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Effect of Reduced-Fee Dental Hygiene Treatment and Oral Health Perceptions Among Socioeconomically Deprived Persons

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Abstract

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by

Janeime Asbury

MPH, Walden University, 2012

BS, Sweet Briar College, 1992

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Epidemiology

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Abstract

Access to oral health care remains problematic for millions of Americans. Factors such as socioeconomic status, age, race, and lack of dental insurance benefits inhibit the ability of many to obtain preventative oral health care. The aim of this study was to explore the effect of preventive oral health treatment and education at reduced-fee dental hygiene facilities on the oral health behaviors and perceptions of socioeconomically deprived persons within the state of Georgia. This study was based on the health belief model constructs. A convenience sample of 102 participants was recruited from the individuals who visited two dental hygiene colleges to seek treatment for the first time. The independent variable was the receipt of reduced-fee dental hygiene treatment/education. The dependent variables were the oral health perceptions and behaviors of socioeconomically deprived persons, as well as the perceptions and behaviors of patients provided with a referral for follow-up treatment with a dentist. Mediating variables were sex, age, race, and socioeconomic status. Wilcoxon Signed Rank test and logistic regression were applied to detect potential differences in the dependent variables before and after treatment. The most significant changes were found in categories dealing with self-efficacy measures that patients could take to improve their own oral health. Also, the oral health behaviors and perceptions of younger, African-American of low educational and financial background were significantly more improved after treatment. The social change implication of this research may be that oral health practitioners can use these results to create preventative interventions more tailored for socioeconomically deprived persons who face complicated oral health issues.

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Dedication

The body of this work is dedicated to my mother, Janis Asbury. She never stopped talking about the importance of learning. Your life has inspired every aspect of mine and your death propelled me to movement. Your beauty, grace, and wisdom were legendary and my only hope is that I have made you proud.

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To my husband, James, your quiet support is always valued; you are the consistency behind my drive. To my children, you can be whatever you desire to be. Never give up on your dreams. You may gain and loose many things in your life, but your education will always be yours. Ethel, without you, this last push to finish would not be possible.

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Chapter 1: Introduction to the Study

Oral health is an integral component of systemic health. Among disadvantaged populations, successfully attaining preventative oral health services remains challenging (Higgs, Bayne, & Murphy, 2001). Research has shown that poor oral health may exacerbate chronic health conditions such as heart disease and diabetes (Fisher-Owens et al., 2008; Griffin et al., 2012); however, dental diseases (e.g. dental caries, periodontal diseases) are largely preventable with routine dental care. Disadvantaged populations routinely forgo dental care inadvertently increasing the risk for chronic health conditions (Cohen et al., 2007).

In the landmark Report of the Surgeon General Oral Health in America (Satcher, 2000), the author revealed extensive disparities in oral health care among minorities and socioeconomically deprived people. Today, oral health continues to remain an elusive goal for millions of socioeconomically deprived persons (Asadoorian, 2009; Fisher-Owens et al., 2008; Peres et al., 2011; Vanderbilt et al., 2013). For the last decade, the United States has listed increased access to preventative dental services for adults as one of the objectives for Healthy People 2020 (HHS, 2013).

Disparities in access to preventative oral health care among deprived persons have been attributed to race, ethnicity, income, education, and insurance coverage (Bailit & D'Adamo, 2012; Fisher-Owens et al., 2008). Traditional resources for dental insurance have continued to decrease as small businesses reduce or eliminate dental benefits, and employee out-of-pocket expenses increase (Higgs et al., 2012; Ramraj & Quiñonez, 2013). For many economically deprived persons, Medicaid has become the primary form of

health insurance (Higgs et al., 2001). Nationwide state reductions and exemptions in adult dental Medicaid benefits have led to the underutilization of preventative dental services in a dental office (Bailit & D'Adamo, 2012) and an increase in the overutilization of hospital emergency rooms for the treatment of non-traumatic dental injuries (Okunseri et al., 2012). For this reason, the overutilization of hospital emergency room use for the treatment of non-traumatic dental injuries has been extensively examined (Cohen et al., 2011; Lee et al., 2012;Okunseri et al., 2012; Pajewski & Okunseri, 2012; Seu, et al, 2012). However, the role that oral hygiene instruction plays in encouraging follow-up visits with a dental practitioner among socioeconomically deprived persons, especially for those who had uncovered dental expenses, remains to be examined.

Background

Several studies have documented that disproportionally high rates of disadvantaged adults, particularly disadvantaged minorities, tend to more frequent the emergency room for non-traumatic dental emergencies (Cohen et al., 2009; Kim et al., 2012; Pajewski & Okuseri, 2012). The reasons stated for not seeking treatment for preventative dental measures range from limited access to care issues, lack of socioeconomic means, and absence of insurance (Ramraj & Quiñonez, 2012). Recent reductions in Medicaid dental benefits by individual states, coupled with minimum wage employment opportunities with little to no dental benefits, have left many people without dental insurance coverage. In 2012, approximately 130 million Americans did not have dental insurance coverage (Sanders, 2012). Recent trends in reduced Medicaid benefits for dental care, in some states,

have contributed to the rise in emergency room use for dental emergencies rather than using dental offices (PEW Center on the States, 2012).

Cohen et al. (2010) and Kim et al. (2012) reported that the study participants with lower income and lower education attainment levels were more likely to use the emergency room for a dental issue. African Americans particularly experienced dental pain associated with root caries and periodontal diseases more often than their White counterparts, often delaying treatment for anywhere from 10 to 14 days before seeking treatment from an emergency room (Quiñonez, 2009). In addition, the authors reported that the participants eventually went to a dental office for a follow-up visit; however, they could not determine from the data how long the interval was. Non-traumatic dental visits to the emergency room traditionally result in a palliative treatment of pain medication accompanied with a referral to a local dental office for follow-up care (Pajewski & Okunseri, 2012).

Non-traumatic dental emergencies typically occur from untreated dental decay (Quiñonez, 2009). Wilkins (2009) described dental decay as a chronic infectious pathologic process in the hardened tissues of the teeth, which become demineralized when left untreated. Untreated dental caries could lead to the loss of teeth, impaired speech, and an inability to perform normal social roles (Cohen et al., 2007).

Statement of the problem

Racial and ethnic disparities in oral health care have historically been attributed to many factors such as poor education attainment and low socioeconomic status (Clovis, 1994). Reduced health benefits in response to the increase cost of dental care coupled with

fewer providers and higher copays have caused many health care consumers to feel limited in their abilities to seek restorative and preventative dental treatment (Higgs et al., 2001). Consequently, a significant rate of economically deprived adults visited frequently hospital emergency rooms for the treatment of non-traumatic dental emergencies (Cohen et al., 2009; Kim et al., 2012; Pajewski & Okuseri, 2012). Although dental decay is largely preventable, untreated dental disease can influence overall general health (Griffin et al., 2012). Neglecting the treatment of oral diseases (dental caries and periodontal diseases) could lead to the loss of teeth, impaired speech, and an increased risk of negative health outcomes associated with other systemic chronic diseases such as diabetes (Griffin et al., 2012).

Within a 4-year period (1997–2000), 2.95 million emergency room visits for tooth related injuries were estimated (Wall, 2012). In addition, between 2000 and 2006, the number of emergency room visits for dental related issues rose from 108 million to 119 million (Wall, 2012). According to the PEW foundation, the average cost that the nation spent to treat 300,000 cases of dental related visits at the hospital totaled approximately $110 million dollars (PEW Center on the States, 2012). Data from the 2008 National Emergency Department Sample revealed that in the United States, 74 million emergency room visits occur among working adults aged 19 to 64 years old, and 0.2 to 1.0% of the visits were due to complications of dental decay (Walker et al., 2013). Cohen et al. (2011) found that participants with lower income initially were more likely to use the hospital emergency room for non-traumatic dental conditions because a palliative treatment with antibiotics and pain medication were offered (Okunseri et al., 2012). In another study,

Pajewski and Okunseri (2012) indicated that patients aged 18 to 50 years living in areas with a lower supply of dental providers were more likely to return to the emergency department. Both Cohen et al. (2011) and Walker et al. (2008) found that participants eventually went to a dental office for follow-up visits, because palliative emergency room treatment serves only as a temporary solution for the oral health problem. The reduction of Medicaid benefits for dental care in some states has contributed to the rise in emergency room use for dental emergencies rather than dental offices (Naegele et al., 2010). Non-traumatic visits unnecessarily increase the financial costs of hospital expenses (Sanders, 2012; PEW Center on the States, 2012). State-funded hospitals were more likely to suffer from the extreme financial burdens caused by using emergency rooms for non-traumatic dental injuries (PEW Center on the States, 2012). Reduced-fee treatments provided by dental and dental hygiene schools have served as a buffer for those who seek dental care, offering services at a severely reduced rate to give students hands on experience in treating patients. In addition, stand-alone dental hygiene schools, which are not associated with a dental school, offer preventative treatment services without offering restorative treatment services.

A collaborative report conducted by the U.S. Centers for Disease Control (CDC) and Prevention and the Association of State and Territorial Dental Directors (ASTDD) (2010) revealed that 22 of 159 counties in the state of Georgia were without a Medicaid dental provider and 24 counties had no dentist at all, leaving a total of 211,479 Georgia residents without any dental provider. Consequently, a total of 6,427 licensed dental hygienists were working under the direct supervision of 5,382 dentists due to the 1:14 ratio

of dental schools to dental hygiene schools within the state (CDC, 2010). As of 2009, 26% of children younger than 18 years lived in households with income at or below 125% of the federal poverty level. In 2013, a family of four living with an income of $23,850 qualified as 130% below the poverty level (U.S. Department of Health and Human Services, 2013). Reduced-fee dental hygiene and preventive treatment may significantly contribute to promoting oral health of individuals of low socioeconomic status and reducing emergency dental visits expenses (Asadoorian, 2009). In addition, oral diseases (dental caries and periodontal diseases) can be completely prevented with the use of preventive professional hygiene interventions (e.g., fluoride applications, placement of dental sealants, educational strategies, and prophylaxis) (Clovis, 1994). However, the effect of reduced-fee dental hygiene treatment on oral health perceptions of socioeconomically deprived persons has not yet investigated, although evidence suggests that dental hygiene interventions are important for the reduction of oral health disparities, particularly in economically disadvantaged people such as older population groups (Asadoorian, 2009). Therefore, the aim of this study was to assess the effect of reduced-fee dental hygiene treatment on oral health behaviors and perceptions of socioeconomically deprived persons to improve oral comfort and eventually quality of life for this underserved population group.

Purpose of the Study

The aim of this study was to fill the aforementioned literature gap related to the effect of reduced-fee dental hygiene preventive treatment on oral health behaviors and perceptions of socioeconomically deprived persons, who received this treatment for the

first time and who were not be able to afford a dentist at the time of the conduction of the study, within the state of Georgia. Identification of oral health behaviors and perceptions of this disadvantaged population may encourage developing educational oral health promotion programs for this high-risk population group.

Research Questions

The research questions and related hypotheses for this study were as follows;

1. Does preventive treatment (e.g., fluoride applications, placement of dental sealants, educational strategies, and prophylaxis) in an educational dental hygiene clinical setting affect the oral health behaviors and perceptions of socioeconomically deprived persons?

   Null hypothesis: Treatment in an educational dental hygiene clinical setting does not affect the oral health behaviors and perceptions of socioeconomically deprived persons.

   Alternative hypothesis: Treatment in an educational dental hygiene setting does affect the oral health behaviors and perceptions of socioeconomically deprived persons.

2. Do demographics (gender, age, race, and socioeconomic status) of socioeconomically deprived persons who received preventive treatment in an educational dental hygiene clinical setting have a relationship with their oral heath behaviors and perceptions?

Null hypothesis: Demographics of socioeconomically deprived persons who received preventive treatment in an educational dental hygiene clinical setting have a relationship with their oral heath behaviors and perceptions.

Alternative hypothesis: Demographics of socioeconomically deprived persons who received preventive treatment in an educational dental hygiene clinical setting have not a relationship their oral heath behaviors and perceptions.

3. Does preventive treatment (e.g., fluoride applications, placement of dental sealants, educational strategies, and prophylaxis) in an educational dental hygiene clinical setting promote follow-up visits of socioeconomically deprived persons with a dental professional for restorative dental work?

   Null hypothesis: Treatment in an educational dental hygiene clinical setting does not promote follow-up visits with a dental professional for restorative dental work in socioeconomically deprived persons.

   Alternative hypothesis: Treatment in an educational dental hygiene clinical setting promotes follow-up visits with a dental professional for restorative dental work in socioeconomically deprived persons.

The instruments that I used to for the study questionnaire were selected from The Oral Hygiene Behavior Scale (OHBS) used by Buglar, White, and Robinson (2010) and a questionnaire developed by Luciano, Overman, Frasier, and Platin (2008), in partial fulfillment for a master of science degree for Luciano. 41-question dental health questionnaire contained six sections: dental health care habits, dental visits, and condition of the gums, knowledge and beliefs about teeth and gums, and demographic information,

which gave me more insight into the perceptions and beliefs of oral habits among socioeconomically deprived people.

Currently, the OHBS questions consist of 12 categories based on age, brushing behavior, susceptibility scale, severity scale, benefits scale for brushing and flossing, a barriers scale for flossing and brushing, a self-efficacy scale for brushing and flossing, and two Likert scale questions on flossing and brushing behavior. I gathered demographic information such as education, age, gender, race, and socioeconomic status. There were several 5-point Likert scale staged questions rated on the following 5-point scale: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree, generated to match the respondent's general brushing behavior. There were also questions rating attendance to a dental office that were rated as follows: 1 = never, 2 = within the last year, 3 = approximately 2 years ago, 4 = approximately 5 or more years ago, and 5 = I do not remember. I included some existing questions that targeted perceptions of susceptibility: "It is likely that I will develop tooth decay or gum disease, my chances of developing tooth decay or gum disease are high, my mouth is in bad condition, and within the next year I will develop tooth decay or gum disease." A final portion of the questionnaire included a question asking the participants whether they ever visited a hospital emergency room for a dental problem.

Theoretical Framework

The Health Belief Model (HBM) was developed in the 1950s by Hockbaum (Glanz et al., 2002) and eventually adopted by the U.S. Public Health Service as a method to view health issues within a social context (Hollister & Anema, 2004). Proponents of the

HBM believe that people will make better health decisions if the appropriate information is given based on their current perceptions of the benefits or the barriers related to the health behavior. Pinto et al. (2006) believed that the HBM traditionally had been used as a way to explain maintenance and changes in health behavior and as a framework for health behavior interventions. The six constructs associated with the HBM are the perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cue to action, and self-efficacy. Theoretically, the model holds that a person has to believe that (a) she or he is susceptible to the condition, (b) there is a level of severity associated with a condition, (c) there are no existing barriers to prevent the treatment of the condition, and (d) she or he could maintain the necessary conditions to remain free of the condition prior to making an informed decision about adopting a particular behavior (Kasmaei et al., 2014; Pinto et al., 2006; Rosenstock et al., 1988). Although the HBM has been widely used, researchers have found that the progression of acceptance to change behavior does not always follow in a systematic manner.

The Ecological Model was developed by Brofenbrenner to understand individual behavior and environmental determinants (McLeroy et al., 1988). The model holds that there are several tangible levels of environmental influence. The levels of environmental influence when used in the field of health science, allow researchers to determine which appropriate behavior of interest was being affected, and how that interaction intertwines with the environment around the subject matter.

The Ecological Model has been modified to promote health. The modification includes factors that play a role in behavioral outcomes: (a) intrapersonal factors, such as

knowledge and attitudes; (b) interpersonal processes; (c) social networks and families; (d) institutional factors, such as formal and informal rules; (d) community factors, such as relationships in communities and organizations; and (e) public policy, which reflects state laws and policies (McLeroy et al., 1998). Understanding the basic tenants of the Ecological Model, particularly the intrapersonal and interpersonal factors, allow public health interventions to be more successful.

I used an HBM and Ecological Model based self-report questionnaire in a nonrandom convenience sample of dental hygiene clinic patients at two metro Atlanta dental hygiene schools. A cross-sectional study design allowed me to obtain a point in time to examine the oral health behaviors and perceptions of socioeconomically deprived adults. The cross-sectional study design also allowed me to determine the patients behaviors and perceptions of preventative oral hygiene care and current perceptions about seeking follow up restorative treatment when a referral is provided (Szklo & Nieto, 2014). Educational clinical settings customarily offer a variety of dental hygiene services at significantly reduced rates when compared with dental services provided at traditional dental offices. The patients often see a dentist, receive oral radiographs, and receive a dental prophylaxis for less than $100 dollars. Those adults who are socioeconomically deprived may receive treatment at a facility based on the cost.

Nature of the Study

This exploratory study was a quantitative cross-sectional study. The cross-sectional study design allowed me to investigate the potential effect of reduced-fee dental hygiene treatment (independent variable) on the behavior and perceptions of oral health of

socioeconomically deprived persons (dependent variable) and on their behaviors and perceptions with regard to completing follow-up treatment when a referral is provided (dependent variable). Mediating variables were education sex, age, race, and socioeconomic status. For this study, I employed a convenience sampling strategy in dental hygiene clinic patients at two metro Atlanta dental hygiene schools. I provided a blank questionnaire to the participants both before and after treatment in the dental hygiene clinic was provided. *Treatment* was defined as completing the treatment plan rendered by the student hygienist during the initial point of contact with the student hygienist.

Operational Definitions

Economically disadvantaged persons: *Disadvantaged person* is a general term used primarily for people living at or below 200% of the federal poverty level. Disadvantaged persons may also include, but are not limited, to older adults living on limited incomes as well as adults with limited to no education (Fisher-Owens et al., 2008). Typically, disadvantaged persons are disproportionally represented in certain minority populations or geographic location (Kim et al., 2012).

Non-traumatic dental conditions: *Non-traumatic dental conditions* are defined by physician discharge diagnosis codes assigned based on the International Classification of Diseases ninth Revision-Clinical Modification (ICD-9CM) (Okunseri et al., 2012). Examples of non-traumatic dental conditions are dental pain associated with dental caries and pulp infections (Lewis et al.,, 2003).

Oral health: *Oral health* is defined as the state of being free from chronic mouth or facial pain, periodontal disease, tooth decay, tooth loss, and other diseases and disorders that affect the oral cavity (World Health Organization, 2014).

Preventative dental hygiene treatment: *Preventative dental hygiene* refers to the total efforts to promote, restore, and maintain the oral health of the individual (Wilkins, 2009). Examples of preventive treatment are fluoride applications, placement of dental sealants, educational strategies, and prophylaxis (Wilkins, 2009).

Restorative dental treatment: *Restorative dental treatment* is a general term that describes the restoration of diseased, injured, or abnormal teeth to normal function (American Dental Association, 2014).

Assumptions

Listed below are some initial assumptions I had prior to starting the study:

- I assumed access to patients using two Metro Atlanta dental hygiene schools would not be difficult to obtain.
- I assumed an adequate sample size would be obtained.
- I assumed student dental hygienist would have adequate skill levels to properly provide oral hygiene care instructions to participants.
- I assumed student dental hygienist would complete planned treatment in a timely manner to properly obtain pre/post test surveys.
- I assumed the participants would answer openly and honestly and would be willing to participate in the study.

- I assumed the cross-sectional design of the study would accurately demonstrate any true associations between the variables.

