

DEVELOPMENT AND VALIDATION OF AN INSTRUMENT TO
ASSESS COLLEGE STUDENTS' ORAL HEALTH
KNOWLEDGE, BELIEFS, AND BEHAVIORS

by

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ABSTRACT

Oral health education emphasizes the importance of brushing, flossing, and getting regular dental exams. Some examples of oral health problems that can occur without proper oral hygiene and dental care are dental caries and gingivitis. Research has shown that a relationship exists between oral health and other health related problems. The lack of awareness, education, and services regarding oral health and hygiene can cause severe unfavorable outcomes later in life. Unique oral health issues that affect today's college students include the use of smokeless tobacco, sexually transmitted diseases, and oral piercing. Although there are many studies conducted on oral health, few are targeted towards the college aged population. The purpose of this study was to develop a valid instrument based on constructs from the Health Belief Model to measure the knowledge, beliefs, and behaviors of college students' regarding oral health and hygiene. The present study utilized a review of the literature and an eight-step process to develop and validate College Students Oral Health Knowledge, Beliefs, and Behaviors (OHKBB). The most effective way to treat oral health related problems is through prevention. Oral health education is needed to ensure that college students are aware of not only the risks but also the prevention of oral diseases. The proposed research will pave the way for programs to help individuals improve their oral hygiene and reduce their risks of oral health related problems through education by identifying the specific oral health related knowledge, beliefs, and behaviors that affect college students oral health.

DEDICATION

For my parents, William and Lilly Aubuchon,
for you both are my strength and inspiration;
and for my grandparents, James and Lucille Clatto,
I promised you I would live out “The Dream.”

“The more that you read,
the more things you will know.

The more that you learn,
the more places you'll go.”

--Dr. Seuss

LIST OF ABBREVIATIONS AND SYMBOLS

SES	Socio-economic status
HBM	Health Belief Model
CDC	Centers for Disease Control and Prevention
ADA	American Dental Association
BDA	British Dental Association
ACI	Academy of Dentistry International
WHO	World Health Organization
DMFS	Decayed, Missing, & Filled Surfaces
DMFT	Decayed, Missing, & Filled Teeth
RCT	Randomized Controlled Trial
STD	Sexually Transmitted Disease
STI	Sexually Transmitted Infection
HPV	Human Papilloma Virus
IRB	Institutional Review Board
TPB	Theory of Planned Behavior
OHKBB	Oral Health Knowledge, Beliefs, and Behaviors among College Students

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CHAPTER 1 INTRODUCTION

Dental caries and periodontal disease, two major dental diseases, (Ndiokwelu, 2004) can result in pain, discomfort, and may interfere with an individual's ability to function (Kassak, Dagher, & Doughan, 2001; Percy, 2008). These diseases are not life threatening (Kassak et al., 2001; Percy, 2008) and they are preventable through healthy oral health behaviors (Ndiokwelu) and oral health education (Broadbent, Thomson, & Poulton, 2006).

Oral health education emphasizes the importance of brushing, flossing, drinking fluorinated water, getting regular dental exams, and using secondary prevention such as dental sealants. Some examples of oral health problems that can occur without proper oral hygiene and dental care (Ndiokwelu, 2004; Broadbent et al., 2006) are dental caries, gum disease, gingivitis, halitosis, periodontal disease, and oral cancer (Broadbent et al., 2006). Although these oral health issues are rarely fatal, the lack of awareness, education, and services regarding oral health can cause severe unfavorable outcomes later in life (U.S. Department of Health and Human Services [USDHHS], 2000).

From the behavioral aspect, it is important to examine the individual oral health behaviors such as, smoking, flossing, brushing, and routine dental visits (Sheiham & Watt, 2000; Wardle & Steptoe, 1991). Other behavior that have been shown to influence an individual's oral health are known oral piercings, decorative dental covers known as "grills", and oral sex activities are other behaviors that can influence oral health status (Mayers, Judelson, Moriarty, & Rundell, 2002).

It is also vital to examine what factors control the ability to practice healthier oral health behaviors (Wardle & Steptoe, 1991) since behavior change has been found to be difficult among individuals (Honkala & Tala, 1987). Many individuals are not familiar with appropriate oral hygiene practices (ADA, 2008; Broadbent et al., 2006). Unfamiliarity with healthy oral hygiene practices such as brushing, flossing, and regular dental visits, may be influenced by the

amount of knowledge an individual has on these behaviors (McKenzie, 2005). Analysis of individual's oral health knowledge and beliefs may also help identify the effects it has on their oral health, and has been seen to play a large role in influencing oral health hygiene behaviors (McKenzie, Neiger, & Smeltzer, 2005).

Research reveals that gender, age, socio-economic status (SES), education, cultural background, stress, and anxiety play a role in influencing oral health related behaviors and problems. Evidence shows SES, education level, oral health behavior, and oral health outcomes are correlated (Broadbent et al., 2006). Research has also shown that individuals who do not take care of their teeth, thus having negative oral hygiene, are more likely than individuals with positive oral hygiene to develop other health related problems such as oral sexually transmitted infections, heart and gum disease, cancers, and osteoporosis (ADA, 2008; Wardle & Steptoe, 1991).

Although there are many studies conducted on oral health, few are targeted towards the college aged population (Percy, 2008). Healthy People 2010 announced a call to action to decrease oral health disparities among the college population (Healthy People 2010 [Healthy People], 2008). Unique oral health issues that affect today's college students include the use of smokeless tobacco, sexually transmitted diseases, and oral piercing (American College of Physicians [ACP], 2007; see also DeBate, Plichta, Tedesco, & Kerschbaum, 2006; Little, 2002; Mayers et al., 2002; Snyder, 1989).

Oral health education is needed to ensure that college students are aware of not only the risks but also the prevention of oral diseases (Coalition of National Health Education Organizations [CNHEO], 2001; USDHHS, 2000). The most effective way to treat oral health related problems is through prevention (Broadbent et al., 2006).

Throughout interventions and health promotion programs, patient education is important for adoption of informed lifestyle choices among individuals (Alperin & Miner, 1993). Since the 1950s, public health workers have discussed the importance of individuals taking initiative in

their own healthcare practices (Glanz, Rimer, & Lewis, 2002). The proposed research will pave the way for programs to help individuals improve their oral hygiene and reduce their risks of oral health related problems through education by identifying college aged student's oral health related knowledge, beliefs, and behaviors affecting their oral health.

Relevance of Theory

Patient education is important for adoption of informed lifestyle choices among individuals (Glanz et al., 2002). Health behavior and health education integrates the exchange between theory, research, and practice, in order to create effective health education and behavior changes among these individuals. A strong understanding of theory helps health educators promote behavior change by providing insight on the program planning, implementation, and evaluation process (DeBarr, 2004).

Theories also allow us to better understand individual and population based behavior (DeBarr, 2004). For many years, health educators have explained how vital it is for individuals to begin taking initiative of their healthcare (Glanz et al., 2002). Since this time, the introduction of theories, applied to acute and chronic health conditions, have helped explain behavior and propose ideas for achieving behavior change (Holister and Anema, 2004).

Theories and theoretical components, or constructs, have been applied to many previous research studies in order to better understand individual's knowledge, attitudes, beliefs, and behaviors. Studies with theoretical foundation are considered beneficial for the future of similar studies. Unfortunately, few oral health studies have applied theory or theoretical constructs to their study design. Oral health research studies using theoretical basis are needed for comparison to see if certain theories are effective at explaining particular oral health behaviors (Holister and Anema, 2004).

Health Belief Model (HBM).

Proposed in 1950 by Godfrey Hochbaum, Irwin Rosenstock, and Stephen Kegels, and adopted by the United States in 1970 by the United States Public Health Services, the Health

Belief Model is used to motivate people towards better health decision making. Hochbaum (1958), hypothesized that individuals would be more compelled to make better health decisions if they thought they were susceptible to an illness/health behavior outcome, and believed there was a benefit to early detection. The Health Belief Model is a stage theory which includes one's perceived susceptibility and severity, which is also considered together as one's threat to the condition/behavior, as well as their perceived benefits, barriers, and cues to action. In 1988, self-efficacy was added to help priority populations recognize a need for lifestyle behaviors requiring long term changes. Behavior changes are more likely to be adapted if individuals feel endangered by their current behavior pattern and can see that change will result in a valued outcome regardless of the expenditure (McKenzie et al., 2005). A visual explanation of The Health Belief Model is explained in Appendix A.

Application of Theory to Study

The HBM was used to clarify why individuals do not participate in oral health prevention practices such as brushing and flossing the teeth and visiting the dentist (McKenzie et al., 2005). Application of the HBM to oral health related beliefs of college students may help provide insight for their oral health behaviors.

Purpose

The purpose of this study was to develop a valid instrument based on constructs from the Health Belief Model to measure the knowledge, beliefs, and behaviors of college students' regarding oral health and hygiene.

Significance of the Study

When considering the promotion of oral hygiene behaviors, many think only of regular routine dental exams where prevention and promotion are not always addressed. During these routine visits, dentists mainly focus on treatment of oral diseases, dental caries and periodontal disease, and the cleaning of teeth. Health educators often overlook assessing individual's

knowledge, beliefs, and behaviors when analyzing oral health behavior, resulting in little information known on this topic (Wardle & Steptoe, 1991).

Research has shown that a relationship exists between oral health and other health related problems. This further stresses the importance of oral health education and emphasis on healthy oral health practices (Rural Remedy, 2003). In regards to adolescents, oral health has been found to be a reliable measure of their general health (USDHHS, 2000). With this in mind, currently the state of Alabama is experiencing a dental care crisis. In 2003, the Centers for Disease Control and Prevention (CDC) released a data set known as Behavioral Risk Factor Surveillance System (BRFSS) which announced that nearly 24.8 percent of all individuals living in Alabama aged eighteen years and older had lost six or more of their teeth from gum disease or tooth decay. Alabama's finding surpasses the national rate of 17.6 percent, ranking themselves as the sixth highest state in the United States (Rural Remedy, 2003). The U. S. Department of Health and Human Services reported that the impact of oral health on students resulted in a total of 51 million lost school hours each year due to inattention caused by dental pain and discomfort (USDHHS, 2000).

Oral hygiene is the most significant factor associated with prevention of oral diseases (Doshi, Baldava, Anup, & Sequeira, 2007). Research has explained that individuals who have negative oral hygiene habits are more likely than those individuals who have positive oral hygiene to develop other health related problems such as oral sexually transmitted infections, heart and gum disease, cancers, and osteoporosis (ADA, 2008; Wardle & Steptoe, 1991).

With this said, few studies conducted on participant's oral health analyzed the following: 1.) individual's knowledge of oral health, 2.) beliefs about outcomes of performing the oral health behavior, and 3.) the actual individual behaviors they partake. Combined, these three factors may indeed influence their individual oral hygiene (Broadbent et al, 2006). Of the studies conducted on this topic, the majority have been from countries outside the United States. Since they are foreign studies, many of them do not translate correctly to the English language and/or

assess the oral health issues of American college students. Also, many cultural factors influence individual's knowledge, attitudes, beliefs, and behaviors relating to oral health and hygiene. It is hard to generalize those results from foreign studies and apply them to individuals in the United States (Komabayashi, Kwan, and Hu, 2005).

According to the United States Department of Health and Human Services (USDHHS), the oral health of the college-aged population (United States Department of Health & Human Services [USDHHS], 2000), any individual between the ages of 18-25 years (United States Census Bureau [USCB], 2008), can be used as a reliable measure of this population's overall health (USDHHS, 2000). This population, is thoroughly disregarded when it comes to health care and problems (Grace, 1997). Overall, oral health among this population has received the least amount of attention, and more information will help further understand this population's oral health needs and concerns (Percy, 2008).

As stated above, many studies have addressed the subject of oral health. The purpose of the study, *Development and Validation of an Instrument to Assess College Students' Oral Health Knowledge, Beliefs, and Behaviors*, was to develop a valid instrument based on constructs from the Health Belief Model (HBM) that could properly assess the college-aged population's oral health and hygiene.

Limitations

This study will compare students at The University of Alabama's oral health knowledge, beliefs, and behaviors and how each of these may affect the frequency with which they brush and floss their teeth. All subjects of this study were between the ages of 18-25 years. This study also looked at only undergraduate students enrolled in The College of Human Environmental Sciences. The rationale behind the decision to have this college as a part of the study was to help obtain an even distribution between males and females in different areas of study. Many of the introductory classes offered in The College of Human Environmental Sciences do not hold prerequisites for admittance into the class. This allowed for a wide

distribution of majors as well as an even distribution between males and females in these different areas of studies.

Many researchers look at self-reports as an imperfect predictor of behavior (Dumitrescu, Dogaru, B., and Dogaru, C., 2008; Levin & Shenkman, 2004). This was looked at as a major limitation to this study because as a researcher, one cannot know for sure if their sample population is accurately reporting their knowledge, attitudes/beliefs, and behaviors related to their oral health and hygiene resulting in a possible high risk for potential bias among the results. A more accurate assessment of the population would have been one that includes clinical indices and self-report (Dumitrescu et al.; Levin & Shenkman).

There was a potential for bias to occur during this development study due to survey design. Particularly, selection bias may have occurred due to the subject's having the choice to respond or not respond to the survey during the study. This type of bias could have affected the participation rate, which may have in turn, limited the target participant population of n=80 subjects. Additionally, a measurement bias could also arise during this study if participants do not fully comprehend the survey instrument, thus affecting the validity of the developed survey instrument (Windsor, Clark, Boyd, & Goodman, 2004, p. 219).

Potential limitations may have existed within this study design. This study plans to pilot the survey among a small sample size of n=80 students at The University of Alabama. Findings may not accurately validate the developed survey, *Oral Health Knowledge, Beliefs, and Behaviors of College Students*, due to this study only assessing a small percentage of the total college-aged population at The University of Alabama.

Another limitation from this study regarded the body of research available on knowledge, attitude/beliefs, and behaviors of oral health and hygiene. The majority of these studies have been from countries outside the United States which forms a potential bias for the research study because the results are not necessarily generalizable to the rest of the world. A vast amount of these foreign studies have been conducted on children and elderly populations, while

only a small amount has been done on the “college-aged” population (Percy, 2008; Wardle & Steptoe, 1991). Due to these limitations, it was hard to further understand this population’s prominent oral health needs and concerns (Percy, 2008).

A final limitation from this proposed research relates to the nature of the study and results. Although this study has helped add to the American based body of research regarding the “college aged” population’s oral health related knowledge, attitudes/beliefs, and behaviors, it may not be comparable to all other colleges in the United States. For the recruited validation study population will consist of Southern American college students at The University of Alabama in Tuscaloosa, Alabama. Due to this, the results of this validation study may lack generalizability to other college-aged population sectors of the United States.

Delimitations

Delimitations were used in order to set boundaries and limits for the research study, *Development and Validation of an Instrument to Assess College Students’ Oral Health Knowledge, Beliefs, and Behaviors*. Demographic accessibility is vital for the success of this research, and because of this, participants were limited to only college students at The University of Alabama, were between the ages of 18-25 years old. Students who fulfill these requirements were recruited from the College of Human Environmental Sciences, and the study was further delimited to only those subjects who agree to participate in the focus group and pilot test activities.

Definition of Terms

The following list of defined oral health terms and concepts were used throughout this study. Definitions were taken from dentalglossary.net, <http://www.merriam-webster.com/dictionary>, <http://dictionary.reference.com/>, <http://www.medterms.com/>, the American Psychiatric Association; Glanz, Rimer & Lewis, 2002; Gliner & Morgan, 2000; McKenzie, Neiger & Smeltzer, 2005; Gilmore & Campbell, 2005.

<u>Anorexia Nervosa:</u>	An eating disorder explained by an unhealthy fear of weight gain, self-starvation, and evident distortion of body image
<u>Anxiety:</u>	A feeling of nervousness, apprehension, fear, or worry. Some fears and worries are justified, such as worry about a loved one or in anticipation of taking a quiz, test, or other examination. Problem anxiety interferes with the sufferer's ability to sleep or otherwise function. It is noteworthy that teenagers are particularly susceptible to having irritability as a symptom of a number of emotional problems, including anxiety
<u>Attitudes:</u>	Personal evaluation of the behavior at hand; do you see the behavior as good, neutral, or bad?
<u>Barriers:</u>	Physical and psychological costs of the advised action or behavior
<u>Behavior:</u>	Any action undertaken by an individual
<u>Behavioral intention:</u>	Individuals perceived likelihood of acting on a particular behavior
<u>Beliefs:</u>	A state of mind one has towards trust or confidence in someone or something
<u>Bulimia:</u>	A psychiatric compulsive disorder and eating disorder where one experiences episodes of binge eating large quantity of foods followed by purging (vomiting) behavior and/or laxative use
<u>Caries:</u>	The loss of tooth mineral over time followed by bacterial invasion within the tooth
<u>Dentin:</u>	The hard layer under the outer enamel of the tooth
<u>Eating Disorder(s):</u>	Disorders known as anorexia nervosa and bulimia nervosa, which are distinguished by abnormal eating behaviors and beliefs about eating, body weight, and body shape
<u>Erosion:</u>	The wearing away of teeth by chemical substances
<u>Flossing:</u>	Using a thin string made from nylon that is either waxed or un-waxed, and inserting it between the teeth to remove food debris and plaque
<u>Gingival Recession:</u>	Exposure of the root of the tooth, resulting from a shift in the alignment of the gum tissue

<u>Gingivitis:</u>	The first stage of periodontal disease brought on by bacteria in dental plaque build-up in the teeth
<u>Individual Control:</u>	Perceived likelihood of the occurrence of behavior
<u>Intra-Oral:</u>	Refers to tissues of or within the mouth
<u>Knowledge:</u>	The amount of information or understanding one has subject manner
<u>Mandibular Labrette:</u>	Lip piercing
<u>Oral Hygiene:</u>	The process of keeping a clean and healthy mouth
<u>Orogenital:</u>	Sexual activities involving oral contact with the vagina, penis, and/or anus
<u>Oral Piercings:</u>	Punctured tissue in the oral cavity as a form individual decorative design
<u>Outer course:</u>	Sexual intimacy not involving the vagina, penis, and/or anus
<u>Peer Pressure:</u>	Social pressure by individuals within one's peer group to take a particular action, take on certain values, or otherwise conform in order to be accepted.
<u>Periodontal Disease:</u>	Bacterial infection involving bone loss around the teeth and gum area
<u>Peri-Oral:</u>	Refers to tissues of or around the mouth
<u>Purging:</u>	Symptomatic response from many triggers, such as bulimia nervosa, chronic illness, infection, etc., which causes forceful expulsion of stomach contents from the mouth. Frequent purging episodes may result in oral signs of dental erosion of the lingual aspect of the maxillary anterior teeth
<u>Reliability:</u>	The consistency of a series of measurements
<u>Sealants:</u>	A plastic liquid placed on the top surface of the rear teeth, used to prevent tooth decay
<u>Self-efficacy:</u>	Confidence in one's ability to take actions and overcome barriers
<u>Social Norms:</u>	The acceptable normal behaviors individuals should act or portray in a given group, setting, society, or community

Subjective Norms:

The belief that one holds regarding whether most people approve or disapprove of a particular behavior; may be considered a social norm

Health Belief Model (HBM):

A health behavior stage theory that is used to motivate people towards better health decision making

Uvula:

The fleshy extensions of the soft palate in the mouth which hangs above the tongue at the entrance to the throat

Validity:

Measure used to critic the quality of instrumentation

Ventral Mucosa:

Mucous membrane which lines the front of the body cavity particularly the oral cavity

CHAPTER 2 REVIEW OF LITERATURE

Overview

Oral health affects individuals not only physically, but psychologically by impacting how they grow and enjoy life, speak and socialize, chew and taste food, and look and feels about their social well-being (Sheiham, 2005). Knowledge, attitude/beliefs, and behavior play a large role in behavior and behavior change (McKenzie et al., 2005). When considering oral health promotion, many think of regular routine dental exams. Unfortunately, dentists focus on the treatment of oral diseases and may not have time to spend on educating patients about oral disease prevention and promotion of proper oral hygiene. Little is known about the public's knowledge and attitudes regarding their oral health prevention. Health educators often overlook assessing individual's knowledge, attitudes/beliefs, and behaviors when analyzing oral health behavior (Wardle & Steptoe, 1991). From the behavioral aspect, it is more important to look at the individual's health behaviors such as smoking, flossing, brushing and how they influence their lifestyle. It is also important to look at what factors control the ability to practice healthier oral health behaviors (Wardle & Steptoe). Few studies conducted on participant's oral health analyzed their knowledge of the subject matter, attitudes/beliefs about outcomes of performing oral health behaviors, and the actual behaviors they partake in that have influence on their overall oral health. Factors such as these have been found to have an influence on behavior change (Lin & Schwarz, 2001; McKenzie et al.).

