ORAL HEALTH LITERACY IN PARENTS AND CARE PROVIDERS OF YOUNG CHILDREN

Rachel Nye
Northern Michigan University, rnye@nmu.edu

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ORAL HEALTH LITERACY IN PARENTS AND CARE PROVIDERS OF YOUNG CHILDREN

By

Rachel Nye

SCHOLARLY PROJECT

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In partial fulfillment of the requirements
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SIGNATURE APPROVAL FORM

ORAL HEALTH LITERACY OF PARENTS AND
CARE PROVIDERS OF YOUNG CHILDREN

This DNP Scholarly Project by Rachel M Nye is recommended for approval by the student’s Faculty Chair, Committee and Department Head in the School of Nursing

______________________________  February 2018
Dr. Kristi Robinia
Committee Chair: Dr. Kristi Robinia  Date

______________________________  February 2018
Dr. Terry Delpier
First Reader: Dr. Terry Delpier  Date

______________________________  February 2018
Dr. Marguerite Moore
Second Reader: Dr. Marguerite Moore  Date

______________________________  February 2018
Dr. Kristi Robinia
Department Head: Dr. Kristi Robinia  Date
ABSTRACT

ORAL HEALTH LITERACY IN PARENTS AND CARE PROVIDERS OF YOUNG CHILDREN

By

Rachel Nye

Tooth decay ranks first as the most common chronic disease in childhood (U.S. Department of Health and Human Services [HHS], 2000). In addition to the morbidity directly related to cavities, there are a myriad of other systemic implications of this disease. The purpose of the study was to determine baseline oral health literacy levels for a sample of pediatric caregivers living in the Upper Peninsula and to determine the impact of a community based education program on these levels. The program was offered at three locations. A paired sample t-test of sixty-four complete data sets demonstrated a statistically significant increase in oral health literacy levels after the implementation of a community-based educational program. Results indicated that participants had a statistically significant increase in knowledge. Scores reflecting oral health literacy rose from 68.8% on the pre-test to 92.6% on the post-test. Areas showing the largest improvement in knowledge were as follows: when a child first needs to see a dentist, germs cause cavities, smoking in the home increases cavities and mothers/caregivers can pass on cavity causing germs to children. This study confirms a need for further oral health education. Increasing oral health literacy levels in caregivers may lead to an increase in oral health seeking behaviors and a decrease in preventable dental caries in the pediatric population. Decreasing dental disease has the potential to increase overall health.
DEDICATION

This scholarly project is dedicated to my husband and children who supported me in this journey. I am extremely grateful for all your efforts during the oral health literacy events. For the big and small things along the way, thank you. I could not have done this without you.
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PREFACE

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Chapter One

Introduction

This project, entitled “Oral Health Literacy of Parents and Other Care Providers of Young Children”, sought to identify baseline oral health literacy levels of parents and other care providers of young children and to evaluate the efficacy of a community-based educational intervention on increasing oral health literacy levels. Chapter One will provide working definitions, which will be used throughout this manuscript. It will also include an introduction to oral health literacy and factors affecting it. Chapter One will introduce the significance of low health literacy levels and the prevalence and implications of poor oral health in relation to children. Chapter One will also include a brief description of the theoretical framework utilized during this project.

Oral Health Literacy

Consistent definitions of health literacy and oral health literacy are prevalent in the literature. “Health literacy is the degree to which individuals have the capacity to obtain, process, and understand basic oral health information and services needed to make appropriate health decisions” (Ratzan, Parker, Selden, & Zorn, 2000, p. vi). Healthy People specifies that oral health literacy is “the degree to which individuals have the capacity to obtain, process, and understand basic oral and craniofacial health information and services needed to make appropriate health decisions” (U.S. Department of Health and Human Services [HHS], 2010, p. 21-38). Oral health literacy is an important concept because oral health literacy levels of parents have been associated with dental caries rates in children (Bridges, Parthasarathy, Wong, et al., 2014). Dental caries,
also referred to as tooth decay, is a permanent breakdown of the hard surface of the tooth. This damaged enamel can further progress to holes in the tooth’s surface (Centers for Disease Control and Prevention [CDC], 2014). Tooth decay is caused by the action of harmful bacteria in the mouth. Bacteria in the mouth produces acid as it breaks down the sugars in foods that a person eats (National Institute of Dental and Craniofacial Research [NIDCR], 2013). The presence of dental caries increases risk factors for both short and long-term health implications.

**Significance of the Problem**

The presence of dental caries and poor oral health is associated with negative consequences at various stages of the lifespan. Beginning as early as the fetal period, poor maternal oral health has consequences for the neonate. Eighty-one percent of the research studies evaluated in a meta-analysis by Chambrone, Guglielmetti, Pannuti, and Chambrone (2011) identified an association between periodontitis and increased incidence of preterm birth and low birth weight infants. Tooth decay is one of the most prevalent chronic diseases in children (CDC, 2014). Children with poor oral health are more likely to experience tooth pain and are three times more likely to miss school and perform poorly as a result of dental pain (Jackson, Vann, Kotch, Pahel, & Lee, 2011). Dental caries may contribute to altered self-esteem as well as difficulty with sleeping and eating (Bress, 2013). The aforementioned childhood morbidities have been linked to poor oral health, which is a preventable condition.

The deleterious ramifications of dental caries are not limited to childhood. Ninety-two percent of adults in the U.S. aged 20–64 have experienced dental caries in their
permanent teeth (CDC, 2014). Alpert (2017) explains that dental disease causes altered functioning of endothelial cells and increases inflammation that may contribute to health problems such as cardiovascular disease, diabetes, and stroke. A meta-analysis by Lafon et al. (2014) found that stroke risk is particularly affected by edentulism, i.e. loss of teeth, which occurs when caries are untreated.

Due to the multiple comorbidities linked to dental caries, the strain on population health as well as health care expenditure is staggering. The various exacerbations of conditions with the resultant poorer health outcomes cost an estimated $106–238 billion in the U.S. annually (Vernon, Trujillo, Rosenbaum, & DeBuono, 2007). Dental caries are preventable and their rate of occurrence is alarming.

**Health-Related Problem in Rural Populations**

There are many risk factors for the development of dental caries. Some risk factors are more likely to occur in rural populations, whose children are especially vulnerable to the development of caries. Challenges in these communities include reduced financial resources, remote geographic locations, lack of access to fluorinated drinking water, higher rates of poverty, and limited access to pediatric dentists.

According to the U.S. Department of Agriculture, children living in non-metropolitan areas experience a higher rate of poverty than those living in metropolitan areas. In 2016, the poverty rate for rural dwelling children aged 18 and under was 23.5%, while it was 18.8% for those living in urban areas. For rural dwelling children younger than five years of age, the poverty rate was 26.8%, while for urban dwelling children of this age group, it was 20.5% (Annie E. Casey Foundation Kids Count Data Center, 2017).
The overall statewide poverty rate in Michigan in 2015 for children was 22.2% (Annie E. Casey Foundation Kids Count Data Center, 2017). In 2015, the poverty rate for children living in the Upper Peninsula of Michigan was 30.3% in some counties. Marquette and Alger Counties experienced poverty rates of 17.9% and 21% respectively in 2015 (Annie E. Casey Foundation Kids Count Data Center, 2017). In addition to poverty, rural dwelling families may face additional barriers. Due to the geographic challenges of living in a rural area, these families may not have access to transportation for dental visits. Additionally, they are less likely to have access to fluoridated water.

The CDC identifies fluorinated water as one of the ten public health achievements of the twentieth century (CDC, 2014). Population based research found fluoride strengthens teeth and decreases levels of carries. The lack of fluoridated drinking water is a problem found in rural areas when the source of water is primarily well water. In the Upper Peninsula of Michigan, only 33% of the population has access to systemic fluoride (Manz, 2011). In this same geographic region, 66%–70.3% of children entering third grade have at least one cavity. This is a higher incidence than that found in any other regions in Michigan, where the state rate of caries is 55.9% for children entering third grade (Manz, 2011). Additionally, the Upper Peninsula is an identified dental shortage area, and there are only two pediatric dentists in the entire region (Manz, 2011). Despite numerous risk factors, actions taken by pediatric caregivers can help prevent cavities. Parental knowledge of these recommendations and the implications of their omission is imperative in order to reduce the rate of dental caries. Oral health literacy levels in adult populations vary widely, and it is important that pediatric caregivers are aware of the
modifiable risk factors for dental caries. This raises the question what is the baseline oral health literacy of pediatric caregivers in the UP.

The prevalence and implications of dental caries propelled the exploration of factors influencing the oral health of young children living in a rural environment in the central Upper Peninsula of Michigan. The focus of the project was determining the oral health literacy levels of parents and identifying barriers to dental care in this population. The intervention provided information to parents about preventing dental caries.

