongest association in both models to revolve around a feeling of successful being able to complete the behavior. When measuring subjective norm, the coefficient slopes for both variables involving the child’s pediatrician was positive. The subjective norm variables involving the child’s dentist were not statistically significant ($p > 0.05$) and within the limitations of this model did not have a positive association with following through on dental attendance. Although, intention in combination with attitude and subjective norm did have a positive coefficient, unlike the negative association with intention and perceived behavior control.

Figure 5. Slope Coefficient Summary for Dental Attendance



The most notable prediction models revolved around perceived behavior control All three of the models measuring perceived behavior control were significant. Of the 12 variables measuring perceived behavior control (without intention) eight showed a linear relationship. The three models measuring perceived behavior control along with intention

were also significant but in regards to dental attendance the association was negative. Of the nine variables measuring perceived behavior control with intention seven showed a linear relationship

Subjective norm models also showed statistical significance. All six of the models measuring subjective norm were significant, the three models measuring subjective norm independently and the three models measuring subjective norm along with intention. Of the 21 variables measuring subjective norm independently only five showed a linear relationship. When subjective norm was measured along with intention three of the eight variables had a linear relationship. Two of the subjective norm variables, one involving parents and the other involving the child's school had a significant negative relationship. There were eight variables measuring subjective norm along with intention three of which showed a linear relationship.

Attitude models showed the least statistical significance. Only four of the six models were statistically significant. The models measuring attitude toward a healthy diet and oral hygiene were not statistically significant. The model measuring dental attendance independently and the three models measuring attitude along with intention were statistically significant. There was a total of 15 variables measuring attitude independently, four showed a linear relationship. There were seven variables measuring attitude along with intention four of which showed a linear relationship.

Limitations

One of the strengths of this research study was the large number of participants. This study was modeled after the Dutch research study by Van den Branden et al. (2013)

and can serve as a comparison with caution. The study utilized convenience sampling and not a randomized sample, therefore, generalization this research to larger populations is limited, only suggestions based on the results of the study are appropriate. The survey instrument was also limited because intentions and behaviors will be measured on the same instrument, not allowing sufficient time between both measurements. An additional limitation is a failure to do a Bonferroni adjustment. A large number of significance tests were conducted in this study, $p < .05$, was used to determine a statistically significant result, and $p > .05$, not a statistically significant result, although a Bonferroni adjustment would have made no difference in the conclusions. Ordinal variables were converted to linear scales for measurement purposes. To improve participation, it would have been beneficial to distribute the questionnaire at the beginning of the school year with the rest of the enrollment paperwork. In addition, to measuring dental attendance behavior, the items should have clarified that a dental screening at the school was not equivalent to a dental visit at a dental office.

Recommendations

Perceived behavior control was a significant predictor for all three behaviors in this study, both independently and in combination with intention. Motivational interviewing can be used to developed intentions toward diet and oral hygiene to follow through on behaviors. Motivational interviewing has been shown to be an efficient means of behavior change (Albino & Tiwari, 2016; Jassal, Riekert, Borrelli, Rand, & Eakin, 2016; Naidu, Nunn, & Irwin, 2015). In a meta-analysis involving community based

interventions de Silva et al. (2016) found only limited improvement on improving children's diets or oral health when provided with only oral health education. Using motivational interviewing can improve some caretakers follow through on a healthy diet and oral hygiene.

This study indicated that attitude toward a healthy diet and dental hygiene were not significant predictors or oral health behaviors. Taking the results of this study into account dental health educators should focus on changing behaviors beyond education to change attitudes. Jaime, Carvalho, Bonini, Imparato, and Mendes (2015) had a similar result when measuring the knowledge and attitudes of students. Interventions aimed at perceived behavior control in addition to knowledge and attitude are have been shown to be an effective in changing behaviors (Makvandi, Karimi-Shahanjarini, Faradmal, & Bashirian, 2015).

The results of this research indicate that subjective norm was a significant predictor of dental attendance, dental hygiene, and a healthy diet. This study showed subjective norm toward dental attendance was particularly significant when it involved the subjective norm and support of the child’s pediatrician. Oral health programs should focus on improving subjective norm, specifically support from pediatricians (Chaffee, Feldens, Rodrigues, & Vitolo, 2015; Wigen & Wang, 2015). Findings in the current literature support addressing dental decay through an interdisciplinary approach to be practical and effective. Biordi et al. (2015) reported that expanding access to oral health services through nurse practitioner-dietitian was an effective way to address access to

care issues. The current research also supports the development of physician-dentist collaborations to be effective in reducing access to care, but physician training still needs to be improved as well as strategies to ensure continuity of care (Herndon, Tomar, & Catalanotto, 2015; Kranz, Preisser, & Rozier, 2015; R. Z. Roberts & Erwin, 2015).