Methodology

A review of literature was conducted by identifying published studies regarding oral health, oral hygiene, oral education, and specifically individual's knowledge, attitudes, and behaviors about these topics. The following is an inclusive list of databases used to identify articles: PubMed, Extreme Search, EBSCO host, FirstSearch, and LexisNexis. Searches with

the terms “oral health education,” “dental health education,” “oral health education” and “cognitive strategies,” “dental education,” “oral care education,” “oral hygiene education” and “behavior,” “dental education,” “dental insurance,” “dental and visits,” “dental and exams,” “dental and general health,” “bulimia,” “vomiting and behavior,” “purging and behavior,” “oral piercings,” “oral health knowledge,” “attitudes,” and “behaviors,” “oral sexually transmitted infections,” “oral sexually transmitted diseases,” “oral manifestation” and “diseases,” “oral manifestation” and “infection,” “oral sex,” “oral piercings,” “oral decoration,” “mouth jewelry,” “facial jewelry,” “oral grills,” “decorative dental plates,” “decorative dental covers,” “oral tattoos,” and “adolescents” were used to retrieve all articles written on these topics. These terms were searched in various combinations until all were exhaustive. Throughout this analysis, any theoretical basis was considered on a topic regarding oral health education. All realms of oral health and education were considered. Journal articles retrieved were limited to human studies only that were written or translated into the English language.

Introduction

Oral health education emphasizes the importance of brushing, flossing, the use of fluorinated water, regular dental exams, and secondary prevention such as dental sealants. Some examples of oral health problems that can occur without proper oral hygiene and dental care are dental caries, gum disease, gingivitis, halitosis, periodontal disease, and oral cancer (Broadbent et al., 2006). For example, periodontal disease, or gum disease, has become prevalent in the United States among many individuals. Through proper instruction and individual motivation towards effective oral health care procedures, prevention and control of this disease is achievable (Caine, 1976). According to the American Dental Association (ADA), a large number of individuals who are not familiar with appropriate oral practices, and therefore their overall health may suffer (American Dental Association [ADA], 2008). In 2006, only 500 million visits to a dentist were made by Americans, indicating that a significant proportion of individuals are not preventing oral diseases and problems by regularly visiting a dentist.

Routine visits to a dentist in conjunction with primary prevention can help alleviate oral health problems (ADA, 2008).

The topic of oral health has been researched by many for years. Although this is a field with ample information, literature is still limited on particular segments of the population. The majority of the work available looks at oral health among children and elderly adults. Research completed on the college-aged population and their oral health threats is lacking among the available literature (Percy, 2008). The “college-aged” population is known as any individual between the ages of 18-25 years (United States Census Bureau [USCB], 2008), and is thoroughly disregarded when it comes to their health care and problems (Grace, 1997), but overall, oral health among this population has received the least amount of attention (Percy). According to the United States Department of Health and Human Services (USDHHS), the oral health of adolescents can be used as a reliable measure of their overall health (United States Department of Health and Human Services [USDHHS], 2000). The purpose of this review is to identify the associations between college-aged individual’s oral hygiene practices and their knowledge, attitudes, and behaviors regarding oral health. This review of literature will include any studies relating to oral health knowledge, attitudes and/or beliefs, and behaviors completed with individuals between the ages of 18-25 years, including studies from the United States as well as international research.

Attitude/Beliefs

An individual’s attitude or belief towards performing a particular behavior may be used as a predictor of certain behavioral outcomes (Al-Ansari, J., Honkala, E., and Honkala, S., 2008; Watson et al. 1998). Regarding oral health, it has been shown that if an individual holds high concern for their oral health, they are more likely to partake in healthy oral health behaviors. On the other hand, correlation has been shown with negative oral health behaviors and low concerns for oral health (Al-Ansari, J., et al.; Watson et al.). Ultimately, evaluating attitudes and/or beliefs of individual’s oral health may help understand their oral health behaviors.

Also, individual's attitude regarding how they perceive themselves can ultimately reflect their overall health status (Coons, McGhan, Bootman, & Larson, 1989). Regarding health care, it is important for individuals to feel a sense of personal control and take charge of their own health through self-care. Self-care can be considered the behaviors or performances the individuals improve on their health (Coons et al). For individuals to adopt characteristics like these it is recommended that health professionals such as dentists, hygienists, and health educators provide proper encouragement, skills, and resources for them to become comfortable with self-care activities. Helping individuals become more comfortable with self-care activities, such as brushing and flossing, increases their confidence, or self-efficacy, in their ability to participate in that behavior. As a result, individuals may be more inclined to adopt healthier behaviors or participate in them more frequently (Coons et al.).

A study which looked at the effects of self-care information of general health related attitudes and beliefs were completed by Coons et al. (1989). These researchers developed an intervention to see if it was possible to increase individual's ability to take more responsibility for their health. This study used means of a treatment group, where information regarding self-care and self-help of common illnesses was disseminated and then compared to a control group who was not given the information. Both the control and intervention group were asked to complete a survey instrument which measured the individual's attitude toward health-related information, their attitude regarding self-care and personal involvement in medical care, as well as their dimensions of beliefs: internal, powerful others, and chance (Coons et al., 1989).

Results from Coons et al. (1989) stated that a difference was found between the groups and that those who were involved in the treatment group held higher concern for their oral health and were more actively involved in their own health care after the intervention. Among the participants beliefs regarding their health being controlled by powerful others, those in the treatment group were less likely over the control group to believe that their health was controlled by others such as physicians or dentists. This study lacked the behaviors of oral health actually

being applied to the tested intervention, but these findings give light to the ability of changing an individual's behavior by altering their attitudes or beliefs (Coons et al.), even those relating to oral health issues, for any health behavior can be applied to the proposed idea (Coons et al.).

One's opinion of their health status can be influenced by the behaviors they demonstrate (Coons et al., 1989; Montano & Kasprzyk, 2002). Dumitrescu (2007) analyzed the self-reported oral health status of 344 dental students in Bucharest, Romania. Students were asked to rank their perceived oral health, satisfaction with the appearance of their own teeth, as well as a self-report of the gingival (gum) condition on a scale of "excellent", "very good", "good", "normal", or "poor/very poor". Overall, students held positive beliefs about the overall conditions of their teeth and gums (Dumitrescu, 2007).

A study conducted by Kawamura, Ikeda-Nakaoka, and Sasahara (2000) identified which attitudes/beliefs were held by their study population of Japanese dental hygiene and general nursing students. When asked about the appearance of their gums, teeth, and breath, the differences in both majors were small or absent among the two majors. Both groups were more concerned about the color of their teeth and having bad breath over the conditions of their gums. The findings by Kawamura et al. (2000) are not surprising; both nursing and dental hygienist students all undergo academic course work in oral disease and care. Their knowledge of this area may be influential on their personal attitudes towards their oral self-care (Kawamura et al.).

A similar study to Kawamura et al. (2000) was conducted by Komabayashi, Kwan, and Hu (2005). These researchers used the same survey instrument for to identify which attitudes/beliefs were held by their participants (Komabayashi et al.; Kawamura et al.). Komabayashi et al. conducted a cross-national study to compare these oral health attitudes/beliefs among British and Chinese dental students by means of the Hiroshima University-Dental Behavioural Inventory (HU-DBI). This instrument consisted of twenty dichotomous questions (agree or disagree), and was found to have a good test-retest reliability

showing that it was effective in understanding patients and predicting their oral health outcomes. These students were asked about their self-rated appearance of their gums, teeth, and breath. It is important to point out that since these study populations are from different representative sections of the world, the environment of one school is not representative of the other. Also, cultural influences were also noted as a barrier between the findings of these two countries. Results concluded that Chinese students were significantly more worried about these oral health factors over the British students (Komabayashi et al., 2005).

The results from Komabayashi et al. (2005) were somewhat consistent to those found by Kawamura et al (2000). Many factors influence individuals attitudes and health behaviors; one through learning and the other is more culturally determined through the use of subjective, or social norms. These factors may help explain why Chinese and Japanese students held higher concern for their oral hygiene (Kawamura et al.; Komabayashi et al.), for in Asia, many health beliefs and behaviors are taught in the home (Schwarz & Lo, 1995). One can generalize that both studies findings are due to the educational background as well as the many factors which influence individual's attitudes and health behaviors, such as learning and through the use of social norms being of family, friends, or colleagues in their academic program (Kawamura et al.; Komabayashi et al.).

Another study by Dagli et al. (2008) used the same instrument, Hiroshima University Dental Behavior Inventory (HU-DBI) as Kawamura et al. (2000) and Komabayashi et al. (2005) to evaluate oral health attitudes and behaviors. Findings from the Dagli et al. study were similar to those found in Kawamura et al. (2000) and Komabayashi et al. (2005). Dagli et al. conducted a study on n=372 dental students in India. Students were questioned on their current attitudes and behaviors regarding oral health and results concluded that the majority of them, 66%, were concerned about having bad breath and they were considerably concerned about the overall appearance of their teeth and gums. In all, the dental students in India had poor oral health awareness (Dagli et al., 2008). These findings may come as no surprise, as these are dental

students who are primarily concerned with teeth and oral health. It is surprising that these dental students had poor oral health awareness and they were studying oral health at the graduate level. This makes one believe that if individuals who study oral health lack these awareness, then it may be linear with the overall population who does not study oral health (Dagli et al., 2008).

Many of the findings in the studies reviewed above (Coons et al., 1989; Dumitrescu, 2007; Kawamura et al., 2000; Komabashi et al., 2005) were only measured by self-reports which makes it hard to conclude what findings means. Many researchers look at self-reports as an imperfect predictor of behavior (Dumitrescu et al., 2008; Levin et al., 2004). This is considered a major limitation to these studies because one cannot know for sure if their sample population is accurately reporting their attitudes/beliefs related to their oral health, resulting in a possible high risk for potential bias among the outcome. A more accurate assessment of these populations assessed would be one that includes clinical indices and self-report (Levin & Shenkman, 2004).

With the idea of accurate assessment through means of clinical indices and self-report, a study by Levin & Shenkman (2004) used dental exams and self-reports to evaluate the populations oral health related attitude. Levin & Shenkman looked at 123 adolescent Israeli army recruits to see if a relationship existed between their dental caries and their oral health attitudes (Levin & Shenkman).

Since many individuals suffer from dental diseases, the World Health Organization (WHO) uses a scale called DMFT and DMFS for carries detection among individuals. DMFT and DMFS evaluate individuals Decayed, Missing, and Filled Teeth and Surfaces respectively, and assigns each participant dental scores (World Health Organization [WHO], 2008). Levin & Shenkman's participant's teeth were evaluated using these WHO criteria scales for caries. Participants also completed the same instrument used in the studies by Kawamura et al. (2000) and Korbayashi et al. (2005).

Researchers found that only 13% of the Israeli army recruits were caries-free in their lifetime and at the time of study, 50% currently had caries. Another finding was that 40% of the individuals reported, "I put off going to the dentist until I have a toothache" which correlated with the high decay scores from the DMFT/DMFS evaluation. One can infer that negative attitudes towards regular dental exams may be found associated with decay of the teeth (Levin & Shenkman). The population in this study was shown to hold similar attitude or beliefs toward their oral health as the British students in the Komabayashi et al. (2005) study. This study helps verify that patient education is vital in order to increase individual's consciousness on how to prevent oral diseases. This may help improve their oral health attitudes and behaviors thus help them develop an overall better oral health (Levin & Shenkman; see also Kamamura et al., 2000; Komabayshi et al.).

Another study to examine the oral health related attitude/beliefs of its population was conducted by Broadbent et al. (2006) among 742 participants within the Dunedin, New Zealand population. These individuals were asked to fill out a questionnaire that examined their oral health beliefs on their confidence (self-efficacy) of performing the following behaviors: drinking fluoridated water, keeping their mouth clean, avoiding sweet foods, visiting the dentist, using dental floss, and using fluoridated toothpaste. They were assessed three times throughout their early adulthood: at ages 15, 18, and 26 years. The participants also received three dental examinations to check for dental caries and missing teeth, plaque accumulation was measured on a scale provided by the Oral Hygiene Index, and at age 26, periodontal measurements were taken (Broadbent et al.).

Broadbent et al. (2006) examined whether or not there was a positive association between these dental health beliefs and oral health behaviors over time. This research identified the perceptions one has on threats toward oral health risks. The authors felt that researching the beliefs of the participants' efficacy regarding performing certain oral health

behaviors, such as drinking fluoridated water, flossing, visiting the dentist regularly, etc., could be useful in predicting their overall oral health throughout their lifetime (Broadbent et al.).

Overall, Broadbent et al. (2006) found that unfavorable dental health beliefs were associated with poor oral health. One finding showed that participants had the lowest perceived threat towards dental caries regarding the following oral health behaviors: the importance of drinking fluoridated water, use of dental floss, or the avoidance of sweet foods. Females were significantly more likely than males to have favorable perceptions towards oral health behaviors measured in this study. Stability overtime was found among the participants beliefs “keeping the teeth and gums very clean,” as only 6% of these individuals changed their views on performing this behavior overtime. The least stable oral health behavior among the participants in this study was associated with “drinking fluoridated water,” as 52.4% changed their beliefs towards performing this behavior overtime (Broadbent et al.). This experimental longitudinal study was unique as it looked at dental beliefs as a predictor of oral health over a long period of time.

Daily flossing is recommended for preventing oral disparities (ADA, 2008). Self-efficacy of flossing has been found to correlate strongly with low levels of dental plaque (Stewart, Strack, & Graves, 1999). A study conducted by Schuz, Sniehotta, Wiedemann, and Seemann (2006) attempted to identify determinants of dental flossing including one’s perceptions about risks associated with not flossing and their positive and negative outcome expectations of performing the behavior. University students (n=258) in Berlin, Germany were surveyed three times over a six week span to see how flossing behavior changed over time with the help of education, planning techniques, and constant reminders. Initially, participants were asked to complete a questionnaire assessing perceptions of individual’s risks for oral health related diseases, self-efficacy of performing oral hygiene behaviors, and frequency of dental flossing in the last week. Outcome expectations, risk perceptions, and self-efficacy are vital for individuals to incorporate the behavior of flossing into their daily hygiene routine. This study found that the participant’s

intentions to floss were correlated with high levels of risk perception, outcome expectations of flossing, and self-efficacy of flossing. Findings from this study help show that attitudes can be used to predict behavior and behavior change among individuals. (Schuz et al.)

A randomized controlled trial (RCT) conducted by Sniehotta, Soares, and Dombrowski (2006) also explained attitudes related to flossing behavior among Scottish undergraduates. The control group (n=140) were administered floss packets, they were collected after two weeks, and residual floss in the packets was measured to determine amount used. The intervention group (n=99) attended a lecture addressing education on oral self-care, the threats associated with dental caries and periodontal disease, and preventive effects of flossing, which was followed by a five minute demonstration on flossing. A survey was distributed to assess the attitudes, perceived behavior control, and behavioral intention regarding flossing. Each participant was given a packet of floss with a flossing guide. In addition, the intervention group was sent a follow-up e-mail suggesting immediate planning for where and when they would floss their teeth for the next two weeks. Two week and two month follow-up survey and residual floss were compared between the control and intervention group. Intervention participants demonstrated more positive changes in flossing habits after the two-week and two-month follow-ups compared to control participants. Planning when and where one would floss were significantly related with flossing behavior after the two month intervention period. Findings indicated that participants that held positive cognitions about flossing and were more highly motivated to act on the behavior (Sniehotta et al., 2006).

This longitudinal study was the first to present evidence that brief interventions can facilitate changes in oral health behaviors. Dental flossing is very important for preventing many oral diseases, and an increase in attitudes/beliefs among individuals has been shown to help increase their intention to perform this daily oral hygiene behavior. Specifically, Schuz et al. (2006) and Sniehotta et al. (2006) found that positive cognitions about the intention to floss increased the likelihood of performing the behavior (Schuz et al.; Sniehotta, et al.).