**Significance for the Population**

Approximately 80 million Americans have limited health literacy (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011). Low levels of oral health literacy in parents and caregivers may place a child at risk of poor oral health (Miller, Lee, DeWalt, & Vann, 2010) and future systemic implications (Alpert, 2017). Parents and caregivers with higher health literacy levels are more likely to participate in health seeking behaviors, with subsequent fewer related health disorders in children (Miller et al., 2010). Providing access to knowledge may increase the likelihood of parents’ engagement in and encouraging oral health promoting behavior in their children, thus decreasing the incidence of oral caries in their children. Preventing cavities can decrease pain and suffering, decrease other infections, and reduce the number of missed school days. Diseases such as diabetes, cardiovascular disease, respiratory disease, and preterm labor are associated with poor oral health (Alpert, 2017). Improved oral health has the potential to decrease the occurrence of these costly systemic conditions. Nurses are in a role that embraces a holistic approach to care, with the potential to influence outcomes.
Significance for Nursing

Nursing care occurs along the spectrum of health, often within the context of limited resources. It is especially important for nurses to be involved in preventative and educative interventions intrinsic to the primary level of care. Education and screenings specific to oral health are not consistently included in primary preventative care (Quinonez et al., 2014). There is considerable opportunity for improving oral health in these settings. Well-child visits have been identified as a specific area of opportunity by Bernstein et al. (2017). The frequency of well-child visits allows periodic and recurrent contact with children and their families. Clinic nurses as well as advanced practice nurses in these settings could educate parents of young children during these well-child visits about the importance of regular dental visits, oral care techniques, and even offer them fluoride varnishing. This would be especially beneficial for populations at higher risk.

There is considerable opportunity for nurses to have an impact on oral health literacy levels in a variety of settings. Providing a community-based educational program about oral health recommendations has the potential to increase parental oral health literacy levels and thus eliminate some of the barriers to children not receiving recommended interventions. This particular project looked at oral health literacy levels of pediatric caregivers and the effectiveness of a community-based education program in increasing these levels.

Purpose of the Study

The purpose of this study was to determine if a community-based education
program was effective at increasing oral health literacy in pediatric caregivers.

The specific research questions were as follows:

a) What are the oral health literacy levels for adult pediatric caregivers in Marquette/Alger Counties?

b) Is a community-based oral health education program effective at increasing oral health literacy levels of pediatric caregivers?

c) What are the barriers to seeking dental care?

Theoretical Framework

The theory of planned behavior (TPB) guided this project and provided fundamental perspectives to its approach and goals. The TPB is a middle-range theory, originally derived from the field of psychology (McEwen & Wills, 2014). The TPB takes into consideration behavioral beliefs and attitudes, subjective norms, and perceived behavioral control (Perry & Langley, 2013). Theory elements include a readiness to perform a new behavior, feelings about the new behavior, and the performance of the behavior (Eadie, 2014). Establishing the definitions of terms and tenets of good oral hygiene enhances the awareness of desired behaviors.

Definition of Terms

For the purpose of this project, relevant terms were defined according to current literature.
**Health literacy** is the degree to which an individual has the capacity to obtain, communicate, process, and understand basic health information and services to make appropriate health decisions (Ratzan et al., 2000, p. vi).

**Oral health literacy** is the degree to which individuals have the capacity to obtain, process, and understand basic oral health information and services needed to make appropriate health decisions (HHS, 2010).

**Dental caries** is also known as cavities or tooth decay. Cavities are caused by a breakdown in tooth enamel (CDC, 2014). Bacteria and acid cause the breakdown of enamel. An individual with tooth decay may be asymptomatic. As the cavity enlarges, symptoms may include the following: tooth pain and sensitivity, pain in the tooth when biting or eating sweet, hot, or cold foods. Additionally, the holes in the teeth may be visible or may be stained brown, black, or white.

**Early childhood caries** is the presence of one or more missing, filled, or decayed tooth in a child of 71 months of age or younger (American Academy of Pediatric Dentistry [AAPD], 2016).

**Pediatric Caregiver** For this project, the use of the term pediatric caregiver referred to the parent, grandparent, foster parent, guardian, or any other provider of care for the child. This is not to be confused with a primary care provider, e.g., a pediatrician.

**Tenets of Oral Health Literacy: Information for Pediatric Caregivers**

In addition to defining terms, it is important to have an awareness of the essential components of oral health care. Evidence-based recommendations gleaned from the literature were incorporated into this project. Topics thought to be indicative of oral
health literacy included the purpose of fluoride and important dental hygiene practices such as frequency of brushing and flossing. Knowledge of the appropriate time for a first dental visit as well as the importance, timing, and frequency of subsequent dental visits is necessary for compliance. The role of the diet and the transmission of cavity causing bacteria between people are other pertinent pieces of information. Ideally, care providers should be prepared to take appropriate action if a tooth falls out. General information related to essential oral health care practices is provided below.

**Fluoridated water**

Fluoridated water at a concentration of 0.7 ppm has demonstrated the ability to reduce dental caries (Spencer & Do, 2016). Fluoride supplementation via drops or tablets is recommended for children who do not have access to fluoridated water (CDC, 2014).

**Fluoridated toothpaste**

Adults and children who can spit out toothpaste should be encouraged to brush teeth using a fluoridated toothpaste at least twice a day. Brushing disrupts bacterial growth on teeth and provides fluoride to the area (Weinstein, Huebner, Graves, & Tut, 2011).
Sealants and Varnish

The application of dental sealants or fluoride varnish have demonstrated protection from caries (AAPD, 2017). It is generally recommended that sealants be placed as soon as the child’s molars appear (NIDCR, 2013).

Fluoride Varnish (Place with Fluoride)

The recommended application schedule is every three months (Healthy Children, 2015). Professionally applied fluoride varnish for at risk children has shown to decrease the risk of caries (Marinho, Worthington, Walsh, & Clarkson, 2013).

Flossing

Brushing without flossing misses 40% of tooth surfaces. Regular flossing is encouraged (De la Rosa, Guerra, Johnson, & Radike, 1979 as cited by Goyal, Lyle, Qaqish, & Schuller, 2013).

Early and Frequent Dental Visits

The AAPD (2017) recommends that children first see a dentist by the age of one, or when the first tooth erupts, whichever is first. Subsequent visits to the dentist are recommended every six months (AAPD, 2017).

Diet

It is important to avoid sugary snacks and drinks to reduce the rate of cavities (Sheiham & James, 2014). Sugar intake at less than 3% of energy intake for children is ideal for preventing cavities. If fluoride is used, a maximum of 5% of energy intake is recommended to prevent cavities (Sheiham & James, 2014).
Transmission

Streptococcus mutans is the bacteria most associated with childhood caries. Horizontal (child-to-child) and vertical (mother-to-child) transmission is possible (Milgrom, Huebner, Mancl, Garson, & Grembowski, 2013). Avoidance of saliva sharing activities such as sharing food and drinks, sharing eating utensils, and kissing the child on the lips will prevent person-to-person transmission of streptococcus mutans. A small child who puts their hands in someone’s mouth and then their own may also be exposed to streptococcus mutans (AAPD, 2017).

Dental home is “the ongoing relationship between the dentist and the patient, inclusive of all aspects of oral health care delivered in a comprehensive, continuously accessible, coordinated, and family centered way”. The dental home should be established no later than 12 months of age and includes referral to dental specialists when appropriate (AAPD, 2015, p. 12).

Chapter Two will provide a review of the literature as well as further exploration of the TBP in relation to oral health literacy.
Chapter Two

Chapter Two will provide a discussion of the application of the theory of planned behavior in relation to this project. Chapter Two will also provide an overview of the literature that guided the pre- and post-survey questionnaire, educational presentation, and methodology of this study. The research questions this project sought to answer are as follows:

a) What are the oral health literacy levels for adult pediatric caregivers in Marquette/Alger Counties?

b) What are the barriers to seeking dental care?

c) Is a community-based oral health education program effective at increasing oral health literacy levels of pediatric caregivers?

Health Literacy

According to the Ratzan et al. (2010, p, vi) “health literacy is the degree to which individuals have the capacity to obtain, process, and understand basic oral health information and services needed to make appropriate health decisions”. Many parents, especially those who have low health literacy levels, are unaware of recommendations to prevent dental caries in their children. Lower health literacy levels have been associated with lower use of health care services and poorer health (Berkman et al., 2011). Low levels of health literacy are a prevalent problem.
Prevalence and Implications of Low Health Literacy

It is estimated that 80 million Americans possess limited health literacy levels (Berkman et al., 2011). Certain populations have demonstrated an increased risk for lower health literacy levels. These include the elderly, minority groups, people living in poverty, and those with educational qualification lower than high school (Parker, Ratzan, & Lurie, 2003). Exploration of parental health literacy is imperative. A study of 6,100 parents in the United States demonstrated that 28.7% had either basic or below basic levels of health literacy (Yin et al., 2009). In a study of Head Start Parents, one-fifth to one-third of parents answered questions incorrectly (Knowlden, Hill, Alles-White, & Cottrell, 2012).

Lower health literacy levels may lead to more significant health problems and poorer health outcomes. According to Berkman et al. (2011) individuals with lower health literacy levels are more likely to receive emergency care and to be admitted to the hospital. They are also less likely to participate in some health screenings and preventive vaccinations. Treatment compliance may be hindered by the inability to follow medication labels and health messages. These occurrences lead to an increased cost in providing care.

