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EXAMINING PARENTS ORAL HYGIENE KNOWLEDGE
AND THEIR CHILDREN'S ORAL HYGIENE BEHAVIORS

By

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ABSTRACT

The purpose of this quantitative study was to examine the relationship between a parent's level of oral hygiene knowledge and the oral hygiene behaviors of their children ages 7 to 17 in the greater United States. The theoretical framework of Albert Bandura's Social Cognitive Theory and the Health Belief Model guided the study. Instruments included the Oral Health Surveys Basic Methods 5th Edition and the Fourth National Survey of China for data collection. Q Data analysis was performed utilizing the chi-square test of independence to determine the likelihood of a relationship between the parent's oral hygiene knowledge and their child's oral hygiene behaviors. Additionally, prevalence was performed to investigate characteristics of a parent's hygiene knowledge and a child's oral hygiene behaviors that occurred at a specified point of time. According to the data results, many of the parents displayed mostly positive oral hygiene knowledge. Emerging areas of concerns included the application of sealants to the teeth to prevent dental caries and what causes dental caries. Recommendations for future research suggest that parents are provided with the proper educational literature regarding the application of sealants to help prevent dental caries and what factors cause dental caries. Additionally, the researcher recommends integrating oral health education into school health programs to help parents with the reinforcement of proper oral health behaviors for their children (Simmer-Beck et al., 2015). The researcher also recommends that parents receive educational literature to inform them on the advantages of brushing properly to reduce the occurrence of dental caries.

Keywords: parental oral hygiene knowledge, oral hygiene behaviors, tooth brushing, flossing, sealants, dental caries

CHAPTER 1

INTRODUCTION

Orthodontics is a specialty in dentistry that concentrates on the correction of malocclusion—abnormal alignment of the upper and lower teeth—in children and adult patients. To achieve the desired movements for tooth correction, the orthodontist prescribes braces—which can be metal, ceramic, or sapphire and are glued to each tooth—or clear teeth aligners for the patient to utilize. The braces, or clear aligners, work by applying a gentle constant pressure on the teeth to advance them slowly into the correct position. Additionally, wires, rubber bands, and ligature elastics are the other components that work in conjunction with the brackets to move the teeth. To achieve movement, the teeth advance through a process called bone remodeling—the breaking down of bone and rebuilding of bone.

While bone remodeling is an important process in orthodontics, equally important is the oral hygiene of the patient. The orthodontic brackets accumulate plaque extremely fast and if the patient brushes their teeth inadequately throughout their treatment, the patient's teeth may be more susceptible to cavities (Naeem & Makhdum, 2019). While most adult patients are compliant, some younger patients are non-compliant regarding their orthodontic treatment. For instance, some parents place the onus of brushing after every meal with their child. Yet, some parents neglect to model or continuously stress the importance of proper oral hygiene health. Therefore, depending on the child's environment, some children's oral hygiene health reflects their parent's perception of good oral hygiene health. The younger patients who choose to be non-compliant will often find their treatment will extend beyond their estimated treatment time as well as the development of caries. Moreover, it is not just the patient's oral hygiene that suffers, but a host of other issues can arise such as low academic achievement and school absenteeism to name a few (Seirawan, Faust, & Mulligan, 2012).

School absenteeism and academic achievement both come under the purview of oral health. For example, researchers found that oral diseases contributed to the student's lower academic achievement (Seirawan et al., 2012). Coupled with orthodontic treatment, oral hygiene often reflects the patient's orthodontic compliance or non-compliance. Researchers noted that social dimensions often related to the oral health status of a child (Kumar, Kroon, & Lalloo, 2014). For instance, some common factors that run parallel to a child's oral health status are parental education and income. A recent study elucidated how children who have parents with lower education levels and are immigrants tend to have a higher risk of dental caries in comparison to children with parents who have a higher level of education and Western background (Berendsen et al., 2018).

In this quantitative study, the researcher investigated whether previous research generalizes to the population within the greater United States. Moreover, the researcher sought to find whether a parent's level of oral hygiene knowledge influences the oral hygiene health behaviors of their children. For the purposes of this study, the private dental office in a metropolitan city in Texas was referred to as Correct Smile Dentistry. Also, in this study, the researcher delineated the education levels of the parents as lower education levels or higher education levels. If the parent had a lower education level, it encompassed grades 0-12; if the parent had a higher education level, it encompassed a 4-year college education or more.

There were a few studies (e.g., Chu, Ho, & Lo, 2012; Hooley, Skouteris, Boganin, Satur, & Kilpatrick, 2012; Mishra, Pandey, Chopra, & Arora, 2018) that examined whether there was a relationship between a child's oral health hygiene and the education level of their parents. Within the private practice of Correct Smile Dentistry, some of the younger patients required a constant reminder of the importance of brushing thoroughly to achieve good oral hygiene health. Parents were considered to be a key factor for ensuring their children develop good oral hygiene habits that are conducive for oral hygiene success. The researcher believed

in the existence of a strong possibility that oral health and parental education were concomitants of each other. Addressing the issues of a possible link between oral health in children and the education levels of their parents would be advantageous because the child would still be malleable and corrective measures could be applied to unhealthy habits to circumvent negative outcomes. Researchers have found that children with less dental caries have parents whose education level is high (Chu et al., 2012). Additionally, studies suggested that a parent's nutritional knowledge is far more important than educational levels in general (Schneider, Jerusalem, Mente, & De Bock, 2013). Therefore, additional questions should start to emerge addressing the dental knowledge of a parent in efforts to improve the oral hygiene health of their child.

Topics related to a possible link between parental education and child oral health performance were already in existence. Researchers have found that parents with higher levels of education appeared to be more cognizant of dental caries and the negative outcomes associated with a lack of proper oral health care (Srinivas & Jeevanandan, 2019). Moreover, according to the research, parents with higher levels of education had taken their child to the dentist at least once. In contrast, parents with a lower level of education were not as aware of their child's dental health status and dental office visits were negated for several reasons—reasons that seem more urgent than dental care included the need for food, clothing, and shelter (Srinivas & Jeevanandan, 2019).

Additional researchers found that children with educated parents were diagnosed as having good oral health as opposed to their counterparts who had uneducated parents and the commonly found toothache (Mishra et al., 2018). Children with educated parents were also more likely to visit the dental office for routine checkups when compared to children of uneducated parents (Mishra et al., 2018). In this study, uneducated parents were classified as individuals who did not have a high school education. Researchers have also found a

connection between the education level of parents and their child's nutritional habits. Parents with a higher education level would intentionally control the snacking and sugar intake for their children (Branden, Broucke, Leroy, Declereck, & Hoppenbrouwers, 2012). However, in children with less-educated parents, there was an increase in the number of dental caries due to a higher intake of sugar and snacks.

This study was intended to inform less-educated parents about the importance of good oral hygiene health and the possible deleterious effects that can occur. Tooth caries, one of the main negative outcomes of poor oral hygiene, leads to school absenteeism and poor academic performance. Thus, the importance of this study was to reinforce good oral hygiene health to parents who might be prone to misinformation because of a low education level.

The purpose of this study was to investigate whether there was a difference in oral hygiene behaviors between children who have parents with a higher level of oral hygiene knowledge than those children who have parents with a lower level of oral hygiene knowledge. There should be a greater focus placed on more early dental visits and parent accountability (Bahuguna, Jain, & Khan, 2011); specifically, the levels of oral hygiene habits established by the parents of low educational levels. Most children are taught how to walk, write, brush their teeth, and chew their food first at home. It was the goal of the researcher to have this study serve as a catalyst for a paradigm shift at home, at school, and the dental office to equip parents of all educational levels with dental knowledge to help improve the oral hygiene health of their children. Collectively, these environments must change their behavior to encompass more responsibility to apply corrective measures for children.

Statement of the Problem

In the orthodontic profession, the researcher noted how some of the younger patients displayed a problem with poor orthodontic compliance and poor oral hygiene health. Despite giving the patient oral hygiene instructions, both orally and in written form, gingivitis, caries,

and enamel scarring have occurred in a few of the younger patients whose ages range between 7 and 17. This problem has negatively affected some teenagers because of a lack of brushing and flossing. In a recent study, 210 parents and their children were assessed. Researchers found that children of educated parents brushed their teeth twice a day (Mishra et al., 2018). Conversely, children of uneducated parents were noted to brush less than twice a day, often experience toothaches, and had a frequent visit to the dentist to address tooth pain (Mishra et al., 2008). Parents should stress how imperative good oral hygiene health is to children at an early age with periodic inquiries to ensure the child is adhering to a successful oral hygiene routine.

Within the private dental office of Correct Smile Dentistry, some of the children's oral hygiene health can be deemed as inadequate—inadequate refers to the presence of plaque, gingiva inflammation, or caries. Since the development of oral hygiene habits should be implemented and enforced by parents, the onus of good hygiene relies heavily on the mother and father of the child. Education was one of the variables of socioeconomic status and could be one of the factors that have an impact on a child's oral hygiene health (Edelstein, 2002) as well as an indicator of how much a parent was willing to invest in their child's oral health (Berendsen et al., 2018).

Younger patients, specifically some teens, showed a lack of compliance with their orthodontic treatment which was noted to be problematic. In some cases, irreversible damage was done to the patient's enamel due to a lack of oral hygiene. Likewise, a lack of good oral hygiene did eventually promote unwanted caries. As a result, studies have shown that severe cavities are often associated with feelings of embarrassment which promotes feelings of anxiety and withdrawal from peers (Seirawan et al., 2012). Equally, the inability to concentrate in school was heightened, due to the associated pain, which caused a high incidence of school absences (Seirawan et al., 2012). A previous study was conducted using

the multiple logistic regression model. The model identified significant predictors of good oral hygiene compliance; these predictors were noted to be living with married parents and good school performance (Al-Jewair, Suri, & Tompson, 2011).

While good oral hygiene health was imperative for children, compliance and technique were not autonomous events. Humans are creatures of habit and routine. The habit of implementing the performance of good oral hygiene behaviors in children rests on the shoulders of the child's parents. Since the onus for successful oral hygiene behavior begins with the parent(s), it is worth investigating whether the oral hygiene knowledge of the parent is a possible concomitant for acceptable oral health behaviors.

Purpose of the Study

The purpose of this quantitative causal-comparative study was to investigate whether there was a relationship between a parent's level of oral hygiene knowledge (the independent variable) and their child's oral hygiene behavior (the dependent variable) in the greater United States. There were various socio-demographic factors to consider regarding oral hygiene health in children. For instance, employment, family size, single-parent household, ethnicity, and living conditions were all factors the researcher was cognizant of regarding oral hygiene behaviors. However, for the purpose of this study, the researcher chose to investigate whether a parent's oral hygiene knowledge may be a factor in the success or failure of proper oral hygiene behaviors in children. Education was a determinant factor in making proper health behavioral choices. For example, parents with a low level of education were associated with a higher risk for caries (Hooley et al., 2012). Moreover, strong intentions and positive attitudes to control a child's sugar intake was attributed to highly educated parents (Hooley et al., 2012).

Research Question

Some orthodontic patients, who are children, appear to be less compliant with their oral hygiene than their adult counterparts. Initially, the onus belongs to the child's parents to help them develop oral hygiene habits that will be advantageous for the child to have healthy oral hygiene behavior success. This research seeks to answer the following question: What is the relationship between a parent's level of oral hygiene knowledge and their child's oral hygiene behaviors in the greater United States?

Conceptual Framework

The purpose of this study was to excavate supportive data that elucidated a possible relationship between a parent's level of oral health hygiene knowledge and their child's oral hygiene behaviors—children that resided in the greater United States—and the oral hygiene knowledge of their parents. The underpinnings of Social Cognitive Theory (SCT) helped to define the framework of this study. In 1960, Stanford psychologist Albert Bandura started the Social Learning Theory (SLT) which developed into the SCT in 1986. One of the unique features of SCT is the way individuals obtain and maintain behavior. Six constructs define Social Cognitive Theory: (1) Reciprocal determinism is the central concept of SCT that refers to the reciprocal interaction of a person, environment, and behavior; (2) Behavioral capability refers to an individual's ability to successfully perform a behavior; (3) Observational learning refers to individuals witnessing and observing a behavior performed by others and then reproducing those actions; (4) Reinforcements refers to the likelihood of continuing or discontinuing a behavior based upon internal or external responses to a person's behavior; (5) Expectations refers to the expected consequences of an individual's behavior; and (6) Self-efficacy refers to the individual's confidence level in their ability to perform a behavior successfully. In this study, SCT was of particular interest because the researcher sought to find a causal relationship between a parent's education level and their child's oral hygiene

health. The child must be taught how to brush their teeth which is oftentimes modeled by the parent. Furthermore, the child is expected to mimic the actions of the parent(s) and develop a habit of continuance.

For observational learning to occur, Bandura hypothesized that individuals embrace a model—in this instance, a model refers to an individual who displays an action that will be beneficial to another individual if they were to mimic that individual's actions—and retain the actions of the model. Moreover, the individual must be able to reproduce the model's behavior and be encouraged to do so (Schunk & DiBenedetto, 2020). This hypothesis would align with the expectation that the child would look up to the parent as a model and reproduce the actions of the parent. Therefore, it was assumed that children who were successful with their oral hygiene could credit their parents for properly modeling and instilling good oral hygiene habits. It would be through this process of observational learning that the child would be able to benefit from the maximum reward, good oral hygiene behaviors.

Assumptions, Limitations, and Scope

Various presuppositions encompassed this study. One assumption, based on prior research, was that the education level of the parent(s) affected the oral hygiene health of their child. It was assumed that the parent that had a low level of education would have children who lacked the proper oral hygiene habits necessary for success. Moreover, research found that maternal levels of low education were related with ECC, early childhood caries (Weatherwax, Bray, Williams, & Gadbury-Amyot, 2015; Traebert, Guimarães, Durante, & Serratine, 2009). In contrast, it was assumed that parents with an elevated level of education would have children who displayed good oral hygiene health (Schwendicke et al., 2015). Moreover, some parents, with high and low levels of education, had the perception that oral hygiene efforts would not completely prevent their child from getting caries. This group of

parents believed that there were external factors beyond the control of themselves and their children that could cause caries such as genetics, health problems, and chance (Duijster, de Jong-Lenters, Verrips, & van Loveren, 2015).

If parents with an elevated level of education or low level of education were more cognizant of their child's oral hygiene health, their children would have greater success with their oral hygiene health. Researchers found that educating parents on oral health and nutrition instructions in the dental office proved to be beneficial as parents were able to retain and recall the information they were taught in the clinic (Chang et al., 2018). Additional assumptions included participants in this study answering all the survey questions openly and honestly.

This study had some possible limitations that should be noted. For instance, some participants may answer questions dishonestly or leave some questions unanswered; these instances were also seen as limitations to the study. Moreover, a respondent may find some of the questions difficult to understand which could lead them to guess on a question rather than to answer the question with a complete understanding. Therefore, any questionnaire that was incomplete or half-filled would not be utilized for the study.

There were many other variables besides parental education levels that could impact children's oral hygiene habits. Socioeconomic—income and education—and sociodemographic—age, race, ethnicity, and language—were variables that could affect a children's oral hygiene habits. This study did not address those factors. Other variables included whether the child comes from a two-parent or single-parent household. A child in a single-parent household may not garner any much-needed attention and would be left to provide for themselves.

Rationale and Significance

This quantitative study seeks to find the nexus between parental education levels and oral hygiene health to unearth solutions to help parents help their children succeed with their orthodontic care. Additionally, the parent's educational level can be an early indicator of the patient's oral hygiene health success.

Parents who are considered to have a low level of education would benefit from this study. Research has found that children who have a high prevalence of caries tend to have parents who have a low level of education (Babaei, Pakdaman, Hessari, & Shamshiri, 2019; Cianetti et al., 2017; Saldūnaitė et al., 2014). Data from this study can be generalized across the population to better inform parents with low levels of education on the pitfalls that lie ahead if corrective measures are avoided. Additionally, this research will present supportive information that elucidates poor oral hygiene habits that are often found when parents are not willing to invest in their child's oral hygiene health (Berendsen et al., 2018) or when parents neglect to have their children brush their teeth twice a day as recommended by the ADA (Mishra et al., 2018).

For this study, the researcher will compare the oral hygiene knowledge level of parents—to determine whether higher levels of oral hygiene knowledge may be a contributor to successful oral hygiene behaviors in their child and lower levels of oral hygiene knowledge to poor oral hygiene behaviors in their child—in efforts to suggest corrective measures to circumvent the possibility of any deleterious effects. In this study, the term high level of education will refer to parents with an undergraduate degree or higher. The term low level of education will refer to parents with a high school diploma or lower. If there is a causal relationship found between parent levels of education and the oral hygiene health of their children, the group of parents that are related to a high experience of cavities should be addressed through education in efforts to improve the oral health of their children. However,

previous studies have also investigated other contributing factors to a child's oral hygiene health such as sociodemographic status and socioeconomic status.

Definition of Terms

The following definitions will supply the reader with an explanation of unfamiliar dental terminology. Additionally, the following terms are commonly used in the dental profession to address various variables and conditions that affect the patient's teeth.

Caries. The clinical term in dentistry for tooth decay. The terms caries and cavities will be used interchangeably in this study (Dofka, 2013).

Child. A term referring to a “son or daughter of human parents” (“Child,” 2017). In this study, an individual in active orthodontic treatment between the ages of 7 and 17.

ECC. This acronym stands for Early Childhood Caries. The term ECC refers to “the presence of one or more decayed (non-cavitated or cavitated lesions), missing (due to caries) or filled tooth surfaces in any primary tooth in a preschool-age child between birth and 71 months of age” (American Dental Association).

Enamel Decalcification. This term refers to “a common negative sequela of orthodontic treatment in the absence of proper oral hygiene” (Kulshrestha, 2017). A permanent white mark that is embedded within the enamel.

Interdigitate. The interlocking of the teeth, similar to interlocking the fingers of two clasped hands (“Interdigitate,” 2017).

Malocclusion. Refers to the misalignment or imperfect position of the teeth when the maxillary and mandibular arches come together. “Disorder or improper occlusion” (Dofka, 2013).

Oral hygiene. A term used to describe the practice of “personal maintenance and cleanliness of the hard and soft tissues of the oral cavity” (Ireland, 2010).

Orthodontics. A specialty branch of dentistry concerned with “the growth and development of the face and jaws and the treatment of irregularities of the teeth” (Ireland, 2010).

Orthodontist. A dentist who “straightens teeth and corrects malocclusions” (Dofka, 2013).

Patient. A term referring to an individual “awaiting or under medical care and treatment” (“Patient,” 2017). In this study, an individual who receives orthodontic treatment at the private dental office in a metropolitan city in Texas.

Parent. A male or female individual that provides care and is regarded as the legal guardian for the child participant in this research. “One that begets or brings forth offspring” (“Parent,” 2017). Parent and guardian will be used interchangeably in this study.

Plaque. A sticky film that coats the teeth and contains bacteria; “invisible film on tooth surface” (Dofka, 2013).