A unique study conducted by Al-Ansari, J., Honkala, E., and Honkala, S. (2003) looked at the oral health related attitudes of male students (N=153) at the Health Science College in Kuwait. Participant was asked to fill out a questionnaire regarding their perceived oral health status including whether or not they believed they had a dental disease and how they perceived their oral health. Regarding whether or not they believed they had a dental disease(s), 47 participants believed that they did, while 61 individuals responded as “no” or “did not know” whether or not they had a dental disease. When asked how they perceived their oral health status, the majority of students believed their oral health was “average” or “good” (Al-Ansari, J., et al., 2003). A rationale for these findings were not justified, although one can only base an assumption that these individuals may lack oral health care, thus believing that they are more susceptible to a dental disease.

A study by Watson, Gibson, and Guo (1998) assessed the oral health knowledge of 213 women, with the primary goal to identify issues that affected women’s oral health. Participants were asked about their perceived dental and periodontal health. This study showed that 62% of these women reported having “some” or “lots” of dental or gum problems, stating a high percentage of perceived poor oral health among this population. This finding is significant to that of not having a regular source of dental care among the women in this study (Watson et al., 1998). High negative beliefs towards individuals oral health status and limited access to oral health care has been found to correlate among the studies of Al-Ansari, J., et al. (2003) and Watson et al. These results further emphasize the importance of oral health education in areas where individuals do not have access to oral health care in order to increase the attitudes individuals hold towards their oral health and hygiene (Al-Ansari, J., et al.; Watson et al.).

A study in Enugu, Africa by Ndiokwelu (2004) looked at individual’s oral health attitudes by surveying 700 students aged 14-21 years. Questions asked included the following: whether they thought of themselves as susceptible to periodontal disease, how they would be affected if they lost their teeth, and why they brushed their teeth (Ndiokwelu).

Results from this study indicated that the participants held high beliefs regarding their attitudes towards oral hygiene behavior, for 88% responded that they would be very upset if they lost some teeth. When asked why individuals regularly cleaned their teeth, 45% responded for the purpose to look clean, 28% said they wanted to look presentable, and 72% stated for the prevention of disease, which implies healthy oral health attitudes among this study population. On the contrary, 97% of the students felt they were not susceptible of periodontal disease at any point in their life. These findings explain opposing attitudes related to oral health among this study population, inferring that more education is needed (Ndiokwelu, 2004).

Behavior

Oral diseases like periodontal (gum) disease and dental caries (cavities) account for 20.9 million lost days each year from work, study, or activity (Millstein, Petersen, & Nightingale, 1993). Although most oral diseases are not life threatening, they do result in pain, discomfort, and functional problems (Pilot & Miyazaki, 1994). Likewise, two thirds of adolescents experience bleeding gums, a warning sign for periodontal disease (Millstein, 1993).

Periodontal disease and dental caries are two of the most preventable dental diseases through behaviors such as brushing and flossing the teeth, and limiting sugar intake. Although research has shown that it can be difficult to change one's behavior in respect to oral hygiene and dietary behaviors that affect oral hygiene (Honkala, 1984), dental caries and periodontal disease have decreased over time due to improvements in individual's oral health behavior (Pilot & Miyazaki, 1994). Ultimately, healthy oral health behaviors are imperative among all individuals in order to decrease their risk of the development of dental diseases (Honkala), for an individual's health status later in life is greatly impacted by their lifestyle and health-related behaviors early in their life (Coons et al., 1989; Healthy People, 2008).

Another behavior that is recommended to help positively influence an individual oral health is routine dental exams because these exams help treat and prevent any oral disease(s). Dentists and hygienists focus on cleaning the teeth and gums during these exams in order to

better the oral health and hygiene of the individual. An individual who utilizes this behavior may benefit by having positive oral health (Sheiham & Watt, 2000; Wardle & Steptoe, 1991)

Gender Differences Regarding Brushing

The ADA, British Dental Association (BDA), and Academy of Dentistry International (ACI) recommends twice a day brushing with fluoride toothpaste among all individuals in order to help prevent against dental caries and periodontal disease (ADA, 2008; British Dental Association [BDA], 2008; Academy of Dental International [ADI], 2008).

Females and males in many countries have been studied to determine which gender is more likely to brush their teeth (Chen, M., Andersen R., & Barmes, D., 1997). Reports from many studies have shown that females are more likely to brush their teeth more often than males (Al-Ansari, J. M., & Honkala, S., 2007; Chen, M. et al., 1997; Kassak, 2001).

Kassak et al. (2001) examined adolescent Lebanese college students' (N=954) oral hygiene and factors associated with the frequency they brushed their teeth. This study found that more females brush their teeth two or more times a day; females (78%) and males (54%) (Kassak et al.). Another study by Al-Ansari, J. M., & Honkala, S. (2007) looked at oral health behavior among health science college students in Kuwait. A total of 700 students were surveyed on their oral health knowledge and behavior in order to see if the overall observed increasing rate of dental caries and periodontal disease in Kuwait was being experienced in this population. When asked about tooth brushing frequency, female students, 62%, and male students, 35%, reported twice a day brushing (Al-Ansari, J. M., & Honkala). It has been shown in more than one study that women, over men, brush more frequently each day. The lack of tooth brushing behavior found in these studies (Ansari, J. M., & Honkala; Chen et al.; Kassak et al.) explain the need for oral health education in order to improve behaviors among individuals.

Al-Ansari, J., et al. (2003) looked at the oral health related behaviors of 153 male students in Kuwait. Each participant was asked to fill out a questionnaire regarding their oral health behavior including daily teeth brushing habits. Findings from this study show that 34% of

the population brushed their teeth two or more times a day, while 45% reported only brushing once a day and 20% stated that they brushed less than once a day. These findings show that a few students reported brushing their teeth the international dental recommended of two or more times a day (ADA, 2008; ADI, 2008; Al-Ansari, J., et al.; BDA, 2008). This helps to further emphasize the need for more oral health education to help influence the increase in healthy oral hygiene behaviors among college students regardless of their academic background. These efforts may be found effective if more credence is targeted towards the male population, as noted in studies above. (Al-Ansari, J., et al.; see also Al-Ansari, J. M., 2007; Chen et al., 1997; Kassak et al., 2001).

Brushing

Periodontal disease and oral caries can be prevented through the oral hygiene behavior tooth brushing (Broadbent et al., 1996; Horton, Zimmerman, & Collings, 1969) and individual control (Ndiokwelu, 2004). Many studies, some mentioned previously, have looked at the difference in brushing behaviors among males and females. Regardless of gender, brushing the teeth is an important part of healthy oral hygiene (Honkala, 1984; Sheiham & Watt, 2000; Wardle & Steptoe, 1991).

Dumitrescu (2007) analyzed the oral health behaviors of 344 dental students in Bucharest, Romania. All participants completed a self-administered questionnaire relating to the frequency of different oral hygiene behaviors, including brushing. Findings portrayed that 93% of the students brushed two or more times a day. This explains that a majority of the individuals in the study follow the international recommendations of brushing the teeth twice a day (ADA, 2008; ADI, 2008; Al-Ansari J., et al., 2003; BDI, 2008). Another previously mentioned study by Kawamura et al. (2000) used the HU-DBI to explore the frequency of their tooth brushing behaviors among Japanese dental hygiene and general nursing students. Findings show that all students met or exceeded brushing requirements set by international guidelines (ADA; ADI; BDI; Kawamura et al.). One can infer that this occurred due to the

international recommendations of twice a day brushing since the percentage of twice a day brushers was 80% of the student population (ADA; ADI; Al-Ansari, J., et al.; BDI).

Dental and health sciences college students have been the primary focus for the majority of oral health related knowledge and awareness studies (Al-Ansari, J., et al., 2003; Al-Ansari, J. M., & Honkala, S., 2007; Dumitrescu, 2007; Kawamura et al., 2000; Komabayashi, 2005;). Due to this common trend, Doshi et al. (2007) conducted research on the oral health related knowledge and behaviors among college students with different backgrounds. This study was completed in India involving 240 students within the medical and engineering colleges. Each student in this study completed questionnaire relating to their oral hygiene practices. Doshi et al. explained that the engineering group in this study was anticipated to have the same oral health related knowledge and behavior as the medical group regardless of their non-medical background because they both had equal literacy levels.

In regards to brushing behavior, results from Doshi et al. (2007) explained that close to 44% of the medical group practiced brushing their teeth twice daily. The remaining individuals from this group either brushed only in the morning, 45%, or after every meal, nearly 11%. Among the engineering students, 39% brushed twice a day, while 60% only brushed in the morning, and 0.9% brushed after every meal. These findings are not considered significantly significant among the different groups, and it was stated by the authors that dental brushing frequency was influenced by personal motivation levels not academic background (Doshi et al.). Following the international recommendation of twice a day brushing (ADA, 2008; ADI, 2008; Al-Ansari, J., et al.; BDI, 2008) has been shown to be a trend throughout international studies (Dumitrescu, 2007; Doshi et al.; Kawamura et al., 2000)

Flossing

Particles from food can become stuck or lodged between teeth and gums resulting in decay causing bacteria to adhere in the oral cavity, resulting in the build-up of plaque. Although brushing the teeth is a way to help clean the gums and teeth, all bacteria is not removed during

this process, for toothbrush bristles cannot reach all bacteria. In addition to brushing the teeth, the daily use of floss, or interdental cleaner, is recommended by the ADA, ADI, and BDA to help remove plaque and food from between the teeth and under the gum line (ADA, 2008; ADI, 2008; BDI 2008; Schuz et al., 2006), which helps prevent against the development of caries and periodontal diseases (ADA; Bauroth et al., 2003; Bellamy et al., 2004).

Dumitrescu (2007) analyzed the oral health behaviors of dental students in Romania (n=344). Within the questionnaire that participants completed, flossing was a behavior measured, and finding revealed that 44% of the study population reported using dental floss more than once a week. This study showed that only 22% of participants followed the daily flossing recommendations set by the ADA, ADI, and BDA. These findings are important to this review of literature because they points out that even those who are in the dental profession may not adhere to the daily recommendations of healthy oral hygiene (Dumitrescu), explaining why many individuals do not floss daily (Schuz et al.)

Kawamura et al. (2000) used the HU-DBI to explore Japanese dental hygiene and general nursing student's behaviors, including flossing behaviors. When the student population was asked about their flossing behavior, the majority reported never using dental floss and many also reported not being taught by a dental professional the proper way to floss. These findings (Kawamura et al.) corresponded with the Japanese national survey results in 1987, stating that there is a low use of dental floss among Japanese individuals (Ministry of Health and Welfare, 1987). Overall this stresses the need for education regarding the benefits of flossing as well as proper instruction to help individuals partake in the behavior.

A study by Schuz and colleagues (2006) looked at attitude as a predictor of behavior change among college students. Participants were given a sample of dental floss along with flossing instructions directed by the ADA. Two weeks later they were assessed on their consistency of flossing when they had routinely planned, and asked how often they flossed during the last week. Students were instructed to mail back their first spool of floss at the end of

the week in order for the floss to be measured to determine the residual amount. Four weeks later, the third assessment was performed, and students were asked additional questions regarding flossing and again instructed to return their second pack of floss in order for the residual floss of that spool to be measured. Schuz et al. found that only 11% met flossing (Schuz et al.) set by the ADA, ADI, and BDA (ADA, 2008; ADI, 2008; BDA, 2008). The researchers stated that an increase in knowledge may influence behavior change among this age group (Schuz et al.) The study by Kassak et al. (2001) also looked at flossing behavior among adolescent Lebanese college students (N=954). Their findings concluded that only 28% of their sample flossed their teeth representing low (Kassak et al.) and similar results of those of Schuz et al. These results indicate that education on flossing may be useful among this college-aged population by increasing their oral health related knowledge, and in turn, increase their routine oral health behaviors (Hamilton & Coulby, 1991).

A study by Akarslan et al. (2008) found similar results as Schuz et al. (2006). Akarslan et al. investigated the dietary habits and oral health behaviors of n=416 adults between the ages of 18-25 years. Participants were dental students in the country of Turkey. Each dental student completed a questionnaire regarding their dietary habits and oral health related behaviors, including brushing and flossing their teeth. Dental exams were also given to each participant. Results concluded that 56% of participants did not use hygiene aids, such as flossing, in addition to brushing their teeth. Routine exams found that dental plaque build-up was the most significant effect on their oral health. This study was conducted on a population that consisted of dental students. Dental students are familiar with the proper and health regimens for oral health. One can infer that if the majority of a population of dental students does not adhere to healthy oral hygiene habits, these behaviors may be congruent to those of the college aged population who are not dental students. This explains that efforts need to be made to help individuals be more familiar with oral hygiene habits that can help eliminate dental plaque

(Akarslan, 2008). These results are in line with those of Kassak et al. (2001) and Schuz et al. (2006).

Doshi et al. (2007) carried out research on the oral health behaviors among medical and engineering college students in India. Findings are as follows: 12.5% of medical and 5% of the engineering group used dental floss as an oral hygiene aid other than a toothbrush. Statistical significance was found between the medical and engineering groups and the use of dental floss, stating that medical students were more likely to floss over those in the engineering college (Doshi et al., 2007). Findings from the five studies reviewed on flossing behavior (Doshi et al.; Dumitrescu, 2007; Kassak et al., 2001; Kawamura et al., 2000; Schuz et al., 2006) conclude that more education on the importance of dental floss and oral health is needed to see a behavior change among college-aged students.

Dental Visits

Dental Exams focus on the treatment of oral disease and cleaning of the teeth (Wardle & Steptoe, 1991). From the behavioral aspect, they are important for the overall oral health of the individual (Sheiham & Watt, 2000; Wardle & Steptoe). According to the ADA, routine dental exams are important for oral exams and professional cleanings (ADA, 2008) and the CDC recommends two visits in a 12 month period (CDC, 2008). ADI also recommends routine dental visits to help prevent oral health problems and to treat current problems early on (ADI, 2008).

Al-Ansari, J., et al. (2003) also looked at the oral health related behavior, dental visits, among the male health science population in Kuwait. Researchers found that 60% of the participants had visited the dentist in the last year, while nearly 30% had not seen the dentist in over two years. This finding shows that a high proportion of the male student population utilizes the dentist as a form of prevention from oral disparities (Al-Ansari, J., et al., 2003).

Another study which assessed the behaviors of 213 women was completed by Watson et al. (1998). When asked about having a regular dentist to use for oral health care and needs, 41% reported not having a dentist to whom they can visit. A significant finding was found

regarding the length of times that had passed from their last dental visit. Nearly 43% of these women had not visited the dentist in the last two years, while more than 10% had not seen a dentist in over five years. This study concluded that having dental insurance was strongly associated with recent dental visits (Watson et al.). These studies help to verify the need for more oral health education on the importance of dental exams in order to help increase the percentage of college-aged individuals who regularly visit the dentist (Al-Ansari, J., et al.; Watson et al.).

Dumitrescu, (2007) analyzed the oral health behaviors of 344 dental students in Bucharest, Romania. Each participant completed a questionnaire, which included information about their use of the current dental system, as well as their current oral health status. Findings revealed that nearly 97% of the students had visited the dentist at least one time in the last two years, which falls short of the countries recommended once yearly visit (Dumitrescu). On the other side of the spectrum, 64% of that population reported seeing their dentist in the last six months. Also almost half the study stated that they had current dental caries that had not been treated, and over 35% said they had experienced toothache(s) in the last year. A vast majority of these individuals had a current dental caries or pain, or both, and did not utilize the dental-care system to better their oral health status (Dumitrescu).

This paves a way for future researchers to see the importance of oral health education and promotion, specifically regular dental cleanings and exams. One can infer that all populations, not only college-aged, can benefit from more oral health promotion due to the fact that those in the current study were future dentists who do not utilize the oral health care system to better their oral health status (Dumitrescu).

Kawamura et al. (2000) used the HU-DBI questionnaire to assess Japanese dental hygiene and general nursing students asking about professional oral hygiene instruction, as well as information about seeking dental care. An important finding in this study showed that the majority of the students reported that they did not see a dentist until they had a toothache. The

majority of students reported never having a dentist tell them that they brushed their teeth very well, which may relate to why the majority of this population reported never using dental floss (Kawamura et al.).

The cross-national study completed by Komabayashi et al. (2005), resembling the study by Kawamura et al. (2000), also compared the oral health behaviors of British and Chinese dental students using the HU-DBI. Questions were asked about professional oral hygiene instruction, as well as information about seeking dental care. The majority of the British and Chinese students reported that they did not worry much about visiting the dentist. Further expanding on this issue, 54% of the Chinese and 13% of the British students only sought dental care when symptoms arose (Komabayashi et al.). Students were also asked whether or not they had received any professional oral hygiene education throughout their lifetime. The majority of the British and Chinese students claimed they were taught proper oral hygiene instruction by a dental professional, and 57% of British and 33% of Chinese students reported having had a dentist tell them that they brushed their teeth very well (Komabayashi et al.).

One can conclude from the Kawamura et al. (2000) and Komabayashi et al. (2005) studies that these students were educated by other individuals, such as those in their social norms, on the proper way to brush their teeth since many reported not having professional instruction. Many factors influence individuals health behaviors; one through learning behavior and the other is more culturally determined through the use of social norms. These factors may help explain why Chinese students held a higher concern for their oral hygiene (Komabayashi et al., 2005), for in Asia, many health behaviors are taught in the home (Schwarz & Lo, 1995).

A possible reason why many of these students did not receive professional instruction (Kawamura et al., 2000; Komabayashi et al., 2005) may be because in Asia, many health behaviors are taught in the home, and professional care is not considered until all home remedies are exhausted (Schwarz & Lo, 1995). In the cases where students did seek

professional care (Kawamura et al.; Komabayashi et al.), the fact that during routine dental visits many dentists mainly focus on treatment of oral diseases and the cleaning of teeth may be a reason why many students did not receive professional instruction. Dental professional may not have time to spend on educating patients about proper oral hygiene. Proper oral hygiene education may be an issue that health educators or hygienists address in future dental care (Wardle & Steptoe, 1991).

The research by Doshi et al., (2007) on the oral health related behaviors among 240 college students in India also measured how many of the students had ever visited the dentist and how often they did so. Results show that 21% of the medical students and 22% of the engineering students had never visited the dentist. Of those who had visited a dentist, (nearly 80% of both groups) 68% of the medical and engineering group reporting only visiting the dentist when they experienced oral pain. Findings from these six studies regarding dental services (Al-Ansari, J., et al., 2003; Doshi et al.; Dumitrescu, 2007; Kawamura et al., 2000; Komabayashi et al., 2005; Watson et al., 1998) verify the need for more in depth understanding of the oral hygiene practices college-aged individuals partake in, especially dental visits and factors that influence their utilization of dental services available.