In this study, it was found that attitudes and subjective norm are important to oral health, but perceived behavior control and intentions were stronger indicators for positive oral health behaviors. These findings can have useful implication for community oral health interventions aimed at low socioeconomic preschool parents. According to the results of this future interventions should include practical diet and hygiene skills building for preschool parents and consider organizational strategies to improve oral hygiene self-efficacy. To encourage dental attendance, educators must understand the barriers parents face and consider teaching parents skills which focus on behavior management in the dental office and simulation trainings aimed at helping parents feel in control in the dental environment.

Preventing childhood dental decay involves many multifaceted behaviors (Albino & Tiwari, 2016). For this reason, formative research and assessments should be performed prior to launching intervention programs. The results can help program developers design behavior change programs focused on the issues that present the most significant barriers to behavior change. Targeted interventions should be focused on eliminating barriers to individual behavior change or promote positive social attitudes to

positively affect behavior change. This research suggests that interventions should target several levels of social determinants and barriers to evoke behavior change.

It is essential that the dental public health community intensify efforts to address dental disease upstream in addition to oral health education and mechanical means to reduce decay in this vulnerable population. Albeit treating dental disease is important in reducing untreated decay in children, the most cost-effective approach is early prevention. Interventions must happen early in the child's life or before birth. Recent research supports the importance of interventions early in the life of the child. Ozen et al. (2016) argued that children who had their teeth brushed before 18 months of age had a lower rate of tooth decay than those that began brushing habits after 18 months of age. Dietary interventions early in a child's life is also an effective means of diverting the disease (Chaffee et al., 2015; Wigen & Wang, 2015) according to the recent literature. Borowska-Struginska et al. (2016) suggest that prevention strategies should begin during the prenatal period to affect behavior change. Further studies should assess the effectiveness of behavior control simulation exercises and further study family dynamics and its effect on subjective norm.

Implications

Although dental is mostly preventable (Ng & Chase, 2013) it remains the most unmet healthcare need of American children (Newacheck et al., 2000) and the most prevalent chronic disease in both children and in adults (National Institutes of Health, 2014), affecting more children than any other chronic infectious disease in the United

States (Centers for Disease Control and Prevention, 2014). The American Academy of Pediatrics, reports that this disease is five times more common than asthma and seven times more common than hay fever children. Almost half of American children experience dental decay by age 11 (The National Institute of Dental and Craniofacial Research, 2012) but low-income, minority children have a higher rate of untreated dental decay (Anderson et al., 2010). By identifying specific the barriers that affect positive oral health behaviors, mainly a noncariogenic diet, dental hygiene habits, and regular dental attendance, cost-effective targeted behavior change programs, and evidence-based prevention strategized based on formative research can be successfully partnered with oral health education and mechanical interventions to reduce the disproportionate rate of dental disease.

Untreated dental decay negatively affects every aspect of a child's life. The results of this study will drive social change by providing data to warrant significant attention to changing oral health behaviors by addressing specific social determinants impeding change. This study supports efforts to reduce the rate of dental decay in low socioeconomic status children, children on state-sponsored health insurance, and children receiving free or reduced school lunches. Untreated dental decay not only has a negative effect on the quality of life of children but also has an adverse effect on the lives of their families. This results study can aid in developing targeted interventions aimed at changing dental behaviors that promote decay and evoking planned deliberate behaviors that prevent decay.

Conclusion

Dental disease in children is a significant public health concern because of the associated negative consequences the disease has on a child's quality of life. Untreated dental disease negatively affects the child's ability to eat, sleep, and function well at home and at school. Decay also has unaesthetic consequences which also negatively affects the child's self-esteem and social development reaching into adulthood. By identifying the specific determinants impeding positive behaviors, cost-effective early prevention programs and evidence-based behavior change interventions can be successfully partnered with oral health education and mechanical means to reduce disease. Oral health interventions should focus on modifying specific behaviors at different levels and support approaches which promote planned and deliberate positive oral health behaviors to improve the oral health of vulnerable populations. The dental public health community must intensify efforts to address dental disease upstream in addition to oral health education and mechanical means to reduce decay in this vulnerable population. Positive, healthy changes in oral health behaviors early in life will yield significant oral health improvements as children age.