Cost of Low Health Literacy

According to Vernon et al. (2007), approximately $106–238 billion are spent in the U.S. annually because of low levels of health literacy. Hongal et al. (2013) estimate that low levels of oral health literacy result in an approximate cost of $73 billion annually in the U.S. Low literacy levels contribute to the omission of health-seeking behaviors,
more cavities, and higher cost for treatment as well as pain and illness for children with cavities. For example, lower caregiver literacy was associated with inappropriate nighttime bottle use and omission of daily brushing in a study by Vann, Lee, Baker, and Divaris (2010). Those with low health literacy are less likely to seek preventative care and more likely to utilize emergency departments experiencing increased hospitalization rates. Lower literacy levels may imply the inability to read, comprehend, and complete health care-related forms and directions, including medication administration directions (Hongal, et al., 2013).

The prevention of dental caries is extremely important to prevent both the short and long-term effects of dental decay. Dental caries have caused 51 million lost school hours, pain and suffering, trouble in speaking, eating, and learning (Department of Health and Human Services, 2000). Chronic conditions associated with poor oral health include diseases such as cardiovascular disease and stroke, respiratory disease and diabetes (Guo et al., 2014). Poor oral health has also been implicated in low birthweight infants and preterm birth (Hwang, Smith, McCormick, & Barfield, 2012). Assessment of oral health literacy levels is crucial in studying the effects of low levels. The next section will explore the state of oral health in the U.S.

**Oral Health in the United States**

Dental caries are prevalent nationwide, especially among children. Healthy People 2020 identified that 33.3% of children aged three to five during 1999–2004 had dental caries. Nearly 24% of those remained untreated in the same population (HHS, 2018). The rates of dental caries in children are five times than those of childhood
asthma, with tooth decay ranking first as the most common chronic disease in childhood (HHS, 2000). The epidemic of dental caries in children is especially notable in Michigan’s Upper Peninsula.

**Oral Health in the Michigan’s Upper Peninsula**

In Michigan’s Upper Peninsula, 66% of children entering third grade have oral decay. This is higher than any other region of the state. Additionally, the Upper Peninsula is an identified dental shortage area, and there are only two pediatric dentists in the entire region (Manz, 2011). Rural dwelling families encounter numerous barriers, which increase the risk factors for dental caries. The next section will discuss risk factors for poor oral health.

**Risk Factors for Poor Oral Health**

Several risk factors for the development of dental caries have been identified in the literature. Tinanoff and Reisine (2009) identified that the presence of previous caries, having special health care needs, the presence of white spots on the teeth, and visible plaque are risk factors in the development of dental caries. Children considered poor or near to the poverty line are also at a higher risk of getting dental caries (Tinanoff & Reisine, 2009). Additional risk factors identified by Tinanoff and Reisine (2009) include caries in their siblings or mother’s teeth. Using logistic and cumulative logistic regression analysis, Dye, Vargas, Lee, Magder, and Tinanoff (2011) found that the oral health status of a mother was determined to be a strong predictor of the oral health status of their children and that poverty had a higher association with an increased number of
cavities. Limitations to the Dye et al. (2011) study were the potential mismatching of some children’s data to their own mother’s data.

A study by Schroth, Halchuk, and Star (2013), which involved the Manitoba First Nations Children, demonstrated an association between severe early childhood caries with paternal education levels, paternal employment status, and maternal smoking during pregnancy. The same study demonstrated that increased rates of caries were associated with daily intake of pop, juice, sweets, and fast food, and lack of breastfeeding (Schroth et al., 2013).

Children living in rural areas are especially vulnerable to the development of caries due to several risk factors linked to rural settings. Children living in rural areas are more likely than their urban counterparts to experience poverty. The 2012 poverty rate for children living in rural areas was 26.7% (U.S. Department of Agriculture Economic Research Service, 2017). One risk factor for the development of dental caries is poverty. Absence of fluoridated drinking water is another risk factor in the development of dental caries (Mayo Clinic, 2017). Lack of fluorinated drinking water is a problem found in rural areas when the source of water is primarily well water. This is true in the Upper Peninsula of Michigan, where only 33% of the population has access to systemic fluoride (Manz, 2011).

A study by (Wilson et al., 2014) revealed poor parental oral health behaviors among American Indians in one of the most rural and impoverished tribal regions in the Northern Plains. This group has a low socio-economic status and minority status. Findings among this population epitomize the perfect collection of risk factors and
Barriers to dental care as well as related outcomes. Barriers to appropriate oral hygiene and adherence to regular dental care will be discussed next.

**Barriers to Oral Health**

The identification of barriers to maintaining good oral health in children includes parental factors as well. In the case of young children, parents are responsible for the implementation of recommended oral hygiene practices and compliance with the recommended schedule of dental visits and interventions. Inadequate parental knowledge may contribute to the omission of recommended oral health practices. According to Knowlden et al. (2012), several knowledge deficits were noted in the baseline assessment of parental knowledge. These included the amount of sugar consumption per day, level of assistance that children need with brushing, use of bottles and liquid placed in them, and recommended time frame for a child’s first dental visit.

Wilson et al. (2014) studied American Indians in the Northern Plains area, where the rate of early childhood caries is 62%. “Distance, extreme weather conditions, lack of paved roads, inconsistent access to a private car, and absence of public transportation, with walking and hitchhiking common” were all barriers identified by the researchers (p. 6). This population reported past negative dental experiences, limited availability of dental health providers, and a considerable economic disadvantage (Wilson et al., 2014). Limitations of this study were lack of data about performance of desired behaviors. Another rural dwelling minority group, the Manitoba First Nations people, also verbalized a lack of available dental services, especially those that were culturally appropriate (Schroth et al., 2013). Schroth et al. (2014) also found that parents
experienced guilt and questioned their parenting when their child had a cavity or poor oral hygiene.

A study of 100 adolescents in north Florida shed light on barriers to receiving appropriate dental care in a rural setting. According to Dodd, Logan, Brown, Calderon, and Catalanotto (2014), barriers of rural dwelling adolescents in this study were: lack of transportation, misconception that dental care was not needed, financial burden, issues related to use of Medicaid, fear and parental issues. The lack of transportation was due to lack of public transit, not having a ride, not having money for gas and having to travel great distances to a dentist that accepted Medicaid. Issues related to Medicaid included long wait times for appointments and long wait times in crowded waiting rooms prior to seeing the dentist. Parental work responsibilities did not allow them to get their child to the dentist. Fear was further explained as fear of needles, procedures, bad news, fear of judgment and fear of pain (Dodd et al., 2014).

A study of 675 parents of children enrolled in Head Start programs in Ohio found that 73% of parents identified at least one barrier to following oral health care guidelines. Knowlden et al., (2012) focused on the parents of Head Start children due to the likely risks associated with this population of low-income children. The tool utilized was the Parental Oral Health Knowledge Assessment (POHKA) scale. The POHKA survey was purposeful about parental knowledge of child oral health care practice, parental dental history and barriers to dental care. Approximately 35% of parents did not recognize the need for their child to visit the dentist by the time of their child’s first birthday. The reported barriers were restricted dental office hours that conflict with parent’s work hours, dentists refusing to treat children less than age three, and some offices barring
parents from accompanying children (Knowlden et al., 2012). The most commonly cited barrier in this particular study was a lack of dental insurance. Although Knowlden et al. (2012) identified a lack of dental insurance as a major barrier, a study of 560 children enrolled in Head Start as well as Medicaid in Maryland found that despite having dental coverage, only 20% of these children receive dental care (Vargas, Monajemy, Khurana, & Tinanoff, 2002).

A study by Schroth et al. (2014) found that barriers included a child’s resistance to brushing, busy schedules and receiving conflicting information about the recommended first dental visit. Additionally, lack of support from extended family was cited as a barrier to performing recommended oral hygiene practices. Numerous families reported being told by the dentist office that their child was too young despite the presence of teeth or the child being at least one year of age at the time of the call (Schroth et al., 2014). A review of the theoretical framework that addresses oral health seeking behaviors will follow.
Theoretical Framework: Theory of Planned Behavior and Oral Health Literacy

The TPB is a social cognitive theory derived from psychology (McEwen & Wills, 2014). The TPB guided this project and provided fundamental perspectives to the approach and goals of this project. The TPB is a prescriptive middle range theory in which prescribed activities are utilized to reach identified goals (McEwen & Wills, 2014).

The purpose of the TPB is prescriptive in that prescribed activities are utilized to reach identified goals (McEwen & Wills, 2014). The elements are a readiness to perform, feelings about the new behavior and the performance of the behavior (Eadie, 2014). These elements are an amenable match for implementing oral health literacy projects. This theory could be utilized to describe, predict, and potentially guide nursing interventions related to the knowledge of oral health and oral health-seeking behaviors.

The TPB includes the following: attitude toward the behavior, subjective norms, and perceived behavioral control that then influences intention and resultant behavior. Attitude towards behavior can be negative or positive evaluations of the expected outcome of the behavior. For this project, parents of young children completed an intake assessment (pre-survey) that identified their knowledge levels as well as oral health practices. Considerations of parental attitude towards oral health-seeking behavior were reflective in their attendance at the event as well as answers on the pre-survey.

The social pressure to perform or not perform the behavior are the subjective norms (Ajzen, 1991). Van den Branden, Van den Broucke, Leroy, Declerck, and Hoppenbrouwers (2015) further explain that subjective norms are perceptions about the
judgment of others e.g. dentist, significant other, etc. in terms of the behavior. The educational intervention provided to parents by a pediatric dentist or nurse will imparted information about oral hygiene, including the benefits of oral health behaviors such as brushing, flossing, fluoride, dental visits. This establishes the normative belief by an “authority” figure i.e. the subjective norm.