Behavioral Threats

Peer pressure effects the college-aged population each and every day. Although some pressures can be seen to positively influence these individuals decision making, some pressure from peers can negatively influence their overall health. This type of pressure has been shown to dominate adolescents' good health habits and replace them with unhealthy choices, some of which can become a threat to the individual's oral health. Many oral health threats that adolescents are facing these days are outlined below, and may be found associated with peer pressure (Kukral, Cruz, & Dalmas, 2007).

Smoking

Tobacco in any form, cigarette, smokeless or oral tobacco, pipe, or cigar, is an unhealthy behavior that has can affect your oral health and ultimately cause oral cancer (ADA, 2008).

Tobacco use has been linked to periodontal disease and the loss of teeth (Academy of General Dentistry [AGD], 2008; see also Navarro, 2006) as well as the user may experience tartar build-up, stained teeth, or blackish stains on the tongue (Navarro). Oral or smokeless tobacco can cause precancerous sores in the mouth or on the lips known as leukoplakia, or erythroplakia (American Cancer Association [ACA], 2007). Regardless of the type of tobacco, any use can result in negative effects on the mouth and teeth (Navarro).

A study by Broadbent et al. (2006) found that their non-smoking participants were more likely to have spent all their life with fluoridated water and held stable favorable oral health related beliefs over time. Non-smokers also had a significantly lower prevalence of poor oral health behaviors, fewer sites in the mouth with bleeding when probed during dental exams, and fewer teeth extracted overtime due to caries. Overall, non-smokers had more favorable oral health behaviors resulting in healthy oral outcomes (Broadbent et al.).

A study that looked at individuals smoking behaviors was proposed by Watson et al. (1998), who assessed the oral health behaviors of women (n=213). Of this study population, 27% were smokers and two subjects reported using smokeless tobacco products. Nearly 40% of the smokers were under the age of 30 years, and the percentage of smokers throughout this study significantly decreased with age. Watson et al. stated that these finding correlate with those of national statistics, but suggest the importance of early education regarding smoking since the majority of the studies smokers were young in age. Furthermore, the Broadbent et al. (2006) and Watson et al. studies justify the need to educate more college-aged individuals on the oral health risks associated with smoking (Broadbent et al.; Watson et al.).

Purging

Eating disorders have been identified by the American College of Physicians as one of the most serious issues affecting adolescents and young adults today (American College of Physicians [ACP], 2007; see also Snyder, 1989; DeBate, Plichta, Tedesco, & Kerschbaum, 2006). Among college women, the most common and severe eating disorders are those known as anorexia and bulimia nervosa (DeMoor, 2004; Schmidt & Treasure, 1997; Schwitzer et al., 2001; Schwitzer et al., 2008). These behaviors have been shown to negatively affect an individual's overall and oral health. This is especially seen in the purging aspect of the eating disorder, bulimia. Bulimia is defined by the DSM-IV-TR as binge-eating and self induced purging of ingested food, by ways of laxative and vomiting abuse (American Psychological Association [APA], 2000). Few individuals with eating disorders like bulimia receive treatment. More effort needs to be made towards early diagnosis of individuals with eating disorders because secondary prevention efforts, such as early diagnosis, referral, and treatment, help to decrease medical and oral problems related to the disorder (Ashley, 1996; DeBate et al.; Piran, 2002). Those who play an important role in the secondary prevention of eating disorders are dentists and dental hygienists because typically they are the first healthcare professional to identify that a problem is occurring because of the symptoms they may see in the mouth.

Relating to the vomiting behavior and its effects on the teeth, dentists and hygienists may be able to identify the oral complications commonly associated with bulimia: tooth erosion, tooth sensitivity, and dry mouth (DeBate et al., 2006; DeMoor, 2004; Little, 2002). If dentists and hygienists observe these overt health behaviors in individuals early on, rather than ignoring, avoiding, or underestimating them, more individuals may be able to seek treatment for their illness before it gets any worse (DeBate et al.; DeMoor, 2004).

Two studies in this review look at the effects bulimia has on one's oral health. Enzell and Angmar-Mansson (1999) studied 81 individuals with diagnosed eating disorders, including bulimia, based on the APA's DSM IV-TR criteria (APA, 2000). These individuals were then

compared to a control group of participants with out disordered eating. Erosion of the enamel and dentine of the teeth were found in 96% of the eating disordered group, which is a significance number when compared to the control group. Findings from this study show that individuals with bulimia have significantly poorer oral health. Researchers state that since those with disordered eating, such as bulimia, have an increased susceptibility to caries and erosion, these individuals should be encouraged to see a dentist regularly in order to maintain healthy teeth (Enzell & Angmar-Mansson, 1999).

Another study by Jones and Cleaton-Jones (1989) found that among their 11 bulimic subjects (all diagnosed by psychiatrists) 69% of them had teeth with erosion. Compared to the control group of 22 subjects, the erosion in the teeth of the bulimic subjects was found to be larger and deeper in the pulp of the teeth. Dental caries were also of a higher percentage in the bulimic patients when compared to the control group (Jones & Cleaton-Jones, 1989). Both of these studies, Enzell & Angmar-Mansson (1999) and Jones & Cleaton-Jones (1989) concluded that increased amounts of dental caries and erosion were found in their subjects who were diagnosed with the eating disorder bulimia. Health education needs to be focused towards preventing unhealthy eating behaviors such as bulimia in order to improve their oral health.

Oral Piercings

One oral health threat current affecting many college-aged individuals is that of oral piercings. These piercings can occur on many places in the oral cavity, including the tongue, lips, cheeks, frenum, or uvula (Berenguer, Forrest, Horning, Towle, & Karpinia, 2006; Kukral et al. 2007; Navarro, 2006) while the most common sites are the tongue and lower lip within the oral cavity (Shinohara E., Horikawa, Ruiz, & Shinohara, M., 2007). Facial decorations of this kind can complicate and interfere with speaking, chewing, and swallowing (Kukral et al.). Complications that can arise from the addition of these facial ornaments are infection, chipped or broken teeth, damaged fillings, injury and recession of gum tissue, development of scar tissue, oral nerve damage, bleeding, pain, swollen cheeks, gums, tongue, or lips, and an excess

production of saliva (ADA, 2008; Chen & Scully, 1992; Levin, Zadik, & Becker, 2005; Kukral et al.; Maheu-Robert, Andrian, & Grenier, 2007). Regardless of the side effects that can arise from the onset of these piercing, many college-aged individuals continue to unify themselves through these facial piercings (Levin et al.; Stirn, 2003).

Currently oral piercings are gaining acceptances as a sign of individuality and facial decoration (Levin et al., 2005; Stirn, 2003) and are also considered a form of body art among particularly younger people (Levin et al.; Mayers, Judelson, Moriarty, & Rundell, 2002; Navarro, 2006). It was found by Mayers et al. that 50% of university student populations have some form of body piercing. These researchers looked at the prevalence of piercings, including oral, among 454 undergraduate students in Pleasantville, New York. Results showed that four percent of the male and 16% of the female population had their tongue pierced, while only two percent of the female population had lip piercings. Of the individuals with their tongues pierced, 10% of that population responded having oral problem associated with the piercing. This study explains that many university students unify themselves through body art, but does not give clinical evidence of piercing complications (Mayers et al.).

A study by Levin et al. (2005) looked to see the prevalence and complications of oral piercings among young adults (n=389) at a military based dental office. Findings revealed that 20% of the subjects had an oral piercing and the majority of this group stated that they experienced swelling and bleeding at the site of damage after the piercing took place. In regards to the risks involved with wearing an intra-oral piercing ornament, 58% of the participants were unaware of the dangers involved. Participants who had an intra-oral piercing were given a clinical examination to assess their teeth and gums. Of the 11 participants who had intra-oral piercings, a total of 15 fractured teeth were found. Other complications were four individuals had gingivitis, nine cases of infection, and 21 cases of gingival recession. These findings further verify that oral piercings are not only popular among adolescents today, but they cause significant oral health threats to the oral cavity (Levin et al., 2005). Furthermore, these

results correspond with those of Mayers et al. (2002). Since many individuals are not aware of the dangers involved with these piercings, it is important for health educators, dentists, and hygienists to educate individuals of the risks and complications associated with oral piercings (Stirn, 1992; Levin et al.).

Due to the increase of oral piercings among adolescents (Kukral et al. 2007), a unique study by Ventä et al. (2005) looked at the oral piercings among first year university students (n=234) in Finland. Within this population, eight students, all female, reported having 11 oral piercings. Results concluded that 38% of the individuals with oral piercings experienced gingival recession (Ventä et al.).

Gingival recession is a serious risk factor for oral piercings (ADA, 2008; Chen & Scully, 1992; Levin, Zadik, & Becker, 2005; Kukral et al.; Maheu-Robert, Andrian, & Grenier, 2007). Much research has been done on this issue to gain more understanding of the factors associated with this oral health problem. Specifically, length of time the individual has worn the oral piercing and the severity of gingival recession has been analyzed (Berenguer et al., 2006; Campbell et al., 2002; Chambrone, L., & Chambrone, L. A., 2003; Jornet & Alonso, 2006; Kapferer, Benesch, Gregoric, Ulm, & Hienz, 2006; Leichter & Monteith, 2006; Levin et al., 2005; López-Jornet & Camacho-Alonso, 2006; Maheu-Robert et al., 2007; Shinohara E. H., et al., 2007; Ventä et al., 2005).

Leichter and Monteith (2006) examined the relationship between this outer lower lip piercing and gingival recession among 91 individuals with this particular piercing, and compared them to a control group. Results showed a significant increase in gingival recession cases among the pierced individuals, for 68% of the pierced group had gingival recession on at least one tooth in the area around the piercing, while 22% of the control group experienced recession in the area where this piercing would have been (Leichter & Monteith, 2006).

The duration of time individuals had been wearing their piercing ranged from one to 86 months (average=16.4 months). Results indicated that the longer the individuals had been

wearing the piercing, the greater the increased risk and severity of recession (Leichter & Monteith, 2006). These results are consistent to other research studies where individuals with their tongues pierced for a longer time had more severe gingival recession and tooth chipping (Campbell, Moore, Stephens, & Tatakis, 2002).

A similar study to Leichter and Monteith (2006) and Campbell et al. (2002) also evaluated the relationship between oral piercings and periodontal status overtime. López-Jornet and Camacho-Alonso (2006) studied 98 intra-oral piercings (tongue, lip, or cheek) among 97 subjects. Findings revealed that 23 of the cases experienced gingival recession while 75 cases did not. Statistical significance was found between length of time the piercing had been worn and dental complications. Dental complications were also found to be more prevalent in individuals who had their piercing for less than two years (López-Jornet & Camacho-Alonso).

Kapferer, Benesch, Gregoric, Ulm, and Hienz (2006) also compared 50 subjects with intra-oral lip piercings to a 50 subjects control group without intra-oral lip piercings in order to see the prevalence and causative factors of gingival recession of these piercings. Subjects received a dental examination for the analysis of their teeth and gums, and they were also asked to fill out a questionnaire about their dental history, oral hygiene habits, and the presence of any intra-oral lip piercing. Results showed that 68% of the participants with intra-oral lip piercings and four percent of the control group, experienced gingival recession. Of those who experienced recession associated with the oral piercings, a significant relationship existed between the length of time since the piercing and the prevalence of the gingival recession. In other words, the longer the amount of time elapsed since the piercing, the higher the prevalence of recession among the gums of the patients (Kapferer et al., 2007) which are in sync to those found by Leichter and Monteith (2006), Campbell et al. (2002), and Berenguer et al. (2006). The data from this study supports the findings in the previously mentioned study explaining that gingival recession is prevalent among those with oral piercings.

Berenguer et al. (2006) conducted a case study to help further understand the long term effects of oral piercing on the oral cavity. Their subject was a 28 year old woman who had her tongue and lower lip pierced for the last 12 years and was experiencing loose teeth which were causing her pain. After full examination, dentists revealed that she had severe periodontitis, plaque and calculus deposits, bleeding, and peri-oral scarring. The patient was advised to remove all oral jewelry and seek orthodontic and endodontic treatment, as well as develop adequate oral hygiene techniques to help prevent against future oral problems such as decay and sensitivity. This subject had no evidence of periodontitis prior to her oral piercings concluding that her long term oral piercings, in all probability, was the link to her oral health problems. Authors concluded that long term effects of the oral piercings hold severe oral health effects for the teeth and gums, and eventually over time may lose normal oral function (Berenguer et al.). It is important that health professionals be aware of the risks associated with oral piercings, such as gingival recession, in order to educate individuals on proper oral care and ultimately advise them to seek alternative routes for individuality (Berenguer et al.; Leichter & Monteith, 2006).

Although studies have explained the risk and prevalence associated between longer duration of time an oral piercing is worn and gingival recession (Berenguer et al., 2006; Campbell et al., 2002; Kapferer et al., 2007; Leichter & Monteith, 2006; López-Jornet & Camacho-Alonso, 2006), research also shows that gingival recession can occur short after the onset of the piercing (Chambrone, L., & Chambrone, L. A., 2003; Shinohara, E. H., et. al., 2007).

One case report on a 19 year old female college student with a lip piercing was studied by Chambrone, L., and Chambrone, L. A. (2003). The woman in the study had her lip pierced six months prior to the study. Clinical examination revealed gingival recession with ulcerations near the piercing site. The researchers concluded that the cause of recession and ulcerations were related to the lip piercing (Chambrone, L., & Chambrone, L. A.).

Shinohara, E. H., and colleagues (2007) analyzed an individual who was experiencing problems with his tongue piercing. The subject's tongue had been pierced for four months, but one week after the piercing was made, the hardware from the jewelry began to embed itself into the ventral mucosa of the tongue and overtime completely implanted into the tongue. Proper procedures were taken to remove the piercing and promote healing within the tongue. This study reveals that dental complications can arise as shortly as one week following a piercing.

These findings (Chambrone, L., & Chambrone, L. A., 2003; Shinohara, E. H., et al., 2007) contradict those which stated that the longer length of time a piercing is worn increases the risk and severity of recession of the gums (Berenguer et al., 2006; Campbell et al., 2002; Kapferer et al., 2007; Leichter & Monteith, 2006; López-Jornet & Camacho-Alonso, 2006). Disputing findings like these further explain the need for more research on this area.

Decorative Dental Encasements

Decorative dental covers, also known as grillz, grills, fronts, plates, golds, shines, and caps (Grills, 2006; Kukral et al., 2007), are an oral accessory made of gold, diamonds, and other jewels (Grills, 2006; Hollowell & Childers, 2007). These "grills" became popular when rap groups began wearing them in the early 1990's. Ever since then, celebrities have been adding this oral ornament to their daily wardrobe. Like any other trend, this popular look is slowly becoming popular among adolescents (Kukral et al.; Hollowell & Childers).

Due to these social pressures (Kukral et al.; Hollowell & Childers), many adolescents have adopted these behaviors in order to fit in. Unfortunately these individuals are not aware of the problems associated with wearing "grills" (Kukral et al., 2007), and it is important that those who wear them become familiar with the risks associated with them (Grills, 2006).

Food can easily become caught or trapped in between the "grill" and the teeth, causing bacteria to collect and decay may begin to form (Grills, 2006; Kukral et al., 2007). If healthy oral hygiene habits such as brushing and flossing do not fully remove the debris ("Grills"), negative consequences such as bad breath in the short term, and tooth decay, enamel damage,

gum irritation, and chipped teeth in the long term, can occur (Grills; Kukral et al.). Overall, these decorative trends can cause permanent oral damage and seriously affect an individual's oral hygiene (Kukral et al.)

Those who wear oral decorative dental encasements should be aware of these potential oral threats and adopt healthy oral hygiene habits and limit the time spent wearing their oral ornament (Grills; Kukral et al.). Additional healthy behaviors for "grill" wearers include cleaning the piece each day and remove the ornament while eating (Grills, 2006).

Before 2006, there were no published studies showing that "grills" are harmful to the oral cavity. A recent case study by Hollowell and Childers (2007) was one of the first to examine the effects of "grills" on an individual's teeth and gums. This study was on a 16 year old, who over a 10 year period had no history of dental caries. At his last dental appointment, patterns of decay in his upper front teeth were identified. The only lifestyle change which could lead to decay of this sort was the recently addition of a "grill" to his oral cavity. Researchers concluded that food particles were trapping under his "grill" and causing decay (Hollowell & Childers, 2007).

Oral Sexually Transmitted Infections (STIs)

College aged individuals, those between the ages of 18-25 (U.S. Census Bureau [Census], 2005, p.9), are typically considered a healthy group of individuals (Grace, 1997). Although this may be the perception of many, this population's rates of morbidity and mortality from developmental, environmental, and behavioral risk factors are higher than those of the general population. Medical conditions such as infection also occur more frequently among these individuals, and infections of the genitourinary system are among the highest reason students visit health facilities at colleges or universities. It is important to note that it is also common for this population to delay treatment of a health problem due to inopportune time and class schedule (Grace, 1997).

According to the Centers of Disease Control and Prevention's (CDC) 2006 Disease Profile, sexually transmitted diseases (STDs) include the following: gonorrhea, herpes,

chlamydia, syphilis, and human papilloma virus (HPV). These diseases greatly impact the health of the United States by affecting more than 65 million Americans (Centers for Disease Control and Prevention [Centers], 2008, p.27).

Prevention, diagnosis, and treatment efforts towards STDs have progressed in the last few years, but in specific populations, infections rates of these sorts continue to increase. Each year, nearly 19 million new cases of STDs transpire, half of which occur from individuals aged 15-24 (Centers, 2008, p.27). With this increasing issue among the college aged population, it is vital for college health professionals to not only treat diseases, but to move towards the idea of community wellness. In regards to the college/university campus setting, this environment not only affects the students and their educational outcomes, but also the quality of life among the entire campus and surrounding communities. Grace, (1997) pointed out that wellness efforts have been made on preventing and limiting the spread STDs among this population especially in the college/university setting (Grace).

In regards to oral health, many of the STDs mentioned above can be transmitted through intimate sexual practices involving orogenital contact, also known as oral sex (Edwards & Carne, 1998; Terezhalmay & Naylor, 1996) or the practice of “outer course” (Remez, 2000). This intimate act is common in both heterosexual and homosexual relationships and has become a chief route for STDs. These diseases have been shown to manifest in the oral cavity (Edwards & Carne) and symptoms can be identified primarily in the oral cavity by their oral lesions (Percy, 2008). The next few paragraphs in this review will describe and explain common orally transmitted sexual diseases, as well as identify their estimated risk rate of acquiring the specific STD. It should be noted that research shows that the orogenital transmission of the STD HIV disease is low. Although not impossible, the estimated risk rate of acquired HIV during oral sex is 0.04%. Due to this low prevalence rate documented in the research (Boekeloo & Howard, 2002) HIV and oral sexual transmission has not been included in this review.