Summary

Orthodontics is a discipline in dentistry that requires compliance from the patient to be highly effective. The more compliant a patient is, the better the results and the extension of the patient’s treatment can be avoided. Parents are an important piece of the puzzle regarding the oral hygiene health of their children. While some studies show that the parent’s level of education factors into how well a child pursues the highest standards of their oral hygiene health (Mishra et al., 2018), there are occasions where the parent has modeled good oral hygiene habits effectively, yet the child might be non-compliant.

Though researchers have found that a parent’s education level influences the oral hygiene health of their children (Mishra et al., 2018), it is not known to what extent parental education influences their children’s dental hygiene in the dental practice that is the site of this proposed study. The purpose of this quantitative causal-comparative study is to

investigate whether there is a significant difference between the oral hygiene health of 7- to 17-year-old dental patients (the dependent variable) whose parents have higher education levels (the independent variable) and those whose parents have lower education levels at Correct Smile Dentistry. The following literature review investigates the possible reasons parent education levels may influence a child's oral hygiene health.

CHAPTER 2

LITERATURE REVIEW

Numerous factors can affect the oral hygiene health of adolescent and teenage school children. Socioeconomic status, nutrition, geographic location, learning disabilities, lack of parental involvement, and parent level of education are a few concomitants that can influence a child's oral hygiene health. Additionally, researchers have found the oral health of a child can play a vital role in their academic success (Gopalan, Asokan, John, & Priya, 2018). Notably, a sample of 2014 children was used to research the impact of oral health on school performance—school performance was considered as school absenteeism and homework completion (Gopalan et al., 2018). The result found children with poor oral hygiene and dental caries displayed a significant association with school absenteeism when juxtaposed to their peers with good oral hygiene and no dental caries. Simply put, the importance of good oral hygiene health is imperative for a child's success beyond the four walls of the home. At home, the foundation for good oral hygiene health should be reinforced by the parents—this will necessitate parental involvement in the child's oral hygiene care until the parent feels the child can accomplish the task on their own. Understanding whether a parent's oral hygiene knowledge affects their child's oral hygiene health is the relevance of this research.

No matter what level of oral health knowledge, parents are the essential building blocks for successful oral hygiene health in their children which is why parental involvement and accountability are crucial in the beginning stages of oral hygiene health. Researchers find that the oral health knowledge of parents is associated with the oral health of their children (Djordjevic, 2018). Initially, most parents will model the proper way for their children to take care of their oral hygiene. During infancy, oral health-related habits are established and maintained during early childhood (Djordjevic, 2018). Parents will instill the correct measures needed to support a child's brushing techniques and supervise their child's oral

hygiene habits for a while. However, a child's oral hygiene success is only as successful as their parents' instructions. Not all parents have the same level of understanding of what constitutes good oral hygiene; one possible determinate factor to consider could be the parents' level of education. The results of a possible association of oral hygiene health with the education levels of parents can provide the educational field credible evidence. Utilizing this credible evidence can be conducive for those schools that have school-based oral health programs established which provide corrective and preventative measures to help ensure a child's oral hygiene success (Sammadzadeh, Fatemi, Karimi, & Shabani, 2017; Naidu & Nandlal, 2017). Furthermore, while educators can recognize poor academic performance may be symptomatic of poor oral health care, dental practitioners may infer possible poor oral hygiene health to be associated with the child's parent's level of oral hygiene knowledge. Hence, placing an emphasis on parental oral health practices and beliefs can be vital in preventing poor oral hygiene and dental caries (Djordjevic, 2018).

The need for proper oral hygiene health is paramount among some school-aged children. Young children are at a phase of childhood where they acquire knowledge of norms and values of society and lifelong sustainable oral health-related behaviors, beliefs, and attitudes should be established (Goel, VEDI, Veerasha, Sogi & Gambhir, 2015). Tooth decay does not discriminate; age, race, or socioeconomic status does not matter regarding dental caries. Additionally, tooth decay is highest in middle-income countries among 12-year old children, while more than half of tooth decay is left untreated in high-income countries (Goel et al., 2015).

The purpose of this review is to provide credible knowledge to address the parental education levels relationship to oral hygiene health in 13- to 17-year-old children. Additionally, possible corrective measures will be addressed and suggested—such as increased parental involvement—to circumvent the occurrence of deteriorating oral health.

The vast majority of data in this literature review was gleaned from scholarly journals between the years of 2015-2019. Any resources older than four years old were discarded except for one source, The Impact of Oral Health on the Academic Performance of Disadvantaged Children from *The American Journal of Public Health*, from the year 2012. Moreover, the information was obtained using database searches from ERIC-ProQuest, EBSCOhost-Academic Search Complete, and Google Scholar. The works included in this literature review were selected based on criteria relating to various facets of parental education levels and the relationship with oral hygiene health in children. This review will address how a parent's level of education can influence their child's oral hygiene health positively or negatively. To understand the importance of good oral hygiene, this review will also address the repercussions of having poor oral hygiene health.

Parent Accountability

Parents play an integral role in the oral hygiene health of their children. Parent's education levels may dictate whether they understand oral health education (Srinivas & Jeevanandan, 2019). Oral health education helps parents identify the importance of ensuring their child has healthy teeth. Healthy teeth in the preliminary stages of childhood will provide the child with a positive self-image, proper retention of the primary teeth to serve as space maintainers for the developing permanent teeth, and improved quality of life which encompasses not missing school due to tooth pain (Berg & Slayton, 2015). Studies have highlighted the significant influence that parental knowledge of oral health has on dental caries in children; moreover, dental caries among children and a lack of parental oral knowledge has shown to be associated (Isong, Luff, Perrin, Winickoff, & Ng, 2012; Naidu & Davis, 2008). Researchers have found that a parents' knowledge of oral dental health plays a vital role in the development of oral hygiene habits in their children (Birant et al., 2020).

Additionally, researchers have found that a parent's oral health knowledge can directly affect their child's oral health behaviors (Zhang, Li, Lo, & Wong, 2020).

Researchers have investigated several factors that influence dental caries in children—factors that range from socio-economic status to political and economic policies (de Paula, Bovi Ambrosano, & Mialhe, 2015; Paula et al., 2016). Investigators found that oral health-related quality of life and dental caries are influenced by parental socio-economic characteristics (Kumar, Tadakamadla, Kroon, & Johnson, 2016). Moreover, the effect of SES (socio-economic status) on dental caries is unequivocal; children in lower SES families garner greater caries than their counterparts (Kumar et al., 2016).

Parental Education Levels

Parents with low oral health knowledge attribute to higher odds for developing Early Childhood Caries (Rai & Tiwari, 2018). The American Academy of Pediatric Dentistry defines Early Childhood Caries as the existence of caries in one or more primary teeth in children 6 years or younger. Early Childhood Caries (ECC) affects not only the deciduous teeth but the impacted permanent dentition is also at risk of developing caries. The adverse effect of developing caries early is that it can result in episodes of dental visits and treatments which affect the quality of life. (Faheem, Maqsood, & Shaikh, 2018). Sadly, children of young parents with low socioeconomic status and less oral health knowledge are more susceptible to tooth decay and deciduous teeth being prematurely lost (Seirawan et al, 2012; Saldūnaitė et al, 2014). While some parents are knowledgeable about some of the oral health risks for children, there are some parents who are not well informed on other aspects of oral health care. In one study, Early Childhood Caries was found to be significantly related to maternal oral health care knowledge (Rai & Tiwari, 2018). For instance, a study found that 97.7% of parents were aware that baby teeth are important and 98.9% of parents knew permanent teeth need to be brushed twice daily; 92% knew that baby teeth needed to be

brushed twice daily (Mahat & Bowen, 2017). However, 28.7% of parents perceived that cavities in baby teeth produce long-lasting issues while 44.8% of parents felt that cavities in permanent teeth can be caused by cavities from the baby teeth (Mahat & Bowen, 2017).

Regular dental visit check-ups are imperative for individuals to have oral hygiene success. Without periodic dental visit check-ups, individuals are more prone to getting caries; dental caries left untreated can produce deleterious outcomes such as tooth pain or eventual tooth removal. Researchers found that parents with an elevated level of education tend to care more about oral hygiene education and regular dental visitations than their low education level counterparts (Saldūnaitė et al., 2014). Families that consist of parents that have low levels of education may have children who are more susceptible to cavities due to a few reasons: (1) poor knowledge about oral hygiene, (2) less access to oral hygiene products, and (3) have less access to dental services (Al-Meedani & Al-Dlaigan, 2016; Cianetti et al., 2017).

Father's Education Level

In certain instances, researchers have found an association between the father's level of education and the child's oral health hygiene (Han, Khang, & Choi, 2015; Schwendicke et al., 2015; Babaei et al., 2019). In Iran, a study was conducted utilizing a new Caries Assessment and Spectrum Treatment (CAST) instrument that was developed in 2011 (Frencken, de Amorim, Faber, & Leal, 2013). The CAST instrument helps to detect exceedingly small cavities that are in the initial stage to advanced lesions. The scoring system for the CAST instrument is 0 for sound, 1 for sealant, 2 for restoration, 3 for enamel lesions, 4/5 dentin lesions, 6 for pulp involvement, 7 for abscess/fistula, and 8 for tooth loss. Researchers often use the CAST instrument when seeking data about dental caries in developed and developing countries where dental caries are prevalent. Based upon the research encompassing 6-to 7-year-old children, the study revealed that children with fathers

who had a low level of education were 2.4 times more likely to garner a CAST score of 3 or higher (Babaei et al., 2019).

One of the negative consequences of poor oral hygiene health is tooth loss. Edentulism can be loosely defined as a loss of all of one's teeth. KNHANES, Korean National Health and Nutritional Examination and Survey, is a questionnaire researchers use to collect data. Researchers Han et al. (2015) utilized this instrument in a study in Korea to investigate the association of a father's education level with individuals considered to possess an edentate status. The researchers used a total of 4 education levels: no education, primary, middle, and high school or more. Data posited the edentate status of Korean elders had an association with parental education levels and remains effective throughout the subject's life despite their own personal educational level (Han et al., 2015). In this case, the father's educational level appears to have a significant impact on the subject's edentulism status, however, cultural differences must be considered.

This study is cognizant of the fact that one culture's practices may not generalize to the practices of other cultures. In 2011, researchers Dos Santos, Nadanovsky, and De Oliveira investigated the inconsistencies of oral hygiene practices for children. Professional organizations in ten countries were contacted; a request for items containing information on children's oral hygiene habits were sent to these countries. The following countries participated in the study: The United States, Canada, Denmark, Norway, Finland, United Kingdom, Japan, Australia, Brazil, and Sweden. Some of the inconsistencies found were the types of toothpaste children should use and until what age should toothbrush supervision cease (Dos Santos, Nadanovsky, & De Oliveira, 2011). Therefore, there is still a need for universal understanding concerning a child's oral health hygiene.

Mother's Dental Knowledge

It has been found that a mother's positive behavior regarding oral health during a child's early years significantly influences the oral health behavior of the child (Khoshnevisan et al., 2020). Some people think that restoring primary teeth is a waste of time and money since the primary teeth are temporary (Srinivas & Jeevanandan, 2019). This attitude of parents was not relegated to only low education level parents. In a recent study, 30% of parents with a postgraduate level of education similarly felt that treatment on deciduous teeth would be unnecessary since the teeth would exfoliate on their own and be replaced by a permanent tooth (Srinivas & Jeevanandan, 2019). However, deciduous teeth do have a purpose—deciduous teeth can serve as place holders while the permanent teeth continue to develop in the bone until time for eruption. While investigating a mother's knowledge regarding dietary and feeding practices, researchers found that 33.7% of mothers believed that caries could be caused by prolonged breastfeeding while 53.9% thought that prolonged bottle-feeding caused caries (Shetty, Deoghare, Rath, Sarda, & Tamrakar, 2016). Additionally, studies showed that 56.3% of mothers were cognizant of the importance of keeping the deciduous teeth in good health (Faheem et al., 2018).

Brushing twice a day with fluoride toothpaste is instrumental in reducing the occurrence of dental pain; however, only 46% of mothers were aware of this fact. Conversely, in Malaysia, a study of mother's knowledge was more positive regarding oral hygiene health. Indeed, 85% of the mothers in the study were aware of how to properly take care of their child's oral health. Similarly, in India, 91% of mothers advocated supervising their child's early brushing routine. Mothers are categorized as role models for their children as the mother's oral hygiene practices are strongly associated with their child's oral health (Shetty et al., 2016; Traebert et al., 2009). This association is established during the infancy

stage of the child and the practice is continued throughout the child's life. Therefore, the education of the parent plays a vital role in the child's oral health.

Negative Consequences of Poor Oral Hygiene Health

Some of the negative outcomes of dental caries on a child's life are poor speech, difficulty chewing, decreased appetite, low weight, sleeping difficulty, and diminished learning ability. For instance, when a child has dental caries, the pain may be so severe the child may develop an alternative way of chewing to prevent experiencing pain from the side of the mouth where caries exist. Dental caries may also trigger pain which causes the child to eat less to avoid pain; as a result, the child may lose weight due to a decreased appetite. Furthermore, being unable to eat, the child loses the proper nutrients of a well-balanced meal which can affect the child's ability to retain added information both in the classroom and outside of the classroom. As previously mentioned, associated with dental caries is dental pain which can affect a child psychosocially and emotionally. While being three times more prone to school absenteeism, children with dental pain may also display a decrease in school performance (Almeida, Leal, Medonca, Hilgert, & Ribeiro, 2018).

School children who display poor oral health are four times more likely to miss school than their peers who display good oral health. Symptoms related to dental pain or infection caused children to miss school and increased their likelihood of performing poorly in school due to absences (Naavaal & Kelekar, 2018). Similarly, school absenteeism has shown to take time away from learning opportunities and decrease academic performance (Neves et al., 2016).

Data from the National Survey of Children's Health found that children who displayed untreated oral health care needs were associated with missed days from school. Additionally, the research was replicated in a separate study of US (United States) children which found comparable results (Ruff, Senthil, Susser, & Tsutsui, 2019). Though the authors

of this study found a negative association with school absenteeism and academic performance, the study quality was limited due to inconsistent exposure and a predominance of cross-sectional designs.

There are a host of other variables to consider when addressing dental caries and poor oral health in children. Particularly, children with autism, cerebral palsy, and other disabilities should be taken into consideration. However, for the purposes of this study, children without any disabilities will be the topic of discussion. Research has provided evidence which elucidates the consequences of untreated caries on the quality of life in children. Untreated caries can evolve into ulcerations, fistulas, pulp involvement, and an abscess (Corrêa-Faria et al., 2018). If these variables become concomitants of decay, the quality of life of the child will be exacerbated. Some factors which predispose children to poor oral health care include poor nutrition, poverty, and a lack of knowledge on how to properly utilize preventative measures to clean their teeth. Positive outcomes can be achieved if children are taught at an early age about the efficacy of brushing properly. As a method to improve oral health care, studies suggest using a toothbrush to remove debris from the teeth (Macnab & Mukisa, 2018). Moreover, reducing the production of acids that lead to the formation of plaque and tooth decay can be achieved by avoiding sugary foods and liquids and brushing and flossing regularly.

The most common and effective dental care which can be performed in the home, to remove dental biofilm (plaque), is with toothbrushing. Toothbrushing should be performed twice daily for a minimum of 2 minutes. Furthermore, children between the ages of 18 months to 5 years should use a toothpaste that contains 500-550 ppm of fluoride on a soft bristle toothbrush while under the supervision of an adult (Hamilton, Cornish, Kirkpatrick, Kroon, & Schwarzer, 2018). Theoretically, a program aimed at improving toothbrushing among children through parental supervision appears advantageous; however, the overall

success of such programs is low (Hamilton et al., 2018). Reasons given may be due to children's health behavior being dictated by their parents and the child's lack of control, in the home, over their activities. Additionally, parents may begin the monitoring process and eventually taper off and desist.

Improper Brushing

Kaewkamnerdpong & Krisdapong (2018) found that school performance may be negatively affected due to poor oral health. Some of the associations between oral cleanliness and school performance considered the substantial presence of plaque on the child's teeth, dental caries, and poor oral health (Rebelo, Rebelo Vieira, Pereira, Quadros, & Vettore, 2019). The presence of plaque on one's teeth is indicative of a lack of brushing or using an improper brushing technique. Researchers Maharani, Adiatman, Rahardjo, Burnside and Pine (2017) found that the presence of a substantial amount of plaque had a significant association with the child's performance in school. Moreover, along with improper brushing, high sugar consumption is also associated with causing dental plaque. Therefore, a reduction in one's sugar intake and using the proper brushing technique should help rectify the situation.

Dental Caries

The World Health Organization (WHO) defines oral health as a state of being free from oral and throat cancer, periodontal disease, facial and mouth pain, oral infection and sores, tooth decay or loss, and other disorders and diseases which may inhibit an individual's capability to correctly bite, chew, smile, and speak as well as one's psychosocial well-being (FDI World Dental Federation, 2015).

To get a glimpse of the impact of dental caries on a child's teeth, here is a brief synopsis on developing dentition in children. Tooth eruption begins around 6 to 10 months old, usually with the lower incisors first (Anatomy and Development of the Mouth and Teeth, n.d.). All primary teeth will usually have erupted by 2 1/2 years old; by age 6, the permanent

teeth begin to appear. Most of the permanent teeth will have erupted by the age of 12. Lastly, the third molars, wisdom teeth, should have erupted by 21 years of age (Anatomy and Development of the Mouth and Teeth, n.d.). The teeth that are most susceptible to caries are the molars—molars have grooves, or fissures, on the chewing surface which can become a food trap if not thoroughly cleaned by brushing. Primary teeth serve as space maintainers for the developing permanent teeth which are impacted in the jawbone. The reason it is imperative to keep primary teeth healthy and avoid premature loss is that space is lost for the tooth's successor which may lead to crowding problems for erupting permanent teeth. Untreated tooth decay is problematic as it causes difficulties in sleeping and eating, impacts growth in a child, and is the leading cause of absence from school (FDI World Dental Federation, 2015). According to the Global Burden of Disease Study, untreated decay of permanent teeth has a global prevalence of over 40 percent for all ages. Moreover, out of 291 diseases, untreated decay is the most prevalent condition.

Most states consider chronic absenteeism as an indicator of school performance. Disadvantaged children in primary and secondary school, who may miss school due to dental caries, place themselves at risk of falling behind academically. Further studies found that school children with dental caries had a 44% higher probability of poor school performance and 57% greater likelihood of school absenteeism (Rebelo et al., 2019).

The most common preventable disease in the world is untreated caries. Among children aged 5 through 17, untreated caries are over 5 times as common as asthma (Ruff et al., 2019). In fact, in the United States, geographic, income, and ethnic disparities reflect that 15% of children, 20% of minorities, and 25% of children below the poverty threshold display untreated dental caries (Ruff et al., 2019).

Dental Pain

Untreated dental pain or infection can have long-lasting detrimental effects on school performance and attendance; school children may be unable to concentrate in class due to dental pain (Agaku, Olutola, Adisa, Obadan, & Vardavas, 2015). Similarly, studies suggest that an individual's body weight, growth, nutrition, and general health are impacted by severely decayed teeth which causes discomfort, pain, learning disorders, sleeping problems, and absence from school (Shaikh, Siddiqui, & Aljanakh, 2016). Additionally, inferior oral health care is recognized as affecting the daily performance of students and their quality of life—quality of life being construed as missed opportunities for learning.