Scope and Delimitations

I clearly defined the scope and delimitations of the study which were:

- The results of the study were limited to two Metro Atlanta dental hygiene schools. Additional dental hygiene schools located outside of the Metro Atlanta area were not in the scope of the study, which limited the scope of the study to the Metro Atlanta area.
- Participants of the study represented ethnic minorities and socioeconomically disadvantaged adults aged 18 years and older accurately, as previous research has demonstrated that this subgroup of the general population has difficulties obtaining adequate access to dental care (Griffin et al.,, 2012).
- Individuals should have clearly stated that they could not afford a dentist when the study was conducted to participate in this study.
- Potential participants should have clearly stated that they had not received the assigned dental hygienist treatment before the start of the study.

Limitations

Access to Metro Atlanta dental hygiene school patients could have been difficult to establish. Learning institutions have limitations and restrictions concerning access to their patients that could have presented as a barrier to identification of participants:

- Willingness of patients to participate could have been difficult to obtain. The transitional nature of patients that use dental hygiene schools presented a challenge if they did not return for the completion of treatment (Higgs & Murphy, 2001)
- Using nonrandom samples of dental hygiene patients could have potentially introduced selection bias within the study. However, using appropriate statistical analyses, such as multivariate analysis, selection bias and confounding could be minimized. The cross-sectional study design is limited to associations between the variables and cannot imply causation (Creswell, 2013). Using the pre/post test design could also have led to selection bias if attrition rates were high during the posttest phase of the study. Adequately maintaining follow-up contact with participants could have helped reduce potential attrition from the study. Results could not be generalized to other dental hygiene programs throughout the nation. Each state has a separate scope of practice laws for dental hygienist, which could result in variations of how preventative dental hygiene services were performed

Significance

The aim of this study was to fill the aforementioned literature gap related to the effect of reduced-fee dental hygiene treatment on oral health behaviors and perceptions of socio-economically deprived persons within the state of Georgia. Identification of oral health perceptions of this disadvantaged population may encourage developing educational oral health promotion programs for this high-risk population group.

Healthy People 2020 (2013) legislation was created to address lagging health care among disadvantaged populations. Specifically, Healthy People 2020 preventative oral

health objectives aim to “increase awareness of the importance of oral health, increase acceptance and adoption of effective preventative interventions and last to reduce disparities in access to preventative and dental treatment services” (HHS, 2013) and to increase the proportion of children, adolescents, and adults who use the oral health care system (HHS, 2013). Filling the void in the literature related to the oral health behaviors and perceptions of socioeconomically deprived adults who may use the hospital emergency rooms for non-traumatic injuries may enable the development of targeted interventions that increase access to dental services for deprived adults, thereby reducing repeat visits to an emergency room setting for preventable dental treatment needs. According to the results of this study, institutional changes could be needed that would allow potentially collocating dental hygienist in medical practices, which were also found to be both feasible and helpful for providing preventative oral health services among disadvantaged children (Braun, 2003). Practical implications of this study could include decreasing the visitation to emergency rooms for preventable non-traumatic dental conditions that, in turn, could potentially lower the increasing financial burden that many states incur from treating preventable non-traumatic dental emergencies.

In addition, partnerships with local dental offices and dental hygiene schools could introduce disadvantaged patients without dental homes to a place where they could visit a dental professional for routine dental care. Therefore, the results of this research could make a significant contribution to the field of public health creating a positive social change in the oral health promotion and status of disadvantaged adults, as well as the overall health status of deprived residents within state of Georgia.

Summary

Access to oral health care remains problematic for millions of Americans (Sanders, 2012). Limiting factors such as socioeconomic status, employment status, age, race, and lack of dental insurance benefits play a vital role in the ability of many to obtain preventative oral health care (Assadorian, 2009; Bailit & D'Adamo, 2012; Ramraj & Quiñonez, 2013). The lack of access to routine preventative dental care has, through time, contributed to the skyrocketing rates of hospital emergency rooms being used for non-traumatic dental injuries. Research has shown that the overall increase in the use of hospital emergency rooms for non-traumatic dental injuries has cost the nation billions of dollars (Pew Center on the States, 2012), contributing to the overall increase in the nationwide cost of health care.

The aim of this study was to explore the effect of any associations between oral health behaviors and perceptions of socioeconomically deprived persons within the state of Georgia receiving treatment at reduced fee dental hygiene facilities. A review of the literature in Chapter 2 demonstrates the historic increase in the use of hospital emergency rooms for non-traumatic dental injuries. In addition, the viable option that reduced-fee dental hygiene clinics could hold in providing socioeconomically disadvantaged adults an affordable venue in which to receive comprehensive preventative dental hygiene services, which have been linked to the reduction of dental decay and periodontal disease, are discussed in Chapter 2.

Chapter 2: Literature Review

Introduction

The inability to pay for preventative dental care remains problematic for millions of Americans. Minorities, particularly African American and Hispanic American adult's ages 18 to 64 years, are more vulnerable to the most common chronic disease, dental decay (Sanders, 2012). Research has shown that annually the number of adults using hospitals as primary care centers for non-traumatic dental injuries continues to increase (Okunseri et al., 2012).

The increase in the use of hospital emergency rooms as primary treatment centers has been attributed to many reasons (i.e., socioeconomic status, cultural barriers, transportation challenges, and an inability to pay for services) (PEW Center on the States, 2012). Recent economic downturns have forced traditional private health insurance companies to increase premiums for dental coverage (Higgs et al., 2001). Similarly, budget reforms in services covered by Medicaid allow individual states to restrict dental benefits for adults older than 18 years to emergency extractions only (Wallace et al., 2011). Currently, preventative dental services are no longer a covered within the state of Georgia (Georgia Department of Community Health, 2012).

In Georgia, as in other states, hospital emergency room physicians treating non-traumatic dental injuries typically provide a palliative treatment of antibiotics, pain medication (Okunseri et al., 2012), and referral for follow-up care with a dental professional. It is unclear whether patients seek follow-up care with a dental professional because previous research has demonstrated that patients who use hospital emergency

rooms for non-traumatic dental injuries often revisit the emergency room when infection occurs again (Okunseri et al., 2012).

Socioeconomically deprived people who live near dental hygiene schools can take advantage of below-market prices to receive preventative oral hygiene care in the form of radiographs, prophylaxis, periodontal treatment, and dental exams. Little research has been done addressing the effect of reduced-fee dental hygiene treatment on the behaviors and perceptions of patients who use these services.

The aim of this study was to assess the effect of reduced-fee dental hygiene treatment on oral health behaviors and perceptions of socioeconomically deprived persons visiting dental hygiene school clinics within the state of Georgia. In this chapter, I demonstrate how lack of preventative oral hygiene care among children has long-lasting effects into adulthood. I explored how socioeconomically deprived person's attempt to deal with the inability to afford preventative dental care. Finally, I looked at the common coping mechanisms socioeconomically deprived persons employed to deal with the lack of preventive dental care that not only affects the health of the person but also the financial soundness of the nation's economy.

Literature Research Strategies

I conducted Literature research using several sources on information. I accessed PsyTEST using the search terms “stages of change, and “oral hygiene” to obtain suitable instruments for the study. Term such as “dental hygiene”, “oral hygiene”, “dental”, “dental emergencies”, and “oral health”, “Reduced fee dental hygiene treatment”, “socio-economic deprived persons”, “behaviors and perceptions of oral health”, *emergency dental treatment, adult oral health, and Georgia oral health* was used. The terms were used to narrow all inquiries of peer-reviewed journals. In most cases, searches were limited to a 13-year period between 2000 and 2013, with the exception of all of the research reports concerning the theoretical foundation used to support the study. In addition, the literature research was limited to the English language from peer-reviewed articles. A thorough review of the resources used by previous authors provided supplemental research needed to understand the issues fully. The Walden University online library search engine Academic Search Complete provided most of the articles for this review. Google scholar provided additional resources that were not available from the Walden University Library database.

There were a few articles discovered concerning the actions of socioeconomically deprived persons seeking dental treatment from hospital emergency rooms. However, there was little research found addressing socioeconomically deprived persons using reduced-fee dental hygiene clinics for treatment in the state of Georgia. The literature review was limited to the historical and current effect of access to preventative oral health care among socioeconomically deprived persons, as well as the behaviors and cost associated with such practices in obtaining access to preventative oral health care.

Theoretical Background

The HBM was developed in the fifties by Hockbaum (Glanz et al., 2002), and eventually adopted by the United States Public Health Service as a method to understand health issues within a social context (Hollister & Anema, 2004). Proponents of HBM think that people will make better health decisions if relevant information is given based on their current perceptions of the benefits or the barriers related to the health behavior. Pinto et al., (2006) thought that the HBM traditionally, had been used as a way to explain maintenance and changes in health behavior and as a framework for health behavior interventions. The six constructs associated with the HBM are perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cue to action, and self-efficacy. Theoretically, the model holds that a person has to believe that; (a) he is susceptible to the condition; (b) that there is a level of severity associated with the condition; (c) that there are no existing barriers to prevent the treatment of the condition; and (d) that he could maintain the necessary conditions to remain free of the condition prior to making an informed decision about adopting an appropriate behavior (Hollister & Anema, 2004; Kasmaei et al., 2014; Pinto et al., 2006; Rosenstock et al., 1988).

Research conducted in the early 1980s (Janz & Becker, 1984) showed that the perceived barriers construct of the HBM played a large role in the clinical application of the HBM with other health related conditions such as screening practices, diabetic regimens, and end-stage renal disease regimens.

The versatility of the HBM has been demonstrated by the various disciplines that have used the approach in an attempt to gain a richer understanding of the psychosocial

behaviors behind individual's actions. Deeper understanding of appropriate activities can help clinical, public health workers better design interventions created to increase the health of the population overall.

In the field of injury prevention Gielen & Sleet (2002), successfully used the HBM to demonstrate that a better understanding of behavioral motivation in the field of injury prevention led to a successful community organization effort in Harlem New York in the 1980"s (Gielen & Sleet, 2002). In the field of Pharmacy, a study conducted by Pinto et al., (2005) revealed that diabetic educational counseling performed by pharmacist working at national retail pharmacies was successful in helping patients understand the severity of maintaining an anti-diabetic regimen.

Only a few studies using the HBM to study oral health practices were found because historically other theoretical constructs were deemed more useful in understanding patient behaviors (Anagnostopoulos et al., 2011; Morowatisharifabad & Shirazi, 2007) as a construct in the field of dentistry. The few researchers that used the HBM model have successfully demonstrated the beneficial nature of individual constructs within the model as a guide to understanding how patients view preventative oral health care services. Morowatisharifabad & Shirazi, (2007) showed that three constructs of the HBM, perceived benefits, perceived barriers, and perceived self-efficacy significantly influenced oral health behavior among preuniversity adolescents in Yazd, Iran. The authors studied interpersonal influences, situational influences, perceived self-efficacy, perceived benefits, perceived barriers, and activity related affects on oral health behaviors like brushing and flossing. The results showed that as perceived barriers to oral health behaviors increased, perceived

self-efficacy decreased. The results also revealed that activity related affects increased self-efficacy as well. When students were shown how to perform preventative oral health behaviors like brushing and flossing, they felt better about being able to continue those behaviors.

Anagnostopoulos et al., (2011), determined that self-efficacy and perceived severity served as significant predictors of tooth-brushing behavior among Greek dental patients. Recent research conducted on the brushing behavior among adolescents in northern Iran by Kasemaei, Shokravi, Hidarnia, Hajizadeh, Atrkar-Roushan, Shirazi, and Montazeri (2014) showed that as perceived susceptibility and perceived psychological barriers increased, the power of predicted tooth-brushing habits increased threefold. Flaer et al., (2010) believed that using the HBM in clinical practice would provide helpful insights into the thinking beliefs and perceptions of the underserved populations dental health that would provide valuable insight for dental professionals.

My study revolved around the beliefs and perceptions of oral hygiene based on instructional measures and treatment provided by dental hygiene students. Dental hygiene students are taught to tailor oral hygiene instruction to the needs of the patient as well as physically demonstrate oral hygiene techniques to maintain a healthy dentition. Morgan, Verkroost, & Hunter (2012) demonstrated that dental hygiene students were more consistent than dental students when teaching oral hygiene instructions to patients.

The HBM model was originally designed to help better understand specific health behaviors, therefore the HBM model is better suited to help understand socio-economically deprived persons perceptions and behaviors of oral health after receiving treatment and

oral health education from dental hygiene students. By making the patients fully aware of existing oral health conditions, the patients will have the necessary oral health knowledge needed to reconsider using hospital emergency rooms for non traumatic dental injuries rather than seek follow up care with a dental professional. Understanding perceptions and behaviors will be critical for the student hygiene clinician as they learn to work with patients to adopt better oral health techniques that will decrease oral diseases such as periodontal disease and dental caries.

The Ecological Model was developed by Urie Brofenbrenner to understand individual behavior and environmental determinants (McLeroy et al., 1988). The model holds that there are several tangible levels of environmental influence, which when used in the field of health science allows researchers to determine what the appropriate behavior of interest is being affected by and how that interaction affects the environment around the subject matter.

The Ecological Model has been modified for use in health promotion. The modification includes factors that play a role in behavioral outcomes; (a) intrapersonal factors as knowledge and attitudes; (b) interpersonal processes; social networks and families; (c) institutional factors like formal and informal rules; (d) community factors like relationships in communities and organizations; (e) and public policy which reflect state laws and policies (McLeroy et al., 1998). Understanding the basic tenants of the Ecological Model, particularly the intra and interpersonal factors allow public health interventions to be more successful. Flaer et al. (2010) noted that when dealing with the socioeconomically

deprived population, understanding the population's beliefs, values, and culture might be helpful when attempting to motivate behavioral change.

Review of the Literature

Global Adult Oral Health

Globally, maintaining oral health continues to be problematic in both developed and developing countries (Perterson, Bougeois, Ogwa, Estupinan-Day, & Ndiaye, 2005). Dental caries and periodontal diseases contribute overwhelmingly to the global and oral health burden of every developed and developing nation. Dental caries among adults worldwide affects almost 90-100% of the population in a majority of countries (Moysès, 2012). According to the World Health Organization as cited by (Peterson et al., 2005), many developing countries locate adult treatment centers primarily in urban area's while adult care in rural and remote area's limit services to pain relief and emergency care. The very poor in developing countries have little to no preventative oral care options (Moysès, 2012).

Child & Adolescent Oral Health in the United States

Among children and adolescents, untreated dental decay can affect the way they eat, speak, and interact among their peers (Marrs, Trumbley, & Malik, 2011). The pain associated with untreated decay cumulatively results in millions of hours of school lost per year (Marrs, Trumbley, & Malik, 2011). Lagging educational milestones, as a result, of untreated dental decay among children and adolescents are not uncommon (Jackson et al.,

2011). The inability to meet these educational milestones, particularly among poor minorities creates problems that persist for many years past into adulthood.

Mandates passed by the federal government require that many states provide dental insurance for children to address growing concerns among public health officials combating the growing gap in oral health care among the socioeconomically disadvantaged group (Tianoff & Reisine, 2009). Researchers Peres et al., (2011), were successful in demonstrating that adults who experienced poverty and inadequate oral hygiene care as children continued to experience higher proportions of unhealthy oral conditions despite gains in socioeconomic status later in life.

Adult Oral Health in the United States

Within the United States adults aged 18 and older face some of the same difficulties as adults globally. A community-based survey taken between 1992-1994 in Harlem New York revealed that more than 30% of the survey participants experienced teeth and gum problems (Treadwell & Northridge, 2007). According to the National Health and Nutrition Examination Survey taken between 1988-1994 and 1999-2004, adult oral health improved slightly overall, however the prevalence of dental caries declined for all groups except those living at or below the federal poverty level (FPL) (United States Department of Health and Human Services, 2007). Research conducted by Dolan, Atchison, & Huynh (2005), identified those living at or below the FPL as elderly adults, ethnic minorities, and non-Hispanic whites have contributed significantly to the rise in levels of poverty that consistently have demonstrated an underutilization of dental services since 2001 (Dolan, Atchison, & Huynh, 2005)

Adult Oral Health in Georgia

Georgia oral health statistics mirrors both global and national oral health statistics. Georgia Medicaid service programs typically reimburse dentist for basic services below customary fees (Dolan, Atchison, & Huynh, 2005; Georgia Health Policy Center, 2012). A survey conducted in 2012 by the Georgia Health Policy Center revealed that there are slightly more than four thousand practicing dentist within the state of Georgia, of the four thousand eight hundred dentist provided care for Medicaid participants (Georgia Health Policy Center, 2012). Of the eight hundred Medicaid dental providers listed, the majority provided care primarily to children that typically have an average wait time for appointments of 2.5 weeks (Georgia Health Policy Center, 2012).

The improvement of access to care within the state has been marginal. Previous statistics revealed that there were twenty-two counties without a practicing dentist; however the Georgia Health Policy Center (2012) found that there were currently only sixteen counties in the state without a practicing dentist. Seven of the sixteen counties have a non-white population at or above 50%, and unemployment rates for these counties is near or above 10%, with one county having an unemployment rate of 15% (Georgia Health Policy Center, 2012). The survey also revealed that the average driving time for persons living in counties without a dentist is 16-36 minutes or 10-22 miles.

Twenty-seven dentists in the survey identified themselves as public health dentist within the state of Georgia which divides its public health districts into a total of sixteen regions within the state, 44% faced budget cuts which led to a reduction in staff and twelve of the sixteen only provide preventative and restorative services (Georgia Health Policy

Center, 2012). Other options for restorative treatment available to the poor and near poor of Georgia come from the single dental school located centrally within the state that was reported to have treated over ten thousand Georgians in 2012 (Georgia Health Policy Center, 2012) and a few reduced fee dental clinics located in or around the metro Atlanta area. Poor Georgians face a better chance at receiving preventative oral health care within the state primarily because the state has sixteen dental hygiene schools located throughout the state.

Economic Conditions and Oral Health

While all of the nation states have some form of state supplemented medical and dental benefits for children, budget restraints have led the many states to reduce or eliminate dental benefits for adults aged 18 and older (Higgs et al., 2011; Naegele et al., 2010). As mentioned previously, Georgia Medicaid provides lower than average dental reimbursement rates for dental services contributing to the more than 74% of dentist within the state working in private practice either part or full time (Georgia Health Policy Center, 2012). Many dentists have cited low reimbursement and excessive paperwork as deterrents to becoming Medicaid providers (Higgs et al., 2011).

A qualitative study conducted by Cohen et al., (2007), suggested that low income adult minorities reported that the dental pain resulting from untreated dental decay inhibited daily activities like sleeping, talking, working and interacting with peers. The study also indicated these many patients experiencing dental pain, as a result, of dental decay resorted to self-care strategies like utilizing pain medications for extended periods of time (at least two weeks) before seeking professional help from a dentist or hospital

emergency room (Cohen et al., 2007). Griffin et al. (2012), reported that older adults with toothache pain experience a significant reduction of quality of life and exacerbates other chronic health conditions like diabetes and heart disease. The relationship between race/ethnicity, age, education, and socioeconomic status and untreated dental decay has been adequately documented (Gilbert et al., 2002; Griffin et al., 2012; Kim et al., 2012; Wall, 2012). The largest group using hospital emergency rooms for non-traumatic dental injuries according to the research were persons between the ages of 18-64 years of age (Okunseri et al., 2012; Quiñonez, 2013; & Ramraj & Quinñonez, 2013). Research conducted by Naegle, Cruz, & Nadanovsky (2010), suggested that patients with minimal dental insurance often opted for lower cost dental treatment options if given the opportunity to choose from recommended treatment rather than affordable treatment. In a similar study, Tilashalski et al., (2005) experienced similar results in their research when patients declined a more expensive root canal procedure in lieu of less expensive extraction. Canadians with similar circumstances were reported to refrain from certain restorative and preventative services citing the services as too costly (Ramraj & Quiñonez, (2012). Wallace et al., (2011), documented a direct link between the elimination of Oregon adult Medicaid dental benefits when the results showed a 77% increase in ambulatory medical care use and 101% in emergency room department use for dental related conditions. For those socioeconomically deprived persons without dental insurance, hospital emergency rooms have become a necessary choice for the treatment of non-traumatic dental emergencies (Lee et al., 2012; Seu, Hall & Moy, 2012; Walker et al., 2013; Wall, 2012).