The following section explains and describes each of the five major STDs that an individual can contract through orogenital contact with an infected host. These include the following: gonorrhea, herpes, chlamydia, syphilis, and HPV (CDC, 2006).

Herpes simplex virus.

A viral STD known as herpes simplex virus (HSV) has been shown associated with infection of the oral cavity (Bruce & Rogers, 2004; Carne & Edwards, 1997; Centers for Disease Control and Prevention [Centers], 2007b; Teo, 2006). This virus commonly occurs among young adults and can be transferred through intimate sexual practices, including orogenital (Bruce & Rogers). There are many types of herpes simplex viruses, but the strain known as HSV type 1 (HSV-1) is most often linked to oral infection as a result from genital contact (Bruce & Rogers; Centers, 2007b). HSV-1 most often causes infection of the mouth and lips through genital or oral contact with an infected host. These oral soars are commonly known as “fever blisters” and transmission to the genital region can occur (Centers, 2007b). Furthermore, contact with an infected partner can lead to lesions on the inner oral cheek and gum tissue in the mouth (Bruce & Rogers).

Human papilloma virus.

Human papilloma virus (HPV) is currently the most common viral STD affecting men and women today (Centers for Disease Control and Prevention [Centers], 2007c; Centers for Disease Control and Prevention [Centers], 2007e; Percy, 2008). To date, there are over 90 different strains of HPV, all of which can cause different diseases or effects on the body (Summersgill et al., 2001). HPV wart-causing strains 6 and 11 can host in mucosal and cutaneous sites in the body, such as the mouth, (Summersgill et al.) and oral manifestation of HPV has been linked to orogenital contact (Bruce & Rogers; Edwards & Carne, 1998; Summersgill et al.). These strains of HPV are considered to have “low-risk” to your health because they do not put the infected host at risk for developing cancer (Centers, 2007c, 2007e; see also Bruce & Rogers; Summersgill et al.).

If warts appear in the oral cavity, they typically are small single or grouped bumps that can be raised or flat, small or large, and have been seen to resemble the shape of cauliflower (Centers, 2007c, 2007e). These oral lesions are typically white, pink, or flesh in color, soft to the touch, and enlarge to plaques (Bruce & Rogers). An outbreak of oral warts can occur within weeks or months following oral sex with an infected partner (Centers, 2007c, 2007e). Some individuals who come in contact with an infected partner may never see signs of transmission because their immune system naturally fought off this virus (Centers, 2007c).

Syphilis.

Syphilis, a bacterial STD that has been shown to be declining in incident rates in the last few years, continues to infect young adults (Bruce & Rogers, 2004; Centers, 2007h). The most common extragenital site for syphilis infection is in the oral cavity (Siegel, 1996). Syphilis is spread by direct person to person contact with a syphilis sore, and can be transmitted to the oral cavity during oral sexual activity (Centers for Disease Control and Prevention [Centers], 2007g; see also Bruce & Rogers; Centers for Disease Control and Prevention [Centers], 2004) at a rate of 18-80% (Percy, 2008).

If caught early, syphilis can easily be treated with antibiotics (Bruce & Rogers). When an individual contracts syphilis orally, a chancre can form on the lips, tongue, or pharynx, and are considered to be painless (Bruce & Rogers; Centers, 2007g; Centers, 2004; Siegel; Terezhalmay & Naylor, 1996). An extremely infectious chancre (Siegel; Centers, 2007h) can appear round, small, or flat, and can have raised borders (Bruce & Rogers; Centers, 2007g; Siegel). If not treated, the infection can progress into a more serious stage and cause papules or rashes in the oral mucosa (Centers, 2004, 2007g; Bruce & Rogers; Siegel). Other symptoms from syphilis include radiant plaque accumulation in the mouth as well as the development of oral ulcers (Bruce & Rogers; Siegel). If the symptoms of syphilis remain untreated, the protective epithelial barrier in the mouth, which help protected against infection, can be disturbed and risk for acquiring HIV is increased (Centers 2004, 2007g).

Syphilis has been known to spread through orogenital contact with an infected host (Bruce & Rogers, 2004; Centers, 2004, 2007g; Percy, 2008; Centers, 2007h; Terezhalmay & Naylor, 1996). A report by the CDC revealed the rate of transmission of syphilis by oral sex among individuals in Chicago, Illinois during 1998-2002. Their findings showed that of 1,583 reported syphilis cases during these consecutive years, nearly 14% were attributed to orogenital sexual activity. It was stated in this report that the result found underestimated the accounts of orogenital transmission of syphilis. Many reported engaging in genital, anal, and oral sex, and the 14% represents individuals who only participated in orogenital activity (Centers, 2004).

Gonorrhea.

Gonorrhea, a bacterial STD, is the second most frequently reported disease in the United States (Centers for Disease Control and Prevention [Centers], 2007f; Terezhalmay & Naylor, 1996). Currently teenagers and adolescents (those aged 15-24 years) are at high risk of contracting gonorrhea compared to any other age group (Boekeloo & Howard, 2002; Siegel, 1996) and those among the southern region of the United States are at an increased risk of transmission. In the last few years, the south has experienced the highest rates of gonorrhea compared to the other regions of the United States (Centers for Disease Control and Prevention [Centers], 2007h). Of those who are infected with Gonorrhea, 20% are infections of the oral cavity. These cases were transmitted by orogenital sexual contact with an infected partner (Centers for Disease Control and Prevention [Centers], 2007d; Siegel). Symptoms include multiple ulcers of the mouth, including the tongue and hard and soft palate, as well as the oral mucosa can become extremely red with a white pseudomembrane (Bruce & Rogers, 2004; Siegel; Terezhalmay & Naylor). Halitosis, hypersalivation, and a sore throat have also been noted as common side-effects (Percy, 2008; Siegel; see also Centers, 2007d). As seen in syphilis, gonorrhea infection also increases an individual's risk for acquiring HIV (Siegel; Centers, 2007h).

Chlamydia.

The most common infectious disease (Centers, 2007h) and most frequently reported bacterial STD (Centers for Disease Control and Prevention [Centers], 2007a) in the United States is known as Chlamydia. Adolescents are at the highest risk for this STD, specifically women aged 15-24 years (Centers, 2007h; Terezhalmay & Naylor, 1996). Chlamydia can be transmitted through orogenital activity and symptoms can arise in the mouth and throat of the infected host (Centers, 2007a; Percy, 2008; Terezhalmay & Naylor). Diagnosis of this oral STD can be made by identifying flesh colored lesions on the lips, tongue, and oral mucosa. If lesions remain untreated, they can become hard and larger in size, causing damage to the gums and hard palate (Terezhalmay & Naylor).

As seen above, many STDs have risk of manifestation in the oral cavity as a result of orogenital activity (Edwards & Carne, 1998). In order to further understand the oral health related risks that college-aged population face regarding oral STDs, it is important to examine in the behavior of oral-sex, the associated attitude towards this behavior, and the knowledge they hold on this subject (Remez, 2000).

Many young individuals have the perception that oral sex is not the same as genital sex (Remez, 2000) and that oral sex is not considered as intimate as a behavior as genital sex, resulting in many of them engaging in the act of oral sex with more partners than they do with genital sex (Boekeloo & Howard, 2002). Adolescents also feel that oral sex, over genital or anal sex, is more socially acceptable among their peers (Halpern-Felsher, Cornell, Kropp, & Tschann, 2005; Remez). The increase in partners enhances the possibility for more exposure to STDs, and many of these individuals are not using oral barriers, such as dental dams, as protection against STDs (Boekeloo & Howard).

A study by Halpern-Felsher et al. (2005) on ninth grade adolescents (n=580) found that more students had participated in oral sex than vaginal sex. They reported that students considered the act of oral sex to be a less risky behavior on their health, socially, and

emotionally over vaginal sex consequences. They also perceived their risk of contracting STDs orally to be significantly less than the risk of contracting them vaginally. Since these individuals perceive this act less risky, they are more likely to engage in oral sex (Halpern-Felscher et al.).

Another study by Boekeloo and Howard (2002) looked at 12-15 year old adolescents' (n=335) sexual experiences and their use of protection towards STDs. Finding revealed that 18% had reported having oral sex, 25% of which had never had vaginal sex. Very few students (n=4) stated using barrier protection towards STDs during oral sex activity (Boekeloo & Howard).

A similar study by Stone, Hatherall, Ingham, and McEachran (2006) also examined the oral sex activity and STD protection among students aged 16-18 years (N=1,373). When participants were asked if STDs could be acquired during oral-genital contact, 26% did not know whether or not they could. The finding could be important because over 56% of the population had participated in oral sex and overall, the percentage of activity among individuals increase with age. Among the 16, 17, and 18 year olds, 49%, 63%, and 73% respectively, partook in orogenital activity. Of these individuals, 20% reported using barrier protection towards STDs at least once (Stone et al. 2006). Findings from the above researchers help verify that the prevalence of oral sex activity among young adolescents is high (Boekeloo & Howard, 2002; Halpern-Felscher et al., 2005; Stone et al., 2006) and the use of protection during oral sex is low (Boekeloo & Howard; Stone et al.). This further emphasizes the need for more education regarding safe-sex practices and the risks involved with orogenital sexual activity.

Lastly, a study by Auslander et al., (2009) looked at the sexual behaviors and Sexually Transmitted Infections (STI) risk among sexually experienced adolescent girls. Their study evaluated the sexual behavior of N=202 sexually experienced girls between the ages of 14-21 years of age. Finding from this research explained that adolescent girls participate in a wide range of sexual behaviors: oral, anal, and vaginal sex. Forty-nine percent and 67% of their

sample population reported giving and received oral sexual behavior, respectively. This study concluded that vaginal sex creates a much greater risk of contracting an STI than oral sex but those who engage in oral sex are more likely to engage in other high risk behaviors, thus further increasing their risk of infection of an STI (Auslander et al., 2009). A similar study by Stankovic et al., (2009) concluded similar findings with additional evidence suggesting a low rate of barrier protective use among participants (Stankovic et al., 2009). These findings suggest the need for education to be provided to this population about sexual risks and STIs (Auslander et al., 2009; Stankovic et al., 2009).

The population in these studies (Boekeloo & Howard, 2002; Halpern-Felscher et al., 2005; Stone et al., 2006) were of younger age groups than the reviews targeted “college-aged” population, but led one to conclude that if this orogenital activity is occurring frequently in the younger population (Boekeloo & Howard; Halpern-Felscher et al.; Stone et al.), then higher proportion of older adolescents may be engaging in oral sex. This conclusion is further supported by the findings by Stone et al.

These findings further emphasize the need for education on the importance of protection against orogenital STDs. Individuals who are not in a long-term monogamous relationship or those who engage in oral sex activity should use a protective measure such as a barrier product to reduce their chance of acquiring STDs. Barrier protections include those such as a condom or dental dam and reduce the risk of STD transmission among the individuals partaking in the orogenital activity (Centers, 2004).

Knowledge

Patient education is a large part of oral health education. Proper techniques should be integrated into educational curriculum in the beginning years of education in order to initiate primary prevention in regards to oral health (ADA, 2008). Education early in life can not only help in prevention of oral health problems at that time, but also increase knowledge for adoption of lifelong healthy oral health behaviors practices. Oral health education is needed to insure

that individuals are aware of not only the risks but prevention of oral diseases (Hamilton & Coulby, 1991).

Researchers have found an increase in oral health knowledge is correlated with these improved behaviors (Hamilton & Coulby, 1991). With this in mind, the following is a review regarding the oral health related knowledge individuals hold.

The Al-Ansari & Honkala, (2007) evaluated their population's knowledge of oral health. An oral health questionnaire assessed individual's knowledge on various topics including fluoride, toothpaste, flossing, role of sugar in caries, and dental extractions. Al-Ansari and Honkala reported that the vast majority of this population knew that fluoride aided in the prevention of oral caries while sugar intake can lead to the formation of oral caries. Although these findings were found consistent among the male and female study population, females' knowledge, over males, was statistically higher in regards to oral health. The female population's behaviors regarding the use of fluoridated toothpaste, visiting the dentist, and frequency of daily tooth brushings were found to be statistically significant with the association of their level of oral health related knowledge. This study helps to verify that there is a need for an increase in oral health information especially among the male population (Al-Ansari & Honkala).

The previous findings (Al-Ansari & Honkala, 2007) indicate that there is an increased need for oral health education in the male population. A study Watson et al. (1998) assessed women's oral health knowledge by asking five oral health knowledge statements taken from the National Institute of Dental Research. Watson et al. found that the women in their study lacked knowledge on oral health related information. For example, 25% of the participants were not aware that fluoride helps prevent cavities in individuals of all ages. Researchers suggest that oral health education is needed for these women (Watson et al.). This seems to be a continuous concern of many research studies and the future of health education may benefit by incorporating more oral health into the curriculum (Al-Ansari & Honkala; Waton et al.).

In another study to address the issue of oral health related knowledge was done by Davies (2001). This researcher looked at the knowledge and behaviors associated with the oral health of (n=6,251) Chinese individuals. Individuals received clinical examinations and completed the Oral Health Survey developed by the colleagues at the Sun Yat-Sen University of Medical Sciences in Guangdong, China. A finding explained that 90% of the surveyed population reported not knowing if the toothpaste they used contained fluoride, a necessity component for healthy enamel. This study concluded that these adults had little knowledge regarding oral health (Davies).

Many studies conducted over forty years ago looked at the relationship between individual's education level and periodontal disease. The longitudinal study by Horton and Summnick, 1967; Horton and Summnick, 1968, addressed these two variables among men living in Texas and Colorado who were affected by periodontal problems commonly associated with gum disease. Researches revealed that a relationship existed between education and periodontal conditions. As those who were more educated had better overall periodontal conditions (Horton & Summnick, 1967, 1968). A similar study by Horton, Zimmermann, and Collings, (1969) looked at 188 individuals with a history of periodontal disease. Findings were consistent to those by Horton and Summnick, (1967 & 1968); a correlation existed between educational level and periodontal disease. These three studies help to conclude that individuals who hold higher formal education influence the severity of a disease (Horton & Summnick, 1967 & 1968; Horton, Zimmerman, & Collings, 1969).

A few years later, Caine (1976) looked at the relations linking academic majors and the prevalence of periodontal disease, dental caries, and oral hygiene patterns among 120 undergraduate students in the following concentrations: natural sciences, nursing, education, business, social sciences, business administration, and English. Each participant underwent a dental examination to have their teeth and gums checked using the following three evaluation:

the Ramfiord Periodontal Index (PDI), The Oral Hygiene Index (OHI-S), and the DMFT Index (Caine).

Caine (1976) reported that among its participants, the prevalence of periodontal disease was not evenly distributed among all academic majors in this study. Nursing students, a subgroup of the study population comprised entirely of females, were among the academic majors whose prevalence of periodontal disease was the lowest. This finding may be related to the idea that females, over males, are more likely to brush their teeth each day and brush more often than males (Al-Ansari, & Honkala, 2007; Chen et al., 1997; Kassak, Dagher, & Doughan, 2001), for brushing the teeth is a primary prevention technique towards the development of periodontal disease (Broadbent et al., 2006). No relationship was found to exist among the prevalence of dental caries and academic majors within this study population. The oral hygiene instrument (OHI-S) was also not found to be consistent among academic majors, for nursing students had the lowest scores on this evaluation. This finding explains that these women participated in behaviors such as brushing, flossing, and regular dental visits. This study revealed that those in the academic major of nursing, compared to other disciplines, overall had a lower chance of developing periodontal disease primarily because they portrayed positive oral hygiene behaviors which benefited their oral health (Caine). This could also be held true due to their academic background on health and hygiene. Their increased knowledge of these preventative behaviors may influence them to partake in healthy oral behaviors (Hamilton & Coulby, 1991).

Knowledge of a behavior is thought to be an important predictor for behavior (Hamilton & Coulby, 1991). This idea also holds truth to oral health related knowledge and behavior (Ashley, 1996) especially because those who have a greater knowledge of oral health practices and are confident in their control over their oral health, hold a higher likelihood of adopting self-care practices (Freeman, Maizels, Wyllie, & Sheiham, 1993). The unique study conducted by Al-Ansari, Honkala, E., & Honkala, S. (2003) looked at the oral health related knowledge of the

male only student population at the Health Science College in Kuwait. The survey questions asked about the risks of periodontal and dental diseases, the role of fluoride in toothpaste, plaque, and the role of sugar in caries development. Study findings reported that nearly all participants were familiar with the role sugar plays in the development of oral caries, as well as that fluoride is added to toothpaste for the prevention of such oral caries, while only one-third of this population knew the risk of periodontal disease. The results from this study indicate that the male students in Kuwait exhibited high levels of knowledge regarding oral health primarily because of their academic background in health care. Findings do show that these individuals can benefit from more oral health education so they can better their knowledge of the common oral health disease, known as periodontal disease.

Doshi et al. (2007) carried out research on the oral health related knowledge and behaviors among 240 students at a college in India. The final variable analyzed by this study related to the participants knowledge of fluoride. Each questionnaire asked if the participant knew about fluoridated toothpaste. Findings for this measure were statistically significant, for 27.5% of the medical and 48.4% of the engineering group reported being unaware of this information. No significance was found among the difference in the group's usage of fluoridated toothpaste; 58.7% of the medical and 48.3% of the engineering group used fluoridated toothpaste. These results contributed to the conclusion that the level of knowledge among both groups was significantly lower than expected (Doshi et al., 2007).

Emphasis in oral health education is vital for individuals worldwide to insure that they are aware of the risks and prevention of oral diseases (Al-Ansari, Honkala, E., & Honkala, S., 2003; Caine, 1976; Davies, 2001; Doshi et al., 2007; Horton et al., 1969; Horton & Summnick, 1967; Horton & Summnick, 1968; Watson et al., 1998). Education early in life can not only help in prevention of oral health problems during childhood, but also increase knowledge for adoption of lifelong healthy oral health behaviors practices (Hamilton & Coulby, 1991).