The perceived behavioral control is the amount of control the individual believes he/she has over the behavior (Van den Branden et al., 2015). The intention to perform the behavior is reflective of how motivated a person is to perform it (Ajzen, 1991). After the educational program, parents completed a post-survey. The post-survey data demonstrated and reflected oral health knowledge levels after the intervention as well as the parent’s ability or desire to follow oral health recommendations. The post-survey indicated the parent’s perception of their ability to comply with oral health seeking behaviors (Eadie, 2014).

The readiness to perform component would help to determine if the mother or other family members are motivated and capable of overseeing the care of children’s teeth. The feelings about the new behavior could very much be influenced by nursing. If parents understood the many benefits of improved oral health, they may have feelings that are more positive or more motivational for supervising home care activities and arranging for office based dental care. The performance of these preventative behaviors would be beneficial for the child now and in the future. The ultimate goal is an improvement of oral health, which in turn results in an improvement of overall health. Performing oral health seeking behaviors may empower the parents because they have an ability to enhance their child’s outcome (Perry & Langley, 2013).
As evidenced by a literature review, the TPB has been utilized in oral health literacy. Dumitrescu, Wagle, Dogaru, and Manolescu (2011) found that attitude, subjective norm, perceived behavioral control, oral health knowledge, and current oral health habits were positively correlated with an intention to improve oral health behaviors. Van den Branden et al. (2015) applied the TPB in a study of 1,057 parents of preschoolers. Behaviors related to oral health as well as attitude, subjective norms, perceived behavioral control, and intention were assessed via self-report of parents of children longitudinally at zero, three and then five years of age. It was found that parental perceived behavioral control when their children were age zero was predictive of dietary and oral hygiene behaviors when their children were aged three and five (Van den Branden et al., 2015) In conclusion, the TBP was a valid indicator of intentions and oral health behaviors in parents of preschool aged children. Evaluation of oral health literacy levels is an integral component when determining efficacy of interventions. A discussion of measurement tools will follow.

Measuring Oral Health Literacy

Many tools claim to measure oral health literacy. According to Dickson-Swift, Kenny, Farmer, Gussy, and Larkins (2014), many of the tools that exist to assess oral health literacy have been criticized because they assess word recognition and reading skills rather than meaning and subsequent translation into behaviors. Word recognition tests are commonly used because they are quicker and easier to administer (Sabbahi, Lawrence, Limeback, & Rootman, 2009). Some measurement tools currently in use that assess word recognition are the Rapid Estimate of Adult Literacy in Dentistry i.e. REAL-
D 30, REAL-D-99, and the Rapid Estimate of Adult Literacy in Medicine and Dentistry, i.e. REALMD and REALMD-20 (Dickson-Swift et al., 2014; Sabbahi et al., 2009).

Measurement tools that assessed comprehension and numeracy are the TOFHLiD (Test of Functional Health Literacy in Dentistry) and the OHLI (Oral Health Literacy Instrument) (Dickson-Swift et al., 2014). Sabbahi et al. (2009) developed and tested the Oral Health Literacy Instrument (OHLI) that utilized 17-labeled items on seven pictures. Participants are asked to match a word from a list to the appropriate item on the picture (Sabbahi et al., 2009). One test that assess word recognition and comprehension are the Oral Health Literacy Assessment (In English and Spanish) (OHLA-E and S respectively) (Dickson-Swift et al., 2014). Tests that assess conceptual knowledge are the Baltimore Health Literacy and Oral Health Knowledge Project Survey (BHLOHKP), The Health Literacy in Dentistry (HeLD) (Jones, Brennan, Parker, & Jamieson, 2015) and the Comprehensive Measure of Oral Health Knowledge (CMOHK) (Dickson-Swift et al., 2014). The CMOHK was found to have similar results as the REALM and the TOFHLA. CMOHK scores of participants in Maryland found the lowest scores in those who spoke a language other than English, Hispanics and those with less than a high school education. The highest scores were in those who spoke English as a child, spoke multiple languages at the time of survey, graduated from college and were non-Hispanic white (Macek et al., 2017).

The Hong Kong Oral Health Literacy Assessment Task for Paediatric Dentistry (HKOHLAT-P) assesses literacy and numeracy tasks. The HKOHLAT-P demonstrated that an oral health literacy tool that reflected comprehension and not simply word recognition was more strongly associated with the oral health status of children.
participating in the study (Bridges, Parthasarathy, Au, et al., 2014). The Oral Health Literacy Adults Questionnaire (OHL-AQ) assesses reading comprehension, numeracy, literacy, as well as decision making (Dickson-Swift et al., 2014).

The Parental Oral Health Knowledge Assessment (POHKA) was utilized by (Knowlden et al., 2012) to determine oral health literacy levels of Head Start parents. The Cincy Smiles Foundation (CSF) in conjunction with Head Start developed the POHKA survey. The POHKA is a 12-item survey that assesses parental knowledge of recommended oral health practices. Knowlden et al. (2012) reported the tool to be reliable and internally consistent. The survey used for this project was the Upper Peninsula Oral Health Literacy Assessment Survey. The survey asked questions that reflected comprehension because word recognition was not reflective of actual knowledge. Additionally, this project involved a similar population as the Knowlden et. al (2012) study. Knowlden et. al (2012) found their survey to be internally consistent and reliable when administered to parents of children enrolled in Head Start Preschools. Knowlden et al. (2012) demonstrated the efficacy of a community based educational program. The following section will address other successful community based educational programs.

**Community Based Educational Programs**

The success of community based education programs is present in the literature. A study by Huebner and Milgrom (2015) demonstrated that a community based educational program for parents of young children increased parental oral health literacy and increased the number of children brushing twice per day from 59% to 89%. Another
project implemented by (Hanson, Thompson, & Huerque, 2009) analyzed pre- and post-
survey data after participants attended five educational booths. The findings
demonstrated an increase in the pre- versus post-test by one question. They had notably
high pre-educational scores. The age of first dental visit was the notable increase
between the pre- and post-testing. The study by Schroth et al. (2014) successfully
utilized a community based approach utilizing a PowerPoint presentation to provide
education about the prevention of oral caries. Community based educational
interventions have been successful at increasing oral health knowledge. The following
section will briefly address the relationship between knowledge and behavior.

**Oral Health Literacy Levels and Behavior**

A study of 1273 child caregiver dyads where the children were enrolled in WIC in
the state of North Carolina (Vann et al., 2010) found that low literacy scores were
associated with deleterious oral health behaviors and higher literacy scores were associated
with better oral health status reported by the participants. The aforementioned Wilson et
al. (2014) study found that there was a higher compliance to oral health recommendations
in those with higher oral health literacy scores. This is a promising and desirable effect of
increased oral health knowledge in pediatric caregivers. However, not all studies found a
link between knowledge and action.

According to Horowitz, Kleinman, Child, and Maybury (2015) information alone
is not a guarantee of compliance with recommended preventative oral health practices. In
the Macek et al., (2017) study, the CMOHK score was not associated with dental care
utilization i.e. visiting a dentist of having teeth cleaned in the past year. A study by Miller
et al., (2010) also demonstrated no relationship between literacy and behavior. It is beyond the scope of this project to examine relationships between literacy and dental care utilization and adherence to current recommendations. However, this project did seek to understand barriers that may inhibit families from utilizing care regularly or caring for their teeth appropriately.

Chapter Three will provide information about methodology inclusive of research design, sample, population, participants and instrumentation. The data collection and data analysis methods will also be discussed.
Chapter Three

Introduction

The purpose of the study was to identify baseline oral health literacy levels of parents and other care providers of young children and to determine the efficacy of a community-based educational session on increasing oral health literacy levels of parents of young children. Barriers to dental health compliance will also be explored.

Protection of Human Rights

Approval for this project was sought and obtained from the Northern Michigan University Institutional Review Board (see Appendix A). The subjects of the study were the adult caregivers of young children who were invited to participate in an oral health literacy fair. Inclusion criteria included attendees who were over the age of 18 and who self-stated that they were the care provider of a young child and had signed a written consent. Written, informed consent was obtained prior to participation (see Appendix B). Participants were made aware that they did not have to participate in the study in order to attend the oral health literacy fair. Participants were also made aware that they could discontinue participation at any time. The consent form included contact information for Dr. Brian Cherry, Graduate Dean at the time of the study, and a representative of the Human Subjects Research Review Committee of Northern Michigan University. Contact information was also provided for researchers Rachel Nye and Kristi Robinia. Attendees at the second event were given contact information for Dr. Erika Tyler, pediatric dentist. Exclusion criteria was care provider age of less than 18.
Letters of Support

This project was designed under consultation with a pediatric dentist and the sponsoring agency, which was the Alger Marquette Community Action Board (AMCAB). Dr. Erika Tyler, pediatric dentist, and Earl Hawn, the Executive Director of AMCAB provided letters of support for this project (Appendix C). Earl Hawn’s letter specifically identified support for this project to be focused on this population. Offering the intervention in a community based setting was at the recommendation of Heidi Mager, Health Services Manager of AMCAB, due to the ongoing reports of transportation issues as a barrier for the AMCAB population (Mager, 2015).