According to interviews conducted by the PEW Center of the States (2012), emergency-room doctors have seen a steady increase in patients using hospital emergency rooms for non-traumatic dental injuries. In an analysis of non-traumatic dental visits to emergency departments in the United States, Okunseri et al., (2012) recognized that between the years of 1997-2007, non-traumatic dental visits to the emergency room increased by "54% at an annual rate of 4%" even though all emergency room visits increased only by "23% for a population increase of 12.5%" (Okunseri et al., 2012). The cost associated with the increased use of hospital in 2006 alone equaled $110 million (The PEW Center of the States, 2012). In the state of Georgia, emergency hospital visits totaled more than 22 million in 2007 (The PEW Center of the States, 2012). Seu et al. (2012) found that between 2006 and 2009, 18-44 years-old persons accounted for 62% of dental related emergency department visits based on the regional and national data collected from the Healthcare Cost and Utilization Project on emergency department visits. Georgia currently primarily reports data on children's oral health within the state. The Behavioral Risk Factor Surveillance System is used to gather basic information about adult's age 18 and older. According to the data collected in 2010, 70% of adult Georgians reported visiting a dental office within the past year (Centers for Disease Control and Prevention, 2010). Currently very little information has been reported about the 30% of Georgians that did not report seeing a dentist within the past year.

Most state hospitals are ill equipped to handle such large expenses, particularly when non-traumatic dental injuries pull much needed medical personnel away from traumatic hospital injuries that are covered by most health insurance policies. In an effort

to offset climbing cost associated with treating the socio-economically disadvantaged, many states have adopted legislative policies that endorse the privatization of hospitals (Sloan, Picone, Taylor & Chou, 2001). Since the mid-1990s, approximately 56% of hospitals have become private with the ability to locate in the area's where incomes are higher as well as the want to perform procedures that yield higher dividends (Sloan et al., 2001). This shift in ownership in hospitals has left many states burdened with the cost of paying for the surplus expense of care for the poor and disadvantaged.

More and more Americans are experiencing dental pain, delaying much needed oral care, and using hospital emergency rooms only to receive palliative treatment of pain medication, antibiotics and referral to a dentist (Okuneri et al., 2012). For this reason, some researchers have sought to explore methods to address the problem. Recent research in Germany by Reissmann, John, Scierz, Kriston, and Hinz (2013) showed a significant relationship between oral health and the perception of general health. Those who felt good about their oral health displayed an overall perception that their general health was better as well (Reissmann et al., 2013).

Oral Health Preventive Treatment

Dental hygiene students (DHS) typically learn to care for their patients over a period of two years. Halfway through the first-year DHS begin to treat patients in a clinical setting. Prior to treating patients clinically, DHS are taught the basics of formulating the dental hygiene care plan (Wilkins, 2009). The primary focus of hygiene students is preventative in nature. Students learn how to assess the patients based on risk factors, patients overall health status, current healthcare knowledge and the patients ability to take

care of themselves (Wilkins, 2009). The DHS are then taught how to collect quantitative data based on the periodontal health of patients as well as screen for signs of obvious dental decay through radiographic analysis (Wilkins, 2009).

At the completion of the data collection phase, DHS employ a variety of ways to treat the patient. Initially, the DHS informs the patient of their findings. Then the student must educate the patient on their current oral health status as well as provide necessary tools that will enable the patients to maintain their own oral health. Once the student discusses this with the patient, the student will perform a dental prophylaxis, which is the "mechanical removal of both soft and calcified debris in the mouth" (Wilkins, 2009, p. 353). Prior to performing the prophylaxis, the DHS must take into the consideration the patients' willingness to participate in treatment, the patients; understanding of the treatment, and the patients' physical ability to use any oral health care aids recommended to them (Wilkins, 2009). The overarching goal of the DHS is to reduce bacteria in the oral cavity, therefore, increasing gingival health and educating the patients on proper oral health maintenance procedures.

Some common techniques DHS employ to reduce oral bacteria and decrease risk of caries is to provide antimicrobial agents like fluoride that also supports the re-mineralization of the tooth surfaces at higher concentrations. Fluoride can be delivered in several ways; by rinse, varnish, or gel. Dental sealants are a second preventative measure used by DHS. Sealants are resins which "when placed on the occlusal/chewing surfaces of the teeth serve as a preventative barrier to decay-causing bacteria which tend to settle in the deep crevices and grooves of the occlusal/chewing surfaces" (Harris, Garcia-Godoy, &

Nathe, 2014, p. 275). While dental sealants are traditionally applied to primary teeth, they can be applied to adult molars without any signs of decay.

Oral Health Behaviors and Perceptions

For many years oral health researchers have strived to understand the relationship between oral health behaviors, oral health perceptions and general health. Reissman et al., (2013) demonstrated a positive correlation between perceptions of oral health and perceptions of overall general health among Germans. The study confirmed an overlapping between the adults' perceptions of their overall general health and their oral health. The adults that felt that their general health was good also felt their oral health was good likewise if the adult perceived their general health was poor, they also perceived their oral health to be poor.

Although dental diseases remain largely preventable with the utilization of regular dental care in a professional setting as well as home care of brushing and flossing, and controlling dietary intake can significantly reduce carious lesions (Anagnostopoulos et al., 2011), yet more and more Americans prolong dental pain by avoiding much needed dental care (Okuneri et al., 2012). Horrowitz, Wang, & Kleinman (2012) found that the communication style of the provider plays a large role in increasing health literacy and compliance with treatment among Maryland adults with children under the age of six living at home. The results showed a positive relationship between education, gender, and health literacy and compliance with treatment and a negative relationship between education, gender, health-literacy, and compliance with treatment. Horrowitz, Wan & Kleinman (2012) concluded that individuals who demonstrated the greatest dental needs

oftentimes did not feel that communication levels with the dentist were helpful or instrumental to seeking dental treatment.

A study conducted in Jeddah City Saudi Arabia, Farsi et al. (2003) found that public and private school students age 12-18 had some pre-existing knowledge about periodontal diseases and oral health care. Specifically over 80% of the students knew that daily brushing prevented periodontal disease, however only 30% knew that daily flossing also prevented periodontal diseases. More importantly, the students did not equate brushing, flossing, or using the regional cultural miswak with the prevention of tooth loss later in life (Farsi et al., 2003). Overall the researchers found that female students in general with higher incomes attending private schools were more likely to realize correctly that flossing and brushing would prevent the occurrence of periodontal diseases later in life (Farsi, Farghaly, & Farsi, 2003). The research indicated that the students clearly had some general knowledge of maintaining oral health, yet they still benefited from detailed oral hygiene instruction.

A systematic review concerning patient preferences for shared decision making by Chewning et al. (2012) revealed that overall patients faced with chronic life threatening diseases and invasive procedures chose to play an active role in their therapy when feasible. The researchers found that patients who participated in the planning of their treatment trusted their physicians more and experienced higher self-efficacy to contribute to the outcome of their disease process (Chewning et al., 2012). Lee et al. (2012), found that oral health literacy and self-efficacy play an important role in oral health status and dental neglect. The researchers concluded that health literacy continues to be problematic

for adults since most health information is written at or above the tenth-grade level (Lee et al., 2012). Low-health literacy scores have been associated with decreased health knowledge, health status, and decreased use of preventative services (Lee et al., 2012).

Oral Hygiene Instruction Performed by Dental Hygiene Students

Self-efficacy has been shown to have a significant affect on health related actions in several studies (Anagnostopoulos et al., 2013: Farsi et al., 2012; Stewart et al., 1996). DHS are taught early that dental health education is planned to use the patient's existing knowledge, attitude, culture and values to promote oral health practices (Nathe, 2011, p. 121). The DHS learn the principles of psychology and sociology that facilitate learning and behavioral change. Students learn about the Health Belief Model, the Theory of Stages of Learning, the Transtheoretical Model, the Theory of Reasoned Action, and the Theory of the Sense of Coherence. The HBM has six constructs associated with the theory. Perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cue to action, and self-efficacy. Theoretically, the model holds that a person has to believe that (a) he is susceptible to the condition, (b) that there is a level of severity associated with the condition, (c) that there are no existing barriers to prevent the treatment of the condition, and d) that he could maintain the necessary conditions to remain free of the condition prior to making an informed decision about adopting an appropriate behavior (Hollister & Anema, 2004; Kasmaei et al., 2014; Pinto et al., 2006; Rosenstock et al., 1988). The stages of learning theory teach students that there are six stages in the learning process; unawareness, awareness, self-interest, involvement, action, and habit in which patients

learn (Nathe, 2011, p. 127). The Transtheoretical model holds that there are five stages of change that a person experiences before achieving a goal. Pre-contemplation, contemplation, preparation, action, maintenance, and termination (Nathe, 2011) The Transtheoretical model also recognizes that the movement through the stages of change is multidirectional in nature. People can move about in different stages throughout the process of learning. The Theory of Reasoned Action holds that all behaviors are affected by people's cultural and social relationships, and people make decisions based on current knowledge and values (Nathe, 2011). The Social Cognitive Theory holds that the more a person believes in their ability to accomplish a goal, the more likely they will plan to succeed at that particular goal (Nathe, 2011, p.127). The sense of the coherence theory teaches that if a person has a strong sense of their relationship with their surroundings, they are better equipped to adapt to stressful situations that affect their health (Nathe, 2011, p. 126).

With the basic knowledge of health behavior models, DHS use a variety of techniques with individual patients to identify the best way for the patient to learn how to adapt better oral hygiene practices in their daily home life. In a study where male veterans were randomly subjected to 40-minute education sessions designed to increase knowledge of the causes and prevention of dental disease, researchers noticed an increase in the brushing and flossing behavior (Stewart et al., 1996). The researchers used the changes of stage theory on veterans receiving regular free dental care using a pretest-posttest design. The veterans either received educational instruction from a periodontist, a psychologist or none at all over a five-week period (Stewart et al., 1996). The groups receiving oral care

instructions from both the periodontist and the psychologist showed statistically significant changes in flossing self-efficacy scores (Stewart et al., 1996). In more recent study, Kakudate et al. (2009) compared traditional oral hygiene instruction given to periodontal patients with oral hygiene instruction incorporating Bandura's social cognitive theory to focus on self-efficacy. The study participants were given oral hygiene instruction one time a week for three weeks. Initially, the researchers did not find any difference between both groups, however by the third week the group that received oral hygiene instruction incorporating the social cognitive theory displayed higher levels of self-efficacy for brushing and lower plaque scores overall.

Many public health dentists continue to believe that educational programs aimed at changing behavior are essential to motivating people to change their ways, yet still other public health dentist call for an expansion of the oral health care workforce. While legislative policy is required to either extend dental care benefits to the underserved population or expand the oral health-force model, my study will remain focused on the oral hygiene instruction performed by DHS. In a study that compared oral hygiene advice/instruction given by dental students and dental hygiene students, Morgan, Verkroost, & Hunter (2012), found that 95% of dental hygiene students delivered oral health instruction as compared to just 48% of dental students. This study supports my notion that DHS are adequately trained to deliver oral hygiene instructions to the patients that will participate in this study.

Summary

A thorough search of the literature has shown that periodontal diseases and dental caries remains a problem both globally and nationally. Globally socioeconomically disadvantaged persons are more likely to suffer from untreated periodontal diseases and dental decay. Within the U.S., federal mandates have made it easier for socioeconomically deprived children to receive preventative oral hygiene services, while socioeconomically deprived adults 18 and older were more likely to go without preventative dental care and are more likely to utilized the hospital emergency rooms for non-traumatic dental injuries. The research has also shown that the cost of using hospital emergency rooms costs the nation millions of dollars annually. The literature has also shown that interventions and health education programs which incorporate psychosocial theories have been beneficial in helping adolescents and adults make necessary lifestyle and behavioral changes to improve their overall oral health outlook. Theoretically, in Georgia the underserved population would be more likely to use and dental hygiene reduced fee dental clinic to receive preventative care because of the proportion of dental hygiene school locations offering preventative care within the state rather than restorative care. Additionally the comprehensive services offered at reduce rates for oral hygiene preventative care are much lower that the same services offered in private practices within the state. The research, however, has not shown how preventative oral hygiene instruction to adults ages 18 years and older provided by dental hygiene students in dental hygiene school clinics will influence the perceptions and behaviors of this group.

In the next chapter, the reasons why a quantitative cross-sectional design was used, and the rationale behind the choice, are discussed. I will explain in detail how the study will be carried out as well as the instruments used and why they are appropriate for the study.

Chapter 3: Research Method

Introduction

In Chapters 1 and 2, I discussed how oral health among disadvantaged populations continues to remain problematic and difficult to attain (Higgs et al., 2012). Disparities in access to preventative oral health care have been attributed to race, ethnicity, income, education, and sociocultural factors (Kelesidis, 2014 & Owens et al., 2008). Cultural beliefs and perceptions of oral health care have been linked to individual patient preferences, health-related risk behaviors, and dental service use (Kelesidis, 2014). Trends in dental underuse are evidenced by the steady increase in the use of hospital emergency rooms for non-traumatic dental injuries. Cost associated with treating non-traumatic dental injuries has exceeded $100 million throughout the United States (Wall, 2012; Pew Center on the States, 2012).

Dental hygiene schools have traditionally served as an entry point for underserved and underinsured populations seeking oral health care because of the comprehensive services offered (Gadbury-Amoyt & Simmer-Beck, 2014). The comprehensive care (prophylaxis, radiographs, sealants, fluoride varnish, and oral health education) provided by dental hygiene students have been shown to increase dental service use and support positive advancement of oral health (Simmer-Beck et al., 2014).

The aim of this study was to assess the effect of reduced-fee dental hygiene treatment on oral health behaviors and perceptions of socioeconomically deprived persons visiting dental hygiene clinics within the state of Georgia using a cross-sectional pretest, posttest quantitative study design.

Research Design and Rationale

Quantitative research is best suited for explaining an occurrence by using collected numerical data (Meadows, 2003). This exploratory research had a quantitative pretest, posttest cross-sectional study design. A validated questionnaire (please see instrumentation section below for more details) was provided to the participants before the treatment within the dental hygiene clinic and followed by the same questionnaire after completion of the treatment. Previous research has demonstrated that the cross-sectional design is a widely used design in dental research because it allows the health needs of the population to be assessed while providing useful information for the planning of health resources (Anagnostopoulos et al., 2013; Kasmaei et al., 2014; Meadows, 2003; & Morowatisharifabad et al., 2007). The cross-sectional design also allowed for a relatively quick, low-cost analysis as long the sample size was adequate, and a large loss to follow-up did not occur.

The independent variable of the study was reduced fee dental hygiene treatment. The first dependent variables of the study were the oral health perceptions and behaviors of socioeconomically deprived persons. The second dependent variables of the study were the perceptions and behaviors of patients when a referral for follow-up treatment was provided. Mediating variables of the study were sex, age, race, education, and socioeconomic status.

Identification of oral health perceptions of this population could encourage the development of educational oral health promotion programs. This particular demographic of patients symbolized the high-risk population group targeted by Healthy People 2020.

Healthy People 2020 (2013) legislation was created to address lagging healthcare among disadvantaged populations. Specifically, Healthy People 2020 preventative oral health objectives aim to "increase awareness of the importance of oral health, increase acceptance and adoption of effective preventative interventions and last to reduce disparities in access to preventative and dental treatment services" (HHS, 2013) and to increase the proportion of children, adolescents, and adults who use the oral health care system (HHS, 2013). Filling the void in the literature related to the oral health behaviors and perceptions of socioeconomically deprived adults who may use the hospital emergency rooms for non-traumatic injuries may enable the development of targeted interventions that increase access to dental services for deprived adults, thereby reducing repeat visits to the emergency room setting for preventable dental treatment needs.

Practical implications of this study may include decreasing the visitation to emergency rooms for preventable non-traumatic dental conditions that, in turn, can potentially lower the increasing financial burden that many states incur from treating preventable non-traumatic dental emergencies.

Population

All participants of the study were selected from new patient's seeking dental hygiene care from two dental hygiene school clinics within the Metro Atlanta area. For this study, inclusion criteria included fluent English reading and speaking, male and female, non-established (new) patients of record between 18 years and older of any ethnicity. Exclusion criteria included established dental hygiene clinic patients of any ethnicity younger than the age of 18 years who could not read or speak English fluently. In addition,

individuals who previously used reduced-fee dental hygiene treatment services, and who reported that they could not afford a private dentist at that time of the study, were excluded from the study.

Sampling and Sampling Procedures

After receiving approval from Walden University Institutional Review Board, data will be collected from a convenience sample of new-dental hygiene patient's age's 18 and above, utilizing services from two individual metro Atlanta dental hygiene schools. A pre-test, post-test single group design was utilized to examine the differences between the pre and post test questionnaire scores of the participants. A typical semester for dental hygiene students ranges between 12 to 18 weeks. I collected my data during the semester time frame to allow the dental hygiene students adequate time to complete patient treatment. More time would be spent on data collection if an appropriate sample size could not be obtained within the initial 12-18-week timeframe. A computerized power analysis tool called G*Power 3.1 (Faul et al., 2009) was used to determine an appropriate sample size and effect size for the study. The needed effect size was calculated based on the correlation results from a similar study of Luciano et al. (2008). Therefore, with an effect size of 0.17 at 0.05 alpha level, a sample size of at least 100 participants would be needed to achieve a satisfactory statistical power (0.81).

Procedures for Recruitment, Participation, and Data Collection

After obtaining Walden University's IRB approval, IRB approval or equivalent format approval was sought from Georgia Perimeter University, and Georgia Highlands College. Both colleges provided conditional approval, contingent upon final approval from

Walden University. Once IRB approval was obtained, I spoke to the two dental hygiene program directors from the schools dental hygiene clinics. A copy of the approved IRB application was given to each individual program director as well as an introductory packet containing a letter explaining the purpose, the confidentiality and the anonymity of the study, written consent form, as well as a sample of the questionnaire. Walden University IRB thought it best that each school have individual written consent forms. Once permission was obtained from the program directors to proceed, I placed recruitment flyers at the facilities to begin onsite recruitment.

As the researcher, I made several copies of the questionnaire and consent forms to be provided to each participant who agreed to participate in the study and as the researcher, I approached each participant individually to explain the study and solicit participation.

- The recruitment process of potential participants began with the placement of informational flyers and posters located throughout both campus dental hygiene clinics. Each flyer reflected that the participants needed to contact me to receive a consent form and questionnaire.
- Once contacted, I asked to meet with the participants 30 minutes prior to their dental hygiene appointment at the dental hygiene school to provide them with a study consent form and a questionnaire notated with an identifying number.
- All forms (consent & questionnaire) were filled out in a semi-private room. I anticipated that the questionnaires would take 20-30 minutes to complete. The participants were given an identifying number and my contact information.