Ndiokwelu, (2004) assessed individual's oral health knowledge. Questions asked included knowledge of the signs and symptoms of periodontal disease and fluoride in toothpaste, as well as if they knew if periodontal disease could lead to the loss of teeth (Ndiokwelu). Results indicated that 69% of participants knew that fluoride helped aid in the prevention of dental caries and 87% did not know that periodontal disease could lead to the loss of teeth. When asked about the signs and symptoms of periodontal disease, 40% were familiar with painful and bleeding gums as warning signs (Ndiokwelu). More education is needed to help increase these students knowledge and risks towards developing oral health diseases like periodontal disease, so they can develop cues to action for adequate oral hygiene (Ndiokwelu).

Barriers

More individuals lack dental insurance than medical insurance (USDHHS, 2000), and the lack of insurance limits the individuals access to oral health care (Percy, 2008). Health problems do not escape those who are in the college environment. Students between the ages of 18-25 have the highest of all age groups to be uninsured due to the fact that at a certain age, children are canceled from their parent's health insurance plans. Many students who can stay covered on their parent's insurance policy while in college may find themselves at the risk for being considered outside of their coverage area while away at school. This results in their medical expenses not being covered when they are away from home. Fortunately, many colleges have campus health services. Here students can receive basic medical needs at a discounted price due to their affiliation as a student at the college, but they are not fully protected come the event of a serious medical problem. Although these services are helpful to some extent, they do not provide dental services for students to utilize (Grace, 1997).

Watson et. al (1998) addressed the care-seeking characteristic of insurance. Results indicated that over one half of their study population reported not having any forms of dental insurance or benefits. Within this population, 41% of the individuals did not have a dentist for whom they could receive oral care from. Findings conclude that having dental insurance is

strongly related with utilization of dental services. More information and education is need so individuals can become familiar with lower-fee dental clinics as well as how to acquire dental insurance (Watson et al., 1998).

A study by Jamieson et al. (2009) conducted a study on risk factors for impaired oral health. Participants were between the ages of 18-34 and from Australia. Results concluded that nearly 43% of participants had oral health impairments, either a toothache, poor dental appearance, or had to avoid particular food(s) for the last 12 months. The greatest prevalence of oral health impairment was associated with difficulty in paying for treatment. This is seen as a barrier to oral healthcare and concludes that there is a need to reduce financial barriers to dental care among this population (Jamieson et al., 2009).

In addition to the lack of dental coverage among this population (Grace, 1997; Jamieson et al., 2009; Watson et al., 1998), many individual may live in an rural area where dental care is not available. A study by Kikwilu et al. (2008) explained the prevalence of oral pain and barriers to oral care facilities in their study on Tanzanian adults. These researchers surveyed n=1759 adults over the age of 18-years, separating these participants by rural and urban living. Results concluded that 59% reported experiencing oral pain within the last year and of those, only 26.5% sought out treatment. The study found that of those who did not seek treatment, nearly 43% was because of financial reasons: they either did not have enough money for treatment or they did not have money to pay for transportation to a clinic since one was not in their hometown. Results from this study conclude that oral health clinics in rural areas are recommended for the health of rural citizens. Although this study may not fit the realm of the purposed research, it may be applicable to many areas in which college-age individuals live. Many schools are located in rural areas with limited access to health care or facilities. This study shows that even in the college setting it can be hard to seek oral health care if the need occurs (Kikwilu et al., 2008).

Theoretical Application

Health Behavior and Health Education incorporate the exchange between theory, research, and practice in order to construct effective health education and behavior changes among individuals. Throughout interventions and health promotion programs, patient education is important for adoption of informed lifestyle choices among individuals. Since the 1950's public health workers have discussed the importance of individuals taking initiative in their own healthcare practices (Glanz, Rimer, & Lewis, 2002). Since this time, the introduction of theory/models applied to acute and chronic health conditions have been shown to help explain behavior and propose ideas for achieving a change in behavior (Holister & Anema, 2004). Under theoretical analysis, it is important to point out that individual intention is independent of the overt action of others (DeBarr, 2004). These articles in this review will include models and theories reported in peer reviewed literature associated with oral health since January 2003 (Hollister & Anema).

Health Belief Model (HBM)

Proposed in 1950 by Godfrey Hochbaum, Irwin Rosenstock, and Stephen Kegels, and adopted by the United States in 1970 by the United States Public Health Services, the Health Belief Model is used to motivate people towards better health decision making. Hochbaum (1958), hypothesized that individuals would be more compelled to make better health decisions if they thought they were susceptible to an illness/health behavior outcome, and believed there was a benefit to early detection. The Health Belief Model is a stage theory which includes one's perceived susceptibility and severity, which is also considered together as one's threat to the condition/behavior, as well as their perceived benefits, barriers, and cues to action. In 1988, self-efficacy was added to help priority populations recognize a need for lifestyle behaviors requiring long term changes. Behavior changes are more likely to be adapted if individuals feel endangered by their current behavior pattern and can see that change will result in a valued

outcome regardless of the expenditure (McKenzie, Neiger, & Smeltzer, 2005; Rimer & Glanz, 2005). A visual of HBM is found in Appendix A.

A study in Enugu, Africa by Ndiokwelu, (2004) used the Health Belief Model to see if individual's health knowledge, attitudes and awareness of preventable behaviors were in agreement with the model. Ndiokwelu surveyed 700 students aged 14-21. Questions asked included the following: whether they thought of themselves as susceptible to periodontal disease, knowledge of the signs and symptoms of periodontal disease, where or not they knew if periodontal disease could lead to the loss of teeth, how they would be affected if they lost their teeth, why they brushed their teeth, and knowledge of fluoride in toothpaste (Ndiokwelu).

Results from this study indicated that the participants held high beliefs regarding their attitudes towards oral hygiene behavior. When asked if they would be very, mildly, or not upset if they lost some teeth, 88% responded that they would be very upset. When asked why individuals regularly cleaned their teeth they could respond with multiple answers. Forty-five percent stated for the purpose to look clean, while 28% said they wanted to look presentable. Seventy-two percent responded as prevention of disease as the reason why they brush their teeth (Ndiokwelu, 2004). These factors (Ndiokwelu) can be thought of as the construct perceived benefits of behavior change under the Health Belief Model (McKenzie et al., 2005).

Also under the Health Belief Model, the construct perceived susceptibility looks at the individual's beliefs about their chance of acquiring the condition at hand (McKenzie et al., 2005). When Ndiokwelu's (2004) study population was asked if they considered themselves susceptible to periodontal disease, the majority, over 97% of the students felt they were not susceptible of getting periodontal disease at some point in their life. Knowledge relating to the benefits of fluoride in an individual's diet was analyzed among participants and 69% knew that fluoride helped aid in the prevention of dental caries. Finally, oral health related knowledge regarding periodontal disease, revealed that nearly 87% did not know that periodontal disease could lead to the loss of teeth while close to 40% were familiar with the signs and symptoms of

periodontal disease: painful and bleeding gums (Ndiokwelu). If an individual has the correct knowledge relating to the subject, finds the health behavior important to them and a form of treatment exists, and then Health Belief Model predicts that an individual will be ready to change. This construct is known as the “cues to action” under the Health Belief Model (Mckenzie et al.). With the Ndiokwelu (2004) study in mind, can infer that due to the fact that the majority of the student’s knowledge regarding side effects of periodontal disease was low explains why they did not perceive themselves as susceptible towards periodontal disease; thus why there is not a cue to action towards behavior change. More education is needed to help increase these students knowledge and risks towards developing oral health diseases like periodontal disease, so they can develop cues to action for adequate oral hygiene (Ndiokwelu).

Conclusion

Although there are many studies conducted on oral health, few are targeted towards the college aged population (Percy, 2008). Many of these research studies are among populations that incorporate the age group of college aged students. These studies are not specifically targeted towards college aged individuals and their unique needs and risks. Also, many of these studies are from an international viewpoint. It is difficult for one to generalize their outcomes on the American college aged population. Studies on the unique oral health behaviors and needs of the college-aged population are necessary to further understand the risks of these individuals.

All of the studies reviewed in this paper pointed out the need for oral health education in order to increase individual's knowledge on healthy oral hygiene and behaviors. Health education interventions and health promotion programs incorporate patient education because it is important for adoption of informed lifestyle choices among individuals (Alperin & Miner, 1993). Patient education is a large part of oral health education. More techniques should be integrated into educational curriculum in the beginning years of education in order to initiate primary prevention in regards to oral health. Education early in life can not only help in prevention of

oral health problems at that time, but also increase knowledge for adoption of lifelong healthy oral health behaviors practices. This can also be done through means of campaigns and interventions to help increase knowledge on oral health and decrease unhealthy oral health behaviors such as smoking and infrequent dental brushings and flossing. The ADA 2008, states that oral health education is needed to insure that Americans are aware of not only the risks but prevention of oral diseases (ADA, 2008). A call for action must be taken so that individual's oral health and hygiene practices improve and disparities can be eliminated.

There is a need for an instrument to analyze the unique oral health behaviors and risks of the college aged population. Due to this call to action, an additional topic has been added to this review of literature. A review of past studies concerning the topic of instrument development and validation has been added. This effort will help researchers comprehend survey development and validation, as well as assist them in designing an instrument that is right for this population.

Instrument Development and Validation

Disciplines may lack instruments that accurately assess specific population at need. If a situation like this arises, an instrument may need to be developed to fully assess the population. Once developed, validation tests should be ran to assure the instrument accurately examines what it indeed was developed to measure (Espie et al., 2001; Leung et al., 2005; Maciel, Jennings, and Natour, 2009; Mueller, 1986; Perko, 1999; Sepulveda, Kyriacou, and Treasure, 2009). The following review of the literature outlines the development and validation direction that previous studies have addressed.

Of the studies reviewed, many expressed why there was a desired need for a developed instrument in their particular discipline. Whether the literature addresses a concern for an instrument to examine the particular population, there is not an instrument of its kind available to assess the target population and need, to date, or if instruments available are not specific to the

population at which you plan to study, they address the need for the development (Espie et al., 2001; Leung et al., 2005; Maciel et al., 2009; Perko, 1999; Sepulveda et al., 2009).

A study by Sepulveda et al. (2009) developed and validated a scale called the Accommodation and Enabling Scale for Eating Disorders (AESED). Items for the AESED were generated by a panel of clinicians and researchers. Next, caregivers of a family member who currently had an eating disorder were identified and asked to participate in the study. Caregivers were asked to review the 41-item instrument. Detailed specifics were not given as to what participants actually reviewed on the instrument. Then next stage included another set of caregivers who reviewed the final stage of AESED. Convergent and discriminant validity was established by correlating the AESED with a 5-factor score developed from the instruments answer scale. Spearman correlation was used, as well as a Mann-Whitney μ test for categorical variables (Sepulveda et al., 2009).

Espie et al. (2001) developed and validated an instrument for measuring concerns about epilepsy in people with mental retardation called the Glasgow Epilepsy Outcome Scale (GEOS). First, researchers formulated 21 focus groups comprised of individuals who were either family or staff cares, and health practitioners to participate in a review to identify the impact epilepsy was perceived to have. Each completed an Epilepsy Knowledge Profile in order to help promote general discussion about epilepsy. Additionally, each participant was asked to report about a particular individual to whom they were going to report their concerns about epilepsy. All discussions were recorded. A draft of an instrument was made from the discussion of each focus group. Specific drafts were mailed to the participants of that focus group, plus additional cares identified from a database. Completed scales were analyzed using correlation methods to reduce the number of initial items on each scale. Items were selected among the most relevant concerns. The final version of GEOS contained 90 items. Discriminant and concurrent validity tests were also ran (Espie et al., 2001).

A study by Maciel et al. (2009) developed and validated a questionnaire on specific low back pain knowledge (LKQ). The initial stage of LKQ was developed through recorded focus groups of five to 12 people: physicians, physiotherapists, physical educators, occupational therapists, nurses, and patients. The purpose of these focus groups was to suggest important items for the formation of questions in LKQ. Items noted as important by the focus group members were developed into questions for LKQ and a draft was reviewed by the members of the focus group at a later date. Reviewers scored each question on a zero to five scale regarding the items importance, clarity, objectivity, and ease of comprehension of the terms used. Questions that received a rating of four or more from this review were retained for the next draft of LKQ. Face and content validity were determined through the judgment of the focus group members: 1.) whether LKQ included all relevant low back pain items, and 2.) did the questions effectively address each item. Construct validity was used to see if LKQ discriminated between the two populations: 1.) healthcare professionals with the specific knowledge, and 2.) patients without the specific knowledge. This study stated that the literature suggests using sample sizes of 20-40 participants to test the reliability and validity of a self-assessment instrument like LKQ (Maciel et al., 2009).

The Chinese Quality of Life instrument (ChQOL) was developed and validated by Leung et al. (2005). Researchers developed an initial model of ChQOL from a review of the literature and then submitted a draft to a panel of experts for review. The panel of experts consisted of Chinese Medicine scholars who were asked to comment on the initial domain model of ChQOL and to propose strategies on developing a scope and parameter to guide the drafting of items for ChQOL. Items were drafted, per expert panel suggestions, and reviewed by a group of 100 Chinese Medicine practitioners. Practitioners were asked to comment on whether or not they agreed with the overall scope and parameter of the instrument. The set of items were further revised and disseminated among a convenient sample of healthy patients receiving Chinese

Medicine treatment. These participants were asked to comment on the clarity of the items and to suggest improvements in the wording of the items asked in ChQOL (Leung et al., 2005).

Experts and patients were then asked to comment on the next stage of ChQOL's scope and parameter. Scores for the scope and parameter were calculated on a one to five point scale. A field test was also conducted on healthy and patient subjects using Chinese Medicine treatment. This step was completed in order to test the scope and parameter of the instrument, as well as to examine its psychometric properties. Participants were also asked to complete previously developed instruments for comparison reasons. Convergent validity was established by correlating the parameter scores with the parameter scores of the other developed instruments. ANOVA tests were run to determine the discrimination validity of ChQOL. Reliability tests were also ran for the final draft of ChQOL (Leung et al., 2005).

Evidence in the literature suggested a need for an instrument regarding adolescent athletes and dietary supplements. Perko (1999) developed an instrument, Survey to Predict Adolescent Athletes Dietary Supplement Use (SPAADSU), to satisfy this gap in the research. This researcher followed a seven-step procedure developed by Mueller (1986) for instrument development that utilizes a Likert scale. An additional two steps were included in Perko's instrument development design in order to strengthen the instrument development procedure. The nine-stages were as follows: 1.) identify the attitudinal object, 2.) collect a pool of opinion items, 3.) pool of items reviewed by panel of experts, 4.) pilot test draft of the SPAADSU, 5.) administer the item pool to a group of respondents, 6.) score each item for each respondent, 7.) sum respondents' item scores, 8.) correlate item scores with total scale scores for all respondents, and 9.) apply statistical criteria for limitation of test items (Perko, 1999).

Step 1 was identified through a review of the literature and efforts to determine the parameters for the instrument were completed by focus groups with adolescent athletes, expert panel submission of materials relevant to the topic areas, and evidence in the literature. Step 2 was formulated from evidence collected in step 1. From there, a pool of 73-items was

developed for the questionnaire. In step 3, experts in the areas of adolescent athletics, sports nutrition, and instrument development were identified for review of the 73-item draft of the instrument. Experts were asked to evaluate each item and after their review, 18 items were omitted and changes were made to questions retained, per expert panel suggestions (Perko, 1999).

A pilot test draft of the updated questionnaire was completed in step 4 of the development stage and was administered to a group of adolescent athlete respondents in step 5. Scores were assigned to each question and answer choice on the developed instrument. Each instrument completed by the adolescent athlete group in step 5 was evaluated and scored in step 6. In step 7, the sum of respondents' items scores were calculated and provided a mean score and minimum and maximum score for respondents in each section of the instrument. Correlations for scores were made in step 8, and finally in step 9, items were eliminated per statistical analysis. The final form of SPAADSU contained 36-items and this instrument was found reliable (Perko, 1999).

Many of the statistical analyses ran by the researchers in these studies are more specific data analysis for reliability tests. Also, these studies are of many diverse topics but their overarching theme was that of instrument development and validation. This review above helps pave a way for future researchers to develop and validate an instrument to assess the oral health knowledge, attitudes, and behaviors of the college aged population (Espie et al., 2001; Leung et al., 2005; Maciel, Jennings, and Natour, 2009; Mueller, 1986; Perko, 1999; Sepulveda, Kyriacou, and Treasure, 2009).

CHAPTER 3 METHODOLOGY

Purpose of Study

Evidence in the literature reveals the absence of an instrument on college-aged population's oral health related knowledge, beliefs, and behaviors. This research study sought to develop a valid instrument of this kind based on constructs from the Health Belief Model (HBM) in order to better measure the oral health behaviors of college student's regarding oral health and hygiene that induce health concerns. This research study involved three components within the instrument development and validation process: 1.) an Expert Panel Review, 2.) Participant Panel Review: Discussion Validation Study, and 3.) Participant Panel Review: Timed Validation Study.

Institutional Review Board (IRB)

IRB approval was successfully obtained from the University of Alabama where this research study was conducted. Approval for both the focus group and pilot study included the following: approval of research involving human subjects and waiver of consent for students under the age of 19 years. See Appendices B and C for the 2009 and 2010 IRB Approvals granted by The University of Alabama.

Survey Instrument

The Health Belief Model (HBM) includes individuals' perceived susceptibility, severity, threats, benefits, barriers to change, and cues to action as its major constructs (McKenzie et al., 2005). HBM was developed to clarify why individuals did not participate in prevention practices. Proposed in 1950 by Godfrey Hochbaum, Irwin Rosenstock, and Stephen Kegels, HBM is used to motivate people towards better health decision making. Hochbaum et al., hypothesized that individuals would be more compelled to make better health decisions if they thought they were susceptible to an illness/health behavior outcome, and believed there was a benefit to early

detection. Specifically, this is defined as perceived susceptibility under the HBM. An individual's feelings as to how serious the consequences of a condition really are, is defined as their perceived severity. The HBM is a stage theory and together, one's perceived susceptibility and severity, is also considered as one's threat to the health condition or behavior. How much someone feels that positive steps towards healthy behaviors are beneficial is known as their perceived benefits to that behavior. Success of any behavior change is increased when the perceived positive benefits outweighs the perceived negative benefits. When someone feels the costs of taking action does indeed outweigh the benefits of change, this is considered their perceived barriers. This theory also analyzes individual's cues to action, to better explain what exactly triggers individuals to healthy behaviors. Behavior changes are more likely to be adapted if individuals feel endangered by their current behavior pattern and can see that change will result in a valued outcome regardless of the expenditure (McKenzie, Neiger, & Smeltzer, 2005). These five constructs of within HBM were used to develop this survey instrument. For a visual of the HBM, see Appendix A.