Recruitment

On the recommendation of the AMCAB director, three communities were identified that were likely to yield high attendance and would benefit from the program. Recruitment for the first event, which was held in Marquette County, was focused on Head Start families. Head Start students in the area were sent home with postcard sized flyers. Approximately one and a half weeks prior to the event, the bus driver handed the postcard to students as they got off the bus at their homes. On the day of the event, children wore a reminder pin home on their shirt or jacket. At the February event in Alger County, flyers went out to all the local preschools and kindergarten students in the local districts. Additionally, a flyer was displayed at the community center. The final event was held at a church in Marquette. After permission from local daycare centers, flyers were sent home with approximately 620 children under age five. Some daycare centers also allowed the flyer to be posted at their facilities. The oral health literacy fairs
were free to participants, children and their families. Additionally, each event provided participants with childcare, a meal, an opportunity to win prizes and fair like activities for children. These incentives were emphasized on advertisements and flyers as part of recruitment.

Sample, Population, and Participants

Parents of children enrolled in Head Start programs were the original intended audience and received the most intensive recruitment efforts. This high risk population was chosen due to the demonstrated link between socioeconomic status and increased rates of dental caries (Horowitz et al., 2015). Due to lower than anticipated attendance, a broader recruitment base was instituted. A convenience sample of care providers of young children participated in this project. A total of 75 participants completed either a pre- or post-survey (or both). A total of 63 complete data sets were obtained, i.e., a pre- and post-survey were completed. Forty females, 17 males and three participants who identified their gender as other completed the survey. Thirty-three participants identified themselves as mothers. Seventeen identified themselves as fathers. Three identified as grandmothers. One identified as a foster mom and three identified themselves as an aunt. Of the 64 who responded to the question identifying their education level, 26 had bachelor’s degrees, 11 had graduate degrees, three had an associate’s degree, 14 identified some college, nine were high school graduates and one did not complete high school. There were one to five children in the families who attended.

Research Setting/Context:
This project took place in Michigan’s rural Upper Peninsula, which only has two pediatric dentists. The first fair was held in October of 2015, in Marquette County. Thirty-six people registered at the door. The event was held in a building on the main highway though the city. The second event was held in February of 2016 in Alger County at a downtown community center. Only six people registered at this event due to a major snowstorm in the area. The third event was held in April of 2016 at a church in Marquette County. A total of 45 people registered at the final event. Not all those who registered participated. Invitations were sent to the homes of approximately 600 families total, including families of AMCAB preschoolers and several day care centers and churches in Marquette and Alger counties. The children were supervised in a separate area while the parents received the presentation.

Resources

At all events, childcare was provided. At the first event, childcare was provided by undergraduate nursing students (supervised by two nursing faculty members) as well as Alger Marquette Community Action Board (AMCAB) employees. All but one student volunteer for the second event, held in Alger County, encountered a closed highway (due to weather) and had to turn back. The one student who attended was able to arrive and provided supervision for the small number of children present. The final event, in Marquette county, was staffed the same as the first event. The meal, door prizes, dental care supplies, rental of facilities and purchase of a dental health book were funded through a grant received from the Northern Michigan University (NMU) faculty grants office. Fluoride varnishing as a community based intervention in addition to educational sessions may help decrease the incidence of dental caries (Department of Health and
Human Services, 2000). There was an opportunity for children to have fluoride dental varnish applied at the first and third events. The weather prevented volunteers who were trained in fluoride application from attending the third event. Fluoride was provided by the State of Michigan. It was applied by a trained nursing student, a dental hygienist or a pediatric dentist after receiving written parental consent. See Appendix D for fluoride varnish consent forms.

**Research Question**

This project sought answer to these three questions:

1.) What are the oral health literacy levels for adults of pediatric caregivers in Marquette/Alger Counties?

   **Hypothesis:** Participants will demonstrate knowledge deficit about oral health behaviors and recommendations

2.) Is a community based oral health education program effective at increasing oral health literacy levels?

   **Hypothesis:** After the educational event, participants will demonstrate an increase in knowledge about oral health behaviors and recommendations related to pediatric dental care

3.) What are the barriers to seeking dental care?

   **Hypothesis:** Participants will report barriers consistent to those in the literature.

**Methodology**
This quantitative study explored the effectiveness of a community based oral health education program at increasing oral health literacy levels of a convenience sample of adult care providers of young children. A pre-test, post-test design was implemented. The pre-survey tool (Appendix E) assessed the baseline level of oral health literacy of participants. Following the educational intervention, the post-survey tool assessed the effectiveness of a community based educational event. Participants in attendance at each oral health literacy event were asked to complete the pre-survey prior to participating in the educational intervention. The pre-surveys were always collected prior to the educational presentation. At the beginning of the educational session, participants were given a free book entitled *What to Do for Healthy Teeth* which they were allowed to keep. The book covered oral health topics in children at a third grade reading level.

After the educational session, participants had the opportunity to ask questions and seek clarification. Next, they completed the post-survey (Appendix F) in hard copy form. Assistance with reading the survey was offered at each event, but none of the participants utilized assistance.

During the first two events participants were assigned a research number. Names were called pre- and post-intervention to give participants the appropriate survey. During the third event, folders were created to better and more efficiently distribute the surveys. The folder as well as the pre- and post- survey were labeled with assigned research numbers. The left side of the folder had a welcome letter, a consent form and the pre-survey. There were directions to complete items on the left side of the folder right away. The completed pre-surveys were collected prior to the intervention. The right side of the folder had a narrow strip across requesting participants “please wait until after the
presentation to complete”. Participants were not required to complete the survey and could request to receive the educational intervention without completing the survey. The intervention between the pre-test and post-test was an oral presentation with accompanying Microsoft PowerPoint© that incorporated oral health information. The presentation was followed by an opportunity for parents to ask questions of the presenter. This program was presented twice by a pediatric dentist and once by a nurse.

The topics covered were as follows:

- What to do if a tooth is knocked out
- When to use a sippy cup or bottle and what to drinks to put in them
- Smoking in the home increases cavities
- Fluoride helps prevent cavities
- When a child should first see a dentist/frequency of visits
- Varnishing and sealants
- Diet, brushing and flossing
- Bacteria is associated with cavities and is communicable.
- Systemic/Overall health is linked to caries

**Instrument**

The tool utilized in this study was based upon an oral health literacy measurement tool, which was piloted on parents of Head Start children by Kristi Robinia \((n = 15)\). The tool developed by Dr. Robinia was done via a review of the literature, feedback from Marquette County Health Department’s Dental Health Coordinator, a personal dentist, a pediatric dentist, and five dentists at an Oral Health Summit. The original tool by Robinia was the basis for the tool utilized in this study. See Appendix G for written permission for use of Robinia’s tool. Modifications to the piloted tool were finalized after another review of the literature and after obtaining feedback from a dental hygienist, a different personal dentist and the aforementioned pediatric dentist. The tool utilized in
this study is the Upper Peninsula Oral Health Literacy Assessment Survey. The tool’s validity was addressed via the aforementioned methods. Reliability is not known because it was developed by for this project. Patient educational materials written above the 8th grade level were found by Stossel, Segar, Gilatto, Fallar, and Karani (2012) to be difficult for most people in the U.S. to understand. The tool used simplified wording with this in mind. The pre- and post-survey tool were assessed within the Word Flesch-Kincaid grade level scoring tool. The pre-survey was found to be a 3.8 and the post-survey tool was a 4.8, which indicates that someone with a minimum reading capability of 3rd through 5th grade should have been able to read the surveys (http://www.readabilityformulas.com/flesch-grade-level-readability-formula.php). Questions that determined adherence to current recommendations were as follows:

1. If the child has ever been to a dentist (linked with age)
2. Frequency of dental visits
3. Frequency of tooth brushing
4. Does the child use a bottle or sippy cup at bedtime (linked with age)
5. What do you put in a bottle or sippy cup when putting a child to bed

Questions that were reflective of knowledge levels were:

1. When should you first take your child to the dentist
2. What should you do if a child knocks a tooth out
3. Where do germs causing cavities in the mouth come from?
4. Parents choose from a list of following statements that they believe are true: (may choose more than one)
   a. Smoking in the home can increase cavities in kids’ mouths
b. Bacteria in the mouth can cause heart and lung diseases

c. An injury to a baby tooth can damage the adult tooth

d. If a child has a toothache, you can give them Aspirin

e. None of the above

5. Parents choose between yes, no or not sure to the following statements:

a. Cavities can contribute to poor overall health throughout the lifespan

b. Products containing fluoride help to strengthen teeth and prevent cavities

c. Mothers/caregivers play a role in passing on cavity causing germs to their children

d. Cavities are caused by germs in your mouth

6. Oral health is as important as other physical areas (Likert scale response)

Finally, participants were asked about reasons that dental care was not sought, which addresses barriers. The list of potential barriers on this question were gleaned from identified barriers in the literature. This particular question also allowed for write in options in case not all barriers were identified. The pre- and post-survey tools can be found in Appendix E and F respectively.

Data Analysis

All data was entered into IBM SPSS Version 24. Using a 95% confidence level and a 9.8 confidence interval, the suggested sample size was 100 according to http://www.surveysystem.com/sscalc.htm, which was the recruitment goal. Descriptive statistics inclusive of demographic data were obtained via IBM SPSS-24. Paired t-tests were applied to questions that were administered prior to and after the educational
intervention to determine if there was a significant difference in knowledge levels at these intervals.