Once the pre-treatment questionnaire was completed I remained on site making myself available for participants who were able to complete treatment on the same day. If treatment was not completed on the same day, I asked the participant to inform me of their future appointment date so that I could be present to provide them with a numerically identified post-treatment questionnaire. Participants were again informed that they would be given 20-30 minutes to complete the post treatment questionnaires. After completing of the post-treatment questionnaire, the patients were no longer participants of the study and free to make any additional appointments with their student hygienist.

Instrumentation and Operationalization of Constructs

The combined and revised questionnaire that was used in the study is mostly based on previous research (Appendix A). More specifically, one of the instruments I used for my study was called the Dental Health Questionnaire developed by Luciano et al. (2008), in partial fulfillment for a Master of Science degree for Mrs. Luciano. All of the researchers were associated with the University of North Carolina Chapel Hill at the time of the study.

The forty-one-question dental health questionnaire contains six sections: dental health care habits, dental visits, and condition of the gums, knowledge and beliefs about teeth and gums and demographic information. The HBM based questionnaire was created by Luciano et al. (2008) to explore the oral health beliefs and perceptions of Hispanic Americans within the Siler City, North Carolina.

Prior to using the instrument, the primary researcher Luciano pilot tested the questionnaire with a panel of five randomly selected Hispanic community members to gain

insight on the clarity of the questions, time needed to complete the questionnaire. The appropriateness of the Spanish/English translation was pre-tested using Hispanic dental professionals from a local dental office. After review from the Luciano et al., (2008) thesis committee and the University of North Carolina Institutional Review Board, the questionnaire was deemed acceptable for use. Mariola Luciano was contacted via email to ask for permission to use the instrument on August 3, 2014. Mrs. Luciano, now (M. Steinbicker) provided a positive response to my inquiry to use her instrument on August 4, 2014.

The questionnaire incorporated multiple-choice questions pertaining to dental health care habits, dental visits, and condition of the teeth and gums. Questions pertaining to reasons for visiting the dental hygiene clinic and common signs of periodontal disease were multiple choices. Questions related to oral health utilized a 5-point Likert-type scale. For example, the question "I will lose my teeth as I get older" (Luciano et al., 2008) participants were asked to respond to a five-point Likert scale strongly agree (1), agree (2), neutral (3), disagree (4), strongly disagree (5). For the purpose of this study, demographic information did not include questions about the country of birth. Instead, a question about racial/ ethnic origin was substituted.

I also utilized some questions from the OHBS used by Buglar et al. (2010). Currently, the OHB questions consist of twelve categories based on age, brushing behavior, susceptibility scale, severity scale, benefits scale for brushing and flossing, a barriers scale for flossing and brushing, a self-efficacy scale for brushing and flossing as well as two Likert scale questions on flossing and brushing behavior. There was also a

question asking about the last time attending a dental office which was rated as follows: 1 = within the last year, 2 = about two years ago, 3 = about 3 to 4 years ago, 4 = about 5 or more years ago, 5 = I don't remember. I had questions targeting perceptions of susceptibility: "it is likely that I will develop tooth decay, or gum disease, my chances of developing tooth decay or gum disease are high, my mouth is in bad condition, and within the next year I will develop tooth decay or gum disease." Buglar tested all instruments for reliability using Cronbach's α. Questions about perceived susceptibility $\alpha = .80$, perceived severity $\alpha = .53$, perceives benefits of flossing and brushing $\alpha = .75$ & $\alpha = .47$. Barriers to brushing and flossing $\alpha = 0.81$ & 0.76. Self-efficacy for brushing and flossing both had lower Cronbach's α scores, brushing reliability of $\alpha = .67$ and flossing reliability of $\alpha = .61$ (Buglar et al., 2010).

Kakudate et al. (2009) created an outcome expectancy scale for self care among periodontal disease patients. Although the researchers based their study on the theory of self-efficacy, some of the questions created in their study speak directly to self-efficacy and patient outcome expectancy, and patient behaviors. The researchers were able to establish the reliability and validity of the outcome expectancy scale for self-care in their study successfully. In an effort to capture the behaviors and perceptions of socio-economically deprived persons using dental hygiene schools for treatment, I used five validated questions from the researchers survey and incorporated them into my questionnaire using a Likert scale. Kakudate et al., (2009) validated study questions had a Cronbach's $\alpha = 0.90$ and a Spearman's rank correlation coefficient of the scale of 0.85 ($p < 0.001$).

To ensure the reliability of my modified and combined research instrument, I will assess its internal consistency, using Cronbach's alpha coefficient.

Operationalization

The independent variable (IV) of the study was the reduced fee dental hygiene treatment. The primary group of dependent variables (DVs 1) of the study was the oral health perceptions and behaviors of socio-economically deprived persons and the second group of dependent variables (DVs 2) were; their perceptions and behaviors about completing follow-up treatment when a referral is provided. Mediating variables will be sex, age, race, education, and socio-economic status (Table 1).

Previous dental studies have identified one- or two behaviors as identifiers of a commitment to oral health care (Anagnostopoulos et al., 2011; Kakudate et al., 2011; Kasmaei et al., 2014; Morowatisharifabad et al., 2007; & Tilliss et al., 2003). For the purpose of this study, the identifying behaviors I associated with the commitment to oral health were brushing and flossing.

This study was based on the HBM constructs. The HBM constructs have been defined as perceived susceptibility, perceived severity, perceived benefits, perceived barriers and self-efficacy. The questions in the questionnaire consisted of five questions related to demographic information, eight questions on brushing and flossing behaviors, three questions of reasons for dental visits, and 25 questions related to the HBM constructs using a 5-point Likert scale for responses. Responses ranged from 1 (strongly disagree) to 5 (strongly agree). Table 1 represents Variables, Research Questions, and Items on Survey.

Table 1

Variables, Research Questions, and Items on Survey

Variable category	Research question	Section(s) of the survey
Independent variable:		
Reduced fee dental hygiene treatment	RQ1: Does preventive treatment in an educational dental hygiene clinical setting have a relationship with the oral health behaviors and perceptions of socio-economically deprived persons? RQ2: Do demographics of socio-economically deprived persons who received preventive treatment in an educational dental hygiene clinical setting affect their oral heath behaviors and perceptions? RQ3: Does preventive treatment in an educational dental hygiene clinical setting promote follow-up visits of socio-economically deprived persons with a dental professional for restorative dental work?	Dummy variable
Dependent variables:		
1. The behaviors and perceptions of oral health of socioeconomically deprived persons.	RQ1	Sections A and B
2. The behaviors and perceptions about completing follow up treatment when a referral is provided	RQ3	Section C
Mediating variables:		
Demographic factors sex, age, race, and socio-economic status	RQ2	Section D

Data Analysis Plan

All data will be analyzed using the Statistical Package for Social Sciences (SPSS) version 21.0 (Table 2). Initially, I created a data codebook to keep track of variable names, labels, and changes I make like creating new variables or fixing raw variables. For RQ1 in

which the IV was “reduced fee dental hygiene treatment” (dummy variable) and the DVs “the behavior and perceptions of oral health”, the statistical test I used was the Wilcoxon Signed Ranks Test using SPSS. For RQ2 in which the DVs are “the behavior and perceptions of oral health”, IV is the “reduced fee dental hygiene treatment”, logistic regression was performed using SPSS. The new dummy variable reduced fee treatment was then coded with gender as a covariate to determine if gender factored in the initial logistic regression results.

For RQ3 in which the IV was “reduced fee dental hygiene treatment (dummy variable)” and the DVs “the behavior and perceptions about completing follow up treatment when a referral is provided”, descriptive statistics and the Wilcoxon Signed Ranks test were performed using SPSS. Table 2 represents Statistical procedures per Research Question and Level of Measurement of Variables.

Table 2

Statistical Procedures per Research Question and Level of Measurement of Variables

Research question	Variables	Statistical procedures/analysis
RQ1	IV: reduced fee dental hygiene treatment (dummy). DV: the behavior and perceptions of oral health of socioeconomically deprived persons (ordinal).	Univariate: frequencies. Wilcoxon signed-rank test
RQ2	IV: reduced fee dental hygiene treatment (dummy). MV: demographics DV: the behavior and perceptions of oral health of socio-economically deprived persons (ordinal).	Ordinal logistic regression: DVs versus IV and mediating variables
RQ3	IV: reduced fee dental hygiene treatment (dummy). DV: the behavior and perceptions about completing follow up treatment when a referral is provided (ordinal).	Univariate: frequencies. Wilcoxon signed-ranks test

Note. IV: Independent Variable; DV: Dependent Variable; MV: Mediating Variable

Threats to Validity

Convenience sampling could introduce a number of biases that could affect the external validity of my study (Pannucci, & Wilkins, 2010; Gerhard, 2008). External validity directly affects my ability to generalize any findings of the oral hygiene perceptions and behaviors among socioeconomically deprived persons. One way I attempted to address the issue was to obtain an equal ratio of male and female patients, as

well as of all age groups, from both locations to avoid threats to external validity. Socioeconomic status would not be an issue, because according to the purpose the study, the target population was socioeconomically deprived individuals, therefore the income of all the participants was be anticipated to be relatively low. Additionally, using two different locations for the study may have increased my ability to generalize the findings.

Any threats to the meaningfulness of my study are threats to validity. The cross-sectional pre-test post-test single group design of my study had several potential threats to internal validity. Participants could have been exposed to historical occurrences outside of the study that account for an increase in oral health knowledge (Trochim, 2006). Changes in questionnaire results may not have been attributed to the actual oral hygiene education given by the student hygienist. Participants tend to mature over time (Trochim, 2006). This natural maturation could threaten internal validity as well. One factor unique to the pre-test post-test design is that the participants may have prepared for the post-test potentially influencing the results of the post-test. Instrument threat will not pose any threats to internal validity because I intended to use the same questionnaire. Finally, one of the largest threats to internal validity in my study was a potential high loss to follow up (Trochim, 2006). Patients may opt out of completing treatment with their student hygienist leaving me with incomplete questionnaires, as well as inadequate sample sizes. To reduce potential loss to follow up within the study I waited for each participant to complete treatment. I also tried to ensure that only senior student hygienists' who were clinically more advanced and work at a faster pace treated patients enrolled in the study.

Ethical Procedures

In accordance with the Belmont Report, my study reflected the four major ethical principles of research (Steinberg, Bringle, & Williams, 2010). I showed respect for all participants and their choices while they participated in the study. The participants of my study were adult's ages 18 years and older who were free to choose to participate in the study or not. I avoided causing the patients any harm. I kept the identities of the participants confidential by supplying the participants with random numerical assignments that they used to document their questionnaires. Additionally each participant completed a consent form and confidentiality was protected. All participants were treated equally and fairly. All documentation related to the study has been stored in a locked cabinet in my home office until the appropriate 5 years have passed. After 5 years have elapsed, all paper questionnaires will be destroyed.

To maintain the highest level of ethics, each campus where data collection took place were supplied with the IRB approval number from Walden University IRB department.

Summary

The aim of this study was to assess the effect of reduced fee dental hygiene treatment on oral health behaviors and perceptions of socioeconomically deprived persons visiting dental hygiene clinics within the state of Georgia using a cross-sectional pre-test, post-test quantitative study design. A sample of 102 participants was used to achieve an acceptable statistical power. This study was based on the HBM constructs. The HBM constructs have been defined as perceived susceptibility, perceived severity, perceived

benefits, perceived barriers and self-efficacy. The questions in the questionnaire consisted of five questions related to demographic information, eight questions on brushing and flossing behaviors, three questions of reasons for dental visits, and 25 questions related to the HBM constructs using a 5-point Likert scale for responses. Responses ranged from 1 (strongly disagree) to 5 (strongly agree). Wilcoxon Signed Rank Test, descriptive statistics and ordinal logistic regression using SPSS were used to analyze the data. The results of the study are presented in detail in Chapter 4.

Chapter 4: Results

Introduction

The purpose of this study was to assess the effect of reduced-fee dental hygiene treatment on oral health behaviors and perception of socioeconomically deprived persons visiting two dental hygiene clinics within the state of Georgia. In addition, I examined whether age, gender, ethnicity, education level, and income level played a role in the behaviors and perceptions of this demographic who received preventative treatment in an educational dental hygiene clinical setting. Research Question 1 was comparative in nature addressing the pretest, posttest design of reduced fee dental hygiene treatment:

RQ1: Does preventative treatment in an educational dental hygiene clinical setting effect the oral health behaviors and perceptions of socioeconomically deprived persons?

$H_0$1: There is not a significant difference in the oral health behaviors and perceptions of socioeconomically deprived persons receiving reduced-fee dental hygiene treatment, as measured by the questionnaire.

H_a1: There is a significant difference in the oral health behaviors and perceptions of socioeconomically deprived persons receiving reduced-fee dental hygiene treatment, as measured by the questionnaire.

RQ2 and RQ3 were inferential questions. The two inferential questions and hypothesis were:

RQ2: Do demographics of socioeconomically deprived persons who received preventative treatment in an educational dental hygiene setting affect their oral health behaviors and perceptions?

$H_0$2*:* There is no relationship between demographic factors (sex, age, race, and socioeconomic status) and the beliefs and perceptions of oral health behaviors and perceptions among socioeconomically deprived persons who received preventative treatment in an educational dental hygiene setting, as measured by the questionnaire.

H_a2: There is a relationship between demographic factors and the beliefs and perceptions of oral health behaviors and perceptions among socioeconomically deprived persons who received preventative treatment in an educational dental hygiene setting, as measured by the questionnaire.

RQ3: Does preventative treatment in an educational dental hygiene clinical setting promote follow-up visits of socioeconomically deprived persons with a dental professional for restorative dental work?

$H_0$3: There is not a significant relationship between treatment in an educational dental hygiene clinical setting and the promotion of follow-up visits with a dental professional for restorative dental work among socioeconomically deprived persons, as measured by the questionnaire.

H_a3: There is a significant relationship between treatment in an educational dental hygiene clinical setting and the promotion of follow-up visits with a dental professional for restorative dental work among socioeconomically deprived persons, as measured by the questionnaire.

As outlined in Chapter 3 the questionnaire consisted of four sections labeled A, B, C, and D (Appendix A). Sections A and B, contained questions related to the HBM constructs using a 5-point Likert scale for responses ranging from 1 (strongly disagree) to

5 (strongly agree). Section C contained questions related to behaviors and perceptions related to completing follow up treatment when a referral is provided and Section D contained questions concerning demographic factors such as sex, age, race, and socioeconomic status.

This first portion of the chapter includes a description of the data collection techniques, and the time frame for the data collection. The second portion of the chapter incudes information on the sample demographics: race, sex, age, and socioeconomic status of the research participants. In the third portion of the chapter the study results and descriptive statistics used to evaluate the coded data using SPSS software version 21.0 for data analysis are provided.

Data Collection

Recruitment Techniques

Prior to recruiting participants for the study, I sought IRB approval from three sources, Georgia Perimeter College, Georgia Highlands College, and Walden University. I provided both Georgia Perimeter and Georgia Highlands College with a copy of my approved proposal. Upon reviewing the proposal, both colleges granted me conditional approval providing that a final approval was given by Walden University. Prior to starting the recruitment process, I was to provide both colleges with my Walden University IRB approval number to avoid any confusion, Walden University's IRB representative requested that I have a separate consent form for both schools. Georgia Perimeter College's IRB representative requested that I add her contact information to the Georgia Perimeter Consent form along with Walden University's contact information should any of

the participants have any questions. Both Georgia Perimeter College and Georgia Highlands College's requested a copy of the results.

During a 10-week period between March 6, 2016 and May 12, 2016, I traveled to Georgia Perimeter College Dunwoody campus and Georgia Highlands College Rome campus on either a Tuesday or Thursday, as those days were the set clinical days for second year dental hygiene students. As outlined in Chapter 3, I spoke with school administrators to receive permission to attend either day to solicit for patient participation. I was provided a semi-secluded space in the general vicinity of the patients at both locations where I was able to approach and ask patients to participate in the study. Once the respondents agreed to participate they were given consent forms based on the location of the school dental hygiene clinic.

Sample Description

A total of 102 people agreed to participate in study, of the 102 participants, 65 were from Georgia Highlands College Rome campus, and 37 participants were from Georgia Perimeter College. All questionnaires completed prior to treatment were identified with the letter (A) and a random numerical identifier to indicate the patient. All of the questionnaires completed after treatment was identified with the letter (B) and a matching numerical identifier corresponding to the patient's (A) questionnaire.

Most of the participants were able to answer the questionnaire individually, however some participants requested that I read the questionnaire to them. In cases where the participants asked me to read the questionnaire to them, I was able to sit across from them with a blank questionnaire and read the questions while they recorded responses on

their own questionnaire. Since both colleges held full day clinical sessions from 8 am to 5 pm, I was able to arrive 30 minutes prior to the respondent's appointment time. Arriving early, allowed time for the participants to complete the pre-treatment questionnaire. Subsequently, I then waited two to three hours for my participants to complete treatment and complete the post-treatment questionnaire. In the instances where the participant did not complete treatment on the same day, I was able to coordinate with the participants return to the schools for their next visit. Out of the 102 participants only three respondents did not complete treatment on the same day.

Descriptive Statistics Results

Descriptive statistics were conducted using SPSS to find the frequencies of the demographic factors age, race, sex and socio-economic status and education level. Results of the descriptive statistics are presented in Tables 1-5.

The total number of completed questionnaires was 102, the effect size was calculated through G*Power software, 3.1(Faul et al., 2009). The needed effect size was calculated based on the correlation results from a similar study of Luciano et al. (2008). Therefore, the effect size was calculated to be 0.17—a medium effect size. With an alpha probability of error of 0.05, the sample size of 102 was sufficient to achieve a satisfactory statistical power of (0.81).

Of the 102 participants, 7% reported having some high school education, 27% graduated from high school, 13% reported having had one year of college, 26% reported having two years of college, 21% reported graduating from college, and 3% reported

graduating from graduate school. Table 3 represents the highest level of education completed.

Table 3

Education Levels

		Frequency	%	Valid %
Valid	Some high school	7	6.9	7.2
	Graduated from high school	27	26.5	27.8
	1 year of college	13	12.7	13.4
	2 years of college	26	25.5	26.8
	Graduated college	21	20.6	21.6
	Completed graduate school	3	2.9	3.1
	Total	97	95.1	100.0
Missing	99.00	5	4.9	
Total		102	100.0	

Of the 102 participants 6% identified themselves as Asian/Pacific Islander, 29% identified themselves as Black or African American, 12% identified themselves as Hispanic, and 48% identified themselves as White/ Caucasian. Table 4 represents the ethnicities of the participants.

Table 4

Race/ethnicity

		Frequency	%	Valid %
Valid	Asian/Pacific Islander	6	5.9	6.2
	Black or African American	30	29.4	30.9
	Hispanic American	12	11.8	12.4
	White/ Caucasian	49	48.0	50.5
	Total	97	95.1	100.0
Missing	99.00	5	4.9	
Total		102	100.0	

Of the participants that successfully completed the study, 72 (71%) were female and 27 (27%) were male. Table 5 represents the gender of the participants.

Table 5

Gender

		Frequency	%	Valid %
Valid	Male	27	26.5	27.3
	Female	72	70.6	72.7
	Total	99	97.1	100.0
Missing	99.00	3	2.9	
Total		102	100.0	

The median age of the participants was between 40 and 49. However the highest percentage of respondents was between 30 and 39 (22%) years of age. The second largest percentage of respondents (20%) reported as being 60 years and older. Table 6 represents the age range of the participants.