The prevalence of dental pain is problematic among school-aged children. This study refers to dental pain as a pain in a tooth caused by unmet dental care. Enamel is the hardest substance in the body, however, once the enamel is compromised, the layer underneath the enamel, the dentin, becomes hypersensitive (Lacruz, Habelitz, Wright, & Paine, 2017). The dentin has open tubules that relay to the nerve which is why tooth pain occurs once the enamel is broken down. The persistent pain in a tooth can adversely affect a child's ability to interact socially, their emotional stability, as well as their psychosocial well-being. Moreover, dental pain increases the likelihood that a child will be prone to school absenteeism.

Dental pain is considered a variable linked to the success that a child displays while attending school (Corrêa-Faria et al., 2018). Similarly, dental pain has been linked to school absenteeism which is a considerable factor for the decrease in school performance (Neves et al., 2016). The impact of oral conditions on school performance is still unclear. Some studies were able to find a significant association between academic performance and dental caries while others were not (Rebelo et al., 2019). Though school performance was not always compromised by the presence of dental caries in school-aged children, if the dental caries were accompanied by pain, the child's academic performance was affected (Shaikh et al.,

2016). Hence, a link between oral health and school performance exists, however, effective measures to reduce school absenteeism must be considered.

Oral health conditions have become a growing concern for health and educational researchers. Moreover, oral disease is not a localized condition but a condition that affects children around the world. Oral disease can lead to pain, school absenteeism, poor nutrition, and interference with one's quality of life (de Paula et al., 2015). The pain associated with dental caries is due to a breakdown of the enamel which makes the nerve of the tooth hypersensitive (Mark, 2018). If the decayed tooth is left untreated, depending on the age of the child, it could lead to a pulpotomy, the removal of the nerve in a baby tooth, or a root canal in an older patient. Even worse, if the tooth is beyond repair, it may have to be extracted, which translates to removing the entire tooth. Furthermore, dental caries that go untreated can require an emergency visit with the dentist which means the child will be absent from school, thereby decreasing the child's opportunity for learning (Dias Ribeiro, Almeida, Amorim Medonca, & Leal, 2018).

School Absenteeism

Poor oral health care can eventually lead to school children missing days from school, thereby causing the school child to fall behind in coursework and performing poorly in class. Unmet dental needs—toothaches, decayed teeth, or unfilled cavities—have an impact on school absenteeism (Agaku et al., 2015). Furthermore, dental caries is the single most common childhood disease which can sometimes lead to infections and potentially life-threatening diseases (Agaku et al., 2015). Data from the World Health Organization, WHO, oral health database has suggested that an estimated 200,335,280 teeth were decayed, filled, or missing among the age group of 12 years old (Gopalan et al., 2018). Deterioration of overall health is greatly impacted by untreated dental conditions and poor oral health—these occurrences have an impact on the quality of life of children. Moreover, the increased reports

from parents on low school grades from their child elucidate the association of poor oral health status with academic performance (Gopalan et al., 2018).

Missed Classes

Data from the 2016-2017 National Survey of Children's Health found a significant association in children with oral health problems. The survey found that children with oral health problems were more likely to have problems at school, miss at least one day of school, and miss more than three or six days of school. Additionally, poor oral health was associated with poor academic performance across, sex, age, and socioeconomic status (Guarnizo-Herreño, Lyu, & Wehby, 2019).

Data on 925 sixth grade children in Sakaeo province, Thailand was gathered for condition-specific oral health-related quality of life. Kaewkamnerdpong and Krisdapong (2018) revealed that poor oral health may limit academic activities and learning time. Lending credence to the suggestion that poor oral health is associated with poor school performance, further studies were conducted in Brazil using a case-design with a sample of 1411 school children, aged eight through ten years. The logistic regression model provided data that showed that children who had caries at the beginning of the academic year were more susceptible to demonstrating lower scholastic performance than their counterparts who were without caries (Paula et al., 2016). Comparatively, research conducted in India among 414 school teachers found that poor oral health contributed to difficulty eating, tooth loss, and toothache (Saxena, Nagarajappa, & Ramesh, 2018).

School-based Sealant Programs

Some schools have implemented a school-based sealant program to combat the negative effects poor oral health can cause. Untreated caries can cause pain and infection; 90% of dental caries occur in the permanent teeth of children in the pits and fissures of posterior teeth (Griffin, 2016; Griffin et al., 2017). Furthermore, children living in poverty

are twice as likely to have untreated caries and experience pain and infection (Griffin et al., 2017). However, school-based sealant programs are an option to deliver sealants to children who may not have the opportunity to receive them. Additionally, economic evidence indicates that the benefits of a school-based sealant program outweigh the cost of the program (Griffin et al., 2017). Furthermore, school-based sealant programs were found to lower the incidence of caries and inadvertently affect a child's academic performance (Williams, Rogo, Gurenlian, & Portillo, 2018).

Resin Sealants

It was found that providing a school-based sealant program to 1,000 children would circumvent 485 fillings while remaining cost-effective (Griffin et al., 2016). The use of a resin sealant to prevent caries is a potential advantage for parents with children who are more prone to cavities. Sealants are applied to the chewing surfaces of the molars which helps to prevent cavities from occurring on the posterior teeth (Mark, 2016). However, the anterior teeth of the patient are still exposed to the possibility of caries if improper brushing is performed. As a caveat, some patients may have a horrible gag reflex which renders all isolation techniques null—the molars must be completely dry prior to application of the sealant for the sealant to adhere to the enamel of the tooth (Mark, 2016). If the tooth becomes contaminated with saliva, a bond failure can occur and the sealant will lift off of the tooth leaving the tooth exposed and susceptible for cavity formations.

Conceptual Framework

This research focuses on finding a causal link between the oral hygiene knowledge levels of parents and the oral hygiene health behaviors of their children. Initially, the oral hygiene knowledge levels of parents who have obtained a level of high education and parents who have obtained a level of low education are to serve as models for their children to reproduce proper oral hygiene habits. Albert Bandura's Social Cognitive Theory was one of

two theories that served as the underpinning of this study's theoretical framework. The Social Cognitive Theory (SCT) was utilized to illuminate behavioral interaction between the parent(s) and the child regarding oral hygiene health.

In the 1960s, Albert Bandura, a psychology professor at Stanford University, initiated the Social Learning Theory (SLT) which would later evolve into the Social Cognitive Theory in 1986. Bandura's SCT views the way individuals attain and sustain behavior within the social environment. The purpose of using SCT for this study is to investigate the parent's modeled behavior and whether the efficacy of their behavior translates into good oral hygiene behavior in their child. There are three important variables in the Social Cognitive Theory: ***Behavior factors*** such as social stimuli, influences a person's behavior through cognitive processes and environmental factors; ***Environmental Factors*** are composed of a person's social and physical environment-especially the attitudes, beliefs, and ideas of other people who may influence the individual; and ***Personal factors*** that encompass rewarded characteristics from the past. How a person behaves is influenced by their personality and cognitive factors. The three-way reciprocal model reflects how each variable influences each other. Bandura believes that a person's thinking is influenced by the environment and that individual's behavior influences their environment. Stated another way, the environment influences a person's thinking and feelings which influences their behavior, which in turn, impacts the environment.

One of the unique features of SCT is the way individuals obtain and maintain behavior. Six constructs define Social Cognitive Theory: (1) Reciprocal determinism is the central concept of SCT that refers to the reciprocal interaction of a person, environment, and behavior; (2) Behavioral capability refers to an individual's ability to successfully perform a behavior; (3) Observational learning refers to individuals witnessing and observing a behavior performed by others and then reproducing those actions; (4) Reinforcements refers

to the likelihood of continuing or discontinuing a behavior based upon internal or external responses to a person's behavior; (5) Expectations refers to the expected consequences of an individual's behavior; and (6) Self-efficacy refers to the individual's confidence level in their ability to perform a behavior successfully. From an early age, a child must be taught how to brush their teeth properly which is oftentimes modeled by the parent. Once the child is taught, the child is expected to mimic the actions of the parent(s) and develop a habit of continuance. It is assumed that the parent has espoused the proper brushing and flossing techniques for the child to achieve good oral hygiene success.

For observational learning to occur, Bandura hypothesized that individuals embrace a model—in this instance, a model refers to an individual who displays an action that will be beneficial to another individual if they were to mimic that individual's actions—and retain the actions of the model. Moreover, the individual must be able to reproduce the model's behavior and be encouraged to do so (Schunk & DiBenedetto, 2020). This hypothesis would align with the expectation that the child would look up to the parent as a model and reproduce the actions of the parent. Therefore, it is assumed that children who are successful with their oral hygiene can credit their parents for properly modeling and instilling good oral hygiene habits. It is through this process of observational learning that the child will be able to benefit from the maximum reward, good oral hygiene health.

One of the goals of SCT is to explain how individuals regulate their behavior in efforts to achieve a particular behavior over a while. For this study, parents will have modeled the acts of proper oral hygiene care for their children. As the child ages, the behavior that the parent has modeled for the child will have either diminished or remained static. Addressing the issues of a link between oral hygiene health and a parent's oral hygiene knowledge is advantageous because children are still malleable and corrective measures can

be applied to unhealthy habits to circumvent negative outcomes. This hypothesis was tested with the Bobo doll experiment.

Bandura and his colleagues conducted a study with children to research observational learning behaviors. The research involved an inflatable doll known as a Bobo doll and a film that showed adults interacting aggressively towards the doll (Bandura, Ross, & Ross, 1961). After watching the film, the children were split into four different groups with a Bobo doll. It was observed that the children mimicked the actions of the adults, who were either punished for aggressive behavior, rewarded for aggressive behavior, or suffered no consequences for their behavior. The researchers concluded that the children's future behavior is greatly influenced by observation of the adult's behavior and how the adult's behavior is either punished or rewarded (Bandura et al., 1961).

The second theory utilized is the Health Belief Model. The genesis of the Health Belief Model was in the early 1950's by social scientists at the U.S. Public Health Service. The goal of these social scientists was to comprehend why individuals neglected to espouse a willingness to use measures to inform themselves on the early detection of diseases and compliance with medical treatments. The Health Belief Model is a decision-making process that requires each step to rely on a previous belief. For example, an individual must believe in their susceptibility to a disease or condition. The individual must also believe that the condition is serious and that there is the opportunity for successful intervention for the condition. The individual must believe that the barrier can be conquered by adopting the intervention. To apply this theory to early childhood caries, a parent must believe their child is susceptible to caries; that baby teeth are important and the integrity of the baby teeth's enamel can be compromised by caries. The parent must also believe that caries can be prevented and the parent must be willing to limit sugary snacks and enforce the practice of good oral hygiene behaviors for the child. Similar to the social cognitive theory, there are six

constructs of the health belief model: Perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cue to action, and self-efficacy.

There are limitations to the Social Cognitive Theory. The SCT does not place an emphasis on emotion or motivation other than relying on past experiences. Moreover, the theory assumes that changes in the person will be based upon changes in the environment. The theory can also be broad-reaching and tend to disregard biological and hormonal tendencies that may influence an individual's behavior.

Topical Research

Topics related to a possible link between the educational levels of parents and the oral hygiene health of their children already exist. Regarding data that pertains to parent education levels, authors Al-Meedani and Al-Dlaigan (2016) suggest that children have better dental health when they have mothers who have a high level of education. There can be a host of reasons that make this presupposition valid. For instance, this association may be due to the close relationship mothers are expected to have with their child during the initial months of bonding; it can be assumed that this is the period that mothers are on maternity leave, or they are stay-at-home wives, while the fathers are at work. Additionally, there exists the possibility that the mothers are single moms—the father could be absent from the child's life.

Researchers have found a correlation between dental caries and their parent's level of education (Chu et al., 2012; Mishra et al., 2018; Edelstein, 2002). Children who have parents that have a higher level of income and a higher level of education tend to have fewer dental caries (Chu et al., 2012). Children of parents who have education levels that are considered low are more susceptible to getting oral caries, but a trip to the dental office is unlikely. Researchers found that parents with a low level of education were less concerned about dental care and regular preventative visits to a dentist to arrest possible caries in their children (Saldūnaitė et al., 2014). Dental caries that are left untreated are more likely to cause

children to miss school due to symptoms related to dental pain. Furthermore, when a child misses school, the likelihood of them performing poorly in school increases. Similarly, research by authors Neves et al. (2016) found the opportunity to learn is negated when a child misses school. Moreover, missing school is associated with a decrease in academic performance.

Other topics of interest are relevant as well; high levels of caries began to appear as a common topic regarding poor oral health care and low education level of parents. Some children missed school due to the pain associated with caries in an untreated tooth. The pain of untreated teeth becomes so severe that students miss school to go to their dentist to have the tooth treated. Once again, missing school, commonly referred to as school absenteeism, helps account for a decrease in school performance. Research from Almeida et al. (2018) suggests children with dental pain are three times more likely to have school absenteeism.

Summary

Though oral health affects us all, children may be impacted the most if deleterious conditions are rectified promptly. Parents are the gatekeepers of their child's oral hygiene health that may be affected by their socioeconomic or sociodemographic status. A parent's level of education might infer their lack of oral hygiene information, lack of access to fluoride, and improper brushing just to name a few. Poor oral health can roll over into the child's educational life; school absenteeism is a possible result of being in pain due to a decayed tooth that has been left untreated. A decayed tooth is usually the result of a tooth left untreated which can affect either a primary tooth or a permanent tooth. As previously stated, dental caries can be life-threatening, leading to infections, and is the single most common childhood disease (Agaku et al., 2015).

Parents with low levels of education tend to have a causal connection with children who have high levels of dental caries, a sign of poor oral hygiene health. Studies continue to

show that children with poor oral health will most likely garner dental pain, miss school, and perform poorly in school (Kumar et al., 2018). School performance suffers if a child has to miss school due to an emergency dental office visit or distraction of a toothache which inhibits the child's ability to concentrate in school or on homework assignments (Almeida et al., 2018). Furthermore, missing class results in a child falling behind in class and places limits on a child's opportunity to learn.

The Social Cognitive Theory demonstrates how a parent should become a model of good oral hygiene health for their child. The proper behavior instilled in the parent's child can help to fuel an oral hygiene habit that will be relevant for a lifetime. While research shows that parents who are more willing to invest in the oral hygiene health of their child are parents with a high level of education (Berendsen et al., 2018) this study can help redirect information to parents with a low level of education to help them place an emphasis of the importance of oral hygiene health in their children. If parents are unaware of proper oral hygiene procedures and neglect to take their child to the dentist for routine oral health care, the child runs the risk of developing unwarranted dental caries and garnering the negative effects of poor oral health. Therefore, parent and patient dental education are topics to consider addressing the poor oral hygiene health of children with parents that have low education levels.

CHAPTER 3

METHODOLOGY

This chapter will elucidate the rationale for selecting the quantitative descriptive approach as the research design. Additionally, this chapter will introduce the instruments utilized for data collection and how those instruments were chosen. The problem that this study will investigate revolves around the oral hygiene health of 7- to 17-year-old patients, within the greater United States, and whether there is a relationship between the parents oral hygiene knowledge. Participants, sampling methods, site information, and population will also be featured along with a discussion on the approach taken for analyzing the data. Finally, the methodology chapter will conclude with a review of the limitations and delimitations of the research design, internal and external validity, and any ethical issues associated with this research.

Purpose

Utilizing the theory of social cognitive behavior, the purpose of this quantitative descriptive study was to determine whether there was an existing nexus between parental education and oral hygiene health of 7- to 17-year-old children who were residents in the greater United States.

Research Questions

RQ1: What is the relationship between a parent's level of oral hygiene knowledge and their child's oral hygiene behaviors in the greater United States?

To further investigate the research question, two subset of research questions (SQ) will be asked:

SQ1: In what ways do parents report their levels of knowledge associated with oral hygiene?

SQ2: In what ways do parents report their child's oral hygiene behaviors?

Research Design and Hypothesis

The researcher utilized a quantitative descriptive study based on a non-experimental cross-sectional survey design. This quantitative descriptive study sought to find a relationship between two variables, independent and dependent, after an event had already occurred (Salkind, 2010); a method commonly known as ex post facto research. Ex post facto research, which is Latin for “after the fact” research, refers to the effect and cause already occurring and having to be studied in retrospect. In this study, the independent variable, parental oral hygiene knowledge, was defined as the correct and incorrect understanding on how to achieve oral hygiene success. The dependent variable, children’s oral hygiene health, was defined as proper and improper brushing habits and the presence or lack of dental caries. This data was gathered from voluntary participants willing to partake in the survey.

Hypothesis

There is a significant difference in oral hygiene health for 7-to 17-year-old children whose parents have a higher level of education and those children whose parents have a lower level of education.

The goal of the research was to determine the effect the independent variable may have on the dependent variable or the outcome when juxtaposing two or more groups of individuals (Salkind, 2010). These two groups encompassed participants with good oral hygiene health and participants without good oral hygiene health. The non-experimental research design did not allow for actual manipulation of the independent and dependent variables. As a result, the researcher cannot conclusively posit whether a true cause-and-effect relationship existed between the variables (Salkind, 2010). Additionally, results were restricted from generalization as the subjects were not randomly placed into experimental and control groups—groups formed before the study.

The design of this study investigated the possible relationship between the independent variable, parental education, and the dependent variable, the oral hygiene health of their children (Schneider et al., 2013). Studies have shown that the oral health status of a child was often associated with parental education (Kumar et al., 2014). Additionally, low parental education was related to lower odds of receiving preventative care (Huebner, Bell & Reed, 2013). The researcher chose a cross-sectional survey design that collected data at one particular point in time (Creswell, 2013). The efficacy of the cross-sectional survey design was its ability to supply information within a brief period and for its ability to measure current practices or attitudes (Creswell, 2013). Therefore, this cross-sectional survey examined the current practices, or actual behaviors, of participants in the study.

Setting

The setting for this study was in the greater United States. For the purposes of this study, the researcher used the pseudonym Correct Smile Dentistry to refer to the private dental office, where the researcher is employed, in a large metropolitan city in Texas. The present orthodontist procured the practice from her mentor—who hired her upon completing her specialty training from an accredited orthodontic school—as he was transitioning into retirement. The practice's patient load is a balanced mixture of adults and children; patient ages range from 7 to 75-years-old. A variety of treatment options are available that include traditional braces and corrective trays, otherwise known as Invisalign aligners. Over the years, the patient load of the practice has increasingly grown as well as the staff. Typically, the practice will render treatment to an average of 85 to 110 patients daily.

The researcher's role with the company is one of a factotum; many hats are worn within the organization. The responsibility for any implementation of new software and hardware for the company falls under the umbrella of the researcher's duties. Additionally, the researcher is responsible for the training of the clinical staff to become proficient in the

clinical area as well as on any new software/hardware utilized by the practice. Likewise, the researcher meets with various sales representatives to sort through a bevy of information to find the best supplies that are pertinent to the operations of the office. Permission was requested by the researcher and granted by the owner of the private dental office to conduct this study with patients who were willing to volunteer.