Chapter Four will provide the project analysis.
Chapter Four

Project Analysis

Data Considerations

The final project yielded 75 participants. Eleven participants had missing data i.e. either pre- or post-survey data was missing. Those 11 were omitted from the paired t-testing, but were included in the pre-test as a measure of demographics, baseline knowledge and for identification of barriers. Sixty-four complete data sets were analyzed via paired t-testing to determine the efficacy of a community based educational program.

Participants

Attendees that reported having dental insurance comprised 89% of the sample. Approximately 49% reported having state funded insurance e.g. Medicaid, etc. The population was a rather educated group with over half having a bachelor’s degree or higher. See Figure 1 for a breakdown of participant education levels.
Baseline oral health literacy levels as well as post-interventional oral health literacy levels were compared. Mothers constituted 55% of the participants, while fathers constituted 28%. Other represented caregivers were grandmothers, foster mothers, aunts and those who identified their relationship as other. See Figure 2 for participant demographics. The ages of participants’ children ranged from three months to 37 years (in the case of grandparents attending).
Figure 2. Identification of what relationship the participant had to the child

The setting for two of the events was Marquette County, which is in Michigan’s rural Upper Peninsula. As of 2014, the population of the entire UP was 307,987 with 68,883 of these living in Marquette County (Marquette.org/demographics). At that time, 18% of the population was under the age of 18 and 4.8% were under the age of five (Marquette.org/demographics). The median household income for 2014 in Marquette County was $44,267, with per capita earnings of $22,681 during the same year (Marquette.org/demographics). One of the events was held in Alger County, which had a population of 9,215 in 2016. The percentage of the population under age eighteen was 15.1%, while 3.5% were under the age of five (United States Department of Commerce, 2017). The median household income was $41,270 in 2016 and the per capita earnings were $20,993 (United States Department of Commerce, 2017). All participants were residents of this area although not all were caregivers of children enrolled in Head Start.
Attendees signed in at each of the three events. At the first event, 23 of the 36 people who registered reported having a child in the AMCAB Preschool Program. Three did not answer and ten said that their children were not in AMCAB Preschool. Just under one-third of the thirty-six that registered left prior to attending the presentation. The second event had six attendees. None indicated that their child was in AMCAB. Forty-five people registered for the third event. Of these, 19 said that their child was not enrolled in AMCAB Preschool. Six said that their child was enrolled in AMCAB Preschool and twenty did not answer the question. Not all attendees participated in the educational presentation and not all those who participated in the presentation completed pre- and or post-surveys. All oral health literacy events were analyzed collectively, i.e., the three separate sites were not separated for the data analysis.

Data was analyzed to address the following research questions:

1.) What are the oral health literacy levels for adults of pediatric caregivers in Marquette/Alger Counties? Hypothesis: Participants will demonstrate knowledge deficit about oral health behaviors and recommendations

2.) Is a community based oral health education program effective at increasing oral health literacy levels? Hypothesis: After attending an educational activity, participants will demonstrate an increase in knowledge about oral health behaviors and recommendations for the pediatric population

3.) What are the barriers to seeking dental care? Hypothesis: Participants will report barriers consistent to those in the literature.
Baseline Oral Health Literacy Levels

Pre-test scores demonstrated strong baseline knowledge in some areas. For example, 100% of participants knew fluoride strengthens teeth and 73% report brushing their child’s teeth at least twice per day. There was not a statistically significant difference in response to the statement: Oral health is as important as other areas of physical health. This response asked for a Likert scale response ranging from strongly agree to strongly disagree. The score on the pre-test was 1.23, compared to a post-testing score of 1.14. Table 1 identifies other areas of knowledge that did not reflect a remarkable increase in score accuracy.

Table 1. Baseline literacy strengths of parents and other care providers of young children
Note. These items did not demonstrate a statistically significant increase when pre- and post-survey data were compared. This is due to a baseline higher level of knowledge of these items.

Efficacy of Community-Based Education Program

Individual questions were evaluated for an increase in appropriate answers in the pre- versus post-interventional surveys. The areas with most notable increased scores in the post- test were when to take a child to the dentist for the first time, germs cause cavities, smoking in the home increases cavities and mothers and care providers can pass germs to children. Table 2 highlights areas that had notable increases in literacy.

Table 2: Notable increases in literacy

![Bar Chart](chart.png)

Note. These items were found to have a statistically significant increase in knowledge when pre- and post- survey results were compared.
Thirteen questions on the pre-test and 11 questions on the post-test were identified as an indicator of oral health literacy. Some of the questions were repeated on the post-survey. However, some of the questions reflected current dental hygiene practices and thus did not need to be asked on both the pre- and post-survey. A paired t-test was performed to evaluate difference between the percentages of questions answered correctly on the pre-test versus percentage of questions answered correctly on the post-test. The mean score was 68.8% on the pre-test compared to 92.6% on the post-test. The results on these individual items were statistically significant with a p value of < .0000. The items considered are listed below.

**Parental Oral Health Knowledge**

Parents and other caregivers responded to questions that were reflective of their oral health knowledge level. The following topics were covered via survey questions:

- How often does the child go to the dentist/hygienist?
- How often do you brush your child’s teeth?
- When should you first take your child to the dentist?
- What would you do if your child knocks a tooth out?
- When putting your child to bed, what is in the sippy cup?
- Where do germs causing cavities in the mouth come from?
- Smoking in the home contributes to cavities
- Bacteria in the mouth increases the risk of developing heart and lung disease
- Injury to the baby tooth can damage the adult tooth
- Cavities are caused by germs in your mouth
- Mothers/caregivers can pass cavity causing germs to their children
- Fluoride strengthens teeth and prevents cavities
- Cavities can contribute to poor overall health throughout the lifespan.
- The statement “poor oral health is as important as other areas” was evaluated with a Likert scale.

**Barriers to seeking Dental Care**

Although a review of the literature identified numerous possible barriers to dental care, 50% of the participants in this study stated that they had no barriers to receiving appropriate dental care. For a breakdown of the barriers, see Figure 3.

*Figure 3. Barriers to dental care as identified by this sample.*
Qualitative Data

The last question on the post-survey asked participants what they learned as a result of the program. Forty-two participants wrote “yes”. Some elaborated and identified what they learned, which was consistent with areas of statistical significance on the quantitative data. There were eight comments with positive feedback about the presentation in general. Three commented about the age that kids should go to the dentist. Five commented learning the transmission of cavity causing germs. Thirteen commented about knowing what to do now if a tooth is knocked out. Two commented about sealants and five commented about fluoride. All comments can be found in Appendix H.

Limitations

There were several limitations in this project. Despite extensive advertisement, the number of attendees was lower than anticipated. Invitations and reminders about each event were plentiful, but attendance was not. For example, over 600 children were sent home with invitations. However, the total attendance for all three events was only 77 with 64 complete data sets.

The participants were overall an educated group that may have yielded different result if compared to a group with less than a high school education, which has been considered a risk factor. Attendance at the event may have reflected the value that parents and other care providers of young children place on oral health that may have affected some of the answers. This group did not identify transportation as a barrier, which was not consistent with the literature. Offerings of the program included a variety
of convenient places and at different times of day in order to make attendance easier for those who may have transportation issues. This group did not identify lack of transportation as a barrier. Those who were able to attend may not have transportation issues since they were able to attend. The group included parents of children enrolled in AMCAB preschools (income based) as well as those from private daycares and churches in the area. Based on the sign in at the registration table, twenty-nine attendees stated that their child was enrolled in AMCAB programs. A total of 29 said that their child was not enrolled in AMCAB programs and 23 did not indicate if their child was or was not. Those that did not qualify for income-based preschools may have had access to more resources such as transportation, etc.

The weather was a major barrier in the second event that was offered in Alger County. Closures in the area due to a snowstorm with white out driving conditions affected the number of participants. One of the main roadways from Marquette to Munising was closed to traffic due to adverse weather conditions and a threat to safety. The weather at the Munising event prevented the pediatric dentist from attending and presenting. Therefore, the nurse researcher gave the presentation. Participants were given the pediatric dentist’s email in case they had further questions that were not addressed at the event.

Interruptions were another potential limitation. There were various interruptions from children wanting their parents. Even though children were supervised and had many activities available, a small number of children needed their parents at various points during the surveys and educational time. This may have been distracting to the parents as well as those around them as parents or children moved in and out of the room.
Attendees may have missed information or directions on completion of the surveys. Participants arrived late, left intermittently during the presentation and /or left early. This may have affected the information they received and thus their post-survey scores. At the first event, a volunteer came into the room during the post-survey to say that parents needed to come get their children. Parents may not have completed their survey or rushed through it due to this occurring.

A meal was served at all events. At the first event, the meal was served prior to the presentation. Additionally, ten people signed in for the meal, but left prior to the presentation and survey completion. The meal was offered after the educational session at subsequent events.

The Marquette event was held at a church. This may have been a potential barrier to people who would have been uncomfortable in a church. The Alger county event occurred during a major snowstorm. The food was ordered, the meeting space reserved, and volunteers scheduled, therefore the event was not cancelled. Additionally, extreme weather conditions are rather commonplace in this area. However, on this particular day, driving conditions were atrocious, and one of the major highways into town was also closed. This is likely to have impacted attendance.