Table 6

Age

		Frequency	%	Valid %
Valid	18–20 y	5	4.9	5.4
	21-29 y	18	17.6	19.4
	30-39 y	22	21.6	23.7
	40-49 y	14	13.7	15.1
	50-59 y	14	13.7	15.1
	60 y or older	20	19.6	21.5
	Total	93	91.2	100.0
Missing	99.00	9	8.8	
Total		102	100.0	

Of the 102 (100%) participants that answered the portion of the questionnaire concerning annual income 21(21%) preferred not to answer, 32 (33%) reported earning less than $10,000 and 25 (25%) reported earning between $20,000-$30,000 dollars per year. Table 7 represents the annual income of the participants.

Table 7

Annual income

		Frequency	%	Valid %	Cumulative %
Valid	Less than $10,000	33	32.4	34.4	34.4
	$20,000–$30,000	25	24.5	26.0	60.4
	$30,000-$40,000	10	9.8	10.4	70.8
	Greater than $50,000	7	6.9	7.3	78.1
	Prefer not to answer	21	20.6	21.9	100.0
	Total	96	94.1	100.0	
Missing	99.00	6	5.9		
Total		102	100.0		

After conducting the Kolmogorov-Smirnov and the Shapiro-Wilk Tests of normality, we rejected the null hypothesis that the pre and post-treatment data was normally distributed because all of the *p* values for both Kolmogorov-Smirnov and Shapiro-Wilk test were equal to 0.000. Since the significance value was less than 0.05, I concluded that the pre-treatment and post-treatment data was not normally distributed.

Research Question 1 Results

Does preventative treatment in an educational dental hygiene clinical setting affect the oral health behaviors and perceptions of socio-economically persons?

Based on the 102 completed questionnaires, and conducting descriptive statistics using SPSS, the initial results indicated slight differences of the ranks between Group A questionnaires and Group B questionnaires for most of Section B's 52 behavior and perception questions. The slight differences however were not significant for a majority of the questions. There were however several questions that showed significant differences in the ranks between group A and B questionnaires. (Table 8)

Ninety-five participants answered the question "tooth decay and gum disease will cause my teeth to become loose/break/bad breath" 45 out of 95 (47%) participants responded more positively after treatment for a *z* score of -2.2.437, $p = .015$ rejecting the null hypothesis that there are no differences in the oral health behaviors and perceptions of socio-economically deprived persons receiving reduced fee dental hygiene treatment as measured by the questionnaire.

When asked if "brushing my teeth at least two times a day will prevent tooth decay or gum disease" 34 out of 92 (37%) participants responded more positively after treatment

for a *z*-score of -2.255, $p = .024$ rejecting the null hypothesis that there are no differences in the oral health behaviors and perceptions of socio-economically deprived persons receiving reduced fee dental hygiene treatment as measured by the questionnaire. Ninety-seven participants answered the question "my mouth feels better after I brush them" 35 out of 97 (36%) participants responded more positively after treatment for a *z*-score of -2.038, $p = .042$ rejecting the null hypothesis that there are no differences in the oral health behaviors and perceptions of socio-economically deprived persons receiving reduced fee dental hygiene treatment as measured by the questionnaire.

The most significant post-treatment response was to evaluate the statement "flossing my teeth at least two times a day will save me money on dental expenses" 49 out of 100 (49%) participants responded more positively after treatment for a *z*-score of -3.226, $p = .001$ rejecting the null hypothesis that there are no differences that there are no differences in the oral health behaviors and perceptions of socio-economically deprived persons receiving reduced fee dental hygiene treatment as measured by the questionnaire. When asked "my mouth will look better if I floss them at least once a day" 47 out of 96 (49%) participants responded more positively after treatment for a *z*-score of -1.985, $p = .047$ rejecting the null hypothesis that there are no differences in the oral health behaviors and perceptions of socio-economically deprived persons receiving reduced fee dental hygiene treatment as measured by the questionnaire.

One hundred participants answered the question "I don't like to brush my teeth because it lifts my fillings" 41 out of 100 (41%) responded negatively before treatment. After treatment 23 out of 100 (23%) participants responded more positively for a *z* score of

-2.045, $p = .041$ rejecting the null hypothesis that there are no differences in oral health behaviors and perceptions of socio-economically deprived persons receiving reduced fee dental hygiene treatment as measured by the questionnaire. For the statement "I don't have time to floss" 44 out of 100 (44%) participants thought negatively about flossing prior to treatment. After treatment 28 out of 100 (28%) responded more positively for a z score of -2.248, $p = .024$ rejecting the null hypothesis that there are no differences in oral health behaviors and perceptions of socio-economically deprived persons receiving reduced fee dental hygiene treatment as measured by the questionnaire.

When asked "I am confident I can floss my teeth once a day" 43 out of 95 (45%) participants responded more positively for a z score of -2.099, $p = .036$ rejecting the null hypothesis that there are no differences in oral health behaviors and perceptions of socio-economically deprived persons receiving reduced fee dental hygiene treatment as measured by the questionnaire.

The second most significant change between pre-treatment behaviors and post-treatment behaviors was seen when participants were asked to evaluate the statement "brushing my teeth can help prevent gum problems". Forty-three out of ninety-six (48%) participants responded more positively after treatment with a z score of -2.752, $p = .006$ rejecting the null hypothesis that there are no differences in oral health behaviors and perceptions of socio-economically deprived persons receiving reduced fee dental hygiene treatment as measured by the questionnaire.

When asked to evaluate the statement "using floss helps prevent gum disease" 42 out of 95 (44%) participants responded more positively after treatment for a z score of -

1.913, $p = .05$ rejecting the null hypothesis that there are no differences in oral health behaviors and perceptions of socio-economically deprived persons receiving reduced fee dental hygiene treatment as measured by the questionnaire. Initially, prior to treatment the statement "it is normal for healthy gums to bleed", 42 out of 93 (45%) participants responded negatively, however after treatment 24 out of 93 (26%) responded more positively to the statement for a z score of -2.184, $p = .029$ rejecting the null hypothesis that there are no differences in oral health behaviors and perceptions of socio-economically deprived persons receiving reduced fee dental hygiene treatment as measured by the questionnaire.

Thirty-eight out of ninety-four (40%) participants responded negatively before treatment to the statement " I should only visit a dentist if I am in pain", after treatment 23 out of 94 (24%) responded more positively for a z score of -2.028, $p = .043$ rejecting the null hypothesis that there are no differences in oral health behaviors and perceptions of socio-economically deprived persons receiving reduced fee dental hygiene treatment as measured by the questionnaire. Table 8 represents the results of the Wilcoxon Signed Ranks Test.

Table 8

Research Question 1 descriptive statistics of the sample

	I will lose my teeth if I get tooth decay or gum disease - I will lose my teeth if I get tooth decay or gum disease	Tooth decay and gum disease will cause my teeth to become loose/break/bad breath - Tooth decay and gum disease will cause my teeth to become loose/break/bad breath	Tooth decay and gum disease make my mouth look bad - Tooth decay and gum disease make my mouth look bad	My bad teeth effect my work or day life - My bad teeth effect my work or day life	Tooth decay and gum disease can cause other health problems - Tooth decay and gum disease can cause other health problems	Tooth decay or gum disease will cost me a lot of money - Tooth decay or gum disease will cost me a lot of money
Z	-.064[b]	-2.437[b]	-.987[b]	-.293[b]	-1.773[c]	-.636[c]
p	.949	.015	.324	.769	.076	.525

Research Question 1 descriptive statistics of the sample

	My chances of developing tooth decay or gum disease - My chances of developing tooth decay or gum disease	It is likely that I will develop tooth decay - It is likely that I will develop tooth decay	My mouth is in bad condition - My mouth is in bad condition	Within the next year I will develop tooth decay - Within the next year I will develop tooth decay	If I get tooth decay or gum disease it will be serious - If I get tooth decay or gum disease it will be serious	If I get tooth decay or gum diseases I will suffer severe pain - If I get tooth decay or gum diseases I will suffer severe pain
Z	-.590[b]	-.864[b]	-.959[b]	-.498[b]	-.255[c]	-.728[c]
p	.55	.388	.338	.619	.799	.466

Research Question 1 descriptive statistics of the sample

	Brushing my teeth at least two times a day will prevent tooth decay or gum disease - Brushing my teeth at least two times a day will prevent tooth decay or gum disease	If I brush my teeth at least two times a day they will last a lifetime - If I brush my teeth at least two times a day they will last a lifetime	Brushing my teeth at least two times a day will save me money on dental expenses - Brushing my teeth at least two times a day will save me money on dental expenses	My mouth will look better if I brush them at least two times a day - My mouth will look better if I brush them at least two times a day	My mouth feels better after I brush them - My mouth feels better after I brush them	Flossing my teeth at least two times a day will prevent tooth decay or gum disease - Flossing my teeth at least two times a day will prevent tooth decay or gum disease
Z	-.738[b]	-.094[b]	-2.255[b]	-2.179[b]	-2.038[c]	-2.162[c]
p	.461	.925	.024	.029	.042	.031

Research Question 1 descriptive statistics of the sample

	If I floss my teeth at least two times a day they will last a lifetime - If I floss my teeth at least two times a day they will last a lifetime	Flossing my teeth at least two times a day will save me money on dental expenses - Flossing my teeth at least two times a day will save me money on dental expenses	My mouth will look better if I floss them at least once a day - My mouth will look better if I floss them at least once a day	Tooth brushing is painful - Tooth brushing is painful	My teeth will break when I brush - My teeth will break when I brush	My gums will bleed when I brush - My gums will bleed when I brush
Z	-1.490[b]	-3.226[b]	-1.985[b]	-1.064[b]	-1.295[c]	-.006[c]
p	.136	.001	.047	.287	195	.995
Research Question 1descriptive statistics of the sample						
	I forget to brush at least two times a day - I forget to brush at least two times a day	If I am tired I don't brush my teeth - If I am tired I don't brush my teeth	Toothpaste is expensive - Toothpaste is expensive	I don't like the taste of toothpaste - I don't like the taste of toothpaste	I don't have time to brush my teeth at least two times a day - I don't have time to brush my teeth at least two times a day	I don't like to brush my teeth because it lifts my fillings - I don't like to brush my teeth because it lifts my fillings
Z	-.216[b]	-.101[b]	-1.846[b]	-.044[b]	-.721[c]	-2.045[c]
p	.829	.920	.065	.965	.471	.041

Research Question 1 descriptive statistics of the sample

	Dental flossing is painful - Dental flossing is painful	My teeth will break when I floss - My teeth will break when I floss	My gums will bleed when I floss - My gums will bleed when I floss	I forget to floss at least one time a day - I forget to floss at least one time a day	I don't like the feel of dental floss - I don't like the feel of dental floss	I don't have time to floss my teeth - I don't have time to floss my teeth
Z	-.400[b]	-1.238[b]	-.391[b]	-.261[b]	-.882[c]	-2.248[c]
p	.689	.216	.696	.794	.378	.025

Research Question 1 descriptive statistics of the sample

	I don't like to floss my teeth because it lifts my fillings out - I don't like to floss my teeth because it lifts my fillings out	Brushing my teeth is hard to do - Brushing my teeth is hard to do	I am not sure I can brush my teeth at least two times a day - I am not sure I can brush my teeth at least two times a day	Flossing my teeth is hard to do - Flossing my teeth is hard to do	I am confident I can floss my teeth once a day - I am confident I can floss my teeth once a day	I am not sure I can floss my teeth once a day - I an not sure I can floss my teeth once a day
Z	-.806[b]	-.991[b]	-1.649[b]	-.010[b]	-2.099[c]	-.832[c]
p	.420	.322	.099	.992	.036	.405

Research Question 1 descriptive statistics of the sample

	When I perform good oral self-care I become more confident in myself - When I perform good oral self-care I become more confident in myself	When I perform good oral self-care my dental cost decrease - When I perform good oral self-care my dental cost decrease	When I perform good oral self-care I have more pride in my teeth - When I perform good oral self-care I have more pride in my teeth	When I perform good oral self-care my chewing ability is improved - When I perform good oral self-care my chewing ability is improved
Z	-1.660[b]	-.352[b]	-1.408[b]	-.347[b]
p	.097	.725	.159	.729

a. Wilcoxon Signed Ranks Test
b. Based on positive ranks.
c. Based on negative ranks.

Research Question 2 Results

Do demographics of socio-economically deprived persons who received preventative treatment in an educational dental hygiene clinical setting affect their oral health behaviors and perceptions?

In order to determine if demographics like the sex, age, and socio-economic status of socio-economically deprived persons who received preventative treatment in an educational dental hygiene clinical setting affect their oral health behaviors and perceptions ordinal regression was conducted using SPSS. In order to create a DV suitable for logistic regression a new data set was created. The new variable “reduced fee treatment dummy variable” with code 1 representing Group A answers and code 2 representing

Group B answers. With the new data set in place ordinal logistic regression was conducted using SPSS.

Initial logistic regression results indicated that Group A is equally as likely to have high scores or low scores as Group B since Group A served as the reference category for all of the regression model results. The estimate in each pairing equaled 0.00, which indicates that Group A is equally as likely as Group B to have high or low scores.

When RFT (Reduced Fee Treatment) was paired with age as the DV (dependent variable), those participants who categorized themselves in age category 4 (40-49 years old) were more likely to have lower cumulative scores than Group B (40-49 years old). The 95% *CI* is 0.16 to 0.9, $p = 0.006$. In the tests of parallel lines the Chi-square = 0.00, 4 *df,* $p = 1.00$, so we fail to reject the null hypothesis that socio-economically deprived persons who received preventative treatment in an educational dental hygiene clinical setting affect their oral health behaviors and perceptions with respect to category 4 age group. Table 9 represents the results of ordinal logistic regression with age as the DV.

Table 9

Research Question 2 ordinal logistic regression, reduced fee treatment paired with age

		Estimate	Std. Error	Wald	df	*p*	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[age = 1.00]	-2.868	.350	67.176	1	.000	-3.554	-2.182
	[age = 2.00]	-1.113	.214	27.143	1	.000	-1.532	-.694
	[age = 3.00]	-.065	.196	.109	1	.742	-.448	.319
	[age = 4.00]	.551	.200	7.607	1	.006	.159	.943
	[age = 5.00]	1.295	.220	34.488	1	.000	.863	1.727
Location	[RFT=1.00]	-1.000E-013	.259	.000	1	1.000	-.507	.507
	[RFT=2.00]	0[a]	.	.	0	.	.	.

Link function: Logit.
a. This parameter is set to zero because it is redundant.

Test of Parallel Lines[a]

Model	-2 Log Likelihood	Chi-Square	df	*p*
Null Hypothesis	41.204			
General	41.204	.000	4	1.000

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.[a]
a. Link function: Logit.

When RFT was paired with education as the DV, participants who categorized themselves in education Group A category 2 (graduated from high school), were more likely to have lower cumulative scores than Group B category 2 (graduated from high school) cumulative scores with a 95% *CI* -1.0 to -0.23, $p = 0.002$. We can conclude that we fail to reject the null hypothesis when asking do demographics of socio-economically deprived persons who received preventative treatment in an educational dental hygiene

clinical setting affect their oral health behaviors and perceptions. Table 10 represents the results of ordinal logistic regression with education as the DV.

Table 10

Research Question 2 ordinal logistic regression, reduced fee treatment paired with education

		Estimate	Std. Error	Wald	df	*p*	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[education = 1.00]	-2.554	.305	69.888	1	.000	-3.153	-1.955
	[education = 2.00]	-.617	.197	9.758	1	.002	-1.004	-.230
	[education = 3.00]	-.062	.192	.104	1	.748	-.439	.315
	[education = 4.00]	1.112	.210	28.107	1	.000	.701	1.524
	[education = 5.00]	3.445	.434	63.006	1	.000	2.594	4.295
Location	[RFT=1.00]	.000	.256	.000	1	1.000	-.501	.501
	[RFT=2.00]	0[a]	.	.	0	.	.	.

Link function: Logit.
. This parameter is set to zero because it is redundant.

When RFT was paired with annual income in U.S. dollars as the DV, the participants who categorized themselves in income category 1 (annual income of less than $10,000), Group A participants were more likely to have lower cumulative scores than Group B category 1 participants reporting an annual income of less than $10,000 with a 95% *CI* -1.05 to -0.27, $p = 0.001$.

Likewise participants who categorized themselves in income category 2 (annual income of $20,000-$30,000), Group A were more likely to have lower cumulative scores than Group B participants who categorized themselves in income category 2 with 95% *CI* 0.015 to 0.779, $p = 0.042$. Group A participants who categorized themselves in income category 3 (annual income of $30,000 -$40,000), were more likely to have lower cumulative scores than Group B participants who categorized themselves in category 3

income with a 95% *CI* of 0.273 to 1.052, $p = 0.001$. We can conclude that we fail to reject the null hypothesis when asking do demographics of socio-economically deprived persons who received preventative treatment in an educational dental hygiene clinical setting affect their oral health behaviors and perceptions. Table 11 represents ordinal logistic regression of RFT with annual income as the DV.

Table 11

Research Question 2 ordinal logistic regression, reduced fee treatment paired with income U.S. dollars

		Estimate	Std. Error	Wald	df	*p*	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[income = 1.00]	-.662	.199	11.095	1	.001	-1.052	-.273
	[income = 2.00]	.397	.195	4.143	1	.042	.015	.779
	[income = 3.00]	.662	.199	11.095	1	.001	.273	1.052
	[income = 4.00]	.902	.204	19.514	1	.000	.502	1.302
	[income = 5.00]	1.286	.217	35.221	1	.000	.861	1.711
Location	[RFT=1.00]	1.000E-013	.258	.000	1	1.000	-.505	.505
	[RFT=2.00]	0[a]	.	.	0	.	.	.

Link function: Logit.
a. This parameter is set to zero because it is redundant.

When RTF was paired with race as the DV, the Group A participants who categorized themselves as race category 3 (African American), were more likely to have lower cumulative scores than Group B participants who categorized themselves as

category 3 African American with a 95% *CI* -0.922 to -0.133, $p = 0.009$. We can conclude that we fail to reject the null hypothesis when asking do demographics of socio-economically deprived persons who received preventative treatment in an educational dental hygiene clinical setting affect their oral health behaviors and perceptions. Table 12 represents DV race paired with RFT.

Table 12

Research Question 2 ordinal logistic regression, reduced fee treatment paired with race

		Estimate	Std. Error	Wald	df	*p*	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[race = 2.00]	-2.719	.327	68.937	1	.000	-3.361	-2.077
	[race = 3.00]	-.527	.201	6.865	1	.009	-.922	-.133
	[race = 4.00]	-.021	.198	.011	1	.917	-.408	.367
Location	[RFT=1.00]	.000	.271	.000	1	1.000	-.532	.532
	[RFT=2.00]	0[a]	.	.	0	.	.	.

Link function: Logit.
a. This parameter is set to zero because it is redundant.

In an effort to see if gender influenced any of the factors previously found, I conducted ordinal regression of each demographic with gender as the covariate. When RFT was paired with age as the DV and gender as the covariate, Group A participants who

categorized themselves as group 3 (30-39) were more likely to have lower score that Group B participants who categorized themselves as group 3 (30-39) when gender was added as a covariate. The 95% *CI* -2.357 to -.158, $p = 0.025$; gender 95% *CI* -1.258 to -.081, $p = 0.026$. We can conclude that we fail to reject the null hypothesis when asking do demographics of socio-economically deprived persons who received preventative treatment in an educational dental hygiene clinical setting affect their oral health behaviors and perceptions. Table 13 represents age as DV with RFT and gender as a covariate.