Population

The target population for this cross-sectional design was selected from a pool of individuals who currently resided in the greater United States. The individuals who were willing to participate were parents of children who are 7- to 17 years of age. Individuals opted to voluntarily participate in the study and were recognized as a convenience sampling dataset. After giving consent, the willing parents of 7- to 17-year-old children were asked to provide information pertaining to their level of oral hygiene knowledge. Potential parental participants were expected to have various levels of oral hygiene knowledge. The oral hygiene knowledge levels of the parents were used as the independent variable of the study. Information related to the parent's level of oral hygiene knowledge was obtained from the survey. Also, the information about the oral hygiene behaviors of 7- to 17-year-old children was obtained from the survey from the parents who currently resided in the greater United States. The oral hygiene health behaviors of the 7- to 17-year-old children was used to serve as the dependent variable of this study.

Sampling

This study used single-stage sampling which was designed to allow the researcher sample elements or people in a population directly (Creswell, 2009). While random sampling enabled the researcher to ensure everyone had an equal probability of being selected, the researcher used homogeneous convenience sampling which was a non-probability sampling technique.

Often, researchers will use nonprobability sampling which will allow the researcher to select individuals based on convenience, availability, and representation of a characteristic the investigator is seeking to study (Creswell, 2013). Regarding this study, the researcher utilized a quantitative sampling procedure called convenience sampling. Convenience sampling allowed the researcher to collect a sample from a convenient location. Moreover, the researcher selected individuals willing and available to participate (Creswell, 2013). One of the advantages of using convenience sampling was that it saved time, money, and effort, however, this method sacrificed credibility and information (Creswell, 2007).

Potential participants received notification about the study in two ways: social media and a flyer. Those individuals who were willing to participate had the option to notify the researcher if they had any further questions; the researcher sent the potential participant an email that contained a link to the survey (Appendix D) and consent form (Appendix C). Additionally, the flyer provided a link to the survey as well as a QR code that the participant could scan with their phone. After scanning the QR code, the survey would open, starting with the consent form. The participant had a period of three weeks to complete and sign the electronic information. The researcher extrapolated the forms that contained the requisites necessitated for the study. As previously noted, those forms would be available via a link included in the email once potential participants accepted the invitation to the study. The researcher ensured that participant consent was obtained and that participants met the required prerequisites to participate in the study. At the onset of the survey, the survey would contain initial questions that would address whether the participants qualified to partake in the survey. Those who qualified proceeded with the subsequent questions. Those who didn't qualify were asked to cease with the survey. Additionally, the email included a summary of the study that would be administered electronically. Participants were able to exercise the principles of freedom and autonomy that allowed them to refuse participation or withdraw at

their discretion with no recriminations (Roberts, 2010). The researcher gathered data for this study by utilizing an existing survey tool to collect qualitative data from the parents of 7- to 17-year-old children. The researcher modified the survey to make it applicable for the study.

Instrumentation

One of the existing survey tools that the researcher utilized to obtain data from parents about their 7- to 17-year-old children were designed by the World Health Organization. The World Health Organization is well known for its epidemiological survey methodology. Moreover, WHO provides diagnostic criteria that are easy to understand and applicable in public health programs across the globe. The instrument for the oral health survey is the Oral Health Surveys: Basic Methods 5th Edition (World Health Organization, 2013). Permission to use the survey was requested and granted (Appendix A), utilizing the WHO Permissions Request Form found on their website. The survey consisted of 16 questions that were a mixture of Likert-like and open- and closed-ended questions. The data collected from the questionnaires was a modified version of the original survey instrument. Moreover, the instrument that was used for the parent(s), the Oral Health Surveys: Basic Methods 5th Edition, was used to collect information from the parents such as educational level and oral hygiene behavior. Also, an additional instrument was used based on a survey conducted in Wuhan. This survey investigated the education levels of parents with either their child's oral health behavior or their own oral health knowledge; 8446 families were surveyed. This questionnaire utilized questions from the Fourth National Oral Survey of China (2015-2016). Additionally, this survey was developed by Chinese Stomatological Association according to guidelines established by the WHO. The questionnaire contained 12 questions; the questionnaire falls under the Creative Commons Attribution 4.0 International License which permits free usage if the appropriate credit is given to the original author(s), the indication of any changes made, and a link to the Creative Commons licence. The

Creative Commons license is as follows: <http://creativecommons.org/licenses/by/4.0/>. The researcher culled and melded pertinent information from both surveys to construct one instrument for this study. The researcher noted any changes to the original questions and gave credit to the original authors when necessary.

Some possible limitations of the instrument included dishonest answers and survey fatigue. The researcher ensured that the instrument used precise questions and lacked ambiguity. Likewise, the researcher avoided presenting a lengthy survey in efforts to keep the attention of the participants. The researcher utilized REDCap (Research Electronic Data Capture) for building and managing the online survey. REDCap is a secure web application that functions to support online data capture for research studies. After completion of the online survey, aggregated results were imported into Microsoft Excel in efforts to be imported into the data analyzer R console.

Data Analysis

The researcher used inferential statistics during data analysis. Inferential statistics analyzes the data from a sample to draw conclusions about an unknown population (Creswell, 2013). The software utilized by the researcher was the open-source freeware called R Studio. R is a language and environment utilized for statistical graphics and computations. R Studio is well known for providing a broad array of statistical techniques such as clustering, linear and nonlinear modeling, and time-series analysis. The publication of quality plots, formulae, and mathematical symbols are one of the strengths of R. R runs on a wide variety of UNIX platforms, as well as Windows and MacOS, for the manipulation of data, executing calculations, and displaying graphics.

One of the first steps the researcher performed was to score the data and create a codebook; the researcher proceeded to select an analysis program, input the data into the analysis program, and determined the types of scores to use for analysis (Creswell, 2013).

Scoring data refers to the numeric score the researcher assigns to each response. A codebook refers to questions or a list of variables which interprets the code or score from the responses in the questionnaire.

The researcher attempted to circumvent the occurrence of response bias by completely discarding any surveys with unanswered questions. Response bias is the effect that nonresponses have on the overall results of a survey (Creswell, 2014). The researcher used inferential statistics to acquire inferences from a sample to a population (Salkind, 2010). When utilizing inferential statistics in causal-comparative research, three of the most commonly used analytical methods are the chi-square test, paired-samples and independent *t*-tests, and analysis of variance (ANOVA) or ANCOVA (Salkind, 2010). The chi-square test allowed the researcher to seek out possible statistical relationships between experimental and control groups. The *t*-tests allowed the researcher to determine differences between the control and experimental groups when comparing the mean scores of two groups (Salkind, 2010). In this study, the researcher did not apply any controls to the samples, therefore, an chi-square test of independence was utilized. The ANOVA statistical technique was utilized to test for relationships between three or more groups and a continuous dependent variable.

Limitations

Regarding this study, there were various limitations associated with causal-comparative research. For instance, variables were unable to be manipulated by the researcher due to the ex post facto design of the study (Salkind, 2010). In this study, the researcher had no control over the education of the parents, the independent variable. Additionally, there might be other variables that may have an impact on the dependent variable, the oral hygiene health of children, other than the independent variable. For example, the oral hygiene habits in the children, the dependent variables, may have been influenced by their motivation or lack thereof. Another limitation involved the participant's

household. The size of the household was not taken into consideration at the time of this study. Whether the child came from a two-parent home or a single-parent home was not determined. If the child came from a two-parent home, the researcher obtained educational levels from both parents. Additionally, the occupation of the parent(s) was not considered as well as the demographic location of the family. Other variables that are not considered are the income level of the family as well as the race of the family.

Delimitations

While a limitation was not under the control of the researcher, a delimitation differs in that it falls under the control of the researcher (Roberts, 2010). Some delimitations of this study included the participation of only parents who have children who are 7- to 17- years of age. Moreover, the researcher only chose participants from the greater United States as opposed to choosing participants outside of North America. Therefore, this study can be criticized for the limited possibility to generalize to other parent-child groupings in other foreign cities or countries. However, the researcher intended to provide detailed information so that the produced data could be utilized for its applicability and assessed in similar contexts.

Internal Validity

Internal threats are the most severe threats to validity as they can jeopardize an otherwise good research study. The researcher designed the proposed study to ensure any threats to internal validity were minimized. Internal validity threats refer to the unwarranted impact of additional variables on the researcher's ability to produce valid inferences from the data about the experimental population (Creswell, 2009). For instance, the experiences of the participants, treatments, and experimental procedures are examples of threats that could influence the inferences made by the researcher. Regarding this study, there was the possibility that participants may drop out of the experiment for assorted reasons. To address

this possibility, the researcher extended an invitation out to a large sample group to account for any potential dropouts. Salkind (2010) suggests utilizing homogeneous subgroups, analysis of covariance (ANCOVA), or both in efforts to reduce threats to internal validity. Some strengths of this research design is the ability to extend experimental studies and provide external validity evidence from the findings of previously established experimental research (Johnson, 2001). Additionally, participants can become wiser and more experienced with their oral hygiene practices. Maturation is another potential internal validity threat—the changing or development of individuals during the experiment (Creswell, 2013). However, this study was not a longitudinal study, so the risk of potential maturation was unlikely.

External Validity

Similarly, the researcher established measures to minimize and eliminate external validity threats. External validity threats are incorrect inferences drawn from the sample data to other settings, other people, and past or future situations (Creswell, 2009). For instance, the characteristics of the setting in the experiment may not enable the researcher to generalize to individuals in other settings. The interaction of the selection refers to the inability to generalize beyond the participants in the study (Creswell, 2013).

Ethical Issues

The questions within the survey will address ethical concerns related to personal disclosure and authenticity. The researcher was cognizant of the credibility of the research report and the personal privacy issues related to sending questionnaires over the internet for data collection. The researcher ensured the electronic transmission and collection of information comported ethically through the utilization of REDCap—the REDCap portal functions as a secure web application that will lend credibility to this study. Creswell (2009) suggested that researchers assess the potential for risk to the participants in the study. These risks encompass physical, psychological, economic, legal, or social harm.

The researcher developed an informed consent form for the parental participants to sign before engaging in the study. A major function of the form was to reassure the participants about the protection of their rights during data collection; the signed forms served as documentation of some of the ethical steps applied towards the study. Similarly, to garner participation at the research site, permission was obtained from the individual in authority to make research recruitment flyers accessible to patients; the permission letter is attached in the appendix of this study—permission is usually requested in a written letter that identifies the potential impact, extent of time, and the outcomes of the research (Creswell, 2009). Another ethical procedure required the researcher to respect the research site to avoid any disruptions in the daily flow of the business. The organization has established guidelines for its back office to adhere to in efforts to ensure optimal flow of the patient schedule.

In efforts to lend credibility to the study, the researcher behaved ethically during the data analysis process. In this study, the researcher protected the confidentiality of the participants by disassociating the names from responses. The researcher noted in the consent form that participation in the survey is anonymous. Participants were informed to exclude any information that may identify them. Once the data has been analyzed, based upon recommendations, the researcher usually keeps the data stored for 5 years (Creswell, 2009). However, for this study, the researcher will store the data for one year. After storing the data for one year, it will be properly discarded to avoid misappropriation by other researchers. The researcher did not share the data with individuals not involved with the project. The researcher also maintained an ethical position while accurately interpreting the data gleaned for the study. Additionally, the researcher avoided falsifying, suppressing, or inventing data to meet the researcher's expectations. This includes omitting difficult results to present a convincing research study or creating false data, tables, and inaccurate quotes (Creswell, 2013).

Summary

This causal-comparative study investigated whether there existed a significant difference in oral hygiene health for 7- to 17-year-old patients whose parents had a higher level of education when compared to patients whose parents had a lower level of education. The researcher utilized a survey of oral hygiene health to collect data for this study. The cross-sectional survey allowed the researcher to obtain data and provide information in a short amount of time (Creswell, 2013). The study was conducted using the parents of children between the ages of 7-to 17 that resided in the greater United States. The target population was active patients chosen from the office of Correct Smile Dentistry, where the researcher is currently employed, as well as from regions in the greater United States. Since the researcher did not have access to the names in the population, the design of the sample was a single stage design. Additionally, the researcher utilized a homogeneous convenience sample which allowed the researcher to collect a sample from a convenient pool of potential participants. Participants for the study were provided a link by email to the survey that was conducted electronically online. The collected data was then analyzed using inferential statistics was drawn from a sample to infer conclusions about the population (Creswell, 2013). The researcher used the software R Studio for statistical graphs and computation of the data. The researcher's utilization of an independent t -test helped determine the differences between the two groups of participants.

CHAPTER 4

RESULTS

Studies have found that it is commonplace within the age group of 8-11 -year-old-children to be diagnosed with dental caries (Ilyas, Ashraf, & Jamil, 2018). Dental caries usually occur as a result of poor oral hygiene behavior. The underpinnings of this research were predicated upon a parent's oral hygiene knowledge and their child's oral hygiene behavior. This chapter summarizes the specific research questions under investigation and the corresponding sources of data. Additionally, Chapter 4 provides the results of this study as data was analyzed to identify, describe and delve into the relationship between a parent's level of oral hygiene knowledge and their child's oral hygiene behaviors. Chapter 4 also includes the demographics and description of participants for the survey portion of the research. Moreover, Chapter 4 includes a detailed discussion of the data analysis procedures utilized to address each question. The purpose of this quantitative study was to investigate whether the level of a parent's oral hygiene knowledge had any affect on their child's oral hygiene behavior. This study stipulated that the children must be between the ages of 7 and 17 years old. This age range was chosen because studies have indicated that 60% of the children between the ages 5-17 were affected by dental caries worldwide (Ilyas et al., 2018). As a prerequisite, this study required both the child and the parent to be residents of the greater United States. This chapter concludes with a summary of the results.

Research Questions Investigated

This study was guided by the overarching question, "What is the relationship between a parent's level of oral hygiene knowledge and their child's oral hygiene behaviors in the greater United States? Moreover, the supporting questions under investigation were as follows: Firstly, "In what ways do parents report their levels of knowledge associated with oral hygiene?" Secondly, "In what ways do parents report their child's oral hygiene

behaviors?” To address these questions, the researcher developed a quantitative descriptive study to find a relationship between the two variables ex post facto (Salkind, 2010). The researcher utilized two existing surveys. The instrument used for the oral health survey was the Oral Health Surveys: Basic Methods 5th Edition. Additionally, the second instrument used was the Fourth National Oral Survey of China. A modified version of the two existing survey instruments used for this study was composed of three sections: demographics, child oral hygiene health, and parental oral hygiene knowledge, see Appendix D. Table 1, "Research Questions and Data Sources, " provides an overview of the research questions and data sources.

Table 1. Research Questions and Data Sources

Research Questions	Survey Items
What is the relationship between a parent’s level of oral hygiene knowledge and their child’s oral hygiene behaviors in the greater United States?	Questions 6-33
In what ways do parents report their child’s oral hygiene behaviors?	Section 2, Questions 6-20
In what ways do parents report their levels of knowledge associated with oral hygiene?	Section 3, Questions 21-33

The following sections outline the steps the researcher took that includes the data collection process and analysis method.

Data Collection Summary

The data collection process for this study included various approaches. One of the steps entailed posting recruitment flyers at the approved dental location. The researcher also posted the survey instrument on various social media platforms. Additionally, the researcher

obtained consent from potential participants, as well as exported the final data into Excel for data cleaning.

Recruitment

Participants were recruited utilizing social media and recruitment flyers (Appendix B). With permission from the owner of an orthodontic dental practice, the researcher was allowed to distribute a recruitment flyer to garner potential participants. The researcher utilized the following social media platforms to seek participation for the study: Facebook, Instagram, Twitter, Reddit, and LinkedIn. The researcher found public and private groups on Facebook that allowed students to post their survey on the site, at no charge, to garner participants to complete their survey. These public groups were recognized as survey-sharing platforms. The first public group the researcher requested to join was Dissertation Survey Exchange. After clicking join, the researcher was informed that the membership was pending approval. There were questions established by the group administrators that helped them determine if membership was approved after review. After answering the questions, the researcher clicked submit and waited for approval from the administrators. The researcher was approved within the hour which allowed the posting of the survey and link to the survey on the site.

Through Facebook, the researcher joined the public group Survey Circle that uses a free survey-sharing platform that provided the researcher with an image and brief description of the survey with an embedded QR code for posting on Instagram and other social media platforms. After joining Survey Circle, the researcher did post the image on Instagram which allowed potential participants to scan the QR code to take the survey. The researcher posted the survey on Twitter despite just joining Twitter one month and a half prior to conducting the research. There was very little traction gained through the use of Twitter due to the researcher having an extremely small following.

In order for the researcher to post on Reddit, an account was created. Then the researcher sought out to find which groups on Reddit would allow for the posting of dissertation surveys—not all groups on Reddit allowed posting surveys. The researcher joined r/SampleSize and r/SurveyCircle which allowed students, PhD students, founders, and startups to find survey participants. In order to post on Reddit, there are rules for how to post which the researcher had to adhere to. The title had to be properly formatted to avoid being removed for not matching up with the guidelines. For surveys, the tag had to be bracketed, [Tag]. The tag had to be [Casual], [Academic], or [Marketing]. Then the topic of the survey would follow the tag. Lastly, the demographic would follow in parenthesis. Therefore, the format the researcher followed was [Tag] Topic (Demographic). For this study, the researcher posted [Academic] Parental Oral Hygiene Knowledge (Parents in US w/kids ages 7-17) in both r/SampleSize and r/SurveyCircle. A very brief, one paragraph description and a link was provided for potential participants.

Consent

A consent form was provided for participants at the beginning of the survey to give them an overview of the study and to gain their permission to proceed with the survey if they chose to. Within the consent form, if participants agreed to continue, they had the option to tick the “yes” radio button. Radio buttons were circles placed in front of the answers to the question; participants would click on the circle in order to make their selection . If the participant chose not to continue with the survey, they had the option to tick the “no” radio button. As noted in Figure 1: Participants Consent, one hundred and seventy participants responded to the consent form over a four-week period. Of the one hundred and seventy participants, 167 respondents, or 98.2 percent, responded yes. Moreover, of the one hundred and seventy participants, 3 respondents, or 1.8 percent, responded no. The participants that responded no did not participate in the study.

Figure 1. Participants' consent. Counts/frequency: Yes (167, 98.2%), No (3, 1.8%).

Data collection

The researcher began the data collection process after receiving IRB approval on March 25, 2021. The official date that the researcher began collecting data was March 30, 2021. Additionally, March 30, 2021 was the initial day of recruitment. Data collection for this quantitative study was done utilizing the online, web-based survey tool REDCap. Moreover, REDCap has been recognized as a secure web application that functions to support online data capture for research studies. REDCap allowed the researcher to build and manage the surveys online. Notifications were set up and sent to the researcher via text and email once a participant had completed the survey. This allowed the researcher to monitor responses and participation daily. The survey was officially closed on April 27, 2021.