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Appendix A: Permission to Use Survey

Subject : RE: Requesting Permission - Validated Questionnaire
Date : Mon, May 13, 2013 05:13 AM CDT
From : Sigrid Van den Branden <Sigrid.VandenBranden@med.kuleuven.be>
To : Josefine Wolfe <josefine.wolfe@waldenu.edu>
Attachment : Questionnaire_Van_den_Branden_et_al..docx

Dear Josefine,

Thank you for your interest in our article. We are pleased to share our questionnaire with you.

Attached you can find a translated version of the Dutch questionnaire that we have developed and validated. Of course, the questionnaire was only validated in Dutch and not in English. It would however be interesting to validate it in English, I don't know if you are planning to do this? We would also like to ask you to refer to our study in all reports and publications.

The questionnaire attached contains all questions. After the validation however some items have been removed as described in the article. The final list of items is provided in the article.

I wish you all the best with your doctoral research project. If possible, it would be nice if you could keep us updated on the results of your research.

If you have any further questions, please let me know.

Kind regards,

Sigrid Van Den Branden

On behalf of all co-authors.

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Appendix B: Dental Health Survey – English

DENTAL HEALTH QUESTIONNAIRE

PLEASE PLACE THE COMPLETED QUESTIONNAIRE IN THE ENVELOPE PROVIDED

MAKE SURE TO SEAL THE ENVELOPE

AND RETURN IT TO YOUR CHILD'S SCHOOL

THANK YOU

FOR YOUR PARTICIPATION

Questions About YOU

1) Date of Birth: Month_____ Year_____

2) Relationship to Child
- ☐ Mother
- ☐ Father
- ☐ Grandmother
- ☐ Grandfather
- ☐ Other _____

3) Your Educational Level
- ☐ Did not finish High school
- ☐ Finish High school
- ☐ Some college or technical school
- ☐ Finished college (Bachelor Degree or higher)

4) Origin of Birth
- ☐ United States
- ☐ Other

5) Years Lived in the United States
- ☐ Less than 4 years
- ☐ More than 4 years, but not entire life
- ☐ Entire life

6) Number of children under age 18 in the family
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4 or more

Questions About YOUR CHILD

7) Date of Birth: Month_____ Year_____

8) Childs Gender
- ☐ Male
- ☐ Female

9) Origin of Birth
- ☐ United States
- ☐ Other

10) Language Spoken at Home
- ☐ English
- ☐ Spanish
- ☐ Other _____

11) What is the child's ethnicity
- ☐ White
- ☐ Hispanic / Latino
- ☐ Black / African American
- ☐ Native American or American Indian
- ☐ Asian / Pacific Islander
- ☐ Other _____

12) Is the child enrolled in any of the following
- ☐ Medicaid
- ☐ CHIP Health
- ☐ Private Dental Insurance (purchased by someone or through an employer)
- ☐ Other Dental Coverage_____

13) Which of the following best describes your child (check all that apply)
- ☐ My child is **unable** to speak or comprehend English
- ☐ My child is eligible for free or reduced lunch
- ☐ My child and/or I are homeless
- ☐ My child has a parent that is in or has been in the armed forces
- ☐ My child is enrolled in HEAD START
- ☐ My child is or has been in the conservatorship of the Department of Family and Protective Services

14) How many times does your child eat sugary snacks (e.g. cookies, cake, candy) between the main meals? (only 1 answer possible):

- ☐ never
- ☐ less than once a week
- ☐ more than once a week, but not every day
- ☐ once a day
- ☐ more than once a day

15) How many times does your child drink sugar-containing drinks (e.g. fruit juice, lemonade, soda) between the main meals? (only 1 answer possible):

- ☐ never
- ☐ less than once a week
- ☐ more than once a week, but not every day
- ☐ once a day
- ☐ more than once a day

16) How many times does your child drink (other than water) in bed or at night? (only 1 answer possible)

- ☐ never
- ☐ less than once a week
- ☐ more once a week, but not every day
- ☐ once a day
- ☐ more once a day

17) How many times does your child eat something just before bedtime or at night? (only 1 answer possible):

- ☐ never
- ☐ less than once a week
- ☐ more than once a week
- ☐ every day

18) Do you help your child while teeth brushing? (really helping, not only applying toothpaste on the toothbrush)

- ☐ never
- ☐ once a week or less
- ☐ more than once a week but not every day
- ☐ every day

19) How often do your child's teeth get brushed?