Table 13

Research Question 2 ordinal logistic regression, reduced fee treatment paired with age covariate gender

		Estimate	Std. Error	Wald	df	*p.*	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[age = 1.00]	-4.057	.646	39.401	1	.000	-5.324	-2.790
	[age = 2.00]	-2.293	.577	15.792	1	.000	-3.424	-1.162
	[age = 3.00]	-1.258	.561	5.029	1	.025	-2.357	-.158
	[age = 4.00]	-.609	.555	1.205	1	.272	-1.696	.478
	[age = 5.00]	.156	.554	.079	1	.779	-.931	1.242
Location	Gender	-.669	.300	4.966	1	.026	-1.258	-.081
	[RFT=1.00]	-1.000E-013	.261	.000	1	1.000	-.511	.511
	[RFT=2.00]	0[a]	.	.	0	.	.	.

Link function: Logit.
a. This parameter is set to zero because it is redundant.

When RFT was paired with education as the DV and gender as the covariate Group A participants who categorized themselves with category 1 (some high school), category 4 (2 years of college), and category 5 (graduated college), were more likely to have lower cumulative scores than Group B participants who categorized themselves with category 1,

category 4, and category 5. The 95% *CI* -3.144 to -0.846, $p = 0.001$ for category 1, 95% *CI* 0.755 to 2.924, $p = 0.001$ for category 4, 95% *CI* 2.859 to 5.511, $p = 0.000$ and gender 95% *CI* -.149 to .993, $p = 0.147$. We can conclude that we fail to reject the null hypothesis when asking do demographics of socio-economically deprived persons who received preventative treatment in an educational dental hygiene clinical setting affect their oral health behaviors and perceptions. Table 14 represents education as the DV with RFT and gender as a covariate.

Table 14

Research Question 2 ordinal logistic regression, reduced fee treatment paired with education covariate gender

		Estimate	Std. Error	Wald	df	*p*	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[education = 1.00]	-1.995	.586	11.586	1	.001	-3.144	-.846
	[education = 2.00]	.072	.537	.018	1	.893	-.981	1.125
	[education = 3.00]	.640	.539	1.410	1	.235	-.417	1.697
	[education = 4.00]	1.840	.553	11.046	1	.001	.755	2.924
	[education = 5.00]	4.185	.677	38.264	1	.000	2.859	5.511
	gender	.422	.291	2.100	1	.147	-.149	.993
Location	[RFT=1.00]	-1.000E-013	.257	.000	1	1.000	-.505	.505
	[RFT=2.00]	0[a]	.	.	0	.	.	.

Link function: Logit.
a. This parameter is set to zero because it is redundant.

When RFT was paired with annual income as the DV and gender as the covariate Group A participants who categorized themselves as category 1 (less than $10,000 annually), and category 5 (greater than $50,000) were more likely to have lower cumulative scores than Group B participants who categorized themselves as category 1 and category 5. Category 1 95% CI -2.107 to .022, $p = 0.055$, Category 5 95% *CI* –0.156 to 1.973, and gender *CI* -0.788 to 0.350, $p = 0.452$. We can conclude that we fail to reject the null hypothesis when asking do demographics of socio-economically deprived persons who received preventative treatment in an educational dental hygiene clinical setting affect their oral health behaviors and perceptions. Table 15 represents annual income as the DV with RFT and gender as a covariate.

Table 15

Research Question 2 ordinal logistic regression, reduced fee treatment paired with annual income U.S. dollars covariate gender

		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[income = 1.00]	-1.043	.543	3.687	1	.055	-2.107	.022
	[income = 2.00]	.018	.538	.001	1	.974	-1.036	1.072
	[income = 3.00]	.283	.538	.276	1	.599	-.772	1.338
	[income = 4.00]	.523	.539	.939	1	.333	-.534	1.580
	[income = 5.00]	.908	.543	2.797	1	.094	-.156	1.973
	gender	-.219	.290	.567	1	.452	-.788	.350
Location	[RFT=1.00]	1.001E-013	.258	.000	1	1.000	-.505	.505
	[RFT=2.00]	0[a]	.	.	0	.	.	.

Link function: Logit.

a. This parameter is set to zero because it is redundant.

When RFT was paired with race as the DV and gender as the covariate, Group A participants that identified themselves as race category 3 (Black/African American) were more likely to have lower cumulative scores that Group B category 3 (Black/African American) with 95% *CI* -2.651 to -0.312, $p = 0.013$. We can conclude that we fail to reject the null hypothesis when asking do demographics of socio-economically deprived persons who received preventative treatment in an educational dental hygiene clinical setting affect their oral health behaviors and perceptions. Table 16 represents race as the DV paired with RFT and gender as the covariate.

Table 16

Research Question 2 ordinal logistic regression, with reduced fee treatment paired with race covariate gender

		Estimate	Std. Error	Wald	df	*p*	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[race = 2.00]	-3.686	.661	31.131	1	.000	-4.980	-2.391
	[race = 3.00]	-1.482	.597	6.165	1	.013	-2.651	-.312
	[race = 4.00]	-1.003	.592	2.874	1	.090	-2.162	.157
	gender	-.546	.319	2.920	1	.087	-1.171	.080
Location	[RFT=1.00]	1.001E-013	.275	.000	1	1.000	-.539	.539
	[RFT=2.00]	0[a]	.	.	0	.	.	.

Link function: Logit.

a. This parameter is set to zero because it is red

b. undant.

In an effort to determine gender specific interactions in the ordinal logistic regression analysis of reduced fee treatment paired with each dependent variable, I created dummy variables for both male and female participants to use as the covariate in the regression analysis.

When RFT was paired with age as the DV, and male gender as the covariate, Group A participants who categorized themselves as age group 4 (40-49) were more likely to have lower scores than Group B participants who categorized themselves as group 4 (40-49) when male gender was added as a covariate. The 95% *CI* .281 to 1.126, $p = 0.001$. We can conclude that we fail to reject the null hypothesis when asking do demographics of socio-economically deprived persons who received treatment in an educational dental hygiene clinical setting affect their oral health behaviors and perceptions. Table 17 represents age as DV with RFT and male gender as a covariate.

Table 17

Research Question 2 ordinal logistic regression reduced fee treatment paired with age covariate male gender

		Estimate	Std. Error	Wald	df	*p*	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[age = 1.00]	-2.754	.355	60.154	1	.000	-3.449	-2.058
	[age = 2.00]	-.997	.224	19.885	1	.000	-1.436	-.559
	[age = 3.00]	.067	.209	.103	1	.748	-.343	.477
	[age = 4.00]	.704	.216	10.642	1	.001	.281	1.126
	[age = 5.00]	1.460	.238	37.704	1	.000	.994	1.926
Location	genderm	.534	.287	3.449	1	.063	-.030	1.097
	[RFT=1.00]	-.007	.259	.001	1	.980	-.515	.502
	[RFT=2.00]	0[a]	.	.	0	.	.	.

Link function: Logit.
a. This parameter is set to zero because it is redundant.

When RFT was paired with race as the DV and male gender as the covariate, Group A participants that identified themselves as race category 3 (Black/African American) were more likely to have lower cumulative scores than Group B category 3 (Black/African American) with 95% CI -0.874 to -0.028, p = 0.037. We can conclude that we fail to reject the null hypothesis when asking do demographics of socio-economically deprived persons

who received preventative treatment in an educational dental hygiene clinical setting affect their oral health behaviors and perceptions. Table 18 represents race as the DV paired with RFT and male gender as the covariate.

Table 18

Research Question 2 ordinal logistic regression with reduced fee treatment paired with race covariate male gender

		Estimate	Std. Error	Wald	df	*p*	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[race = 2.00]	-2.643	.336	61.945	1	.000	-3.301	-1.985
	[race = 3.00]	-.451	.216	4.368	1	.037	-.874	-.028
	[race = 4.00]	.062	.213	.085	1	.771	-.356	.480
	genderm	.349	.302	1.330	1	.249	-.244	.942
Location	[RFT=1.00]	-.001	.272	.000	1	.997	-.535	.532
	[RFT=2.00]	0[a]	.	.	0	.	.	.

Link function: Logit.
a. This parameter is set to zero because it is redundant.

When RFT was paired with education as the DV and male gender as the covariate Group A participants who categorized themselves with category 2 (graduated from high school) were more likely to have lower cumulative scores than Group B participants who categorized themselves with category 2 (graduated from high school) when male gender was added as the covariate. The 95% *CI* -1.141 to -0.306, $p = 0.001$. We can conclude that we fail to reject the null hypothesis when asking do demographics of socio-economically deprived persons who received preventative treatment in an educational dental hygiene clinical setting affect their oral health behaviors and perceptions. Table 19 represents education as the DV with RFT and male gender as a covariate.

Table 19

Research Question 2 Ordinal logistic regression reduced fee treatment paired with education covariate male gender

		Estimate	Std. Error	Wald	df	*p*	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[education = 1.00]	-2.662	.318	69.912	1	.000	-3.286	-2.038
	[education = 2.00]	-.724	.213	11.545	1	.001	-1.141	-.306
	[education = 3.00]	-.165	.207	.635	1	.425	-.570	.240
	[education = 4.00]	1.026	.221	21.586	1	.000	.593	1.459
	[education = 5.00]	3.367	.440	58.699	1	.000	2.506	4.229
	genderm	-.359	.280	1.648	1	.199	-.907	.189
Location	[RFT=1.00]	.011	.256	.002	1	.965	-.490	.513
	[RFT=2.00]	0[a]	.	.	0	.	.	.

Link function: Logit.
a. This parameter is set to zero because it is redundant.

When RFT was paired with annual income as the DV and male gender as the covariate Group A participants who categorized themselves as category 1 (less than $10,000 annually), category 2 ($20,000-$30,000 annually), and category 3 ($30,000-$40,000 annually) were more likely to have lower cumulative scores than Group B participants who categorized themselves with category 1, 2, & 3. Category 1 95% *CI* -1.052 to -0.220, $p = 0.003$, Category 2 95% *CI* 0.013 to 0.833, $p = 0.043$, Category 3 95% *CI* 0.271 to 1.106, $p = 0.001$. We can conclude that we fail to reject the null hypothesis when asking do demographics of socio-economically deprived persons who received preventative treatment in an educational dental hygiene clinical setting affect their oral health behaviors

and perceptions. Table 20 represents annual income as the DV with RFT and male gender as a covariate.

Table 20

Research Question 2 ordinal logistic regression reduced fee treatment paired with annual income U.S. dollars covariate male gender

		Estimate	Std. Error	Wald	df	*p*	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[income = 1.00]	-.636	.212	8.984	1	.003	-1.052	-.220
	[income = 2.00]	.423	.209	4.091	1	.043	.013	.833
	[income = 3.00]	.689	.213	10.446	1	.001	.271	1.106
	[income = 4.00]	.928	.218	18.104	1	.000	.501	1.356
	[income = 5.00]	1.313	.230	32.559	1	.000	.862	1.764
	genderm	.100	.280	.129	1	.720	-.448	.649
Location	[RFT=1.00]	-.001	.258	.000	1	.995	-.506	.503
	[RFT=2.00]	0[a]	.	.	0	.	.	.

Link function: Logit.
a. This parameter is set to zero because it is redundant.

When RFT was paired with annual income as the DV and female gender as the covariate Group A participants who categorized themselves as category 1 (less than $10,000 annually), and category 4 ($40,000 -$50,000 annually) were more likely to have lower cumulative scores that Group B participants who categorized themselves as category 1, and category 4. Category 1 95% *CI* -1.398 to -0.250, $p = 0.005$, category 4 95% *CI* 0.169 to1.314, $p = 0.011$. We can conclude that we fail to reject the null hypothesis when asking do demographics of socio-economically deprived persons who received preventative treatment in an educational dental hygiene clinical setting affect their oral health behaviors and perceptions. Table 21 represents annual income as the DV with RFT female gender as a covariate.

Table 21

Research Question 2 ordinal logistic regression reduced fee treatment paired with annual income U.S. dollars covariate female gender

		Estimate	Std. Error	Wald	df	*p*	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[income = 1.00]	-.824	.293	7.916	1	.005	-1.398	-.250
	[income = 2.00]	.236	.287	.677	1	.411	-.327	.799
	[income = 3.00]	.501	.289	3.010	1	.083	-.065	1.068
	[income = 4.00]	.741	.292	6.438	1	.011	.169	1.314
	[income = 5.00]	1.127	.300	14.092	1	.000	.539	1.715
Location	genderf	-.109	.145	.567	1	.452	-.394	.175
	[RFT=1.00]	-1.000E-013	.258	.000	1	1.000	-.505	.505
	[RFT=2.00]	0[a]	.	.	0	.	.	.

Link function: Logit.
a. This parameter is set to zero because it is redundant.

When RFT was paired with race as the DV and female gender as the covariate, Group A participants that identified themselves as race category 3 (Black/African American) were more likely to have lower cumulative scores than Group B category 3 participants 95% *CI* -1.516 to -0.305, $p = 0.003$. We can conclude that we fail to reject the null hypothesis when asking do demographics of socio-economically deprived persons who received preventative treatment in an educational dental hygiene clinical setting affect their oral health behaviors and perceptions. Table 22 represents race as the DV paired with RFT and female gender as the covariate.

Table 22

Research Question 2 ordinal logistic regression with reduced fee treatment paired with race covariate female gender

		Estimate	Std. Error	Wald	df	*p*	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[race = 2.00]	-3.110	.410	57.658	1	.000	-3.913	-2.307
	[race = 3.00]	-.911	.309	8.693	1	.003	-1.516	-.305
	[race = 4.00]	-.394	.303	1.693	1	.193	-.989	.200
	genderf	-.250	.156	2.574	1	.109	-.556	.056
Location	[RFT=1.00]	1.000E-013	.273	.000	1	1.000	-.534	.534
	[RFT=2.00]	0[a]	.	.	0	.	.	.

Link function: Logit.
a. This parameter is set to zero because it is redundant.

When RFT was paired with age as the DV and female gender as the covariate, Group A participants who categorized themselves as group 5 (50-59) were more likely to have lower cumulative scores than Group B participants who categorized themselves as group 5 (50-59) when female gender was added as a covariate. The 95% CI -0.448 to 0.692, p = 0.003. We can conclude that we fail to reject the null hypothesis when asking do demographics of socio-economically deprived persons who received preventative treatment in an educational dental hygiene clinical setting affect their oral health behaviors and perceptions. Table 23 represents age as DV with RFT and female gender as a covariate.

Table 23

Research Question 2 ordinal logistic regression reduced fee treatment paired with age covariate female gender

		Estimate	Std. Error	Wald	df	*p*	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[age = 1.00]	-3.348	.422	62.965	1	.000	-4.175	-2.521
	[age = 2.00]	-1.586	.313	25.680	1	.000	-2.200	-.973
	[age = 3.00]	-.516	.293	3.101	1	.078	-1.091	.058
	[age = 4.00]	.122	.291	.176	1	.675	-.448	.692
	[age = 5.00]	.880	.300	8.596	1	.003	.292	1.469
	genderf	-.307	.148	4.318	1	.038	-.596	-.017
Location	[RFT=1.00]	-1.001E-013	.259	.000	1	1.000	-.508	.508
	[RFT=2.00]	0[a]	.	.	0	.	.	.

Link function: Logit.
a. This parameter is set to zero because it is redundant.

Research Question 3 Results

Does preventative treatment in an educational dental hygiene clinical setting promote follow-up visits of socio-economically deprived persons with a dental professional for restorative dental work?

Research question 3 was based upon section C of the questionnaire. Descriptive statistics between pre-treatment responses and post-treatment responses indicated that between 46-49% of participants visited the dentist within the last year and only 12-15% had not visited the dentist within the last five years. Eighty-four percent of the respondents had never visited a hospital emergency room for a dental problem. Only 5% or the respondents had visited a hospital emergency room for a dental problem within the last five years. Between 37-38% of the respondents visited the dentist for a cleaning, while 18% of the respondents reported visiting the dentist for and exam or tooth puling/pain.

Among the pre-treatment participants 52% of the respondents reported that their gums bleed when brushing or flossing compared with the post-treatment group of 44%. Table 24 represents the results of the Wilcoxon Signed Ranks Test.

Table 24

Research Question 3 descriptive statistics

	When was the last time you visited the dentist - When was the last time you visited the dentist	Have you ever visited a hospital emergency room for a dental problem - Have you ever visited a hospital emergency room for a dental problem	Have you ever had your teeth cleaned by a dentist or dental hygienist - Have you ever had your teeth cleaned by a dentist or dental hygienist	Do your gums bleed when you brush or floss your teeth - Do your gums bleed when you brush or floss your teeth	Have you ever visited a hospital emergency room for a dental problem - Have you ever visited a hospital emergency room for a dental problem	When was the last time you visited a dentist - When was the last time you visited a dentist	If you have visited a dentist what was the reason for your last visit - If you have visited a dentist what was the reason for your last visit
Z	-.749[b]	-1.421[b]	.000[c]	-2.701[b]	-1.594[d]	-.145[b]	-.853[d]
p	.454	.155	1.000	.007	.111	.885	.394

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.
c. The sum of negative ranks equals the sum of positive ranks.
d. Based on positive ranks.

The Wilcoxon Signed Ranks Test was conducted to compare the responses of pre-treatment group with the post-treatment group. For the questions "when was the last time you visited the dentist" (z score of -.749, p = .45), "have you ever visited a hospital emergency room for a dental problem" (z score of -1.421, p = .15), "have you ever had your teeth cleaned by a dentist or dental hygienist" (z score .00, p = 1.0),"when was the last time you visited a dentist" (z score -.145, p = .89), and "If you have visited a dentist what

was the reason for your last visit" (z score of -.853, p = .39), there were no significant values found; therefore we failed to reject the null hypothesis that preventative treatment in an educational dental hygiene clinical setting promotes follow-up visits of socio-economically deprived persons with a dental professional for restorative dental work.

When asked "do your gums bleed when you brush or floss your teeth" more participants responded more positively after treatment for a z score of -2.701, p = .007 rejecting the null hypothesis that preventative treatment in an educational dental hygiene clinical setting promotes follow-up visits of socioeconomically deprived persons with a dental professional for restorative dental work.

Summary

The purpose of this study was to assess the effect of reduced fee dental hygiene treatment on oral health behaviors and perceptions of socioeconomically deprived persons visiting two dental hygiene clinics within the state of Georgia. Descriptive statistics and logistic ordinal regression analysis was also performed to determine if age, gender, ethnicity, education level, and income level influenced the behaviors and perceptions of the participants who received preventative treatment in an educational dental hygiene clinical setting.

The questionnaire consisted of four sections labeled A, B, C, & D (Appendix A). Section A, & B, contained questions from the OHBS used by Buglar et al. (2010) that measure brushing behavior, susceptibility scale, severity scale, benefits scale for brushing and flossing, a barriers scale for brushing and flossing, a self efficacy scale for brushing and flossing as well as flossing and brushing behaviors. The questions related to HBM

constructs using a 5-point Likert scale for responses ranging from 1 (strongly disagree) to 5 (strongly agree). Section C contained questions related to behaviors and perceptions related to completing follow up treatment if a referral is provided.

Descriptive statistics were conducted to determine the frequencies of the demographic factors age, race, sex, education, and socio-economic status. The results revealed that the participant pool consisted of largely Caucasian females who graduated from high school, between the ages of 30-39 with an income of less than $10,000 annually. Due to the pre-test, post-test design, the non-parametric Wilcoxon signed ranks test was used to assess if the mean population ranks differed between the Group A and Group B responses which were determined not to be normally distributed. The results indicated that there were a few behaviors and perceptions of the participants that were significantly influenced after treatment in a positive manner. Participants felt more confident in their ability to perform certain key oral hygiene behaviors routinely associated with adequate oral health in the dental community.