Description of Participants

In order to participate, participants had to be a parent of a child who was between the ages of 7 and 17. Additionally, participants had to reside in the greater United States. Of the one hundred and seventy participants, the complete responses of one hundred and three participants, $n=103$, were recorded. There were different regions within the United States that the participants had the option of choosing to confirm their place of residence. The regions of the United States given for the participants to choose from were West, Midwest, Southwest, Northeast, and Southeast. As noted in Figure 2: Residence, the majority of the participants,

thirty five percent, resided in the West. In the Midwest, there was 12.6% participation. In the Southwest, 16.5% participation was recorded. In the Northeast, there was a participation total of 18.4% recorded. Lastly, there was 17.5% participation recorded from the Southeast.

Figure 2. Residence. Counts/frequency: West (36, 35.0%), Midwest (13, 12.6%), Southwest (17, 16.5%), Northeast (19, 18.4%), Southeast (18, 17.5%).

The participants were required to have at least one child or two or more children between the ages of 7 to 17 years old to be considered eligible to partake in the study. Of the 103 eligible participants, sixty-four participants had one qualifying child. Two or more children were recorded for the remaining 39 participants. Eligible participants were asked to state their relationship to the child. Participates were given the option to choose whether they were a biological parent, step-parent, adoptive parent, foster parent, grandparent, or other. There were seventy-nine participants who were biological parents. Five of the participants were step-parents. There were four participants who were adoptive parents. In addition, there were three participants who were foster parents and only one participant was a grandparent; the remaining eleven were recorded as other.

The educational level of the mother and father were also inquired. The various options the mother and father had to choose from were middle school degree, high school diploma, associate's degree, bachelor's degree, master's degree or higher, and unsure. The researcher found that 2.9 percent of mothers had a middle school degree or below. There were 18.4 percent of mothers who obtained a high school diploma. An associate's degree was obtained by 13.6 percent of mothers while 33 percent of mothers had a bachelor's degree. Additionally, there were 27.2 percent of mothers who had a master's degree while 4.9 percent of mothers reported unsure. The researcher found that 4.9 percent of fathers had a middle school degree or below. There were 19.4 percent of fathers who obtained a high school diploma. An associate's degree was obtained by 13.6 percent of fathers while 37.9 percent of fathers had a bachelor's degree. Additionally, there were 19.4 percent of mothers who had a master's degree while 4.9 percent of fathers reported unsure. The aforementioned demographics are detailed in following Table 2.

Table 2. Detailed Demographics of Survey Participants (n=103)

Variables	<i>n</i>	%
Residence in the United States (<i>n</i> = 103)		
West	36	35.0
Midwest	13	12.6
Southwest	17	16.5
Northeast	19	18.4
Southeast	18	17.5
Household number of children (<i>n</i> = 103)		
One child	64	62.1
Two or more children	39	37.9
Relationship to child (<i>n</i> = 103)		
Biological parent	79	76.7
Variables	<i>n</i>	%

Step-parent	5	4.9
Adoptive parent	4	3.9
Foster parent	3	2.9
Grandparent	1	1.0
Other	11	10.7
<hr/>		
Mother's highest level of education ($n = 103$)		
Middle school degree or below	3	2.9
High school diploma	19	18.4
Associates degree	14	13.6
Bachelor's degree	34	33.0
Master's degree or higher	28	27.2
Unsure	5	4.9
<hr/>		
Father's highest level of education ($n = 103$)		
Middle school degree or below	5	4.9
High school diploma	20	19.4
Associates degree	14	13.6
Bachelor's degree	39	37.9
Table 2 (continued)		
Master's degree or higher	20	19.4
Unsure	5	4.9
<hr/>		

Analysis Method

The survey was closed after a four-week period. Respondents that did not give their consent to participate in the study had their responses deleted by the researcher. The instrument utilized to obtain data for this quantitative, descriptive study came from a survey. The results were downloaded and exported into Microsoft Excel for cleaning and analysis. During the cleaning and analysis process, missing and incomplete data was deleted by the researcher. The first section of the survey was used to collect demographic information about the participants. Question 1 asked participants to state what region of the greater United States that they reside in. Question 2 asked participants the number of children that they have. Question 3 asked the relationship to the child under 18 years of age in the household.

Question 4 asked the highest educational level of the mother. Question 5 asked the highest educational level of the father.

In the second section, Child Oral Hygiene Health, there were some “Yes,” “No” or “Unsure” questions. Additionally, there were 5-, 6-, 7-, and 8-point Likert-scale questions. Questions 6, 8, 9, 12, 15, 16, and 19 were “Yes,” “No,” or “Unsure” questions. Question 6 pertained to the child ever visiting the dentist. Question 8 pertained to whether the child visited the dentist in the past 12 months. Question 9 pertained to any mouth or tooth pain or discomfort experienced by the child in the past 12 months. Question 12 pertained to the child brushing their own teeth. Question 15 pertained to the usage of toothpaste by the child. Question 16 pertained to the child using toothpaste that contained fluoride. Question 19 pertained to having to remind the child to brush their teeth. The data were coded in a codebook and divided into three categories as noted in Table 3.

Table 3. Data Analysis Recoding, Child Oral Hygiene Health: Dental Visits, Tooth Pain, and Tooth Brushing

Code	Descriptor
1	Yes
2	No
3	Unsure

In question 7, participants were given a 7-point Likert-scale question and were given the choices “Less than or 1 year old,” “2 years old,” “3 years old,” “4 to 6 years old,” “More than 6 years old,” “Unsure,” and “Never seen by a dentist or other dental professional.” The data were coded in a codebook and divided into seven categories. The code and descriptor are noted in Table 4 Data Analysis Recoding, Child Oral Hygiene Health.

Table 4. Data Analysis Recoding, Child Oral Hygiene Health: First Dental Visit

Code	Descriptor
1	Less than or 1 year old
2	2 years old
3	3 years old
4	4 to 6 years old
5	More than 6 years old
6	Unsure
7	Never seen by a dentist or other dental professional

In question 10, participants were given the choice “Treatment,” or “Consultation.” The question pertained to the child’s reason for their last dental visit. The data were coded in a codebook and divided into two categories. The code and descriptor are noted in Table 5 Data Analysis Recoding, Child Oral Hygiene Health.

Table 5. Data Analysis Recoding, Child Oral Hygiene Health: Reason for Dental Visit

Code	Descriptor
1	Treatment
2	Consultation

In question 11, a 7-point Likert-scale question was used. The question pertained to the health of the child’s teeth and gums. Participants had the choice of “Excellent,” “Very good,” “Good,” “Average,” “Poor,” “Very poor,” and “Unsure.” The data were coded in a codebook and divided into seven categories. The code and descriptor are noted in Table 6 Data Analysis Recoding, Child Oral Hygiene Health.

Table 6. Data Analysis Recoding, Child Oral Hygiene Health: State of Child's Teeth and Gums

Code	Descriptor
1	Excellent
2	Very good
3	Good
4	Average
5	Poor
6	Very poor
7	Unsure

In question 13, a 7-point Likert-scale question was used. The question pertained to how often the child cleans their teeth. Participants had the choice of “Never,” “Once a month,” “2-3 times a month,” “Once a week,” “2-6 times a week,” “Once a day,” and “Twice or more a day.” The data were coded in a codebook and divided into seven categories. The code and descriptor are noted in Table 7 Data Analysis Recoding, Child Oral Hygiene Health.

Table 7. Data Analysis Recoding, Child Oral Hygiene Health: Tooth Brushing Frequency

Code	Descriptor
1	Never
2	Once a month
3	2-3 times a month
4	Once a week
5	2-6 times a week
6	Once a day
7	Twice or more a day

In question 14, participants were given an 8-point Likert-scale question. The question pertained to items the child uses to clean their teeth. Participants had the choice of

“Toothbrush,” “Wooden toothpicks,” “Plastic toothpicks,” “Toothpaste,” “Thread (dental floss),” “Charcoal,” “Chewstick/miswak,” and “Other.” The data were coded in a codebook and divided into seven categories. The code and descriptor are noted in Table 8 Data Analysis Recoding, Child Oral Hygiene Health.

Table 8. Data Analysis Recoding, Child Oral Hygiene Health: Items to Clean Teeth

Code	Descriptor
1	Toothbrush
2	Wooden toothpicks
3	Plastic toothpicks
4	Toothpaste
5	Thread (dental floss)
6	Charcoal
7	Chewstick/miswak
8	Other

In question 17, participants were given a 5-point Likert-scale question. The question pertained to any problems the child may have experienced with their teeth or mouth during the past 12 months. Participants had the choice of “Very often,” “Fairly often,” “Sometimes,” “No,” and “Unsure.” The data were coded in a codebook and divided into five categories. The code and descriptor are noted in Table 9 Data Analysis Recoding, Child Oral Hygiene Health.

Table 9. Data Analysis Recoding, Child Oral Hygiene Health: Teeth or Mouth Problems

Code	Descriptor
1	Very often
2	Fairly often
3	Sometimes
4	No
5	Unsure

In question 18, participants were given an 6-point Likert-scale question. The question pertained to how often the child would eat or drink any items from a given list. The items in the list were as follows: Fresh fruit, biscuits, cakes, cream cakes, sweet pies, buns, jam or honey, chewing gum containing sugar, sweets/candy, lemonade, Coca Cola or other soft drinks, tea with sugar, and coffee with sugar. Participants had the choice of “Several times a day,” “Every day,” “Several times a week,” “Once a week,” “Several times a month,” and “Seldom/never.” The data were coded in a codebook and divided into six categories. The code and descriptor are noted in Table 10 Data Analysis Recoding, Child Oral Hygiene Health.

Table 10. Data Analysis Recoding, Child Oral Hygiene Health: Sugary Food or Drink Consumption

Code	Descriptor
1	Several times a day
2	Everyday
3	Several times a week
4	Once a week
5	Several times a month
6	Seldom/never

In question 20, participants were given an 4-point Likert-scale question. The question pertained to a comparison of the child’s oral health hygiene in relation to the parent’s oral health hygiene. Participants had the choice of “Better,” “Worse,” “Same,” and “Unsure.” The data were coded in a codebook and divided into four categories. The code and descriptor are noted in Table 11 Data Analysis Recoding, Child Oral Hygiene Health.

Table 11. Data Analysis Recoding, Child Oral Hygiene Health: Child's Oral Hygiene Compared to Parent

Code	Descriptor
1	Better
2	Worse
3	Same
4	Unsure

In the third section, Parental Oral Hygiene Knowledge, there were some “Yes,” “No,” or “Unsure” questions. Additionally, there were 4-, 5-, and 6-point Likert-scale questions. Also, there were “True,” “False,” and “Unsure” questions. Questions 21, 23, 24, and 27 were “Yes,” “No,” or “Unsure” questions. Question 21 pertained to the parent's view on the child flossing their own teeth. Question 23 pertained to if the parent felt that teeth flossing was an option for the child. Question 24 pertained to if the parent felt that only brushing was necessary for their child to have good oral hygiene. Question 27 pertained to if the parent felt that it was necessary to have a baby tooth restored that had a cavity. The data were coded in a codebook and divided into three categories as noted in Table 12.

Table 12. Data Analysis Recoding, Child Oral Hygiene Health: Flossing, Brushing, and Baby Tooth Restoration

Code	Descriptor
1	Yes
2	No
3	Unsure

Question 22 was a 4-point Likert-scale question that pertained to how often a parent felt that it was necessary for their child to floss their teeth. Participants were given the

choices of “Daily,” “Biweekly,” “Monthly,” and “Unsure.” The data were coded in a codebook and divided into three categories as noted in Table 13.

Table 13. Data Analysis Recoding, Child Oral Hygiene Health: Child’s Flossing Frequency

Code	Descriptor
1	Daily
2	Biweekly
3	Monthly
4	Unsure

In question 25, participants were given an 6-point Likert-scale question. The question pertained to the last time the child visited the dentist. Participants had the choice of “Less than 6 months,” “6-12 months,” “More than 1 year but less than 2 years,” “2 years or more but less than 5 years,” “5 years or more,” and “Never received dental care.” The data were coded in a codebook and divided into six categories. The code and descriptor are noted in Table 14.

Table 14. Data Analysis Recoding, Child Oral Hygiene Health: Child’s Last Dental Visit

Code	Descriptor
1	Less than 6 months
2	6-12 months
3	More than 1 year but less than 2 years
4	2 years or more but less than 5 years
5	5 years or more
6	Never received dental care

In question 26, participants were given an 5-point Likert-scale question. The question pertained to the reason for the child’s last dental visit. Participants had the choice of

“Consultation/advice,” “Pain or trouble with teeth, gums or mouth,” “Treatment/follow-up treatment,” “Routine check-up/treatment,” and “Don’t know/don’t remember.” The data were coded in a codebook and divided into five categories. The code and descriptor are noted in Table 15.

Table 15. Data Analysis Recoding, Child Oral Hygiene Health: Reason for Child’s Last Dental Visit

Code	Descriptor
1	Consultation/advice
2	Pain or trouble with teeth, gums or mouth
3	Treatment/follow-up treatment
4	Routine check-up/treatment
5	Don’t know/don’t remember

In question 28 with sub-questions 1-7, participants were given a 3-point Likert-scale question. There were 8 sub-questions. Sub-question 1 pertained to if gingival bleeding is normal when brushing teeth. Sub-question 2 pertained to if gingivitis is caused by bacterial infection. Sub-question 3 pertained to if tooth brushing is helpful in preventing gingivitis. Sub-question 4 pertained to if dental caries is mainly caused by pathogenic bacteria. Sub-question 5 pertained to if sugar intake is associated with dental caries. Sub-question 6 pertained to if the parent believes fluoride protects the teeth from decay. Sub-question 7 pertained to if pit and fissure sealants help in preventing dental caries. Sub-question 8 pertained to if the parent thought that oral health was essential to general health. Participants had the choice of “True,” “False,” and “Unsure.” The data were coded in a codebook and divided into three categories. The code and descriptor are noted in Table 16.

Table 16. Data Analysis Recoding, Child Oral Hygiene Health: Gingivitis and Dental Caries

Code	Descriptor
1	True
2	False
3	Unsure

In question 30, the participants were given a 3-point Likert-scale question. The question pertained to where the parent felt most comfortable having Pit and Fissure Sealants performed. Participants were given the choice of “Dental clinic,” “School,” and “Unsure.” The data were coded in a codebook and divided into three categories as noted in Table 17.

Table 17. Data Analysis Recoding, Child Oral Hygiene Health: Sealants

Code	Descriptor
1	Dental clinic
2	School
3	Unsure

In question 31, participants were given a 6-point Likert-scale question. The question pertained to the determinants of choosing a Pit and Fissure Sealant location. Participants had the choice of “Distance to treatment sites,” “Level of cross-infection control,” “Completeness of medical facilities,” “Effectiveness of emergency response,” “Children’s willingness,” and “Other reasons.” The data were coded in a codebook and divided into six categories. The code and descriptor are noted in Table 18.

Table 18. Data Analysis Recoding, Child Oral Hygiene Health: Sealant Location

Code	Descriptor
1	Distance to treatment sites
2	Level of cross-infection control
3	Completeness of medical facilities
4	Effectiveness of emergency response
5	Children's willingness
6	Other reasons

In question 32, the participants were given a 3-point Likert-scale question. The question pertained to the parent's thought on how often they should visit the dentist for a check-up. Participants were given the choice of "Once a year," "Every 6 months," and "Unsure." The data were coded in a codebook and divided into three categories as noted in Table 19.

Table 19. Data Analysis Recoding, Child Oral Hygiene Health: Dental Check-up

Code	Descriptor
1	Dental clinic
2	School
3	Unsure

In question 33, the participants were given a 3-point Likert-scale question. The question pertained to the parent's thought on how often they should change their toothbrush. Participants were given the choice of "Once a month," "Every 3 months," and "Unsure." The data were coded in a codebook and divided into three categories as noted in Table 20.

Table 20. Data Analysis Recoding, Child Oral Hygiene Health: Changing Toothbrush

Code	Descriptor
1	Dental clinic
2	School
3	Unsure

Presentation of Results

Section 2: Child's Oral Hygiene Behaviors

Section 2 investigates the subset research question, “In what ways do parents report their child’s oral hygiene behaviors?” In order to develop successful oral hygiene habits, children should start visiting the dentist at an early age. The survey questions 6-8 and 10 were associated with dental visits (Appendix E). Most of the respondents (n=96) had taken their child to visit the dentist. When asked how old the children were when they first saw the dentist, participants (n=67) responded from 2 to 6 years of age. This response raised a level of concern; if parents are waiting beyond the age of 2 to take their child to the dentist, the parent may be setting their child up for poor oral hygiene habits. The American Academy of Pediatric Dentistry (AAPD) recommends children visiting the dentist by the age of 1 or within six months after the first primary tooth erupts. When asked if their child had visited the dentist in the past 12 months, many of the respondents (n=74) acknowledged that they did. Ideally, children and parents should visit the dentist once or twice a year depending on the individual’s oral hygiene condition. Regular dental visits will help to circumvent the occurrence of dental caries. There were 58 participants that responded that the reason for their child’s dental visit was for a consultation. In the future, this area will need to be explored more to investigate what type of consultation appointment the individual scheduled

with the dentist; a consultation appointment is too broad in this study and will need to be narrowed down to address the specific needs of future studies.

Survey questions 9 and 11 were associated with the condition of the child's teeth/mouth (Appendix F). Participants were asked if their child expressed any pain or discomfort in their teeth during the past 12 months. There were 69 participants that responded no. However, the responses related to pain and discomfort from the remaining 34 participants needed to be addressed. For instance, questions such as how long the individual has been in pain and to rate the pain level on a scale of 1 to 10 would have provided greater insight to the individual's responses to the question regarding their pain and discomfort. Therefore, it is suggested that individuals see their dentist regularly in order to be proactive—individuals should not wait until they are in pain before they visit the dentist. Survey questions 12-16, 19, and 20 were related to teeth cleaning (Appendix G). Participants were asked if their child brushed their own teeth. There were 86 respondents that answered yes. This response begged the question as to why the remaining 17 respondents replied negatively to the question. For instance, why or what conditions prevented some children from being able to brush their own teeth?

Theoretically, individuals should brush their teeth after every meal. When asked how often your child cleans their teeth, there were 53 respondents that answered twice or more a day and 32 respondents that answered once a day. The respondents that answered they brushed once a day should be educated that brushing once daily is not adequate to ensure good oral hygiene is promoted. If individuals were to brush their teeth after breakfast, after lunch, and after dinner they would decrease their likelihood of getting dental caries. Additionally, incorporating flossing daily would help individuals achieve a positive outcome with their oral hygiene. When asked what items their child used to clean their teeth, the majority, 93 respondents, answered a toothbrush and 79 respondents answered with

toothpaste. There were 97 respondents who answered that their child used toothpaste to clean their teeth while 64 respondents answered that their child's toothpaste contained fluoride. When respondents were asked if they had to remind their children to brush their teeth, 62 respondents answered yes. This response raised a red flag; why did the remaining 41 participants respond negatively? The researcher should have expounded upon this question further. For instance, investigating the ages of the children who must be reminded to brush their teeth would have been advantageous. Parents should be educated on proper oral hygiene techniques to model for their children to encourage their child's proper oral hygiene behavior. Modeling the proper behavior would involve espousing the six constructs from the Social Cognitive Theory, as mentioned in Chapter 3. Moreover, parents need to ensure their children become motivated to brush their teeth more than once a daily to encourage good oral hygiene behaviors and to negate the consequences of poor oral hygiene behaviors. When participants were asked how their child's oral health hygiene compared to their own, 52 participants responded that their child's oral health hygiene was the same as theirs. However, the researcher should have further investigated what parents consider to be good oral health hygiene.