- ☐ less than once a week
- ☐ at least once a week but not every day
- ☐ once a day
- ☐ twice a day or more

20) When was the last time that your child visited a dentist?

- ☐ your child has never been to the dentist
- ☐ more than 1 year ago
- ☐ more than 6 months ago but less than 1 year
- ☐ less than 6 months ago

Dietary Habits	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
21) Less candy helps to prevent dental cavities					
22) If we limit the amount of sugary snacks our child eats he/she will have healthier teeth later					
23) Sugary food is damaging for teeth					
24) Sugary snacks make my child fat					
25) Sweets hinder my child's appetite					
26) It's important to my partner that I give our child healthy snacks between meals (e.g. fruit instead of cookie)					
27) It's important to my partner that I limit the amount of snacks for our child					
28) My partner's opinion about our child's nourishment is important to me					
29) My parent's opinion about our child's nourishment is important to me					
30) My dentist advises me to give my child healthy snacks					
31) My family doctor gives me advice on healthy snacks for my child					
32) My dentist's opinion about our child's nourishment is important to me					
33) The teachers and administrators from the school feel it important that the children receive healthy snacks during playtime					
34) In our family, it is difficult to prevent our child from getting sugary snacks (drinks and food)					
35) It's often hard to say no to my child when he/she wants candy					
36) We succeed in giving healthy drinks to our child as in-between meal snacks					
37) We succeed in giving healthy snacks to our child as in-between meal snacks					
38) I intend to make sure that my child does not receive sugary snacks (food or drinks) too often					

Oral Hygiene	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
39) We **don't** get our child to brush his/her teeth twice a day					
40) We **don't** have time to help our child brush his/her teeth twice a day					
41) It's time-consuming to check each day whether our child has brushed his/her teeth					
42) We manage to brush our child's teeth every day					
43) When it comes to oral hygiene, my friends' and acquaintance's opinion is very important to me					
44) When it comes to oral hygiene, my parent's opinion is very important to me					
45) Our friends and acquaintances feel it important that we help our child to brush his/her teeth twice a day					
46) My parents find it important that my child's teeth get brushed properly					
47) It's important to my family doctor that my child's teeth are brushed at an early age					
48) It's important to my child's pediatrician that my child's teeth get brushed at an early age					
49) It's important to my dentist that my child's teeth get brushed at an early age.					
50) When it comes to oral hygiene, my partner's opinion is very important to me					
51) Buying a toothbrush and toothpaste for the whole family is expensive					
52) When my child brushes his/her teeth too much, they come loose					
53) The risk of dental cavities decreases when my child brushes his/her teeth everyday					
54) Brushing teeth is annoying for a child					
55) In our family, we intend to make sure that our child's teeth get brushed properly every day					

Dental attendance	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
56) We don't have time to take our child to the dentist					
57) I don't see myself taking my child to the dentist					
58) I do think of making an appointment with the dentist for my child					
59) We manage to take our child to the dentist twice a year					
60) For a child a visit to the dentist is **not** a terrible experience					
61) Going for a check-up at the dentist is a traumatic experience for a child					
62) Taking my child to the dentist is unpleasant					
63) Regularly taking your child to the dentist for check-ups, helps your child not be afraid of the dentist					
64) When it comes to visiting the dentist, my child's pediatrician's opinion is important to me					
65) When it comes to visiting the dentist, my family doctor's opinion is important to me					
66) When it comes to visiting the dentist, my parent's opinion is important to me					
67) It's important to our pediatrician that we take our child at an early age to the dentist					
68) When it comes to visiting the dentist, my partner's opinion is important to me					
69) Regular visits to the dentist help my child's teeth to stay strong and healthy longer					
70) The risk of dental cavities decreases when you regularly take your child to the dentist for a check-up					
71) We intend to take our child to the dentist twice a year for a check-up					