The phrasing of the questions rendered the analysis slightly more difficult. Making more questions Likert scale type responses may have assisted the t-test design, i.e., each question could have had a pre- and post-score rather than a cumulative percentage on the pre- and post-survey. The survey tool used was a revised tool, so its reliability was not confirmed. Validity was established by utilizing some items from a
previously piloted study, reviewing the literature, and by eliciting feedback from dentists, hygienists, and the Marquette County Dental Health Coordinator, Rebecca Maino.

**Significance and or Implications**

Baseline oral health literacy levels were found to improve in multiple areas. This may indicate that parents are not receiving adequate oral health education. It is likely that parents will interact more with daycare providers, nurses, and primary care providers earlier and with greater frequency as compared to dentists. Thus, the utilization of a community-based education program should be continued and the possibility of disseminating information through schools and primary care providers and settings may be explored further.

**Conclusions**

This project identified baseline levels of oral health literacy of parents and other custodial care providers of young children in this population. As this was a rather educated sample, the baseline levels of oral health knowledge were higher than anticipated in several areas. However, there were some areas that demonstrated a statistically significant increase in knowledge after the implementation of a community based educational intervention. A small percentage of the barriers identified by this population were consistent with those in the literature, i.e., inability to pay, no insurance, inability to find a dentist, and other unidentified reasons. A total of 50% of this sample did not identify any barrier to receiving care. Further, 25% stated that their child was too young, even though that was not the case. Knowledge about the appropriate age to take a child for their first dental visit was one of the areas that showed significant increase in the
pre- and post-test surveys. The age barrier identified by care providers was reflective of a knowledge deficit that was corrected via the educational intervention.

**Recommendation for Future Research**

Potential barriers to continuance of a community based program is cost and the manpower needed to run especially if childcare is provided. Future exploration of primary care provider integration of oral health is promising. Traditional nursing education does not emphasize oral health care. There may be an opportunity to explore the inclusion of oral health care and incorporation of skills such as dental varnishing as a nursing skill. Primary care providers as well as nurses in an office setting may be in a prime position to provide education and varnishing. Further tool development may be useful, i.e. change to more scaled answer options.
References


The Institutional Review Board (IRB) has reviewed your proposal and has given it final approval. To maintain permission from the Federal government to use human subjects in research, certain reporting processes are required.
A.

You must include the statement "Approved by IRB: Project # HS15—687" on all research materials you distribute, as well as on any correspondence concerning this project.

B.

If a subject suffers an injury during research, or if there is an incident of non—compliance with IRB policies and procedures, you must take immediate action to assist the subject and notify the IRB chair (dereande@nmu.edu) and NMU's IRB administrator (bcherry@nmu.edu) within 48 hours. Additionally, you must complete an Unanticipated Problem or Adverse Event Form for Research Involving Human Subjects.

C.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding. Informed consent must continue throughout the project via a dialogue between the researcher and research participant.

D.

If you find that modifications of methods or procedures are necessary, you must submit a Project Modification Form for Research Involving Human Subjects before collecting data.

E.

**If you complete your project within 12 months from the date of your approval notification, you must submit a Project Completion Form for Research Involving Human Subjects. If you do not complete your project within 12 months from the date of your approval notification, you must submit a Project Renewal Form for Research Involving Human Subjects. You may apply for a one-year project renewal up to four times.**
NOTE: Failure to submit a Project Completion Form or Project Renewal Form within 12 months from the date of your approval notification will result in a suspension of Human Subjects Research privileges for all investigators listed on the application until the form is submitted and approved.

All forms can be found at the NMU Grants and Research website:
http://www.nmu.edu/grantsandresearch/node/102

aw
Amanda Wigand

Graduate Assistant

Grants and Contracts Office
MEMORANDUM

TO: Rachel Nye
   Nursing

FROM: Robert Winn, PhD.
      Assistant Provost/IRB Administrator

DATE: March 29, 2016

Modification to
HS 15-687 IRB
Approval Dates:
9/28/2015-9/28/2016**
"Oral Health Literacy"

Your modification for the project "Oral Health Literacy" has been approved under the administrative review process. Please include your proposal number (HS15-687) on all research materials and on any correspondence regarding this project.

Any additional changes or revisions to your approved research plan must be approved by the IRB prior to implementation. Unless specified otherwise, all previous requirements included in your original approval notice remain in effect.

If you complete your project within 12 months from the date of your approval notification, you must submit a Project Completion Form for Research Involving Human Subjects. If you do not complete your project within 12 months from the date of your approval notification, you must submit a Project
Renewal Form for Research Involving Human Subjects,
You may apply for a one-year project renewal up to four times.

NOTE: Failure to submit a Project Completion Form or Project Renewal Form within 12 months from the date of your approval notification will result in a suspension of Human Subjects Research privileges for all investigators listed on the application, until the form is submitted and approved.

If you have any questions, please contact me.

Jnt
Thank you for attending our oral health literacy program! We are inviting you to participate in a research study. The purpose of this research study is to determine factors influencing oral health. We are inviting you to be in this study because you are the parent or caregiver of a Head Start student. If you agree to participate, we would like you to complete a survey before attending the presentation about oral health and another survey after the presentation about oral health. It may take approximately 15 minutes of your time and we ask that you answer the questions to the best of your ability.

We will keep the information you provide confidential. However, federal regulatory agencies and the Northern Michigan University Institutional Review Board (a committee that reviews and approves research studies) may inspect and copy records pertaining to this research. If we write a report about the study we will do it in such a way that you cannot be identified. There are no known risks from being in this study and you will not benefit personally. However, we hope that others may benefit in the future from what we learn as a result of this study. You will not have any costs for being in the research study. You will not be paid for being in this research study.

Taking part in this research study is completely voluntary. You may skip any questions that you do not want to answer and you may stop participating at any time. If you decide not to be in this study or if you stop participating at any time, you won’t be penalized or lose any benefits for which you otherwise qualify.

If you have any further questions regarding your rights as a participant in a research project you may contact Dr. Brian Cherry of the Human Subjects Research Review Committee of Northern Michigan University (906)227-2300 bcherry@nmu.edu. Any questions you have regarding the nature of this research project will be answered by the principal researcher who can be contacted as follows: Rachel Nye (906) 227-2668 rnye@nmu.edu You may also inquire of the faculty chair overseeing this project: Dr. Kristi Robinia (906) 227-2484 krobinia@nmu.edu. The project # is HS15-687.

By completing and submitting the survey, you affirm that you are at least 18 years old and that you give your consent for Rachel Nye to use your answers in her research. If you would like to participate, please sign the consent below.

I am at least 18 years of age and am voluntarily participating in this study:

______________________________
Signature and Date
APPENDIX C

Letters of Support

Marquette Pediatric Dentistry, P.C.
1025 N. Third St. • Marquette, Michigan 49855
Ph. (906) 226-3600 • Fax (906) 226-3604

September 11, 2014
To Whom It May Concern,
It is my pleasure to write a letter in support of the proposal for the Marquette
County Oral Health Literacy Project being submitted to the Superior Health
Foundation by Kristi Robinia PhD, CNE, RN and Rachel Nye MS, CNE, RN at Northern
Michigan University's School of Nursing.

As the only Pediatric Dentist currently practicing in the U.P., the extent of dental disease
I encounter on a daily basis is truly overwhelming. I absolutely believe that educating
our community and families will play a major role in preventing Early Childhood Caries.
My hope is that this project will not only teach parents/caregivers proper oral hygiene
techniques but also encourage them to schedule their child's first dental visit by age one,
as recommended by the American Academy of Pediatric Dentistry and the American
Academy of Pediatricians.

Our office had the pleasure of working with Northern University's Nursing Program and
AMCAB Head Start in a similar project last year, to great success. The feedback we
received from the students, the children and their families was overwhelmingly positive.
It would be wonderful if we were able to grow the program to include even more
children this year.

In conclusion, I fully support the efforts of this outstanding project. A program
targeted at the prevention of dental caries for this vulnerable population will
definitely aid the efforts of our community in creating healthy smiles and healthy
mouths.

Thank you very much for your consideration!

Erika J. Tyler, D.D.S.
September 10, 2014

To Whom It May Concern,

Please accept this letter of support for an application to fund a collaborative effort being applied toward healthy literacy specifically focused on oral health for young children. We at AMACB have a long standing relationship with the NMI-J School of Nursing and we welcome a continued collaborative effort targeted towards increasing oral health literacy of our low-income families residing in Marquette County. A health literacy intervention program will impact young children's health for years to come. Recent federal budget restrictions and regulations have dampened our ability to reach families with this type of intervention through our Head Start and Early Head Start programs. A grant award with the subsequent help from senior nursing students would ensure implementation of this project.

Sincerely Yours,

Earl P. Hawn Jr.
APPENDIX D

Fluoride Consent

I __________________ (printed name) give my permission for my child

_________________________ (printed name) to have fluoride dental varnish applied.

Application may be by NMU Nursing Students/dental hygienist/dentist/other trained persons.