Ordinal logistic regression was used to determine how well the responses could be predicted based on the demographic factors of age, race, sex, education, and socio-economic status. Initial results demonstrated that each individual demographic in Group A had at least one to two significant results that indicating that the group was more likely to have lower cumulative scores than Group B participants. When logistic regression was performed using reduced fee treatment paired with each individual demographic and sex as a covariate, the significance increased within each demographic. The results of the study

are further discussed in Chapter 5, including limitations, generalizability of the results, and recommendations for practice and further research.

Chapter 5

Discussion, Conclusions, and Recommendations

Introduction

The purpose of this study was to assess the effect of reduced-fee dental hygiene treatment on oral health behaviors and perceptions of socioeconomically deprived persons visiting dental hygiene clinics within the state of Georgia. In addition, this study examined whether age, gender, ethnicity, education level played a role in the behaviors and perceptions of this demographic who received preventative treatment in an educational dental hygiene clinical setting.

Disparities in access to preventative oral health care have been attributed to race, ethnicity, income, education, and sociocultural factors (Kelesidis, 2014 & Owens et al., 2008). Cultural beliefs and perceptions of oral health care have been linked to individual preferences, health-related risk behaviors, and dental use (Kelesidis, 2014).

Dental hygiene schools have often served as an entry point for underserved and underinsured populations seeking oral health care because of the comprehensive services offered (Gadbury-Amoyt & Simmer-Beck, 2014). Studies have shown that the comprehensive care provided by dental hygiene students (prophylaxis, radiographs, sealants, fluoride varnish, and oral health education) have been shown to increase dental service use and support positive advancement of oral health (Simmer-Beck et al., 2014).

A pretest, posttest cross-sectional study design was used. Participants were recruited from Georgia Perimeter College and Georgia Highlands College Rome campus. A total of 102 people agreed to participate in the study. All the questionnaires completed

prior to treatment were identified with the letter (A) and a random numerical identifier, All posttreatment questionnaires were identified with the letter (B) and a matching numerical identifier corresponding to the patient's (A) questionnaire. As mentioned in Chapter 4, the questionnaire consisted of four sections labeled A, B, C, and D (Appendix A). Sections A and B contained questions related to the HBM constructs using a 5-point Likert scale for responses ranging from 1 (strongly disagree) to 5 (strongly agree). Section C contained questions related to behaviors and perceptions related to completing follow-up treatment when a referral is provided and Section D contained questions concerning demographic factors such as sex, age, race, and socioeconomic status.

According to the findings, preventive treatment in an educational dental hygiene clinic did significantly affect the oral health behaviors and perceptions of the participants in some areas of the questionnaire but not all. Forty-seven percent of participants recognized that tooth decay and gum disease causes tooth loss and decay after receiving treatment, (z score of -2.437, p = .015). Thirty-seven percent of the participants recognized that brushing two times a day prevents tooth decay and gum disease, (z-score of -2.255, p = .024). Forty-nine percent of the participants thought their mouth would look better if they flossed at least once a day, (z-score of -1.985, p = .047). These findings are important because as I stated in chapter three, brushing and flossing were the key measures of change, which indicate that the study participants began to understand the disease process that is associated with poor oral health.

The two questions with the most significant positive change between pre and post treatment group responses was that 49% of the participants recognized that flossing two

times a day saved money on dental expenses, (z-score of -3.226, p = .001). This finding alludes to the fact that the participants were moving towards realizing self-efficacy, a HBM construct by understanding that changing their daily behavior of flossing can directly influence the health of their mouths and the expenses needed to maintain good oral health. The second most significant response came after treatment when 48% of respondents responded more positively after treatment to the question brushing my teeth can help prevent gum problems, (z score of -2.752, p = .006). Again these findings indicate that the participants were moving in the direction of self-efficacy, one of the six constructs of the HBM. Research has previously shown that poor oral health may exacerbate chronic health conditions like heart disease and diabetes (Fisher-Owens et al., 2008; Griffen et al., 2012).

The results of this study indicated that preventative treatment given in the clinical dental hygiene setting influences perceived self-efficacy, perceived benefits, and perceived barriers related to oral health care much like the Morowaitsharifabad & Shirazi (2007) study which showed that the three constructs of the HBM were also impacted when students were shown how to perform preventative oral health behaviors like brushing and flossing. Student practitioners spend a good deal of time reviewing oral hygiene with the patient as appointment times tend to last two to four hours. Anagnostopoulos et al. (2011), determined that self-efficacy and perceived severity served as significant predictors of tooth-brushing behaviors as well.

Some of the more common misconceptions about oral health care appeared to be clarified for the participants as well indicating that perceived benefits, and perceived barriers, two constructs associated with the HBM were realized. Kelesidis (2014)

conducted a study that indicated that cultural differences and perceptions about oral health care and oral health care providers was a contributing factor in the lower utilization rates of oral health care services among African Americans in particular. In this study, 45% of the participants were more confident that they could floss at least one time a day, (z score of -2.099, p = .036). Initially 44% of the participants initially thought they did not have time to floss, after treatment that number was reduced to 28% who changed their opinion, (z score of -2.248, p = .024). Likewise 41% of the participants associated tooth brushing with the loss of fillings, 23% of participants responded more positively after treatment (z score of -2.045, p = .041).

Initially, even though 45% of participants responded more negatively to the statement "it is normal for healthy gums to bleed", that percentage dropped to 26% after treatment, (z score of -2.184, p = .029). Prior to treatment 40% of the participants responded negatively to the statement I should only visit a dentist if I am in pain, after treatment 24% more of the participants responded more positively, (z score of -2.028, p = .043). Tilashalski et al., (2007), also found that African Americans when compared to non-Hispanic Whites were less likely to complete treatment based on specific treatment preferences and provider interactions (Tilashalski, Gilbert, Boykin, & Litaker, 2007).

These findings indicated that the treatment and oral hygiene instructions given by dental hygiene students within the school dental hygiene clinic setting did help participants to realize that they were susceptible to the ill effects associated with poor oral hygiene suggesting the HMB construct of perceived susceptibility was realized by the participants.

The second research question, do demographics like sex, age, race and socio-economic status of socio-economically deprived persons who received dental treatment in an educational dental hygiene clinical setting affect their oral health behaviors and perception's. In order to perform logistic ordinal regression using SPSS, I created the dummy variable reduced fee treatment (RFT). When this variable was paired with age, the Group A participants who identified themselves in the 40-49 age group were more likely to have lower cumulative scores than Group B participants, (95% *CI* is 0.16 to 0.9, p = 0.006). When RFT was paired with education, Group A participants who graduated from high school were more likely to have lower cumulative scores (95% *CI* -1.0 to -0.23, p = 0.002). Annual income in U.S dollars appeared to affect the participants the most. Group A participants who made less than $10,000 annually were more likely to have lower cumulative scores than Group B participants in the same income category, (95% *CI* -1.05 to -0.27, p = 0.001). Group A participants that reported an annual income of $20,000-30,000 also were more likely to have lower cumulative scores than Group B participants, (95% *CI* 0.015 to 0.779, p = 0.042). Group A participants that reported an annual income of $30,000-40,000 were also more likely to have lower cumulative score than Group B participants, (95% *CI* of 0.273 to 1.052, p = 0.001). When RFT was paired with ethnicity, African Americans in Group A were more likely than Group B to have lower cumulative scores, (95% *CI* -0.922 to -0.133, p = 0.009).

The results of the logistic regression mirror studies conducted by Ramraj & Quiñonez, (2012) that identified some reasons why people did not seek preventative dental treatment were attributed to limited access to care, lack of socio-economic means, and a

absence of insurance. Clovis, (1994) found that factors such as poor education and low socio-economic status historically have been attributed to disparities in oral health care. In this study, forty through forty-nine year old African Americans with a high school diploma making less than $10,000 dollars were more likely to have lower cumulative scores initially.

In an effort to determine if gender influenced the results, I conducted logistic regression using the each demographic as the DV paired with RFT and gender as the covariate. When RFT was paired with education as the DV and gender as the covariate, Group A participants who categorized themselves as category 1 (some high school) and category 4 (2 years of college), were more likely to have lower cumulative scores than Group B participants who categorized themselves in category 1 and category 4. The 95% *CI* -3.144 to -0.846, $p = 0.001$ for category 1, 95% *CI* 0.755 to 2.924, $p = 0.001$ for category 4. This differed significantly from the results education as the DV paired with RFT and no covariate. Group A category 2 (graduated high school) participants was the only significant category more likely to have lower scores than Group B participants.

When RFT was paired with age as the DV and gender as a covariate, category 3 (30-39) Group A participants were significantly more likely to have lower cumulative scores than Group B category 3 participants. This varied from initial results when gender was not used as a covariate. Category 4 (40-49) Group A participants were significantly more likely to have lower cumulative scores than Group B participants.

When RFT was paired with income as the DV and gender as a covariate, there were no significant findings with any of the income categories. The category that showed the

closest significance was category 1 (less than $10,000 annually), 95% *CI* -2.107 to 0.022, $p = 0.055$.

When RFT was paired with race as the DV and gender as the covariate, Group A category 2 (African American) were significantly more likely to have lower cumulative scores than Group B category 2 (African American), 95% *CI* -2.651 to -.312, $p = 0.013$. This result is similar to earlier findings when RFT was paired with race as the DV without gender as a covariate.

When gender was added as a covariate, the results were very similar to my initial regression results mentioned previously. Overall gender influenced the results significantly for Group A 30-49 years with at least a high school diploma and two years of college. African Americans and Hispanics were also significantly influenced when gender was added as a covariate. These findings also compliment the research findings of Dolan et al. (2005), which identified ethnic minorities living at or below the Federal Poverty Level consistently demonstrated an under utilization of dental services since 2001 (Dolan et al., 2005).

In an effort to further explore the results where gender was added as a covariate with RFT, I created the dummy variables "genderM" and "genderF" to determine which gender male or female affected the results. Group A males between the ages of 40-49 years were more likely to have lower cumulative scores than Group B males in the same age category with a 95% *CI* of 0.281 to 1.126, $p = 0.001$. This finding differs when gender (both male and female) was used as a covariate for RFT paired with age. When RFT was paired with race, the Group A African American males were more likely to have lower

cumulative scores than Group B African American males with 95% *CI* -0.874 to -0.028, *p* = 0.037. The findings were similar to the findings when gender (both male and female) were used as a covariate for RFT paired with race. Doty, & Weech-Maldonado (2004), found similar results indicating that African American's were less likely to utilize dental services significantly when they did not have dental insurance (Doty & Weech-Maldonado, 2003). Group A males that graduated from high school (category 2), were more likely to have lower cumulative scores than group B males in the same category, 95% *CI*-1.141 to -0.306, *p* = 0.001 (category 2). This differed from my previous regression findings when gender (both male and females) was the covariate for RFT paired with education. Group A category 1 (some high school, category 4 (two years of high school) and category 5 (graduated from college) were all more likely to have lower cumulative scores than their Group B counterparts in the same categories. These results are consistent with the findings of Kim et al. (2012), that participants with less education were more likely to have a range of oral health problems (Kim, et. al., 2012).

Group A males that reported annual incomes of less than $10,000 (category 1), $10,000-20,000 (category 2), and $20,000-30,000 (category 3), were more likely to have lower cumulative scores than their Group B counterparts in the same categories. Category 1 95% *CI* -1.052 to -0.220, *p* = 0.003; category 2 95% *CI* 0.13 to 0.833, *p* = 0.043; category 3 95% *CI* 0.271 to 1.106, *p* = 0.001. This differed from my previous findings with gender (both male and female) as the covariate. Group A category 1 participants were more likely to have lower cumulative scores than their Group B counterparts. Cultural differences between males and females as far as their perceptions of oral health care

providers could potentially explain why Group A 40-49 year old males making less than $50,000 were more likely to have lower cumulative scores than their Group B counterparts. Kelesidis (2014) found that African American's in general with low education levels and limited income had stronger adverse perceptions of oral health perceptions (Kelesidis, 2014).

When exploring results using female gender as the covariate, I found slight differences as well. Group A females in income category 1 (less than $10,000) 95% *CI* -1.398 to -0.250, $p = 0.005$, and category 4 ($40,000-$50,000) 95% *CI* 0.168 to 1.314, $p = 0.011$ were more likely to have lower cumulative scores than Group B participants within the same category. These findings again differed from my previous findings when RFT was paired with income and gender (both male and female). Group A category 1 (less than $10,000) 95% *CI* -2.107 to 0.022, $p = 0.055$, was the only category less likely to have lower cumulative scores than their Group B counterparts. This finding is consistent with a study conducted by Sabbah et al., (2009) which found that socioeconomic status affected oral health particularly when dental decay was concerned (Sabbah et al., 2009). Surprisingly, when RFT was paired with education and female gender, both Group A and Group B were similar unlike Group A and B male participants. Female gender Group A category 3 African Americans 95% *CI* -1.516 to -0.355, $p = 0.003$ were more likely to have lower cumulative scores than female gender Group B African Americans. This finding is similar to several studies as ethnicity plays an important role in the perceptions of oral health in minorities, particularly African Americans (Peres et al., 2001; Assadoorian, 2009; Fisher-Owens et al., 2008; Sabbah et al., 2009).

The third research question, does preventative treatment in an educational dental hygiene clinical setting promote follow-up visits of socio-economically deprived persons was based on section C of the questionnaire. Descriptive statistics of the 102 participants indicated that 46-49% of the participants had been to the dentist within the last year and only 12-15% had not visited the dentist within the last five years. Eighty-four percent of the participants had never visited a hospital emergency room for a dental problem within the last five years. Surprisingly between 37-38% of the respondents visited the dentist for a cleaning while 18% of the respondents reported visiting the dentist for an exam, tooth pulling or pain. When the Wilcoxon Signed Ranks Test was conducted to compare the pre-treatment responses to the post-treatment responses, no significant values were found with the exception of the question "do your gums bleed when you brush or floss your teeth", more participants responded more positively after treatment for a z score of -2.701, $p = .007$.

Interpretation of the Findings

The results of the study coincides with current published literature which has stated that there are disparities in oral health care among minorities and socioeconomically deprived people (Peres et al., 2011; Asadoorian, 2009; Fisher-Owens et al, 2008; Vanderbilt et al., 2013).

Non-parametric test results indicated that the participants did experience several constructs of the HBM, perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. Current research has shown that using constructs of the HMB were useful for influencing patient's thinking beliefs and perceptions which can motivate them

to seek preventative care (Flaer et al. 2010). This was further be evidenced by the fact that 46-49% of the participants had visited the dentist within the last year, and only 12-15% of the respondents had not visited the dentist within the last five years. Overall this study further supports current research conducted by Morgan et al. (2013), which found that dental hygiene students were consistent in providing oral hygiene instructions at every visit encounter with patients (Morgan et al., 2013).

According to the logistic regression results of this study, African American participants between 40-49 year olds having low income and low education levels were more likely to begin their questionnaires with lower scores. While the study design of my research does not allow for an interpretation of causation, some explanation of the phenomenon of low scores among 40-49 year olds in Group A could potentially be explained with a study conducted by Higgs et al. (2001) on Health Care Access which found that income, education, and ethnicity were key factors affecting perceptions of if their dental needs were being met. Additionally the major barriers to access to care to participants in the Higgs et al. (2001) study were cost, length of time before an appointment could be made, and not wanting to miss work for appointments (Higgs et al., 2001). Doty & Weech-Maldonado (2003) found that African Americans and Mexican Americans were less likely to utilize dental services when income was a factor (Doty & Weech-Maldonado, 2003). When gender was added as a covariate to the logistic regression formula with reduced fee treatment, the results were very similar with the exception that Hispanics were significantly more affected along with African Americans. In a study conducted by Kelesidis (2014), cultural factors significantly affected the perceptions of

African Americans and Asian Americans indicating that dental provider may become more effective in addressing the needs of this population with increased cultural sensitivity and awareness (Kelesidis, 2014). When specific gender male or female was added as a covariate, the results varied than when gender (both male and female) was used. Macek et al., (2011), found that while women were very competent in their general oral health knowledge about preventing decay and the need to brush and floss daily, they lacked specific details on the disease process and the habits to adopt to prevent the disease process ultimately limiting their oral health literacy scores (Macek et al., 2011). Within a two to four hour appointment time student dental hygienist typically spend half of their appointment time reviewing oral health instructions with their patients (Simmer-Beck et al., 2014).

Limitations of the Study

One major limitation in the study was the questionnaire. The content was long and tedious for the participants to read through. While I thought the questions were posed in simple fashion, I had several participants ask for help reading the document. Several participants hesitated answering the questions based on the amount of question as well. To address this limitation, I made myself available to each participant in the semi private room that was provided to me. I also was available to read the questionnaire to any respondents who indicated difficulty reading the document.

A second limitation was the schedule of the student dental hygiene clinics. Georgia Highlands College clinical sessions were devised to accommodate a more advanced student clinician pace. The second year hygiene students were allowed to see as many as

four patients per clinic session. Georgia Perimeter College allotted time for only two patients per clinic session to be seen by the second year dental hygiene students. To address this limitation, I visited Georgia Perimeter College exclusively to collect data to obtain an equal amount of data from both facilities.

Using a non-random sample potentially introduced selection bias within the study (Trochim, 2006). To address this limitation, logistic regression analysis was conducted so selection bias and confounding could be minimized.

The cross-sectional study design also posed a limitation to this study because the participant's behaviors and perceptions were being measured at a single point in time, making the results un-generalizable to other dental hygiene programs (Trochim, 2006).

Recommendations for Future Research and Practice

This study contributed to the literature by providing information on the effect of reduced fee dental hygiene treatment on oral health behaviors and perceptions of socio-economically deprived persons within the state of Georgia. Specific research on this topic that allows for causation to be determined would further help fill the gap that exists in the literature. Horrowitz et al. (2012) conducted a study that showed a positive relationship between education, gender, and health literacy and compliance with treatment, a future study that specifically targeted what exact role gender played in the decisions making process of the participants would be helpful since 70% of the participants in my study were female. In reviewing the literature, many studies included gender but did not indicate any individual statistics about the differences males and females play in the utilization of oral health care. Chi et al. (2013) explored the relationship between financial hardships and oral

hygiene self-report. The researchers found that financial hardships particularly in women resulted in a higher prevalence of poor oral health self-report (Chi & Tucker-Seeley, 2013). Knowing specific the ramifications gender holds in the decision making process would be helpful in giving dental hygiene programs the ability to further tailor gender specific oral hygiene interventions for their patients potentially ensuring a higher success rate.

Social Change Study Implications

The inability to pay for preventative dental care remains problematic for millions of Americans. My research explored a very small cross-sectional point in time view of two dental hygiene programs within the states of Georgia. Although my research explored the beliefs and perceptions of dental hygiene clinic patients at two dental hygiene schools, the results mirrored several existing research results. The African American male and female population in my study scored significantly lower initially prior to treatment than after treatment. The participants living below or at poverty level also scored lower prior to treatment than after treatment. Nationally, my research is consistent with previous research on the topic. Minorities of low socio-economic status suffer from a multitude of oral health problems stemming from a lack of resources (Sabbah et al., 2009).

Locally, the results of my study confirmed what the Georgia Health Policy Center (2012) found; out of the 800 Medicaid dental providers listed within the state, the majority provided care primarily to children, and there were a total of 16 counties within the state without a practicing dentist and only a handful of reduced fee dental clinics around the metro Atlanta area which cater to adult oral health issues leaving a large minority population not being served (Georgia Health Policy Center, 2012).