CUESTIONARIO DE SALUD DENTAL

POR FAVOR PONGA EL CUESTIONARIO COMPLETADO EN EL SOBRE ADJUNTO

ASEGURARSE QUE EL SOBRE ESTA SELLADO

Y REGRESAR EL SOBRE A LA ESCUELA DE SU NINO

GRACIAS

POR SU PARTICIPACIÓN

Preguntas Sobre USTE

1) Fecha de nacimiento Mes _____ Año _____

2) Relación con el Niño
- ☐ Madre
- ☐ Padre
- ☐ Abuela
- ☐ Abuelo
- ☐ Otro _____

3) Su nivel educativo
- ☐ No terminé la escuela secundaria
- ☐ Terminé la escuela secundaria
- ☐ Asistí a alguna universidad o escuela técnica
- ☐ Terminé la universidad (licenciatura o superior)

4) Origen de Nacimiento
- ☐ Estados Unidos
- ☐ Otro

5) Años de residencia en los Estados Unidos
- ☐ Menos de 4 años
- ☐ Más de 4 años, pero no toda la vida
- ☐ Vida completo

6) Número de niños menores de 18 años en la familia
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4 o más

Pregunras Sobre el NINO/NINA

7) Fecha de nacimiento Mes _____ Año _____

8) Sexo del niño
- ☐ Hombre
- ☐ Mujer

9) Origen de Nacimiento
- ☐ Estados Unidos
- ☐ Otro

10) Idioma más hablado en casa
- ☐ Inglés
- ☐ Español
- ☐ Otro _____

11) ¿Cuál es el origen étnico del niño?
- ☐ Blanco
- ☐ Hispano / Latino o Español
- ☐ Negro / afroamericano americano
- ☐ Nativo Americano o Indio Americano
- ☐ Asiático / Islas del Pacífico
- ☐ Otro _____

12) ¿El niño está inscrito en alguno de los siguiente seguros?
- ☐ Medicaid
- ☐ CHIP Salud
- ☐ Privado Seguro Dental (comprado por alguien o por medio de un empleador de esta persona o otro miembro de la familia)
- ☐ Otra cobertura de seguro dental _____

13) ¿Cuál de los siguientes describe mejor su hijo? (marque todos que aplican)
- ☐ Mi hijo no puede hablar o entender inglés
- ☐ Mi niño es elegible para libre o reducido almuerzo
- ☐ Mi hijo o yo no tenemos un lugar endonde vivir
- ☐ Mi hijo tiene un padre que está o ha estado en la fuerzas armadas
- ☐ Mi hijo está matriculado en HEAD START
- ☐ Mi niño está o ha estado en la tutela del Departamento de la Familia y los Servicios de Protección

14) ¿Cuántas veces come su niño(a) alimentos azucarados (galletas, pasteles, dulces) entre las comidas principales? (sólo 1 respuesta posible):

- ☐ nunca
- ☐ menos de una vez a la semana
- ☐ más de una vez a la semana, pero no todos los días
- ☐ una vez al día
- ☐ más de una vez al día

15) ¿Cuántas veces toma su niño(a) bebidas que contienen azúcar (por ejemplo, jugo de frutas, limonada, refrescos de soda) entre las comidas principales? (sólo 1 respuesta posible)

- ☐ nunca
- ☐ menos de una vez a la semana
- ☐ más de una vez a la semana, pero no todos los días
- ☐ una vez al día
- ☐ más de una vez al día

16) ¿Cuántas veces su niño(a) bebe en la cama o en la noche? (sólo 1 respuesta posible)

- ☐ nunca
- ☐ menos de una vez a la semana
- ☐ más de una vez a la semana, pero no todos los días
- ☐ una vez al día
- ☐ más de una vez al día

17) ¿Cuántas veces tu niño(a) come algo antes de acostarse o por la noche? (sólo 1 respuesta posible):

- ☐ nunca
- ☐ menos de una vez a la semana
- ☐ más de una vez a la semana, pero no todos los días
- ☐ una vez al día

18) ¿Ayuda a su niño(a) mientras que se cepilla los dientes? (realmente ayudar, no sólo la aplicación de pasta de dientes en el cepillo de dientes)

- ☐ nunca
- ☐ menos de una vez a la semana
- ☐ más de una vez a la semana, pero no todos los días
- ☐ una vez al día

19) ¿Con qué frecuencia se cepilla los dientes su niño(a)?

- ☐ menos de una vez a la semana
- ☐ más de una vez a la semana, pero no todos los días
- ☐ una vez al día
- ☐ dos veces al día o más

20) ¿Cuándo fue la última vez que visitó a su niño(a) a un dentista?