Survey question 17 used a Likert-scale to ask participants problems associated with their child's teeth (Appendix H). There were 78 respondents that answered no to their child having difficulty biting foods. There were 82 respondents that answered no to their child having difficulty chewing foods. There were 66 respondents that answered no to their child having difficulty with speech/trouble pronouncing words while 23 participants responded that sometimes their child had difficulty with speech/trouble pronouncing words. There were 70 participants that answered no to their child having dry mouth. When asked if their child felt embarrassed due to the appearance of their teeth, there were 69 respondents that answered no while 16 respondents answered sometimes. When asked if their child felt tense because of

problems with their teeth or mouth, there were 80 participants that responded no. Participants were asked if their child had ever avoided smiling because of their teeth and 79 participants responded no while 13 participants responded sometimes. When participants were asked if their child had their sleep interrupted often, there were 73 responses of no. Participants were asked if their child had difficulty doing usual activities with people who were close to them and 83 participants responded no to this item. Finally, when participants were asked if their child had reduced participation in social activities, 85 participants responded no. The research would have benefitted more if the researcher investigated the ages of the respondents that answered sometimes and yes to this question. Seeking out the ages of the children would identify if the older children were more self-conscious than the younger children. As children age, they become more self-aware of their appearance. Children who have teeth that are missing or aesthetically unappealing may be more prone to withdraw from social circles and smile less.

Parents need to monitor the amount of sugar that their child ingests to help prevent unwanted dental caries. A child's sugar intake should be closely monitored by the parent especially if the child has poor oral hygiene behavior and is susceptible to dental caries. Survey question 18 used a Likert-scale and was associated with sugar intake (Appendix I). When participants were asked if their child ate fresh fruit, 32 participants responded several times a week while 30 participants responded every day. Participants were asked how often their child ate biscuits, cakes, and cream cakes; 30 participants answered once a week. When participants were asked how often their child ate sweet pies and buns, 31 participants answered seldom/never while 29 participants answered once a week. When participants were questioned how often their child ate jam or honey, 24 participants responded seldom/never while 23 participants answered once a week and several times a month. When asked how often their child chewed gum containing sugar, 49 participants responded seldom/never.

There were 33 participants that responded several times a week that their child ate sweets/candy. The number of participants that responded that their child drank lemonade, Coca Cola or other soft drinks several times a month was 33. When participants were asked how often their child would drink tea with sugar, 61 participants responded seldom/never. Finally, when participants were asked how often their child would drink coffee with sugar, 74 participants responded seldom/never. To ensure that the child's sugar intake is kept reasonably low, the onus rest with the parent since they parents are the ones who provide their child with most of the food they eat. Therefore, the parent needs to be properly educated on proper nutrition for their child and what foods and drinks are high in sugar that leads to dental caries.

To test for a significant association between a parent's oral hygiene knowledge and their child's oral hygiene behaviors, a chi square test of independence was performed. The researcher performed the chi-square test of independence on the second section of the instrument, child's oral hygiene behaviors. The assumption was that the sample was randomly drawn from the population and the expected values were at least 5 or greater. The researcher's first hypothesis was: H_0 : (null hypothesis) There is no relationship between a parent's oral hygiene knowledge and the oral hygiene behaviors of their 7 -17-year-old child. The two variables, a parent's oral hygiene knowledge and the oral behaviors of their 7-17-year-old child, are independent. The researcher's second hypothesis was: H_1 : (alternative hypothesis) There is a relationship between a parent's oral hygiene knowledge and the oral hygiene behaviors of their 7 -17-year-old child. The two variables, a parent's oral hygiene knowledge and the oral behaviors of their 7-17-year-old child, are not independent. In table 21, the observed values are listed and the expected values are listed in parentheses. Since the expected values were at least 5, the assumption of the chi square test of independence was met.

Table 21. Child's Oral Hygiene Behaviors (n=103)

	Dental visit past 12 month	Child brushes own teeth	Child uses toothpaste	Have to remind child to brush	Row totals
Child w/good OH*	74 (78.75)	86 (78.75)	97 (82.76)	62 (78.75)	319
Child w/poor OH	24 (19.25)	12 (19.25)	6 (20.24)	36 (19.25)	78
Column Totals	98	98	103	98	397

* OH = Oral Hygiene

After the observed and expected totals were tabulated, the researcher performed a Pearson's Chi-squared test utilizing the quantitative software R. The Pearson's Chi-square test rendered the following values: X-squared = 35.447, df = 3, p-value = 9.803e-08. Since the p-value of 9.830e-08 is less than 0.05 significance level, the null hypothesis was rejected. Therefore, since the two variables being independent was rejected, the alternative hypothesis, there is a relationship between a parent's oral hygiene knowledge and the oral hygiene behaviors of their 7 -17-year-old child, was accepted.

The researcher sought out to find period prevalence since the proportion of the population exhibited a particular characteristic at a point during a given time period of interest, for this study 4 weeks. For the second section, children with good hygiene behaviors that had a prevalence of a dental visit in the past 12 months was 75.5% as opposed to children with poor hygiene behaviors which was 24.5%. Moreover, children with good hygiene behaviors that had a prevalence of brushing their own teeth was 87.8% when compared to children with poor oral hygiene which was 12.2%. Children with good hygiene behaviors that had a prevalence of using toothpaste to brush their teeth was 94.2% in contrast to children with poor hygiene behaviors which was an estimated 5.8%. Lastly, children with

good hygiene behaviors that had a prevalence of being reminded to brush their teeth was 63.3% as opposed to children with poor hygiene behaviors which was 36.7%.

Section 3: Parent's Hygiene Knowledge

Section 3 investigates the subset research question, “In what ways do parents report their levels of knowledge associated with oral hygiene?” The survey questions 21-24 were associated with child flossing/hygiene (Appendix J). When participants were asked if they felt it was necessary for their child/children to floss their teeth, 73 participants responded yes. The researcher felt that this question should have been a resounding yes for all 103 participants. Flossing has been shown to be a necessary part of daily oral hygiene behavior. The American Dental Association (ADA) recommends flossing once a day in addition to brushing twice a day for 2 minutes with toothpaste containing fluoride (Soofi et al., 2020). Participants were asked how often they think it is necessary for their child/children to floss, 49 participants responded daily while 30 participants responded biweekly. When participants were asked if they felt that flossing was optional for their child, 40 participants responded yes while 50 participants responded no. There were 41 respondents that felt that only brushing the teeth was necessary for their child to have good oral hygiene while 49 participants answered no. There was a high percentage of negative responses regarding the frequency and necessity of flossing. These responses elucidated the lack of importance placed on flossing by some parents. While brushing frequently helps to reduce the amount of plaque that forms on the tooth surface, the bristles of the toothbrush can not reach between the teeth. By flossing, the removal of plaque between the teeth can help to circumvent the occurrence of interproximal dental caries—interproximal dental caries are cavities that occur between the teeth. Therefore, the importance of flossing should be stressed to parents and the parent should model the proper technique of flossing to their child to encourage proper oral hygiene behaviors.

Survey questions 25, 26, and 32 were associated with dental visits (Appendix K). When participants were asked how long it had been since their child last saw a dentist, 44 participants responded less than 6 months while 35 participants responded 6-12 months. Participants were asked what the reason for their child's last visit to the dentist. 67 respondents answered for a routine check-up/treatment while 21 participants responded for a consultation/advice. When participants were asked how often they should visit the dentist for a check-up, 74 participants responded every 6 months while 26 participants responded once a year. The responses for these survey questions were encouraging. Out of 103 participants, 100 participants responded positively to dental visits. While the response of every 6 months was ideal, the researcher was cognizant that every individual's oral hygiene needs are different. Some individuals may need to visit the dentist more frequently than others due to circumstances beyond their control, circumstances that could be hereditary. For instance, some individuals have a proclivity to develop copious amounts of saliva which can frequently lead to calculus build-up on the back of the lower anterior teeth. If left untreated, the calculus could lead to other problems that could be detrimental to the individual's oral health hygiene such as gingivitis and periodontitis.

Survey questions 27 and 28 were associated with the condition of the teeth/gums (Appendix L). Participants were asked if they thought it was necessary for their child to get a baby tooth restored that had a cavity. There were 38 participants that responded no and 38 participants that responded yes. The researcher noticed from the responses that the importance of saving a baby tooth needs to be stressed to parents. Parents need to be made aware that baby teeth are essentially place holders for the developing permanent teeth underneath them. Left untreated, a baby tooth with a cavity can affect the permanent tooth that is developing beneath it. As a result, when the baby tooth exfoliates and the permanent tooth erupts, it will have a cavity in it. Therefore, preserving the baby tooth needs to be

stressed to the parent, as noted by the researcher. Participants were asked if gingival bleeding was normal when brushing, 69 participants responded no. The researcher noted that the remaining participants need to be informed that gingival bleeding usually is the result of a lack of flossing and/or the presence of plaque on the enamel due to improper brushing. Participants were asked if gingivitis was caused by bacterial infection, 61 participants responded yes. When participants were asked if tooth brushing was helpful in preventing gingivitis, 87 participants responded true. Participants were asked if dental caries were mainly caused by pathogenic bacteria, 51 participants responded unsure while 41 participants responded true. The researcher noticed that 49.5% of participants responded that they were unsure if pathogenic bacteria caused dental caries. This begged the question as to whether the participants completely understood the question. The researcher believes that pathogenic bacteria should have been defined prior to the question so the participant could have a better understanding of the question. When participants were asked if sugar intake was associated with dental caries, 84 participants responded true. Participants were asked if fluoride protects teeth from decay, 73 participants responded true. When participants were asked if pit and fissure sealants would help in the prevention of dental caries, 48 participants responded true while 46 participants responded unsure. Finally, when participants were asked if oral health was essential to general health, 88 participants responded true.

Survey questions 29-31 were associated with tooth sealants (Appendix M). When participants were asked if they have ever heard of pit and fissure sealants, 55 participants responded no. Participants were asked where they would feel most comfortable having pit and fissure sealants performed, 61 participants responded in a dental clinic. Lastly, when respondents were asked what the determinants are for choosing a pit and fissure sealant location, 21 participants answered completeness of medical facilities while 18 participants answered distance to treatment sites. The researcher noted that questions 29-31 may have

been unfamiliar to some participants due to 53.4% of participants that responded they never heard of pit and fissure sealants. Pit and fissure sealants are a plastic protective coating that seals the biting surfaces of the back teeth by forming a hard shield in the grooves of the teeth. The grooves of the back teeth are more susceptible to trapping food and bacteria which causes tooth decay. Hence, the researcher has suggested that parents become familiarized with the application of sealants to assist with the prevention of tooth decay.

Survey question 33 was associated with a toothbrush (Appendix N). When participants were asked how often they should change their toothbrush, 55 participants responded every 3 months while 37 participants responded once a month. The researcher noted that the participants who responded changing their toothbrush once a month need better information regarding proper oral health hygiene. Toothbrush bristles can become worn which make them inefficient at removing food and plaque. This can lead to enamel and gingival problems. Therefore, parents need to be educated on when to dispose and replace the toothbrushes in their household.

The researcher performed the chi-square of independence on the third section of the instrument called a parent's hygiene knowledge. The assumption was that the sample was randomly drawn from the population and the expected values were at least 5 or greater. The researcher's first hypothesis was: H_0 : (null hypothesis) There is no relationship between a parent's oral hygiene knowledge and the oral hygiene behaviors of their 7 -17-year-old child. The two variables, a parent's oral hygiene knowledge and the oral behaviors of their 7-17-year-old child, are independent. The researcher's second hypothesis was: H_1 : (alternative hypothesis) There is a relationship between a parent's oral hygiene knowledge and the oral hygiene behaviors of their 7 -17-year-old child. The two variables, a parent's oral hygiene knowledge and the oral behaviors of their 7-17-year-old child, are not independent. In table 5, the observed values are listed and the expected values are listed in parentheses. Since the

expected values were at least 22, the assumption of the chi square test of independence was met.

Table 22. Parent's Hygiene Knowledge (n=103)

	Necessary for child to floss	Optional for child to floss	Only brushing necessary for child's good oral hygiene	Necessary for child to get cavity filled	Gingival bleeding normal	Row totals
Child w/good OH*	73 (43.22)	40 (43.22)	41(43.22)	38 (36.49)	14 (40.44)	206
Child w/poor OH*	17 (46.78)	50 (46.78)	49 (46.78)	38 (39.51)	69 (35.87)	223
Column Totals	90	90	90	76	83	429

* OH = Oral Hygiene

After the observed and expected totals were tabulated, a Pearson's Chi-squared test was performed within the R software and the following values were rendered: X-squared = 72.553, df = 4, p-value = 6.559e-15. Since the p-value of 6.559e-15 is less than 0.05 significance level, the null hypothesis was rejected. Therefore, since the two variables being independent was rejected, the alternative hypothesis, there is a relationship between a parent's oral hygiene knowledge and the oral hygiene behaviors of their 7 -17-year-old child, was accepted.

The researcher also sought out to find period prevalence for the third section of this study. Children with good hygiene behaviors that had parents with a prevalence of thinking it was necessary for their child to floss was 81.1% as opposed to children with poor hygiene behaviors which was 18.9%. Moreover, children with good hygiene behaviors that had parents with a prevalence of thinking it was optional for their child to floss was 44.4% when compared to children with poor hygiene behaviors which was 55.6%. Children with good

hygiene behaviors that had parents with a prevalence of thinking only brushing was necessary for their child to have good oral hygiene health was 45.6% in contrast to children with poor hygiene behaviors which was an estimated 54.4%. Furthermore, children with good oral hygiene behaviors had parents with a prevalence of thinking it was necessary for their child to get their tooth cavity filled was 50% as well as 50% for children with poor oral hygiene behaviors. Lastly, children with good hygiene behaviors that had parents with a prevalence of thinking gingival bleeding was normal when brushing was 16.9% as opposed to children with poor hygiene behaviors which was 83.1%.

Summary

This chapter encompassed a review of the data collection and analysis process. The study was a quantitative descriptive study to determine whether there was an existing association between parental hygiene knowledge and oral hygiene health of 7- to 17-year-old children who were residents in the greater United States. One hundred and seventy random participants responded to the survey's consent form. The responses of one hundred and three participants were recorded and analyzed. In the first section, demographics, questions 1-5 pertained to the region of the United States where the participants resided. In the second section, child oral hygiene health, questions 6-20 pertained to the parent's perception of their child's oral hygiene health behaviors. In the third section, parental hygiene knowledge, questions 21-33 pertained to the perception of the parent's overall hygiene knowledge.

The Chi-square test of independence was performed on the second section, child oral hygiene behaviors, and the third section, parent hygiene knowledge. The Chi-Square test was used to test for a relationship between the parent's hygiene knowledge and the child's oral hygiene behaviors. The researcher followed a significance level of .05, so a p-value that was less than or equal to .05 would indicate there was sufficient evidence to reject the null hypothesis. H_0 : (null hypothesis) was "There is no relationship between a parent's oral

hygiene knowledge and the oral hygiene behaviors of their 7 -17-year-old child.” The two variables, a parent's oral hygiene knowledge and the oral behaviors of their 7-17-year-old child, are independent. The researcher’s second hypothesis was: H_1 : (alternative hypothesis) “There is a relationship between a parent’s oral hygiene knowledge and the oral hygiene behaviors of their 7 -17-year-old child.” The researcher did calculate p-values that were less than the significance level in both the second section and the third section, so the null hypothesis was rejected. By rejecting the null hypothesis, the variables were not independent. Therefore, the researcher accepted the alternative hypothesis which suggested that there was an association between the variables, a parent’s hygiene knowledge and their child’s oral health hygiene behaviors. The researcher found that the data glean in the second section, a Child’s Oral Hygiene Behavior, aligns with Bandura’s Social Cognitive Theory. This theory suggests that the child mimics the oral hygiene behaviors of their parents who serve as models for proper oral hygiene techniques. These techniques would include the proper brushing techniques and using the right amount of toothpaste. The researcher found that the data from section three, a Parent’s Hygiene Knowledge, aligns with the Health Belief Model that suggests that parents must believe in their child’s susceptibility to dental caries and take necessary action to intervene and prevent poor oral health hygiene behaviors. This intervention should include daily flossing and brushing to avoid dental caries and gingival bleeding.

In the next chapter, Chapter 5, the findings from this study are summarized and interpreted. The researcher delves into recommendations for action and recommendations for further study.

CHAPTER 5

CONCLUSION

The purpose of this quantitative study was to investigate whether there was a relationship between a parent's level of oral hygiene knowledge and their child's oral hygiene behavior in the greater United States. This chapter includes a discussion on the knowledge of oral hygiene by parents and the parent's perception of their child's oral hygiene behaviors that are between the ages of 7 to 17. This chapter discusses the data and possible future research to help answer the research questions and sub questions:

RQ: What is the relationship between a parent's level of oral hygiene knowledge and their child's oral hygiene behaviors in the greater United States?

SQ1: In what ways do parents report their levels of knowledge associated with oral hygiene?

SQ2: In what ways do parents report their child's oral hygiene behaviors?

The researcher was given approval by the administrators on Facebook and Reddit to post the recruitment flyer in their groups. Additionally, the researcher was given permission from an approved dental location to post the recruitment flyer in their office. A total of 170 participants completed the consent section of the survey. However, 103 participants completed the entire survey. Since there was no data recorded beyond the consent form for 67 of the participants ($n=170$), the researcher omitted the entries of those 67 participants after exporting the final data from the surveys and cleaning the data in Excel. In Chapter 5, the researcher explicates the results of this study and provides recommendations for action and further study. The conclusions that are drawn from the results are presented at the end of the chapter.

Research Findings

The results from the study showed that the oral health hygiene behaviors of 7- to – 17-year-old children had an association with their parent's oral hygiene knowledge. The data showed that 71.8% of the parents who had knowledge about oral hygiene ensured that their child visited the dentist in the past 12 months. This statistic was significant in that it aligns with the literature that found children with educated parents were also more likely to visit the dental office for routine checkups when compared to children of uneducated parents (Mishra et al., 2018). Additionally, the data showed that 83.5% of children could brush their own teeth. This statistic would infer that parents modeled brushing techniques for their child.