______________________________

Parent Signature/ Date
APPENDIX E

Pre- Survey Tool Project # HS15-687

1) Please list the ages of your children and whether or not they have ever had their teeth examined by a dentist or dental hygienist:

<table>
<thead>
<tr>
<th>Age of Child (or children)</th>
<th>Has your child’s teeth ever been examined by a dentist or dental hygienist?</th>
<th>If Yes, how often does your children go to the dentist or dental hygienist?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>□ Yes □ No</td>
<td>□ Every 6 months □ Once a year □ Once every 2 years □ Other, specify________</td>
</tr>
<tr>
<td></td>
<td>□ Yes □ No</td>
<td>□ Every 6 months □ Once a year □ Once every 2 years □ Other, specify________</td>
</tr>
<tr>
<td></td>
<td>□ Yes □ No</td>
<td>□ Every 6 months □ Once a year □ Once every 2 years □ Other, specify________</td>
</tr>
<tr>
<td></td>
<td>□ Yes □ No</td>
<td>□ Every 6 months □ Once a year □ Once every 2 years □ Other, specify________</td>
</tr>
<tr>
<td></td>
<td>□ Yes □ No</td>
<td>□ Every 6 months □ Once a year □ Once every 2 years □ Other, specify________</td>
</tr>
</tbody>
</table>
2) Do you have dental insurance for your children? If so, which type? (private, PPO/HMO, Medicaid, Other (Please specify).

☐ Yes ________________________________

☐ No

3) If any child in your family has not seen a dentist or does not see one regularly, please identify the reason(s): (Select all that apply)

☐ N/A (Not Applicable to our family) because my child regularly sees a dentist

☐ Dental office did not take my insurance plan

☐ Dental office declined my request for an appointment

☐ I do not have dental insurance

☐ I am unable to pay for dental visits or copays for dental visits

☐ Child is too young

☐ The office hours are inconvenient for your work schedule

☐ Haven’t found a dentist

☐ The dental office will not let you back with your child during their exam

☐ Dental office locations are not close to your home

☐ I do not have transportation to get my child to the dentist

☐ Other (List out) ________________________________

4) How often do you brush your child’s teeth?

☐ Once per day

☐ 2 times per day

☐ 3 times per day
5) When should you first take your child to the dentist?
   - Children don’t need to go to the dentist, unless they have pain
   - When they start school
   - As soon as the first tooth comes in, or no later than 1 year old
   - Age 3

6) What would you do if your child knocks out a tooth?
   - Nothing if it is only a baby tooth because adult teeth will come in later
   - Nothing if it is an adult tooth, unless it hurts
   - Go immediately to the Emergency Room
   - Find the tooth, rinse it with salt water, put it in milk and call the dentist

7) Does your child (children) still use a bottle or sippy cup?
   - Yes  Age of child (children) using the bottle/or sippy cup:  
     ________________________________
   - No

8) When putting a child to bed, what would you put in a bottle or sippy cup? (May pick more than one)
   - Milk
   - Sweet liquids
   - 100% Fruit Juice
   - Milk, Juice, or water
   - Water only

9) Where do germs causing cavities in the mouth come from?
   - They come from food you eat
☐ You were born with them

☐ From your caregivers or mother

☐ None of the above

10)  Check off the statements below that are **TRUE.** (May mark more than one)
    ☐ Smoking in the home can increase cavities in kids’ mouths
    ☐ Bacteria in the mouth can cause heart and lung diseases
    ☐ An injury to a baby tooth can damage the adult tooth
    ☐ If a child has a toothache, you can give them Aspirin
    ☐ None of the above

11) Oral health is as important as other physical areas
    ☐ Strongly agree
    ☐ Agree
    ☐ No opinion
    ☐ Disagree
    ☐ Strongly disagree

12) Cavities are caused by germs in your mouth
    ☐ Yes
    ☐ No
    ☐ Not sure

13) Mothers/caregivers play a role in passing on cavity causing germs to their children
    ☐ Yes
14) Products containing fluoride help to strengthen teeth and prevent cavities
   ☐ Yes
   ☐ No
   ☐ Not sure

15) Cavities can contribute to poor overall health throughout the lifespan
   ☐ Yes
   ☐ No
   ☐ Not sure

16) Please identify your relationship to the Head Start student

   Mother
   ☐

   Father
   ☐

   Grandmother
   ☐

   Grandfather
   ☐

   Foster Parent
   ☐

   Aunt
   ☐

   Uncle
   ☐

   Other Care provider (please identify) ____________________________
17) Please identify your highest level of educational background

- Did not complete high school
- High school graduate
- Some college
- Associate degree
- Bachelor degree
- Graduate degree
APPENDIX F

Post-Survey Tool Project # HS15-687

Thank you once again for attending our oral health literacy program! We appreciate your time in filling out this post-survey.

1) When should you first take your child to the dentist?

- Children don’t need to go to the dentist, unless they have pain
- When they start school
- As soon as the first tooth comes in, or no later than 1 year old
- Age 3

2) What would you do if your child **knocks out** a tooth?

- Nothing if it is only a baby tooth because adult teeth will come in later
- Nothing if it is an adult tooth, unless it hurts
- Go immediately to the Emergency Room
- Find the tooth, rinse it with salt water, put it in milk and call the dentist
3) When putting a child to bed, what would you put in a bottle or sippy cup?
   (you may pick more than one)
   - Milk
   - Sweet liquids
   - 100% Fruit Juice
   - Milk, Juice, or water
   - Water only

4) Where do germs causing cavities in the mouth come from?
   - They come from food you eat
   - You were born with them
   - From your caregivers or mother
   - None of the above

5) Check off the statements below that are TRUE. (You may mark more than one)
   - Smoking in the home can increase cavities in kids mouths
   - Bacteria in the mouth can cause heart and lung diseases
   - An injury to a baby tooth can damage the adult tooth
If a child has a toothache, you can give them Aspirin

None of the above

6) Oral health is as important as other physical health

Strongly agree

Agree

No opinion

Disagree

Strongly disagree

7) Cavities are caused by germs in your mouth

Yes

No

Not sure

8) Mothers/caregivers play a role in passing on cavity causing germs to their children

Yes

No

Not sure

9) Products containing fluoride help to strengthen teeth and prevent cavities

Yes
10) Cavities can contribute to poor overall health throughout the lifespan
   - Yes
   - No
   - Not sure

11) Did you learn anything tonight that you didn’t know before, or anything you thought was interesting? (Please use the other side if needed)
Memorandum

To: Rachel Nye

From: Kristi Robinia PhD, RN

RE: Oral Literacy Measurement Tool

Dear Rachel:

You are very welcome to use the oral literacy measurement tool developed for the pilot project, “Oral health literacy”. Please feel free to alter the survey in any manner to fit the needs of your objectives and research population. The tool was developed in consultation with a pediatric dentist, dental care specialist, a general dentist, and through feedback from dentists at an Oral Health Summit.

Let me know if you should need any assistance, Good luck with your research,

Sincerely,

Kristi Robinia PhD, RN
APPENDIX H

Qualitative Comments

Some information about sealants varnish will research later
That my 2 year old should not be using a sippy cup
How to save a knocked out tooth
The importance of caring for baby teeth and how that affects adult teeth
Excellent presentation
Adult teeth are right after baby teeth
Passed through maternal/mom
Yes great information and presentation
Yes cavities are caused by germs that are given to you
I thought the whole program is helpful to people that might just be having children to
know when and what to do when their children start getting teeth
That you can pass germs AKA cavities to your child by kissing them on the lips
Too much fluoride can cause teeth to grow in with a yellowish h color
How to take care of a knocked out tooth
Fluoride in water vs fluoride toothpaste
I wasn’t aware of the procedure for handing a knocked out adult tooth (milk in a cup or
insert back in mouth w/o touching the root and call or see the dentist within 30 minutes)
In general the presentation added detail and emphasis on what I did know. As a result I
appreciate (more) the importance of daily oral health practices.
I also learned that well water might have fluoride in it; I assumed it did not
Yes what to do when a tooth falls out
Yes to take a child to the dentist right away if their adult teeth come up behind them as
the dentist will remove the baby teeth
To put the tooth back in if it is knocked out only when it’s an adult tooth
Yes what to do if knock out a tooth
Oral health is more important than I gave credit for and to get my little ones to the dentist sooner than 2 years also my family and I need to get to the dentist more often – Thank you

See dentist by 1 y/o

That there is fluoride in well water

The section on fluoride was very informative and helpful

Not to rub orajel on gums only water before bed

You can put adult tooth back in

I learned so much! I did not know that children need to go to the dentist for the first time by the time they are one. I will be getting my water tested for fluoride. I had no idea how much fluoride could be in my water.

Being a new parent I found this very helpful as a general guideline for our new little ones future health

That children should see a dentist before one year of age

Did not realize that the new recommendations are to see a dentist before the child is 1.

Xylitol in new moms can decrease children’s dental caries

To not reinsert baby tooth

How young (1 year old to take to dentist)

Yes I did- Glad to have the book to help me remember the info!

Yes that kids go when they get teeth

Yes it is great that these type of session are available to the community. Well done!

Regarding sealants and varnish

How to preserve a tooth that’s fallen out

Can pass germs (cavities) to kiddos

Had no idea about when a tooth gets knocked out!

Super Presentation!

Yes to spit in a cup if a tooth is knocked out to preserve the tooth

The baby tooth component was interesting. Thank you

About salt and water

My daughter has already had a traumatic tooth experience
That we pass our germs (cavity germs) to our kids

Yes! Loved this meeting and everything you guys did to put this together! Thank you so much 😊