- ☐ a su niño(a) todavía no ha ido al dentista
- ☐ hace más de 1 año
- ☐ hace menos de 1 año, pero hace más de 6 meses
- ☐ hace 6 meses o menos

Hábitos Dietéticos	Totalmente en desacuerdo	En Desacuerdo	No tengo opinión	Estar de acuerdo	Totalmente de acuerdo
21) Menos dulces ayuda a prevenir los caries dental					
22) Si limitamos la cantidad de alimentos azucarados para nuestro niño(a) va tener dientes sanos después					
23) Alimentos azucarados es perjudicial para los dientes					
24) Azucaradas engordará mi niño					
25) Dulces obstaculizan el apetito de mi niño(a)					
26) Mi compañero(a) siente que es importante que mi niño(a) come bocadillos saludables para entre las comidas (por ejemplo fruta en vez de galletas)					
27) Es importante para mi compañero(a) limitar la cantidad de aperitivos para nuestro niño(a)					
28) El opinión de mi compañero(a) sobre nutrición de nuestros niño(a) es importante para mí					
29) El opinión de mis padres sobre la alimentación de nuestros niño(a) es importante para mí					
30) Mi dentista aconseja darle a mi niño(a) bocadillos saludables					
31) El médico de mi familia me da consejos sobre bocadillos saludables para mi niño(a)					
32) La opinión del dentista sobre nutrición de nuestros niño(a) es importante para mí					
33) La Junta de directores de la escuela y los maestros sienten que es importante que los niños reciben meriendas saludables durante el juego					
34) En nuestra familia es difícil evitar que nuestros niños consuman azucaradas (comida y bebida)					
35) A menudo es difícil decirle no a mi niño(a)cuando quiere dulces					
36) Tenemos éxito en dar bebidas saludables para nuestro niño(a) entre comidas					
37) Tenemos éxito en dar meriendas saludables para nuestro niño(a) entre comidas					
38) Se asegurará de que mi niño(a) no recibe azucaradas (alimentos o bebidas) a menudo					

Higiene Oral	Totalmente en desacuerdo	En Desacuerdo	No tengo opinión	Estar de acuerdo	Totalmente de acuerdo
39) No conseguimos nuestro niño(a) a cepillarse los dientes dos veces al día					
40) No tenemos tiempo para ayudar a nuestro niño(a) cepille sus dientes dos veces al día					
41) Es desperdicio de tiempo revisar cada día si nuestro niño(a) se ha cepillado los dientes					
42) Nos las arreglamos para cepillar los dientes de nuestros niño(a) cada día					
43) Cuando se trata de la higiene oral, mis amigos y la opinión del conocido es muy importante para mi					
44) Cuando se trata de higiene oral, la opinión de los padres es muy importante para mí					
45) Nuestros amigos y conocidos sienten que es importante que ayudemos a nuestro niño(a) a cepillarse los dientes dos veces al día					
46) Mis padres resulta importante que los dientes de mi niño obtener cepillados correctamente					
47) Es importante para mi médico de familia que los dientes de mi niño(a) se cepillan a una edad temprana					
48) Es importante para mi pediatra que los dientes de mi niño(a) se cepillan a una edad temprana					
49) Es importante para mi dentista que los dientes de mi niño(a) se cepillan a una edad temprana					
50) Cuando se trata de la higiene oral el opinion de mi compañero(a) es muy importante para mí					
51) Comprar un cepillo de dientes y pasta de dientes para toda la familia es caro					
52) Cuando mi niño(a) se cepilla sus dientes demasiado, se vienen sueltos					
53) Disminuye el riesgo de caries dental cuando mi niño(a) cepille sus dientes					
54) Cepillarse los dientes es molesto para un niño					
55) En nuestra familia tenemos la intención de asegurarse de que los dientes de nuestros niño(a) se cepillen correctamente todos los días					