Albert Bandura's Social Cognitive Theory (SCT) was utilized to illuminate behavioral interaction between the parent(s) and the child regarding oral hygiene health. A child brushing on their own was indicative of the child employing the six constructs of the Social Cognitive Theory: (1) Reciprocal determinism, the central concept of SCT, that refers to the reciprocal interaction of a person, environment, and behavior; (2) Behavioral capability, an individual's ability to successfully perform a behavior; (3) Observational learning an individual's witnessing and observing a behavior performed by others and then reproducing those actions; (4) Reinforcements, the likelihood of continuing or discontinuing a behavior based upon internal or external responses to a person's behavior; (5) Expectations, the expected consequences of an individual's behavior; and (6) Self-efficacy the individual's confidence level in their ability to perform a behavior successfully. Consistent with the Social Cognitive Theory, data found that 94.2% of the children used toothpaste to brush their teeth. This statistic would suggest that the child employed some of the components of SCT such as behavioral capability, observational learning, and reciprocal determinism. However, the data showed that 60.2% of children had to be reminded to brush their teeth. This begs the question, why did more than half of the respondent's children fail to continue with the

behavior of brushing their own teeth? According to the Social Cognitive Theory, the reinforcement construct addresses the likelihood of continuing or discontinuing a behavior based upon internal or external responses to a person's behavior. The literature suggests that oral health-related habits are established and maintained during early childhood (Djordjevic, 2018). Therefore, it is possible that parents may not be using the proper positive reinforcement techniques to ensure their child brushes their teeth without having to be reminded.

Flossing is a vital part of having good oral hygiene health. The data results showed that 70.9% of the parents thought that it was necessary for their child to floss. There were 38.8% percent of parents that felt flossing was optional. Additionally, the data found that only 47.6% of parents thought that it was necessary for their child to floss daily. It is imperative that parents teach their children that flossing is just as important as brushing. The literature aligns with the data which found that placing an emphasis on parental oral health practices and beliefs can be vital in preventing poor oral hygiene and dental caries (Djordjevic, 2018). This would include the practice of brushing and flossing daily. Moreover, the literature found that parental knowledge of oral health has a significant influence on dental caries in children (Isong et al., 2012; Naidu & Davis, 2008).

The data showed that 36.9% of parents felt that it was necessary for their child to have a cavity in a baby tooth restored. Equally, 36.9% of parents felt that it was not necessary for their child to have a cavity in a baby tooth restored. However, it was expected that a higher percentage of parents would have been more aware that baby teeth are important. This expectation was based upon previous literature that found that 97.7% of parents were aware that baby teeth are important (Mahat & Bowen, 2017). Additionally, 28.7% of parents perceived that dental cavities in baby teeth produced long-lasting issues. A parent's perception about cavities in baby teeth aligns with one of the theories within the conceptual

framework of this study, the Health Belief Model. The Health Belief Model addresses how an individual must believe in their susceptibility to a disease or condition. Moreover, the individual must also believe that the condition is serious and that there is the opportunity for successful intervention for the condition. Therefore, if the parent does not believe that a cavity in their child's baby tooth is a serious condition, the opportunity for successful intervention for the condition will be negated.

The data showed that 67% of parents felt that gingival bleeding was not normal when brushing teeth. Typically, the gingival will bleed due to improper flossing and brushing. This statistic gives credence to previous studies that suggest using a toothbrush to remove debris from the teeth (Macnab & Mukisa, 2018).

Recommendations for Action

The results of the study showed that some parents are uncertain on what necessitates good oral hygiene behaviors in their children. It is recommended that parents receive educational literature to inform them on how to ensure their children develop good oral hygiene behaviors—according to data results, oral hygiene behaviors such as frequency of brushing and flossing. Children should brush their teeth a minimum of twice daily to negate the possibility of dental caries (Boustedt et al., 2020). However, data results revealed that 31.1% of children were brushing once a day and 7.8% of children were brushing 2-6 times a week. The American Dental Association recommends flossing at least once a day for the removal of plaque between the teeth (Soofi et al., 2020). The removal of plaque between the teeth will lessen the incidences of caries and help prevent periodontal disease. However, data from this study revealed that 48.5% of parents viewed flossing as optional for their child. Therefore, it would be advantageous for children if their parents receive educational literature on the importance of brushing and flossing for their child. Additionally, oral health education should be integrated into school health programs to help parents with the

reinforcement of proper oral health behaviors for their children (Simmer-Beck et al., 2015). School nurses and teachers can help to promote good oral health behaviors by displaying dental health posters in various locations throughout the school, especially in the classroom and cafeteria. School nurses and teachers should also work with school administrators and parents to decide on which healthy foods and drinks should be made accessible in school vending machines. Teachers should place an emphasis on oral health in health class. For instance, teachers can stress the importance of making healthy food and drink choices and model the proper way to brush. Modeling how to floss may pose a challenge for teachers and children, so a video showing children how to floss their teeth may suffice.

In addition, it is recommended that schools invest in school-based sealant programs to help prevent dental caries (Simmer-Beck et al., 2015; Williams et al., 2018). This recommendation is based on the literature of this study and survey data. While the application of sealants helps to reduce caries, only 29.1% of parents had ever heard of pit and fissure sealants as noted in Figure 3: Sealants.

Figure 3. Sealants. Counts/frequency: Yes (30, 29.1%), No (55, 53.4%), Unsure (18, 17.5%).

It appears that parents are not fully aware of the benefits of getting sealants on their child's teeth. This is a preventative measure that is beneficial for the child as it will prevent unwarranted cavities that could lead to pain and missed days in school (Griffin, 2016; Mark, 2016). Also, the researcher recommends parents invest in motivational devices to encourage younger children to brush for an appropriate amount of time, a minimum of two minutes. For example, a two-minute egg timer can be used to help the child to develop consistency in the amount of time they allot for brushing. Additionally, there are some electric toothbrushes that play music to help encourage the child to brush. The researcher also suggests that parents monitor their child's brushing to determine the efficacy of the child's brushing technique. As an added device, disclosing tablets can be used to show the child the areas of the teeth that need further attention. Disclosing tablets are safe tablets that the child chews and it temporarily stains plaque left on the teeth due to inadequate brushing. The highlighted areas are removed once the child brushes again and an additional tablet can be used to ensure the teeth have been thoroughly cleaned.

Recommendations for Further Study

There are areas in this research study that need further investigation. Data from this study showed that 11.7% of children did not brush their own teeth. Based upon the research alone, this statistic might seem unusual since it is assumed that children between the ages of 7 to 17 are expected to know how to brush their own teeth. However, there could be various reasons for this statistic. The child could have a physical disability that prevents them from brushing their own teeth. Moreover, the child could have a cognitive impairment that prevents them from brushing their own teeth. Also, the respondent could have answered the question incorrectly on purpose or by accident. Therefore, it is suggested to further this study by including a section that investigates whether the child has any limitations in their ability to perform their own oral hygiene behaviors.

Another area of concern that needs further investigation is the child's accessibility to dental offices. The data from the research highlighted that 23.3% of children had not visited the dentist in the past 12 months. These results could suggest that socioeconomic factors could play a factor in children not visiting the dentist. For instance, a child's family may live in an area of town that lacks dental offices. Moreover, the child's family may not have a vehicle for transportation and may not live near a bus line to transport them to a dental office. Additionally, the child may not have dental insurance or the parent may not be able to afford going to the dentist. While these examples are speculative, they are valid concerns that need further investigation to better understand equitable access to dental hygiene resources. Therefore, it is suggested to build upon this study by investigating the socioeconomic status of the parent(s).

Some parents need to be better educated to increase their oral hygiene knowledge to promote good oral hygiene behaviors in their children. Data results from this study revealed that 40.2% of parents felt that only brushing was adequate for good oral hygiene. Moreover, 38.8% of parents felt that flossing was optional for their child. Getting oral hygiene information to the parent may call for a bit more creativity. Perhaps the child's school could hold a workshop on dental hygiene during times that would be convenient for the parent; this could be on the weekend or after school hours. Also, schools could send out videos on proper dental hygiene behaviors to the parents.

Conclusion

The dental hygiene knowledge of parents can greatly affect the dental oral hygiene behaviors in children. Parents are expected to model the proper behaviors that would be conducive to the success of their child's oral hygiene behaviors. The results from this study suggested that there were ten themes: the child's dental visits, condition of child's teeth/mouth, teeth cleaning, teeth problems, child's sugar intake, child flossing/hygiene,

parent's perception on dental visits, parent's perception of the condition of child's teeth/gums, parent's perception about tooth sealants, and parent's perception about a toothbrush.

To summarize, overall, the data revealed that the dental visits of the children were positive. Most children had visited a dentist; the majority of the children had visited the dentist within the past 12 months. Regarding the condition of the child's teeth/mouth, most of the children did not express any pain or discomfort in their teeth or mouth. Additionally, most children's teeth and gums were in good to excellent condition. The data showed that many children brushed their own teeth. Moreover, many of the children brushed twice or more a day. Also, the data revealed that most children used a toothbrush and toothpaste to clean their teeth. Data revealed that most children used a toothpaste that contained fluoride. However, the data revealed that many of the children had to be reminded to brush their teeth. The data also revealed that most parents perceived that their child's oral health hygiene was the same as theirs. Results from the data showed that many children did not have any problems biting or chewing their foods; most children did not feel embarrassed by the appearance of their teeth and their speech was not affected by their teeth. Moreover, most children did not avoid smiling because of their teeth and their sleep was not interrupted due to their teeth. The data revealed that most children did not have any difficulty performing usual activities and their participation in social activities were not reduced due to their teeth. According to the data, there were variations in the child's sugar intake. For instance, most children seldom/never used chewing gum containing sugar, ate jam or honey, ate sweet pies or buns, drank tea with sugar, or drank coffee with sugar. However, many children drink soft drinks several times a month. Many children also ate sweets/candy several times a week.

Regarding parent's perception of their child's hygiene, most parents felt that it was necessary for their child to floss their teeth. Moreover, most parents felt that it was necessary

for their child to floss their teeth daily. The data revealed that many parents did not feel that flossing was optional for their child; most parents did not feel that only brushing was sufficient for their child to have good oral hygiene. The data showed that most parents had taken their child to visit the dentist in 6 months or less and the reason for their child's dental visit was for a routine check-up. Also, it was revealed from the data that many of the parents believed that their child should visit the dentist every 6 months. The data revealed equivalent responses for the restoration of a baby tooth with a cavity. Some parents perceived that the restoration of a baby tooth was necessary while an equal number of parents thought that restoration was not necessary. According to the data, most parents felt that gingival bleeding was not normal when their child brushed their teeth. Moreover, most parents felt that bacterial infection causes gingivitis. The data revealed that many of the parents felt that tooth brushing helps prevent gingivitis and that sugar intake is associated with dental caries. Additionally, most of the parents felt that fluoride protects the teeth from decay. Most of the parents had never heard of pit and fissure sealants for their child and many of the parents felt that their child should change their toothbrush every 3 months.

Many of the parents displayed positive oral hygiene knowledge regarding their child's oral hygiene behaviors. This study showed that there are areas that some parents need to improve to ensure the success of their child's oral hygiene behaviors. However, the areas that need improvement could be targeted better if the study were able to distinguish between the parent's gender, ethnicity, race, and educational level. Additionally, other areas of socioeconomic status could also help distinguish where researchers could be more direct in their investigation.

The data from the study revealed that academic educational level did not have a significant association with poor oral hygiene behaviors. There were some parents that had a high school diploma that had children who brush their teeth twice or more a day. It is

unknown which parent may have taken the survey; however, previous literature suggests that a mother's positive behavior regarding oral health during a child's early years significantly influences the oral health behavior of the child (Khoshnevisan et al., 2020). Therefore, some of the children that displayed good oral hygiene habits could attribute their good habits to their mother's positive behavior and oral hygiene knowledge. For definitive answers concerning an association between the parent's academic educational level and the child's oral hygiene behaviors, more research is needed.

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APPENDIX A

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12. Headings. Paragraph headings in this Agreement are for reference only.

13. Dispute resolution. Any dispute relating to the interpretation or application of this Agreement shall, unless amicably settled, be subject to conciliation. In the event of failure of the latter, the dispute shall be settled by arbitration. The arbitration shall be conducted in accordance with the modalities to be agreed upon by the parties or, in the absence of agreement, with the rules of arbitration of the International Chamber of Commerce. The parties shall accept the arbitral award as final.
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APPENDIX B

RECRUITMENT FLYER

Parental Oral Hygiene Knowledge Study

The Study

The purpose of this study is to better understand the relationship between the oral hygiene knowledge of a parent and the oral hygiene behaviors of their child/children between the ages of 7 and 17.

Who can participate?

You are eligible to participate in the research study and share your perspective as a parent if all of the following are true about you. You are:

- A. A parent of a child between the ages of 7 and 17
- B. A resident of the United States

If you do not meet the description and criteria noted above, you are not able to participate in the study.

Your perspective as a parent is very important. Your responses will remain anonymous and confidential. The results of this study may positively impact the oral hygiene health of children.

How do I participate?

If you are interested in potentially participating in the research study, please contact the researcher privately at wmoore4@une.edu or copy and paste the following link into your web browser to begin the survey:

<https://redcap.une.edu/redcap/surveys/?s=RWJA4HPYLA>

Also, you can scan the QR code to take the survey on your mobile phone:

The period for a response is three weeks from the posting of this information on social media. For confidentiality reasons and to ensure validity of research data, please do not respond directly to this social media thread or make public comments regarding this study. Once communication is established, the participant will receive one item via email: a survey link that will contain a sample consent form. I appreciate your cooperation and support as I strive to further explore the relationship between the oral hygiene knowledge of a parent with the oral hygiene behaviors of their child between the ages of 7 and 17.

APPENDIX C
CONSENT FORM

UNIVERSITY OF NEW ENGLAND
CONSENT FOR PARTICIPATION
IN ANONYMOUS SURVEY RESEARCH

Project Title: EXAMINING THE RELATIONSHIP BETWEEN A PARENT’S LEVEL OF ORAL HYGIENE KNOWLEDGE AND THEIR CHILD’S ORAL HYGIENE BEHAVIORS

Principal Investigator(s): Wallace Moore

Introduction:

- Please read this form. The purpose of this form is to give you information about this research study.
- You are encouraged to ask any questions that you may have about this study, now, during or after the project is complete.
- Your participation is voluntary.

Why is this research study being done?

The purpose of this study is to better understand the link between a parent’s level of oral hygiene knowledge and the oral hygiene behaviors of their children. The data from this research study may inform parents on the importance of their child’s oral hygiene behavior.

Who will be in this study?

Parents who have children between the ages of 7 and 17; parents who are current residents of the United States.

What will I be asked to do?

You will need to agree to be a willing participant and thoroughly read and sign a consent form. After consent, you will be directed to click a link to a RedCap Survey which should

take approximately 10 to 15 minutes to complete. The researcher will be using a single click survey as this form of research is known to reduce frustration levels of respondents and increase the quality and rate of user responses.

What are the possible risks of taking part in this study?

The possible risks for participation in this study are limited. There is the potential for a participant to internalize the survey questions and their personal responses.

What are the possible benefits of taking part in this study?

There are no direct benefits for participation in this study. The results of this study may contribute to parents' understanding about the importance of oral hygiene health in children. As a result, the information may help parents with the improvement of their child's oral hygiene health and circumvent the occurrence of negative consequences of poor oral hygiene health such as self-image, dental pain, and school absenteeism.

What will it cost me?

There is no cost to participate in this study.

How will my privacy be protected?

No identifying information about you will be collected. In order to protect the anonymity of your responses, no IP addresses, email addresses or identifying information will be collected. REDCap uses industry-standard security methods to protect data transmission and storage to end users. Additionally, the name of all participating dental offices will be kept anonymous. All participating dental offices will be de-identified and pseudonyms will be used in place of the actual names of those dental offices. ***PLEASE NOTE: THE UNE INSTITUTIONAL REVIEW BOARD MAY REVIEW THE RESEARCH RECORDS.***

How will my data be kept confidential?

Electronic data will be password-protected and stored on the researcher's personal computer. The personal computer, password, and data will only be accessible to the researcher. All

individual answers will be presented in summary form in any papers, books, talks, posts, or stories resulting from this study. Researchers may share the data set with other researchers, but your identity will not be known.

PLEASE NOTE: THIS SURVEY IS ANONYMOUS. PLEASE DO NOT INCLUDE ANY INFORMATION THAT CAN IDENTIFY YOU.

What are my rights as a research participant?

- Your participation is voluntary. Your decision to participate will have no impact on your current or future relations with the University.
- Your decision to participate will not affect your relationship with the researcher or the dental office.
- You may skip or refuse to answer any question for any reason.
- If you choose not to participate there is no penalty to you and you will not lose any benefits that you are otherwise entitled to receive.
- You are free to withdraw from this research study at any time, for any reason.
 - If you choose to withdraw from the research, there will be no penalty to you and you will not lose any benefits that you are otherwise entitled to receive.
- You will be informed of any significant findings developed during the course of the research that may affect your willingness to participate in the research.
- If you sustain an injury while participating in this study, your participation may be ended.

What other options do I have?

- You may choose not to participate.

Whom may I contact with questions?

- The researcher conducting this study is Wallace Moore. I am an employee at the site.
 - For more information regarding this study, please contact Wallace Moore by email: wmoore4@une.edu.

- If you choose to participate in this research study and believe you may have suffered a research related injury, please contact Dr. Heather Wilmot, Lead Advisor at email: hwilmot@une.edu.

If you have any questions or concerns about your rights as a research subject, you may call Mary Bachman DeSilva, Sc.D., Chair of the UNE Institutional Review Board at (207) 221-4567 or irb@une.edu.

Will I receive a copy of this consent form?

- You print and keep a copy of this consent form.

I understand the above description of the research and the risks and benefits associated with my participation as a research subject. I understand that by proceeding with this survey I agree to take part in this research and do so voluntarily.

APPENDIX D

SURVEY INSTRUMENT

CONSENT. Checking “YES” means that you understand the information, that any questions that you may have about this study have been answered, and that you are eligible and voluntarily agree to participate.

Yes ☐ No ☐

CONFIDENTIALITY. This confidential online survey is being conducted through the website REDCap, an independent internet service company. You may find out more about this website, if you wish, at <https://redcap.une.edu/redcap/> No identifying information about you is being collected. In order to protect the anonymity of your responses, no IP addresses, email addresses, or identifying information will be collected. REDCap uses industry-standard security methods to protect data transmission and storage. Survey data will be stored only on a password-protected computer. All individual answers will be presented in a summary form in any papers, books, talks, posts or stories resulting from this study. The data set may be shared with other researchers, but your identity will not be known.

FURTHER INFORMATION. If you have any questions, or would like additional information about this study, please contact WALLACE MOORE at wmoore4@une.edu.

Oral Health Knowledge

Please complete the survey below.

Thank you!

DEMOGRAPHICS

Map of the United States

1. Looking at the map above, what region of the United States do you live in?

☐ West ☐ Midwest ☐ Southwest ☐ Northeast ☐ Southeast

2. How many children do you have?

☐ One child
☐ Two or more children

3. What is your relationship to the children under 18 years of age in your household for whom you are a parent or guardian?