Additional knowledge on the relationships between gender, race, income and education on beliefs and perceptions of dental hygiene clinic patients can be disseminated among the sixteen dental hygiene schools within the state to be used by the students in an effort to bridge the gap of oral health care among the underserved adults within the state. The social change implications of disseminating the information found in this study as supplemental learning materials for continuing education classes and seminars for registered dental hygienist working with the low-income population has the potential to lead to culturally sensitive oral hygiene education and care that could effectively reach the populations that have historically had limited access to oral health.

Additionally the results of my study could be used to demonstrate that the education received by that dental hygiene students in state has properly prepared them to meet the needs of the underserved socio-economically deprived adult population. This realization could initiate dialogue to change the current restrictive practice settings laws in Georgia, indicating that advanced dental hygiene practitioners could potentially be a viable option similar to other states to providing oral health care to the thousands of underserved Georgians within the state.

Conclusion

This research has demonstrated that oral hygiene instruction is instrumental for realizing the current state of their oral health, and making key decisions to change the current state of oral health. My research has shown significant changes to the patient's ability to understand that they can control the outcome of their oral health especially among African American men and women between the ages of 40-49 with low socio-

economic status. The student hygienist's were able to connect with these patients in a way that increased their oral health literacy after receiving treatment.

Despite the significant findings in my research, I was unable to determine what role oral hygiene instruction played in encouraging follow-up visits with a dental practitioner among socio-economically deprived persons. The research revealed that when asked many of the participants had previously been to the dentist within the last year, however despite the fact that the results were not significant, it is worth mentioning that many of the patients did realize the importance of visiting the dentist when not in pain after receiving treatment.

My research like current published research indicated that the population most significantly likely to have lower initial scores were male and female African Americans, low income participants and participants with little education. In 2013, a family of four living with an income of $23,850 qualified as 130% below the poverty level (U.S. Department of Health and Human Services, 2013). While I did not get specific information on the family status of my participants, the 32% of participants earning less than $10,000 dollars and the 25% earning $20,000-$30,000 dollars qualified as living below the poverty level. Asadoorian (2009) stated that reduced fee dental hygiene and preventative treatment may significantly contribute to the promotion of oral health of individuals of low socioeconomic status as well as to the reduction of emergency dental visits (Assadoorian, 2009). Clovis (1994) stated that oral diseases (dental caries and periodontal diseases) could be completely prevented with the use of preventative professional hygiene interventions (Clovis, 1994) and it is my thought that, reduced fee treatment provided by dental hygiene

schools in the state of Georgia has served as a buffer for those seeking dental care due to the extremely affordable rates charged.

In closing, based on the study results it was determined that treatment within a clinical dental hygiene setting does give patients the tools necessary to begin to take charge of their own oral health thereby improving oral comfort and eventually quality of life. The research has provided a deeper understanding of appropriate activities that work with the underserved population that can ultimately help clinical and public health workers better design interventions to increase the oral health awareness of this high-risk population group and of Georgians in general.

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Appendix A: Dental Health Questionnaire

Dental Health Questionnaire

I am asking you to complete this questionnaire so that I can learn more about dental health concerns that are important to you. The questionnaire is confidential which means that I do not want you to write your name anywhere on the questionnaire. A specific identifying number will be placed on your questionnaire. Your answers will be collected with others in your community and summarized to help me to understand your dental health knowledge and dental health habits. Thank you for your participation. The research survey is completely voluntary. You may answer one question, some questions, or all questions if you wish. Because the questionnaire is voluntary, you may choose to stop answering at any moment. I hope that you will respond to all the questions, your responses are very important. Thank you for your help.

Section A

1. How often do you brush your teeth?

1	2	3	4	5
Not at all	Once a week	Every second day	Once a day	Twice a day

2. How many times did you brush your teeth yesterday?

1	2	3	4
Not at all	1 time	2 times	3 or more times

3. Overall, how would you rate your knowledge of tooth brushing and dental flossing as part of your oral hygiene behavior?

1	2	3	4	5
No Knowledge	Very little knowledge	Some knowledge	Very knowledgeable	Highly knowledgeable

4. During the last week, how often did you brush your teeth?

1	2	3	4	5
Not at all	Once a week	Every second day	Once a day	Twice a day

5. During the last week, how often did you floss your teeth?

1	2	3	4	5
Not at all	Once a week	Every second day	Once a day	Twice a day

For the next set of questions circle the number that best describes your agreement or disagreement about the statements below.

Section B. Evaluate the Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
My chances of developing tooth decay or gum disease are high					
It is likely that I will develop tooth decay or gum disease.					
My mouth is in bad condition					
Within the next year I will develop tooth decay or gum disease					
If I get tooth decay or gum disease, it will be serious					
If I get tooth decay or gum disease I will suffer severe pain					
I will lose my teeth if I get tooth decay or gum disease					
Tooth decay and gum disease will cause my teeth to become loose/break/bad breath					
Tooth decay and gum disease make my mouth look bad					
My bad teeth effect my work or day life					
Tooth decay and gum disease can cause other health problems					
Tooth decay or gum disease will cost me a lot of money					
Brushing my teeth at least two times a day will prevent tooth decay or gum disease					
If I brush my teeth at least two times a day they will last a lifetime					
Brushing my teeth at least two times a day will save me money on dental expenses					
My mouth will look better					

if I brush them at least two times a day					
My mouth feels better after I brush them					
Flossing my teeth at least two times a day will prevent tooth decay or gum disease					
If I floss my teeth at least two times a day they will last a lifetime					
Flossing my teeth at least two times a day will save me money on dental expenses					
My mouth will look better if I floss them at least once a day					
Tooth brushing is painful					
My teeth will break when I brush					
My gums will bleed when I brush					
I forget to brush at least two times a day					
If I am tired I don't brush my teeth					
Toothpaste is expensive					
I don't like the taste of toothpaste					
I don't have time to brush my teeth at least too times a day					
I don't like to brush my teeth because it lifts my fillings out					
Dental flossing is painful					
My teeth will break when I floss					
My gums will bleed when I floss					
I forget to floss at least one time a day					
I don't like the feel of dental floss					
I don't have time to floss my teeth					

I don't like to floss my teeth because it lifts my fillings out, but I am confident I can brush my teeth at least two times a day.					
Brushing my teeth is hard to do					
I am not sure I can brush my teeth at least two times a day					
Flossing my teeth is hard to do					
I am confident I can floss my teeth once a day					
I am not sure if I can floss my teeth once a day					
Brushing my teeth can help prevent gum problems					
Using floss helps prevent gum disease					
I should only visit a dentist if I am in pain					
I will lose my teeth as I get older					
It is normal for healthy gums to bleed					
When I perform good oral self care my gum disease will heal					
When I perform good oral self-care I become more confident in myself					
When I perform good oral self-care my dental cost decrease					
When I perform good oral self-care I have more pride in my teeth					
When I perform good oral self-care my chewing ability is improved					

Section C. Please choose the best answer	**Within the last year**	**About 2 years ago**	**About 3-4 years ago**	**About 5 or more years ago**	**I don't remember**

1. When was the last time you visited a dentist?					
2. Have you ever visited a hospital emergency room for a dental problem?					

Please choose the best answer	Never	Not sure	Yes	No
3.Have you ever had your teeth cleaned by a dentist or a dental hygienist?				
4.Do your gums bleed when you brush or floss your teeth?				

Please choose the best answer	Never	Within the last year	About 2 years ago	About 5 or more years ago	I don't remember
5.Have you ever visited a hospital emergency room for a dental problem? reliable, and friendly.					
6.When was the last time you visited a dentist?					
Please choose the best answer	Exam	Cleaning	Filling	Pain/Tooth pulling	Other
7. If you have visited a dentist, what was the reason for your last visit?					

Section D. Please choose the best answer	18-20	21-29	30-39	40-49	50-59	60 or older
What is your age?						

Please choose the best answer	American Indian or Alaskan Native	Asian / Pacific Islander	Black or African American	Hispanic American	White / Caucasian
Which race/ethnicity best describes you? (Please choose only one.)					

	Some High school	Graduated from high school	1 year of college	2 years of college	Graduated College	Completed graduate school
What is the highest level of education you have completed?						

Please choose the best answer	Less than 10,000	20,000 - 30,000	30,000 - 40,000	40,000 - 50,000	Greater than 50,000	I prefer not to answer
What is your annual income						

Please choose the best answer	Male	Female
Are you:		

Appendix B: Permission to Use Questionnaire Developed by Mariola Luciano

Request for permission to use questionnaire developed by Mariola Luciano:

Janeime Asbury

<janeime.asbury@waldenu.edu>

Aug 3

to luciano.mariola

Hello Mrs. Luciano,

My name is Janeime Asbury. I currently am working on my doctoral thesis. The aim of this study is to assess the impact of reduced fee dental hygiene treatment on oral health behaviors and perceptions of socioeconomically deprived persons visiting dental hygiene school clinics within the state of Georgia. After reading your research Survey of oral health practices among adults in a North Carolina Hispanic population, I feel that the 41 question instrument you designed would be helpful to me in my research.

Thank you for your consideration in this matter

Sincerely,

Janeime Asbury RDH MPH

Mariola Steinbicker

Aug 3

to

me

I do not see an issue with you using the survey.

Sent from my iPhone

Appendix C: Normality Test of The Data Set

Normality test of the data set

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
How often do you brush teeth	.345	46	.000	.704	46	.000
How often do you brush teeth	.400	46	.000	.638	46	.000
How many times did you brush yesterday	.413	46	.000	.667	46	.000
How many times did you brush yesterday	.399	46	.000	.687	46	.000
Rate your knowledge of brush and floss oh	.274	46	.000	.833	46	.000
Rate your knowledge of brush and floss oh	.262	46	.000	.849	46	.000
Last week how often did you brush	.328	46	.000	.753	46	.000
Last week how often did you brush	.413	46	.000	.628	46	.000
Last week how often did you floss	.220	46	.000	.874	46	.000
Last week how often did you floss	.220	46	.000	.865	46	.000
My chances of developing tooth decay or gum disease	.212	46	.000	.905	46	.001
My chances of developing tooth decay or gum disease	.231	46	.000	.895	46	.001
It is likely that I will develop tooth decay	.167	46	.002	.915	46	.002
It is likely that I will develop tooth decay	.157	46	.006	.906	46	.001

My mouth is in bad condition	.260	46	.000	.874	46	.000
My mouth is in bad condition	.237	46	.000	.882	46	.000
Within the next year I will develop tooth decay	.277	46	.000	.872	46	.000
Within the next year I will develop tooth decay	.251	46	.000	.874	46	.000
If I get tooth decay or gum disease it will be serious	.282	46	.000	.871	46	.000
If I get tooth decay or gum disease it will be serious	.199	46	.000	.895	46	.001
If I get tooth decay or gum diseases I will suffer severe pain	.226	46	.000	.892	46	.000
If I get tooth decay or gum diseases I will suffer severe pain	.227	46	.000	.876	46	.000
I will lose my teeth if I get tooth decay or gum disease	.248	46	.000	.892	46	.000
I will lose my teeth if I get tooth decay or gum disease	.190	46	.000	.889	46	.000
Tooth decay and gum disease will cause my teeth to become loose/break/bad breath	.249	46	.000	.884	46	.000
Tooth decay and gum disease will cause my teeth to become loose/break/bad breath	.234	46	.000	.822	46	.000

Tooth decay and gum disease make my mouth look bad	.323	46	.000	.754	46	.000
Tooth decay and gum disease make my mouth look bad	.269	46	.000	.747	46	.000
My bad teeth effect my work or day life	.256	46	.000	.869	46	.000
My bad teeth effect my work or day life	.273	46	.000	.839	46	.000
Tooth decay and gum disease can cause other health problems	.308	46	.000	.793	46	.000
Tooth decay and gum disease can cause other health problems	.290	46	.000	.728	46	.000
Tooth decay or gum disease will cost me a lot of money	.279	46	.000	.737	46	.000
Tooth decay or gum disease will cost me a lot of money	.350	46	.000	.691	46	.000
Brushing my teeth at least two times a day will prevent tooth decay or gum disease	.222	46	.000	.897	46	.001
Brushing my teeth at least two times a day will prevent tooth decay or gum disease	.242	46	.000	.835	46	.000
If I brush my teeth at least two times a day they will last a lifetime	.238	46	.000	.871	46	.000

If I brush my teeth at least two times a day they will last a lifetime	.217	46	.000	.880	46	.000
My mouth will look better if I brush them at least two times a day	.304	46	.000	.787	46	.000
My mouth will look better if I brush them at least two times a day	.290	46	.000	.709	46	.000
Brushing my teeth at least two times a day will save me money on dental expenses	.271	46	.000	.869	46	.000
Brushing my teeth at least two times a day will save me money on dental expenses	.261	46	.000	.812	46	.000
My mouth feels better after I brush them	.252	46	.000	.814	46	.000
My mouth feels better after I brush them	.292	46	.000	.697	46	.000
Flossing my teeth at least two times a day will prevent tooth decay or gum disease	.273	46	.000	.853	46	.000
Flossing my teeth at least two times a day will prevent tooth decay or gum disease	.296	46	.000	.796	46	.000
If I floss my teeth at least two times a day they will last a lifetime	.237	46	.000	.896	46	.001

If I floss my teeth at least two times a day they will last a lifetime	.209	46	.000	.879	46	.000
Flossing my teeth at least two times a day will save me money on dental expenses	.227	46	.000	.873	46	.000
Flossing my teeth at least two times a day will save me money on dental expenses	.283	46	.000	.804	46	.000
My mouth will look better if I floss them at least once a day	.259	46	.000	.877	46	.000
My mouth will look better if I floss them at least once a day	.291	46	.000	.818	46	.000
Tooth brushing is painful	.227	46	.000	.852	46	.000
Tooth brushing is painful	.289	46	.000	.783	46	.000
My teeth will break when I brush	.256	46	.000	.839	46	.000
My teeth will break when I brush	.302	46	.000	.721	46	.000
My gums will bleed when I brush	.276	46	.000	.847	46	.000
My gums will bleed when I brush	.291	46	.000	.827	46	.000
I forget to brush at least two times a day	.226	46	.000	.867	46	.000
I forget to brush at least two times a day	.302	46	.000	.748	46	.000
If I am tired I don't brush my teeth	.231	46	.000	.900	46	.001

If I am tired I don't brush my teeth	.198	46	.000	.861	46	.000
Toothpaste is expensive	.248	46	.000	.843	46	.000
Toothpaste is expensive	.292	46	.000	.726	46	.000
I don't like the taste of toothpaste	.253	46	.000	.809	46	.000
I don't like the taste of toothpaste	.253	46	.000	.791	46	.000
I don't have time to brush my teeth at least two times a day	.266	46	.000	.838	46	.000
I don't have time to brush my teeth at least two times a day	.296	46	.000	.737	46	.000
I don't like to brush my teeth because it lifts my fillings	.230	46	.000	.839	46	.000
I don't like to brush my teeth because it lifts my fillings	.364	46	.000	.696	46	.000
Dental flossing is painful	.248	46	.000	.842	46	.000
Dental flossing is painful	.283	46	.000	.800	46	.000
My teeth will break when I floss	.247	46	.000	.813	46	.000
My teeth will break when I floss	.260	46	.000	.736	46	.000
My gums will bleed when I floss	.200	46	.000	.897	46	.001
My gums will bleed when I floss	.233	46	.000	.883	46	.000
I forget to floss at least one time a day	.274	46	.000	.856	46	.000
I forget to floss at least one time a day	.238	46	.000	.848	46	.000

I don't like the feel of dental floss	.260	46	.000	.872	46	.000
I don't like the feel of dental floss	.295	46	.000	.827	46	.000
I don't have time to floss my teeth	.201	46	.000	.894	46	.001
I don't have time to floss my teeth	.296	46	.000	.788	46	.000
I don't like to floss my teeth because it lifts my fillings out	.216	46	.000	.901	46	.001
I don't like to floss my teeth because it lifts my fillings out	.195	46	.000	.889	46	.000
Brushing my teeth is hard to do	.262	46	.000	.789	46	.000
Brushing my teeth is hard to do	.287	46	.000	.688	46	.000
I am not sure I can brush my teeth at least two times a day	.351	46	.000	.765	46	.000
I am not sure I can brush my teeth at least two times a day	.301	46	.000	.680	46	.000
Flossing my teeth is hard to do	.251	46	.000	.839	46	.000
Flossing my teeth is hard to do	.290	46	.000	.783	46	.000
I am confident I can floss my teeth once a day	.267	46	.000	.877	46	.000
I am confident I can floss my teeth once a day	.266	46	.000	.771	46	.000
I an not sure I can floss my teeth once a day	.224	46	.000	.900	46	.001
I am not sure I can floss my teeth once a day	.262	46	.000	.828	46	.000

Brushing my teeth can help prevent gum disease	.313	46	.000	.790	46	.000
Brushing my teeth can help prevent gum disease	.347	46	.000	.642	46	.000
Using floss helps prevent gum disease	.272	46	.000	.838	46	.000
Using floss helps prevent gum disease	.295	46	.000	.675	46	.000
I should only visit a dentist if I am in pain	.245	46	.000	.848	46	.000
I should only visit a dentist if I am in pain	.272	46	.000	.781	46	.000
I will lose my teeth as I get older	.225	46	.000	.886	46	.000
I will lose my teeth as I get older	.225	46	.000	.863	46	.000
It is normal for healthy gums to bleed	.265	46	.000	.872	46	.000
It is normal for healthy gums to bleed	.326	46	.000	.810	46	.000
When I perform good oral self-care my gum disease will heal	.294	46	.000	.864	46	.000
When I perform good oral self-care my gum disease will heal	.231	46	.000	.864	46	.000
When I perform good oral self-care I become more confident in myself	.293	46	.000	.760	46	.000

When I perform good oral self-care I become more confident in myself	.292	46	.000	.726	46	.000
When I perform good oral self-care my dental cost decrease	.309	46	.000	.780	46	.000
When I perform good oral self-care my dental cost decrease	.255	46	.000	.816	46	.000
When I perform good oral self-care I have more pride in my teeth	.294	46	.000	.717	46	.000
When I perform good oral self-care I have more pride in my teeth	.303	46	.000	.748	46	.000
When I perform good oral self-care my chewing ability is improved	.239	46	.000	.795	46	.000
When I perform good oral self-care my chewing ability is improved	.248	46	.000	.815	46	.000
When was the last time you visited the dentist	.314	46	.000	.778	46	.000
When was the last time you visited the dentist	.309	46	.000	.790	46	.000
Have you ever visited a hospital emergency room for a dental problem	.338	46	.000	.650	46	.000

Have you ever visited a hospital emergency room for a dental problem	.377	46	.000	.606	46	.000
Have you ever had your teeth cleaned by a dentist or dental hygienist	.493	46	.000	.386	46	.000
Have you ever had your teeth cleaned by a dentist or dental hygienist	.533	46	.000	.318	46	.000
Do your gums bleed when you brush or floss your teeth	.262	46	.000	.799	46	.000
Do your gums bleed when you brush or floss your teeth	.279	46	.000	.760	46	.000
Have you ever visited a hospital emergency room for a dental problem	.488	46	.000	.465	46	.000
Have you ever visited a hospital emergency room for a dental problem	.518	46	.000	.360	46	.000
When was the last time you visited a dentist	.347	46	.000	.795	46	.000
When was the last time you visited a dentist	.321	46	.000	.804	46	.000
If you have visited a dentist what was the reason for your last visit	.257	46	.000	.857	46	.000

If you have visited a dentist what was the reason for your last visit	.267	46	.000	.861	46	.000

a. Lilliefors Significance Correction