An oral health instrument used to assess the college-aged population's knowledge, beliefs, and behaviors has been developed and validated for research study purposes. Questions were developed to measure five constructs, perceived susceptibility, severity, benefits, and barriers, as well as cues to action under the Health Belief Model (HBM). For the purpose of reliability, five questions were developed for each construct. In addition, the three oral health behaviors: brushing, flossing, and going to the dentist, each have their own set of five questions for the construct, perceived benefits. The reason behind this construct paired with each of the three oral health behaviors is because it is important for the developed instrument to measure college-students perceived benefits for each of these behaviors.

Questions for this survey were developed by the researcher to satisfy the need of an instrument that could assess the college-aged population's oral health knowledge, beliefs, and behaviors. Validity within the instrument was measured in order for the instrument to be useful

in future studies. Validity tests, like the expert panel review and participant panel reviews checked to verify that the developed instrument did indeed measure what it was intended to measure. Finally, statistical analysis using the software Statistical Package for the Social Sciences Version 16 (SPSS) was used to evaluate results of the Participant Panel Review: Timed Validation Study (Gliner & Morgan 2000). Reliability tests will need to be conducted before a research study in order to measure the consistency of the survey responses among participants.

Overview of Instrument Development

Procedural steps for instrument development, item writing, and instrument development were adopted from Espie, et al., (2001), Leung, et al., (2005), Maciel et al., (2009), Mueller (1986), Perko (1999), and Wiersma and Jurs (1990). The following steps were developed from their work and are explained further in this chapter. The steps are as follows: 1.) Identify the scope and parameters of the instrument, 2.) Collect a pool of test items, 3.) Submit draft of test items to expert panel for review, 4.) Organize research draft of instrument, 5.) Administer research draft of instrument to sample of student participants, 6.) Analyze test items from each respondent, 7.) Apply statistical criteria for revisions of test items, and finally, 8.) Revision of instrument for the final version.

Step 1: Identify the scope and parameters of the instrument.

The purpose for developing the instrument, *Oral Health Knowledge, Beliefs, and Behaviors of College Students* (OHKBB), was to measure college student's knowledge, beliefs, and behaviors regarding their oral health habits and hygiene. The instrument tool, OHKBB, was developed based on a comprehensive review of literature and national standards set for oral health and hygiene (Academy of Dentistry International [Academy], 2008; American Dental Association [ADA], 2008). The first step in developing OHKBB was to identify the parameters, or core areas, that were pertinent to the college-aged population. Since oral health education

emphasizes the importance of brushing, flossing, and regular dental exams (Broadbent, Thomson, & Poulton, 2006), these three areas become the parameters of the instrument.

An additional three areas, knowledge, beliefs, and behaviors, were identified as the scope and they were used to fully assess oral health and the college population. Knowledge questions were developed to measure the oral health facts and behavior practices among the population (McKenzie, 2005). Belief questions were developed to measure perceived oral health risks, threats, benefits, and barriers (Hochbaum, 1958). Behavior questions were developed in order to measure the unique oral health behaviors that affect today's college students (American College of Physicians [ACP], 2007). Due to the many different oral health risks associated with negative behaviors and lack of oral care, dental caries and periodontal disease, two major dental diseases (Ndiokwelu, 2004), were identified as the parameter at which questions were developed.

Since theories allow us to better understand individual and population based behavior (DeBarr, 2004), the health behavior theory, the Health Belief Model (HBM), was used as a basis for question development. Items of the OHKBB were developed to measure the core and focus areas through the constructs: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and cues to action, from the HBM.

Step 2: Collect a pool of test items.

After the collaborative efforts of step one, a pool of questions were created in order to examine and measure the college-aged population's oral health related knowledge, beliefs, and behaviors. Five questions were developed for each HBM construct in order to help increase the rate of reliability in future studies. Questions were also developed to address the college-aged populations' unique oral health behaviors and their knowledge of oral health behaviors and hygiene. Finally, nine questions were developed to test other scopes of oral health, including: nutrition, behavioral threats, etc. These items do not fit the realm of this project and will not be discussed throughout this study. All together, this pool represented the first draft of the OHKBB.

Step 3: Submit draft of test items to expert panel for review.

The main reason an expert panel was held was to identify any problems associated with the survey instrument OHKBB early on in the development and validation phases. Expert participation in the Expert Panel Review was vital for the success of the instrument.

A panel of experts (n=13) in the fields of health education, health behavior theory, survey development, and oral health, were identified for the review of OHKBB. These experts were identified within the College of Human Environmental Sciences and the Department of Health Science, the College of Community Health Sciences, and dental offices. Experts were asked to participate in the panel review for the development and validation of OHKBB. The Expert Panel Review was divided into two groups: 1.) a group of health professionals who were considered to be an expert in one or more of the areas of survey design and development, the Health Belief Model (HBM), theoretical application, oral health, and/or college student's health related knowledge, attitudes and behaviors, and 2.) a group of oral health professionals who were considered an expert in areas of oral health and/or the college-aged population's oral health related knowledge, beliefs, and behaviors. The first draft of OHKBB, an instruction sheet, as well as an evaluation sheet to critique the developed survey, was both electronically sent and hand delivered to each member of the Expert Panel Review. See Appendix D for the Expert Panel Review: Health Professionals Instruction Letter. See Appendix E for the Expert Panel Review: Oral Health Professionals Instruction Letter.

Experts from the Department of Health Science within the College of Human Environmental Sciences and the College of Community Health Sciences were identified as part of health group of expert panel members (n=5) because of their background and education in health behavior theory. Experts from local Tuscaloosa, Alabama dental offices as well as from the Appalachian area were identified as part of oral health group of expert panel members (n=8) because of their background and education in oral health, particularly, the college-aged populations oral health.

Members from both the health and oral health groups were asked to provide feedback regarding OHKBB directions, individual items, scales, and the overall instrument (including language level, readability, terms used, layout and design, and the use of the HBM constructs within the instrument, etc.). In addition, the health group of experts was asked to provide feedback regarding the theoretical application used in the developed instrument. Oral health experts received a review packet that did not ask for review on the theoretical application used throughout OHKBB. Each expert panel member was instructed to refer to the designated sections labeled “*Expert Panel*” for specific instruction. In this box there were three options: “*Keep*” the question as is; “*Revise*” the question; or “*Delete*” the question, and they were asked to select one of these options for each question. If they marked a question with “*Revise*” or “*Delete*”, they were asked to provide suggestions for strengthening that question. Each member of the panel was asked to take two weeks to review the instrument and once completed, either submit the completed review electronically or contact the primary investigator for pick-up. Additional time was given to panel members who needed more time for the review.

Step 4: Organize research draft of instrument.

Data from the Expert Panel Review were compiled in an excel file and results were discussed with the thesis committee. Appropriate changes were made to OHKBB. The primary investigator and her research chair reviewed and discussed all comments from the expert panel. Appropriate modifications were made to OHKBB directions, questions, and scales. Edits were also made to questions with HBM application per expert panel suggestions. A second draft of OHKBB was developed from the Expert Panel Review.

Step 5: Administer research draft of instrument to sample of student participants.

Request for approval of research involving human subjects was granted from The University of Alabama’s Institutional Review Board (IRB). The second draft of the instrument OHKBB was administered to two Participant Panel Review groups: 1.) Participant Panel Review

Discussion Validation Study and 2.) Participant Panel Review Discussion Validation Study. Data collected was kept confidential during and after this study.

Students from The College of Human Environmental Sciences enrolled in HHE 270, Personal Health (sections 001 & 004) were asked to participate in the participant panel review for the purpose of validating the instrument OHKBB. The reason for this was to help get an equal number of male and female students in different areas of academic study. Also, introductory classes offered in this college do not hold prerequisites for taking the lower level health classes. It is then possible to have many different majors as well as an even number of male/female students for this review.

Undergraduate students recruited for these studies fit the criteria of 18-24 years of age, as they were similar to those would take the OHKBB in an actual research study. The participants in these review groups were asked to spend 50 minutes of their scheduled class time for these studies. Data from these reviews were kept locked in a file cabinet in the principal investigators office in ensure safety of the data.

At the beginning of each participant panel review, students were informed of their rights as a participant and given the option to participate in the study. They were also provided with a copy of their rights as a participant. See Appendix F. The instructor of both sections of HHE 270 was the primary investigator for this research project. This factor also allowed for a convenient sample of students for these study purposes. Because of this, students were assured that their grade in HHE 270 would not be affected by participation in the Participant Panel Review.

Funding from the Graduate School and the Department of Health Science at The University of Alabama was awarded for the purpose of this study. A copy of the approved Grant can be found at Appendix G. Funds were used to purchase incentives for those who participated in the OHKBB research study. Red and white toothbrushes with *The University of Alabama* inscribed on the front were given out as incentives for participation in the Participant

Panel Reviews. Participation in these validation studies also added to the pool of research needed on college-aged population and oral health.

Students who were selected as participants in the Participant Panel Review Discussion Validation Study (n=27) were enrolled in HHE 270-001. This particular Participant Panel Review was used to increase face and content validity among the developed instrument. Upon agreeing to participate, students were given a copy of OHKBB and a participant panel questionnaire with matching identification letters on both. This was performed in order to keep track of the total number of surveys. Students were not asked to record this letter or associate any form of personal identification to this number. Also, they were not asked to give any form of personal information besides their age in years, racial, and ethnic background. See Appendix H for a copy of the Participant Panel Review Discussion Validation Study Review Sheet.

After participants finished the review questionnaire, a facilitated discussion was conducted by the primary investigator. Participants were asked to discuss the developed survey instrument together as a group. They were encouraged to provide feedback regarding OHKBB directions, questions, scales, and the overall instrument (including language level, readability, terms used, and layout and design).

Feedback from this review was used to refine and clarify questions in OHKBB, thus making it more specific for the target population. Students within this review were also encouraged to express their thoughts and concerns about the survey instrument, and changes were made according to the collaboration of comments among the participant panel. The main reason a discussion-based Participant Panel Review was held was to identify any problems associated with the survey instrument. This review helped increase validity among OHKBB. Participation from students at the university level was vital for the success of OHKBB.

Students enrolled in HHE 270-004, Personal Health, were recruited for the Participant Panel Review Timed Validation Study (n=34). Participants in this review were asked to participate for the purpose of time validation of OHKBB. Upon agreeing to participate in the

study, students were also given a survey with an identification number on it. This was done in order to keep track of the total number of surveys. Students were not asked to record this number or associate any form of personal identification to this number. Also, they were not asked to give any form of personal information besides their age in years, racial, and ethnic background.

One objective of this study was to identify the length of time, on average, it took students to complete the survey. It also was used to see which questions participants may skip or refuse to answer if they were taking this survey for a research study. This review helped increase validity among OHKBB by evaluating the response rate of questions answered and unanswered. This helped identify which questions student may have skipped or refused to answer. Students were instructed to take OHKBB and hand-in their completed OHKBB to the primary investigator immediately upon completion. They were asked to not spend time packing their bags or collecting their belongings. It was important for them to follow these instructions in order for an accurate time to be recorded on their survey instrument. Data from this study were used to determine the mean time spent among participants taking OHKBB as well as to find any questions that students skipped while completing the OHKBB. Results from individual questions were not analyzed for this studies purpose.

Step 6: Analyze test items from each respondent.

Results from the Participant Panel Review: Discussion Validation Study were compiled in a word document. All feedback was analyzed and reviewed collectively by the primary investigator and research chairman. Suggested changes for OHKBB questions that were recommended by multiple members of the Participant Panel Review were heavily considered for change among the question.

Results from the Participant Panel Review Timed: Validation Study were analyzed and reviewed by the primary investigator and committee chair. These results were used to increase validation and make modifications for the proposed and developed OHKBB. Frequencies in

questions left blank, or unanswered, were noted for necessary revisions. The mean, median, and mode time of survey completion was analyzed using SPSS Version 16 to verify normal distribution among the times.

Step 7: Apply statistical criteria for revisions of test items.

Results from the Participant Panel Review Discussion: Validation Study did not include statistical data. Results from the Participant Panel Review: Timed Validation Study were entered into SPSS Version 16. The mean, median, and mode time of survey completion were analyzed using a factor analysis test.

Step 8: Revision of instrument for the final version.

Qualitative results from the Participant Panel Review: Discussion Validation Study were analyzed and reviewed by the primary investigator and research chair. Suggested changes for instrument questions that were recommended by multiple review participants were heavily considered and appropriate changes were made throughout the instrument. Results from the Participant Panel Review: Timed Validation Study were also analyzed and reviewed by the primary investigator and research chairman. Questions that were frequently left blank, or unanswered, by participants were modified and changed to increase later turnover of completed surveys. The retention of the 61-item instrument into the final version of OHKBB was based on question analysis completed by the panel of experts and both panels of participants.

Outcomes and Dissemination

Outcomes from this study will be used for purposes of reliability test on the developed and validated instrument. Outcomes will also be used as pilot data to enhance future grant proposals and obtain subsequent funding to conduct oral health prevention interventions. Potential funding agencies include the American Dental Association and other private foundations and government agencies such as the National Institutes of Health.

Findings from this study will be disseminated by the researcher at professional conferences and through peer-reviewed journal publications. Potential conferences include:

National Oral Health Conference, and the American Academy of Health Behavior Annual Conference. Potential journals include the American Journal of Health Behavior and The Journal of Dental Hygiene.

Timeline

	Nov '08	Dec '08	Jan- Mar '09	April- May '09	June -Aug '09	Sept - Oct '09	Nov- Dec '09	Jan '10	Feb '10	Mar '10	April -Aug '10
Obtain IRB approval	X										
Propose Thesis		X									
Edits from Proposal		X	X								
Theory Change/Appropriate Edits					X	X	X				
Edits to Chapter 3							X	X	X		
Instrument Development					X	X					
Preparation for Expert Panel						X	X				
Expert Panel Review							X	X			
Edits from Expert Panel							X	X			
Preparation for Participant Panel								X	X		
Participant Panel Review: Discussion Validation Study								X			
Participant Panel Review: Timed Validation Study								X			
Edits from Participant Panels								X	X		
Organize and clean data								X	X		
Analyze data								X	X		
Write results and implications								X	X		
Defend Thesis										X	
Reliability Tests for Instrument											X
Submit for Publication											X

CHAPTER 4 RESULTS

Introduction

The purpose of this study was to develop a valid instrument that can examine the college-aged populations' oral health knowledge, beliefs, and behaviors. This chapter will describe the results of the instrument development process for *Assessing the Oral Health Knowledge, Beliefs, and Behaviors among College Students* (OHKBB). The following 8-step procedure, defined in chapter 3, are outlined based on the results occurring in each step: 1.) identify the scope and parameters of the instrument, 2.) collect a pool of test items, 3.) submit draft of test items to expert panel for review, 4.) organize research draft of instrument, 5.) administer research draft of instrument to sample of participants, 6.) analyze test items from each respondent, 7.) apply statistical criteria for revisions of test items, and finally, 8.) revision of instrument for the final version.

Instrument Development Procedures

Step 1: Identify the Scope and Parameters of the Instrument

The OHKBB was developed based on a thorough review of the literature, national standards set for oral health and hygiene (Academy of Dentistry International [Academy], 2008; American Dental Association [ADA], 2008), and the professional experiences of the researcher and her committee.

Theoretical Application of OHKBB

The HBM was developed to clarify why individuals did not participate in prevention practices. Proposed in 1950 by Godfrey Hochbaum, Irwin Rosenstock, and Stephen Kegels, HBM is used to motivate people towards better health decision making (McKenzie, Neiger, & Smeltzer, 2005; (Rimer & Glanz, 2005). The HBM was chosen for theoretical application within OHKBB because of its fit with addressing problem behaviors that suggest behavior change

(Rimer & Glanz, 2005). This theory was the best match for analyzing the unique oral health behaviors among college aged individuals and their beliefs towards dental diseases and healthy oral practices like brushing, flossing, and regular dental exams. A visual example of the HBM is presented in Appendix A.

Parameters of OHKBB

Research explains that oral health education emphasizes the importance of brushing and flossing the teeth, as well as visiting the dentist regularly (Broadbent, Thomson, & Poulton, 2006; Ndiokwelu, 2004). Some examples of oral health problems that can occur without proper oral hygiene and dental care (Broadbent et al., 2006; Ndiokwelu, 2004) are dental caries (cavities) and periodontal disease or gingivitis (gum disease) (Broadbent et al., 2006). Through healthy oral health behaviors, such as brushing and flossing the teeth, as well as routine dental visits, these dental diseases are preventable (Ndiokwelu, 2004). Because of this, the parameters of brushing, flossing, and routine dental visits among the college aged population were identified as the focus of OHKBB.

A review of the literature was completed to identify which oral threats were common among college students. Periodontal disease and dental caries were found to be two of the most preventable dental diseases through behaviors such as brushing and flossing the teeth (Honkala, 1984; Ndiokwelu, 2004; Sheiham & Watt, 2000; Wardle & Steptoe, 1991). Routine dental exams were also recommended to positively influence an individuals' oral health because these exams help treat and prevent oral diseases. Together, these two dental diseases account for nearly 31 million lost days each year from work, study, or activity (Millstein, Petersen, & Nightingale, 1993) due to the pain, discomfort, and functional problems that result (Pilot & Miyazaki, 1994). The college-aged population, especially, was shown to experience early warning signs for cavities and gum disease, (Millstein, 1993) and lack of awareness, education, and services regarding these oral health disparities can cause severe unfavorable outcomes later in life (U.S. Department of Health and Human Services [USDHHS], 2000). For these

reasons, gum disease and cavities were identified as the two dental diseases that were addressed through the parameter variables of OHKBB.

Scope of OHKBB

The areas of oral health knowledge, beliefs, and behaviors were identified as the scope of OHKBB because these particularly defined the parameters in more detail (Morrison, 2006). Knowledge was chosen as portion of OHKBB's scope due to the research showing that individuals have unfamiliarity with the behaviors set as the parameters in OHKBB: brushing the teeth, flossing the teeth, and routine dental exams (McKenzie, 2005). The value, belief, was chosen as a focus of the scope because of the research from HBM (Hochbaum, 1958). Finally, behavior was determined as a focus of the scope of the study due to the many unique oral health behaviors that affect today's college-aged individuals (American College of Physicians [ACP], 2007; see also DeBate, Plichta, Tedesco, & Kerschbaum, 2006; DeMoor, 2004; Little, 2002; Mayers et al., 2002; Snyder, 1989).