☐ Biological parent
☐ Step-parent
☐ Adoptive parent
☐ Foster parent
☐ Grandparent
☐ Other

4. What is the highest educational level completed by the child's mother?

- ☐ Middle school degree or below
☐ High school diploma
☐ Associates degree
☐ Bachelors degree
☐ Masters degree or higher
☐ Unsure

5. What is the highest educational level completed by the child's father?

- ☐ Middle school degree or below
☐ High school diploma
☐ Associates degree
☐ Bachelors degree
☐ Masters degree or higher
☐ Unsure

CHILD ORAL HYGIENE HEALTH

Please read the following statements. Check one box that closely matches your answer.

6. Has the child ever visited a dentist?

- ☐ Yes
☐ No
☐ Unsure

7. How old were the children under 18 in your household for whom you are a parent or guardian when they were first seen by a dentist or other dental professional?

- ☐ Less than or 1 year old
☐ 2 years old
☐ 3 years old
☐ 4 to 6 years old
☐ More than 6 years old
☐ Unsure
☐ Never seen by a dentist or other dental professional

8. Has your child visited the dentist within the past 12 months?

- ☐ Yes
☐ No
☐ Unsure

9. During the past 12 months, did your child or children express any pain or discomfort in their teeth or mouth?

- ☐ Yes
☐ No
☐ Unsure

10. What was the main reason for your child's last dental visit?

- ☐ Treatment
☐ Consultation

11. Using the scale below, how would you describe the state of your child's/children's teeth and gums?

	Excellent	Very good	Good	Average	Poor	Very poor	Unsure
Teeth	☐	☐	☐	☐	☐	☐	☐
Gums	☐	☐	☐	☐	☐	☐	☐

12. Does your child/children usually brush his/her own teeth?

- ☐ Yes
☐ No
☐ Unsure

13. How often does your child/children clean their teeth?

- ☐ Never
☐ Once a month
☐ 2-3 times a month
☐ Once a week
☐ 2-6 times a week
☐ Once a day
☐ Twice or more a day

14. Does your child/children use any of the following to clean their teeth? (Check all that apply.)

- ☐ Toothbrush
☐ Wooden toothpicks
☐ Plastic toothpicks
☐ Toothpaste
☐ Thread (dental floss)
☐ Charcoal
☐ Chewstick/miswak
☐ Other

15. Does your child/children use toothpaste to clean their teeth?

- ☐ Yes ☐ No

16. Does your child/children use a toothpaste that contains fluoride?

- ☐ Yes ☐ No ☐ Unsure

17. From the list below, because of the state of your child's/children's teeth or mouth, how often have they experienced any of the following problems during the past 12 months?

	Very often	Fairly often	Sometimes	No	Unsure
Difficulty in biting foods	☐	☐	☐	☐	☐
Difficulty chewing foods	☐	☐	☐	☐	☐
Difficulty with speech/trouble pronouncing words	☐	☐	☐	☐	☐
Dry mouth	☐	☐	☐	☐	☐
Felt embarrassed due to appearance of teeth	☐	☐	☐	☐	☐
Felt tense because of problems with teeth or mouth	☐	☐	☐	☐	☐
Have avoided smiling because of teeth	☐	☐	☐	☐	☐
Had sleep that is often interrupted	☐	☐	☐	☐	☐
Difficulty doing usual activities with people who are close to you	☐	☐	☐	☐	☐
Have reduced participation in social activities	☐	☐	☐	☐	☐

18. From the list below, how often does your child/children eat or drink any of the following foods, even in small quantities? (Check all that apply.)

	Several times a day	Everyday	Several times a week	Once a week	Several times a month	Seldom/never
Fresh fruit	☐	☐	☐	☐	☐	☐
Biscuits, cakes, cream cakes	☐	☐	☐	☐	☐	☐
Sweet pies, buns	☐	☐	☐	☐	☐	☐
Jam or honey	☐	☐	☐	☐	☐	☐
Chewing gum containing sugar	☐	☐	☐	☐	☐	☐
Sweets/candy	☐	☐	☐	☐	☐	☐
Lemonade, Coca Cola or other soft drinks	☐	☐	☐	☐	☐	☐
Tea with sugar	☐	☐	☐	☐	☐	☐
Coffee with sugar	☐	☐	☐	☐	☐	☐

19. Do you have to remind your child/children to brush their teeth?

- ☐ Yes
☐ No
☐ Unsure

20. How is your child's oral health hygiene in comparison to your oral health hygiene?

- ☐ Better
☐ Worse
☐ Same
☐ Unsure

PARENTAL ORAL HYGIENE KNOWLEDGE

Please read the following statements. Check one box that closely matches your answer.

21. Do you feel it is necessary for your child/children to floss their teeth?

- ☐ Yes
☐ No
☐ Unsure

22. How often do you think it is necessary for your child/children to floss?

- ☐ Daily
☐ Biweekly
☐ Monthly
☐ Unsure

23. Do you feel that flossing is optional for your child/children?

- ☐ Yes
☐ No
☐ Unsure

24. As a parent, do you feel that only brushing your teeth is necessary for good oral hygiene for your child/children?

- ☐ Yes
☐ No
☐ Unsure

25. How long has it been since your child/children last saw a dentist?

- ☐ Less than 6 months
☐ 6-12 months
☐ More than 1 year but less than 2 years
☐ 2 years or more but less than 5 years
☐ 5 years or more
☐ Never received dental care

26. What was the reason for your child's/children's last visit to the dentist?

- ☐ Consultation/advice
☐ Pain or trouble with teeth, gums or mouth
☐ Treatment/follow-up treatment
☐ Routine check-up/treatment
☐ Don't know/don't remember

27. Do you think it is necessary for your child/children to get a baby tooth restored that has a cavity?

- ☐ Yes
☐ No
☐ Unsure

28. Read each of the following 8 statements. Mark each statement as either true, false or not sure.

(1) Gingival bleeding is normal when brushing teeth. ☐ True
☐ False
☐ Unsure

(2) Gingivitis is caused by bacterial infection. ☐ True
☐ False
☐ Unsure

(3) Tooth-brushing is helpful in preventing gingivitis. ☐ True
☐ False
☐ Unsure

(4) Dental caries is mainly caused by pathogenic bacteria. ☐ True
☐ False
☐ Unsure

(5) Sugar intake is associated with dental caries. ☐ True
☐ False
☐ Unsure

(6) Fluoride protects teeth from decay. ☐ True
☐ False
☐ Unsure

(7) Pit and fissure sealants help in preventing dental caries. ☐ True
☐ False
☐ Unsure

(8) Oral health is essential to general health. ☐ True
☐ False
☐ Unsure

29. Have you ever heard of Pit and Fissure Sealants (PFS)? ☐ Yes
☐ No
☐ Unsure

30. Where would you feel most comfortable having Pit and Fissure Sealants performed? ☐ Dental clinic
☐ School
☐ Unsure

31. What are the determinants of choosing a Pit and Fissure Sealant location? ☐ Distance to treatment sites
☐ Level of cross-infection control
☐ Completeness of medical facilities
☐ Effectiveness of emergency response
☐ Children's willingness
☐ Other reasons

32. How often should you visit the dentist for a check-up? ☐ Once a year
☐ Every 6 months
☐ Unsure

33. How often should you change your toothbrush? ☐ Once a month
☐ Every 3 months
☐ Unsure

APPENDIX E

DENTAL VISITS

6. Has the child ever visited a dentist?

Counts/frequency: Yes (96, 93.2%), No (3, 2.9%), Unsure (4, 3.9%)

7. How old were the children under 18 in your household for whom you are a parent or guardian when they were first seen by a dentist or other dental professional?

Counts/frequency: Less than or 1 year old (19, 18.4%), 2 years old (22, 21.4%), 3 years old (23, 22.3%), 4 to 6 years old (22, 21.4%), More than 6 years old (8, 7.8%), Unsure (7, 6.8%), Never seen by a dentist or other dental professional (2, 1.9%)

8. Has your child visited the dentist within the past 12 months?

Counts/frequency: Yes (74, 71.8%), No (24, 23.3%), Unsure (5, 4.9%)

10. What was the main reason for your child's last dental visit?

Counts/frequency: Treatment (45, 43.7%), Consultation (58, 56.3%)

APPENDIX F

CONDITION OF TEETH/MOUTH

9. During the past 12 months, did your child or children express any pain or discomfort in their teeth or mouth?

Counts/frequency: Yes (25, 24.3%), No (69, 67.0%), Unsure (9, 8.7%)

11. Using the scale below, how would you describe the state of your child's/children's teeth and gums?

Teeth

Counts/frequency: Excellent (22, 21.4%), Very good (39, 37.9%), Good (27, 26.2%), Average (10, 9.7%), Poor (2, 1.9%), Very poor (0, 0.0%), Unsure (3, 2.9%)

Gums

Counts/frequency: Excellent (29, 28.2%), Very good (23, 22.3%), Good (32, 31.1%), Average (12, 11.7%), Poor (4, 3.9%), Very poor (0, 0.0%), Unsure (3, 2.9%)

APPENDIX G

TEETH CLEANING

12. Does your child/children usually brush his/her own teeth?

Counts/frequency: Yes (86, 83.5%), No (12, 11.7%), Unsure (5, 4.9%)

13. How often does your child/children clean their teeth?

Counts/frequency: Never (4, 3.9%), Once a month (0, 0.0%), 2-3 times a month (4, 3.9%), Once a week (2, 1.9%), 2-6 times a week (8, 7.8%), Once a day (32, 31.1%), Twice or more a day (53, 51.5%)

14. Does your child/children use any of the following to clean their teeth?

Counts/frequency: Toothbrush (93, 90.3%), Wooden toothpicks (7, 6.8%), Plastic toothpicks (10, 9.7%), Toothpaste (79, 76.7%), Thread (dental floss) (39, 37.9%), Charcoal (5, 4.9%), Chewstick/miswak (0, 0.0%), Other (2, 1.9%)

15. Does your child/children use toothpaste to clean their teeth?

Counts/frequency: Yes (97, 94.2%), No (6, 5.8%)

16. Does your child/children use a toothpaste that contains fluoride?

Counts/frequency: Yes (64, 62.1%), No (14, 13.6%), Unsure (25, 24.3%)

19. Do you have to remind your child/children to brush their teeth?

Counts/frequency: Yes (62, 60.2%), No (36, 35.0%), Unsure (5, 4.9%)

20. How is your child's oral health hygiene in comparison to your oral health hygiene?

Counts/frequency: Better (32, 31.1%), Worse (11, 10.7%), Same (52, 50.5%), Unsure (8, 7.8%)

APPENDIX H

TEETH PROBLEMS

17. From the list below, because of the state of your child's/children's teeth or mouth, how often have they experienced any of the following problems during the past 12 months?

Difficulty in biting foods

Counts/frequency: Very often (6, 5.9%), Fairly often (1, 1.0%), Sometimes (11, 10.8%), No (78, 76.5%), Unsure (6, 5.9%)

Difficulty chewing foods

Counts/frequency: Very often (3, 2.9%), Fairly often (4, 3.9%), Sometimes (6, 5.9%), No (82, 80.4%), Unsure (7, 6.9%)

Difficulty with speech/trouble pronouncing words

Counts/frequency: Very often (6, 5.8%), Fairly often (3, 2.9%), Sometimes (23, 22.3%), No (66, 64.1%), Unsure (5, 4.9%)

Dry mouth

Counts/frequency: Very often (5, 4.9%), Fairly often (3, 2.9%), Sometimes (17, 16.5%), No (70, 68.0%), Unsure (8, 7.8%)

Felt embarrassed due to appearance of teeth

Counts/frequency: Very often (6, 5.8%), Fairly often (5, 4.9%), Sometimes (16, 15.5%), No (69, 67.0%), Unsure (7, 6.8%)

Felt tense because of problems with teeth or mouth

Counts/frequency: Very often (4, 3.9%), Fairly often (3, 2.9%), Sometimes (11, 10.7%), No (80, 77.7%), Unsure (5, 4.9%)

Have avoided smiling because of teeth

Counts/frequency: Very often (3, 2.9%), Fairly often (2, 1.9%), Sometimes (13, 12.6%), No (79, 76.7%), Unsure (6, 5.8%)

Had sleep that is often interrupted

Counts/frequency: Very often (4, 3.9%), Fairly often (6, 5.8%), Sometimes (13, 12.6%), No (73, 70.9%), Unsure (7, 6.8%)

Difficulty doing usual activities with people who are close to you

Counts/frequency: Very often (3, 2.9%), Fairly often (5, 4.9%), Sometimes (6, 5.9%), No (83, 81.4%), Unsure (5, 4.9%)

Have reduced participation in social activities

Counts/frequency: Very often (5, 4.9%), Fairly often (1, 1.0%), Sometimes (6, 5.8%), No (85, 82.5%), Unsure (6, 5.8%)

APPENDIX I

SUGAR INTAKE

18. From the list below, how often does your child/children eat or drink any of the following foods, even in small quantities? (Check all that apply.)

Fresh fruit

Counts/frequency: Several times a day (17, 16.5%), Everyday (30, 29.1%), Several times a week (32, 31.1%), Once a week (12, 11.7%), Several times a month (5, 4.9%), Seldom/never (8, 7.8%)

Biscuits, cakes, cream cakes

Counts/frequency: Several times a day (6, 5.8%), Everyday (10, 9.7%), Several times a week (23, 22.3%), Once a week (30, 29.1%), Several times a month (20, 19.4%), Seldom/never (15, 14.6%)

Sweet pies, buns

Counts/frequency: Several times a day (3, 2.9%), Everyday (4, 3.9%), Several times a week (16, 15.5%), Once a week (29, 28.2%), Several times a month (22, 21.4%), Seldom/never (31, 30.1%)

Jam or honey

Counts/frequency: Several times a day (3, 3.0%), Everyday (9, 8.9%), Several times a week (21, 20.8%), Once a week (23, 22.8%), Several times a month (23, 22.8%), Seldom/never (24, 23.8%)

Chewing gum containing sugar

Counts/frequency: Several times a day (2, 2.0%), Everyday (6, 5.9%), Several times a week (16, 15.7%), Once a week (13, 12.7%), Several times a month (17, 16.7%), Seldom/never (49, 48.0%)

Sweets/candy

Counts/frequency: Several times a day (6, 5.8%), Everyday (7, 6.8%), Several times a week (33, 32.0%), Once a week (21, 20.4%), Several times a month (26, 25.2%), Seldom/never (11, 10.7%)

Lemonade, Coca Cola or other soft drinks

Counts/frequency: Several times a day (4, 3.9%), Everyday (4, 3.9%), Several times a week (19, 18.4%), Once a week (16, 15.5%), Several times a month (33, 32.0%), Seldom/never (28, 27.2%)

Tea with sugar

Counts/frequency: Several times a day (3, 2.9%), Everyday (5, 4.9%), Several times a week (18, 17.5%), Once a week (9, 8.7%), Several times a month (8, 7.8%), Seldom/never (61, 59.2%)

Coffee with sugar

Counts/frequency: Several times a day (3, 2.9%), Everyday (10, 9.7%), Several times a week (8, 7.8%), Once a week (3, 2.9%), Several times a month (6, 5.8%), Seldom/never (74, 71.8%)

APPENDIX J

CHILD FLOSSING/HYGIENE

21. Do you feel it is necessary for your child/children to floss their teeth?

Counts/frequency: Yes (73, 70.9%), No (17, 16.5%), Unsure (13, 12.6%)

22. How often do you think it is necessary for your child/children to floss?

Counts/frequency: Daily (49, 47.6%), Biweekly (30, 29.1%), Monthly (7, 6.8%), Unsure (17, 16.5%)

23. Do you feel that flossing is optional for your child/children?

Counts/frequency: Yes (40, 38.8%), No (50, 48.5%), Unsure (13, 12.6%)

24. As a parent, do you feel that only brushing your teeth is necessary for good oral hygiene for your child/children?

Counts/frequency: Yes (41, 40.2%), No (49, 48.0%), Unsure (12, 11.8%)

APPENDIX K

DENTAL VISIT

25. How long has it been since your child/children last saw a dentist?

Counts/frequency: Less than 6 months (44, 42.7%), 6-12 months (35, 34.0%), More than 1 year but less than 2 years (14, 13.6%), 2 years or more but less than 5 years (5, 4.9%), 5 years or more (1, 1.0%), Never received dental care (4, 3.9%)

26. What was the reason for your child's/children's last visit to the dentist?

Counts/frequency: Consultation/advice (21, 20.4%), Pain or trouble with teeth, gums or mouth (7, 6.8%), Treatment/follow-up treatment (6, 5.8%), Routine check-up/treatment (67, 65.0%), Don't know/don't remember (2, 1.9%)

32. How often should you visit the dentist for a check-up?

Counts/frequency: Once a year (26, 25.2%), Every 6 months (74, 71.8%), Unsure (3, 2.9%)

APPENDIX L

CONDITION OF TEETH/GUMS

27. Do you think it is necessary for your child/children to get a baby tooth restored that has a cavity?

Counts/frequency: Yes (38, 36.9%), No (38, 36.9%), Unsure (27, 26.2%)

28. Read each of the following 8 statements. Mark each statement as either true, false or not sure.

(1) Gingival bleeding is normal when brushing teeth.

Counts/frequency: True (14, 13.6%), False (69, 67.0%), Unsure (20, 19.4%)

(2) Gingivitis is caused by bacterial infection.

Counts/frequency: True (61, 59.2%), False (16, 15.5%), Unsure (26, 25.2%)

(3) Tooth-brushing is helpful in preventing gingivitis.

Counts/frequency: True (87, 84.5%), False (7, 6.8%), Unsure (9, 8.7%)

(4) Dental caries is mainly caused by pathogenic bacteria.

Counts/frequency: True (41, 39.8%), False (11, 10.7%), Unsure (51, 49.5%)

(5) Sugar intake is associated with dental caries.

Counts/frequency: True (84, 81.6%), False (6, 5.8%), Unsure (13, 12.6%)

(6) Fluoride protects teeth from decay.

Counts/frequency: True (73, 70.9%), False (9, 8.7%), Unsure (21, 20.4%)

(7) Pit and fissure sealants help in preventing dental caries

Counts/frequency: True (48, 46.6%), False (9, 8.7%), Unsure (46, 44.7%)

(8) Oral health is essential to general health

Counts/frequency: True (88, 85.4%), False (9, 8.7%), Unsure (6, 5.8%)

APPENDIX M

TOOTH SEALANTS

29. Have you ever heard of Pit and Fissure Sealants (PFS)?

Counts/frequency: Yes (30, 29.1%), No (55, 53.4%), Unsure (18, 17.5%)

30. Where would you feel most comfortable having Pit and Fissure Sealants performed

Counts/frequency: Dental clinic (61, 59.2%), School (5, 4.9%), Unsure (37, 35.9%)

31. What are the determinants of choosing a Pit and Fissure Sealant location

Counts/frequency: Distance to treatment sites (18, 17.5%), Level of cross-infection control (12, 11.7%), Completeness of medical facilities (21, 20.4%), Effectiveness of emergency response (7, 6.8%), Children's willingness (14, 13.6%), Other reasons (31, 30.1%)

APPENDIX N

TOOTHBRUSH

33. How often should you change your toothbrush

Counts/frequency: Once a month (37, 35.9%), Every 3 months (55, 53.4%), Unsure (11, 10.7%)