Asistencia Dental	Totalmente en desacuerdo	En Desacuerdo	No tengo opinión	Estar de acuerdo	Totalmente de acuerdo
56) No tenemos tiempo para llevar a nuestro niño(a) al dentista					
57) No llevoa a mi niño(a) al dentista					
58) Pienso en hacer una cita con el dentista para mi niño(a)					
59) Logramos llevar a nuestro niño(a) al dentista dos veces al año					
60) Para un niño(a) una visita al dentista no es terrible en absoluto					
61) Ir para un chequeo con el dentist es una experiencia traumática para un Niño					
62) A mi niño(a) el dentista es desagradable					
63) Llevar regularmente a su niño(a) al dentista para chequeo, hace que su niño(a) no tenga miedo al dentista					
64) Cuando se trata de visitar al dentista, la opinión de mi pediatra es importante para mí					
65) Cuando se trata de visitar al dentista, la opinión de mi médico de familia es importante para mí					
66) Cuando se trata de visitar al dentist, la opinión de los padres es importante para mi					
67) Es importante para nuestro pediatra que llevamos a nuestro niño(a) a una edad temprana al dentista					
68) Cuando se trata de visitar al dentista, la opinión de mi compañero(a) es importante para mí					
69) Pagando regularmente visitas al dentista proporciona los dientes de mi niño para una estancia más larga					
70) El riesgo de caries dental disminuye cuando se lleva con regularidad a su niño(a) al dentista para un chequeo					
71) Tenemos la intención de llevar a nuestro niño(a) dos veces al año al dentista para un chequeo					

Appendix D: Permission to Conduct Research NEISD

North East Independent School District
8961 TESORO DRIVE – SAN ANTONIO, TEXAS 78217-6225

Department of Planning and Research

September 25, 2015

Dear Ms. Wolfe,

The Department of Planning and Research has reviewed your request to conduct survey research on the attitudes of preschool parents on oral hygiene at the following campuses:

- Canyon Ridge Elementary
- Dellview Elementary
- East Terrell Hills Elementary
- El Dorado Elementary
- Fox Run Elementary
- Harmony Hills Elementary
- Montgomery Elementary
- Northern Hills Elementary
- Oak Grove Elementary
- Oak Meadow Elementary
- Olmos Elementary
- Redland Oaks Elementary
- Ridgeview Elementary
- Rosa Forest Elementary
- Serna Elementary
- Walzem Elementary
- Wilshire Elementary

The district approves this research at the district level only, meaning that you may now approach the campus principal to inquire about participation. You may ONLY conduct research from September 25th, 2015 to May 8th, 2016. If the principal approves the research, please note the additional terms and conditions of this approval:

1. **The study makes minimal interruptions to the regular school program and makes no undue demands upon the time of students, teachers, administrators, or other district personnel.**
2. **The study does not involve research during the first and/or last three weeks of the semester as determined by the adopted NEISD calendar.**
3. **The study is not scheduled during district-wide testing periods.**
4. **The district reserves the right to decline future solicitations for this project.**

Please note – participation in your study by individual district personnel is strictly voluntary. A copy of this letter should accompany your solicitation to district personnel. Should you have questions or need additional information, please contact Dorian Jones at djones2@neisd.net or by telephone at (210) 407-0559.

Sincerely,

Dorian G. Jones M.A.
Research Analyst
Department of Planning and Research
North East ISD
Phone: 210-407-0559
Fax: 210-804-7098

Cc:

Dr. Donna Newman, Associate Superintendent, Division of Campus Admin & Human Resources
Dr. Pauline Dow, Associate Superintendent, Division of Instruction & Tech. Services
Michael Lara, Executive Director for Research & Information Technologies
Jeffrey Kurth, Senior Director, Planning & Research
Maria Perez, Director of Health Services
Laura Huggins, Principal, Canyon Ridge Elementary
Kelli Nungesser, Principal, Dellview Elementary
Christine Salenga, Principal, East Terrell Hills Elementary
Christopher Specia, Principal, El Dorado Elementary
Cindi Jacob, Principal, Fox Run Elementary
Ivonna Gonzales, Principal, Harmony Hills Elementary
Elizabeth Fischer, Principal, Montgomery Elementary
Randy Barr, Principal, Northern Hills Elementary
Harold Massey, Principal, Oak Grove Elementary
Lynn Dockery, Principal, Oak Meadow Elementary
Gaila Booth, Principal, Olmos Elementary
Shawn Hayden, Principal, Redland Oaks Elementary
Veronica Garza, Principal, Ridgeview Elementary
Martha Rodriguez-Stanfert, Principal, Rosa Forest Elementary
Joel Luther, Principal, Serna Elementary
Rachel Yates, Principal, Walzem Elementary
Stacy Deming-Garcia, Principal, Wilshire Elementary