Step 2: Collect a Pool of Test Items

Questions relating to the oral health knowledge, beliefs, and behaviors of the college-aged population were developed for OHKBB. These sets of questions were earlier identified as OHKBB's scope and were developed to define the parameters of OHKBB in more detail.

OHKBB Belief

Belief questions for OHKBB were developed using HBM. Five constructs from HBM were used to guide question development for OHKBB in order to measure individuals' perceived susceptibility, severity, benefits, and barriers, and cues to action. This was based off of the idea that individuals are more compelled to make better health decisions if they think they are susceptible to an illness or health behavior outcome (Hochbaum, 1958).

Six questions for HBM constructs, perceived susceptibility, severity, and benefits, were developed to strengthen reliability among OHKBB. In addition, six questions for the construct perceived benefits were developed for each of the three oral health parameters of OHKBB.

This was conducted in order to measure each parameter of the study: brushing the teeth, flossing the teeth, and routine dental visits. The rationale behind this construct paired with each of the three oral health behavior parameters was because of the importance of OHKBB to measure college-students perceived benefits for each behavior since positive foreseen change increases success in behavior change. Additional questions relative to the parameter behaviors were not developed for the other HBM constructs because the primary investigator and research chairman felt it was necessary to keep OHKBB shorter in length and that it was not necessary to measure each parameter within each additional HBM construct (McKenzie et al., 2005).

The HBM constructs, cues to action, and perceived barriers, were also addressed in questions but were not considered target constructs during the development of OHKBB. As a result, these six questions were not developed for increased reliability, instead, five questions were developed to address the perceived barriers and one question was developed to understand the cues to action. The rationale behind this decision was based on the research by Honkala & Tala, (1987) and Wardle & Steptoe (1991), who explained the importance of examining which factors control the ability to practice healthier oral health behaviors since behavior change among individuals has been found to be difficult. Furthermore, if an individual feels threatened by their current behavior but can see legitimate results from a behavior change, success in that behavior change is increase (McKenzie, Neigers, & Smeltzer, 2005). Cues to action rather determine which factors promote healthier oral health behaviors and perceived barriers address the costs of action towards behavior change. Although these details are important for behavior change (Hochbaum, 1958), they were not the focus of OHKBB. See Table 1 for OHKBB Question Distribution for HBM Constructs.

Perceived benefits.

Perceived benefit questions were developed along the ideas: when do college-aged students partake in healthy oral hygiene behaviors and what benefits do they see from those

behaviors? See Table 2 for OHKBB specific questions developed to assess oral health beliefs: perceived benefits among the college aged population.

Perceived severity.

Questions to address perceived severity were developed to further understand college-aged individuals' perceptions towards the consequences of negative oral health. See Table 3 for OHKBB questions specifically developed to assess the oral health belief: perceived severity among the college aged population.

Table 1

Initial OHKBB Question Distribution for HBM Constructs

HBM Construct	Number of Questions Developed for OHKBB
Perceived Susceptibility	6
Perceived Severity	6
Perceived Benefits	18
Brushing the teeth	6
Flossing the teeth	6
Going to the Dentist	6
Perceived Barriers	5
Cues to Action	1
Total HBM:	36

Table 2

Initial OHKBB Perceived Benefit Question Distribution by Parameter

HBM Perceived Benefit Questions by Parameter	Number of Questions
<u>Brushing</u>	
1.) Brushing my teeth is important to me when I go to meet my girlfriend/boyfriend and/or friends.	
2.) Brushing my teeth is important to me when I go to school or social setting.	
3.) Brushing my teeth is important to me to prevent cavities.	
4.) Brushing my teeth is important to me because then my gums are healthy.	6
5.) Brushing my teeth is important to me because then my appearance is better.	
6.) Brushing my teeth is important to me because then my teeth are healthy.	
<u>Flossing</u>	
1.) Flossing my teeth is important to me because then my gums are healthy.	
2.) Flossing my teeth is important to me because then my teeth are healthy.	
3.) Flossing my teeth is important to me to prevent cavities.	6
4.) Flossing my teeth is important to me because then my appearance is better.	
5.) Flossing my teeth is important when I go to school or social setting.	
6.) Flossing my teeth is important to me because my teeth look cleaner.	
<u>Dentist</u>	
1.) Visiting the dentist regularly, at least once a year, is important to me because then my gums are healthy.	
2.) Visiting the dentist regularly, at least once a year, is important because then I can prevent cavities.	
3.) Visiting the dentist regularly is important to my overall health and wellbeing.	6
4.) Visiting the dentist is important to me because then my appearance is better.	
5.) Visiting the dentist regularly is important to me because then my teeth are healthy.	
6.) Visiting the dentist is important to prevent infections of the gum.	
Total Perceived Benefits:	18

Table 3

Initial OHKBB Perceived Severity Questions

HBM Perceived Severity Questions	Number of Questions
1.) I would be distressed if I got a cavity.	6
2.) If I could not prevent dental decay I would be distressed.	
3.) The thought of having dental problems scares me	
4.) If I were unable to keep my own teeth for my entire lifetime, I would be distressed.	
5.) It would be very costly if I had dental problems.	
6.) My work/school work would be affected if I had a dental disease.	
Total:	6

Perceived susceptibility.

To expand understandings on the beliefs the college-aged population has towards their chances of one day developing a dental disease, questions for OHKBB were developed. Specifically, they were to assess their perceived susceptibility. See Table 4 for specific questions developed for OHKBB that address the oral health belief: perceived susceptibility among the college aged population.

Table 4

Initial OHKBB Perceived Susceptibility Questions

HBM Perceived Susceptibility Questions	Number of Questions
1.) My chances of getting a dental disease are high.	6
2.) It is extremely likely that I will get a dental disease.	
3.) I am more likely than the average person to get a dental disease.	
4.) My family history makes it more likely that I will get a dental disease.	
5.) My gender (male/female) makes it more likely that I will get a dental disease.	
6.) My dental habits make it more likely that I will get a dental disease.	
Total:	6

Perceived barriers.

It was important that OHKBB assessed the college-aged populations' beliefs regarding possible barriers towards positive oral health. Specifically, questions developed for OHKBB assess this population's perceived barriers towards positive oral hygiene. See Table 5 for

specific questions developed for OHKBB that addressed the oral health belief: perceived barriers among the college aged population.

Table 5

Initial OHKBB Perceived Barriers Questions

HBM Perceived Barriers Questions	Number of Questions
1.) Do you have any form of insurance that pays for some or all of your dental care?	5
2.) If you have not seen the dentist in the last year, please choose the main reason why you have not visited them.	
3.) If you brush your teeth less than twice a day, please choose why.	
4.) If you do not floss your teeth daily, please choose why.	
5.) In the instance that you do not brush your teeth when you typically would, please choose the reason(s) why.	
Total:	5

Cues to action.

Questions to see what factors motivate the college-aged population to positive behavior change were developed for OHKBB. These questions measured the HBM construct Cues to Action. See Table 6 for specific questions developed for OHKBB that address the oral health belief: cues to action among the college aged population.

Table 6

Initial OHKBB Cues to Action Questions

HBM Cues to Action Questions	Number of Questions
1.) Indicate the reason for your LAST dental visit.	1
Total:	1

OHKBB Knowledge

Knowledge questions were developed based on the national standards set for oral health and hygiene (Academy, 2008; ADA, 2008) and the research showing that individuals are unfamiliar with these national guidelines and the behaviors brushing and flossing the teeth (parameters set for OHKBB) (McKenzie, 2005). The knowledge questions for OHKBB were also developed to measure the oral health facts and behavioral practices among college-aged

students. In all, (n=12) questions were developed for OHKBB. The following is an outline of the parameters and other topics assessed through the knowledge questions: 1.) three questions for brushing the teeth, 2.) two questions for flossing the teeth, 3.) two questions relating to routine dental exams, 4.) four questions regarding tobacco, 5.) one question for STDs. See Table 7 for OHKBB specific questions developed to assess oral health knowledge.

Table 7

Initial Knowledge Questions for OHKBB

Knowledge Questions by Parameters and Topic	Number of questions developed for OHKBB
<i>Brushing the Teeth</i>	
1.) People can reduce their risk of getting cavities by using fluoride toothpaste.	3
2.) People can reduce their risk of getting cavities by brushing their teeth.	
3.) People can reduce their risk of getting gum disease by brushing their teeth.	
<i>Flossing the Teeth</i>	
1.) People can reduce their risk of getting cavities by flossing their teeth.	2
2.) People can reduce their risk of getting gum disease by flossing their teeth.	
<i>Dental Visits</i>	
1.) People can reduce their risk of getting gum disease by going to the dentist.	2
2.) People can reduce their risk of getting cavities by going to the dentist.	
<i>Tobacco</i>	
1.) Tobacco products can contribute to the build-up of plaque and/or stains on the teeth.	4
2.) Tobacco products can contribute to bad breath, oral cancers, and/or diseases of the gums.	
3.) Tobacco products negatively affect your teeth.	
4.) Tobacco products negatively affect your gums.	
<i>STDs</i>	
1.) People can get a sexually transmitted disease (STD) in their mouth.	1
Total:	12

OHKBB Behaviors

In addition to the behaviors identified as the parameters of OHKBB (brushing, flossing, and going to the dentist), additional oral health behaviors were examined through a review of the literature. The oral health behaviors that were found unique to today's college aged

population were: tobacco products, purging, oral sexually transmitted diseases (STDs), oral piercings, and decorative dental encasements (ACP, 2007; see also DeBate, Plichta, Tedesco, & Kerschbaum, 2006; DeMoor, 2004; Little, 2002; Mayers et al., 2002; Snyder, 1989). Behavior questions were developed for these unique behaviors. The questions regarding purging behavior were eliminated in the early developmental stages due to the inability to identify the difference between purging and disordered eating and purging from continued illness/disease and the ethical issues that may evolve from using them in OHKBB. See Table 8 for specific questions developed to assess oral health behaviors within OHKBB.

Table 8

Initial Behavior Questions for OHKBB

Behavior Questions by Topic	Number of questions developed for OHKBB
<i>Oral Piercings</i>	
1.) Do you currently have any tongue piercings?	
2.) Do you currently have any lip piercings?	
3.) Do you currently have any cheek piercings?	
4.) Do you currently have piercings anywhere else not mentioned from the cheek to the jawbone?	5
5.) In the past, have you ever had any oral piercings like those mentioned in questions 15-18?	
<i>Oral Decorative Dental Encasements</i>	
1.) Do you currently wear oral decorative dental encasements, also known as grillz, grills, fronts, plates, golds, shines, and caps, which snap over your teeth as an oral accessory?	2
2.) In the past, have you ever worn an oral decorative dental encasement, as defined above in question 20?	
<i>Tobacco</i>	
1.) Do you smoke cigarettes?	
2.) Do you use any oral tobacco products (besides cigarettes), such as dip, snuff, chew, or chew-tobacco?	2
<i>Brushing the Teeth</i>	
1.) I brush my teeth...	1
<i>Flossing the Teeth</i>	
1.) I floss my teeth...	1
<i>Routine Dental Visits</i>	
1.) How often do you visit the dentist?	1
<i>Total:</i>	12

Demographics Section

A section to assess the college-aged population's basic demographics was developed for the OHKBB. Questions that asked the participants current class status, current age in years, gender, academic major, and racial background were developed for OHKBB's Demographic Section (National Health and Nutrition Examination Survey [NHANES], 2006).

Survey Scales

The instrument OHKBB incorporated the use of many different types of scales to measure the users' responses. Scale varieties included a five-point Likert-scale, dichotomous answer selections, categorical, and multiple choice scales.

Likert-scale.

A five-point Likert-scale was used to measure the responder's feelings or beliefs towards the question asked. The following explains the measures across the five-point Likert-scale: *Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree*. This scale was particularly used for the questions measuring the HBM Constructs perceived susceptibility, severity, and benefits. Having a five-point Likert-scale of this kind was seen as a suitable scale for these specific questions because it allowed the responder to rate how closely their beliefs match the particular question asked (Klassen, 2010; Waddington, 2000).

Categorical scale.

A categorical scale was developed to measure the behaviors of flossing and brushing the teeth. The scale had six specific categories for answer selection purposes. These categories were as follows: 1.) Less often or never, 2.) Twice per month, 3.) Once a week, 4.) 2-3 times per week, 5.) Once a day, and 6.) Two or more times a day. Each respondents answer fell in one of these six categories (Waddington, 2000).

Dichotomous scale.

Other OHKBB questions were measured along a dichotomous scale of either: 1.) *Yes or No*, or 2.) *True or False* (Klassen, 2010; Waddington, 2000). The variable choice, *I Do Not*

Know, was added to help increase reliability among participants' responses (Waddington, 2000). If a responder perceives the question as unclear, they may become frustrated and choose not to respond to the question. They may also feel that the question cannot be answered with a simple, *Yes* or *No*, *True* or *False*, answer, but they believe that the question could be answered with the choice, *I Do Not Know*. Adding, *I Do Not Know*, to the answer selection increased the likelihood of the responder answering the question (Waddington, 2000). Particular questions that were measured among the *Yes*, *No*, or *I Do Not Know* scale included the piercing, oral decorative encasement, and tobacco behavior questions, as well as one perceived barrier question. Questions that were measured along the *True*, *False*, or *I Do Not Know*, scale included the knowledge question. These scales were seen as the best scale for these question sets because they measure a clear, yes or no, true or false, response to the question. Even with the added, *I do not know*, the primary investigator is able to see if ambiguity lies among this question set.

Multiple choice scales.

Multiple choice scales were developed for the remaining questions, dental behavior, cues to action, dental insurance coverage, and barriers towards brushing, flossing, and routine dental exams. Multiple choice scales were developed specifically for each question (Klassen, 2010; Waddington, 2000). Three questions, the behavior of routine dental visits, barriers to routine dental visits, and cues to action, were developed for OHKBB to measure the main reason for the question asked. Responders were asked to answer the question by choosing *one* reason from the multiple choice list. The developers felt that it was important to see the frequency in responses from these items. The other three questions, barriers to brushing and flossing the teeth, and dental insurance, were developed for the responder to choose *all* choices from the multiple choice list that they felt answered the question. This rationale behind this decision was that it is important to assess all the perceived barriers towards these behaviors and resources.

The answer choice, *other*, was added to each multiple choice answer selection in order to increase reliability among participants' responses. If a responder feels the question is unclear, or the answer choices do not apply to them, they may become frustrated and inclined to not respond to the question or finish OHKBB. The answer selection, *other*, was added to each question in order to increase the likelihood of the responder answering the question (Waddington, 2000). Table 9 below depicts the answer selections among the six questions remaining questions within OHKBB.

Table 9

Initial Multiple Choice Questions and Answer Selections by Scope Variable

Multiple Choice Question by Topic	Answer Selections		Answers per Response
<i>Behavior</i> Routine Dental Visits: 1.) How often do you visit the dentist?	a.) Every 6 months (2 times a year) b.) Once a year (Every 12 months)	c.) Every 1-5 years d.) Never e.) Other	Choose only one reason
<i>Beliefs: Perceived Barriers</i> Routine Dental Visits: 1.) If you have not seen the dentist in the last year, please choose the main reason why you have not visited them.	a.) Fear, apprehension, nervousness b.) My dental insurance has poor coverage c.) I do not have dental insurance d.) I do not have a dentist e.) Causes pain or discomfort	f.) My dentist is not in the same town that I live in right now g.) Cost h.) No reason to see a dentist i.) Never thought about going to the dentist j.) I have seen the dentist in the last year k.) Other	Choose only one reason
Brushing the Teeth: 1.) If you brush your teeth less than twice a day, please choose why.	a.) I forget b.) I do not know how c.) Causes pain/discomfort d.) I do not see a reason to brush 2 times a day e.) Time f.) It causes bleeding	g.) Cost of products h.) Laziness i.) I do not like to brush my teeth j.) I do brush my teeth two or more times a day k.) Other	Choose all that apply

Table 4.9 Continued

Multiple Choice Question by Topic	Answer Selections		Answers per Response
Flossing the Teeth: 1.) If you do not floss your teeth daily, please choose why.	a.) I forget b.) I do not know how c.) Causes pain/discomfort d.) I do not see a reason to floss everyday e.) Time	f.) It causes bleeding g.) Cost of products h.) Laziness i.) I do not like to floss my teeth j.) I do floss my teeth daily k.) Other	Choose all that apply
Dental Insurance: 1.) If you have dental insurance but do not use it, please choose why.	a.) Fear, apprehension, nervousness of the dentist b.) I forget that I have dental insurance c.) My dentist is not in the same town that I live in right now d.) Cost: My co-pay or deductible is still too high	e.) I do not see a reason to go to the dentist f.) Never thought about going to the dentist g.) I have dental insurance & always use it h.) I do not have a dentist i.) I do not have dental insurance j.) Other	Choose all that apply
<i>Beliefs: Cues to Action</i> 1.) Indicate the reason for your last dental visit.	a.) Check-up, dental cleaning, and/or exam b.) Treatment was needed (cavity filled, work done) c.) Experiencing pain or discomfort in the mouth	d.) My dental office called me in for a check-up, dental cleaning, and/or exam e.) I do not go to the dentist f.) Other	Choose only one reason

Step 3: Submit Draft of Test Items to Expert Panel for Review

An Expert Panel Review was designed to establish content validity for OHKBB. This panel of experts was comprised of thirteen recognized leaders in the areas of survey design and development, the HBM theoretical application, oral health, and or college student's health related knowledge, beliefs, and behaviors. The expert review was divided into two groups: 1.) a group of health individuals who were considered an expert in one or more of the areas of survey design and development, the HBM, theoretical application, oral health, and/or college student's health related knowledge, attitudes and behaviors, and 2.) a group of oral health professionals,

who were experts in areas of oral health and/or college student's health related knowledge, beliefs, and behaviors. Expert Panel Review packets were both emailed and hand delivered to each individual of the panel review. Each member of the panel was asked to take two weeks to review the instrument.

The health group (n=5) and the oral health group (n=8) of panel experts provided feedback regarding OHKBB's directions, individual questions, scales, and the overall instrument (including language level, readability, terms used, layout and design, and the use of the HBM constructs within the instrument, etc.). In addition, the health groups of experts provided feedback regarding the theoretical application used in OHKBB. Oral health experts were not asked to review the theoretical application used throughout OHKBB.

Experts were given three options for feedback for each question: "*Keep*" the question as is; "*Revise*" the question; or "*Delete*" the question, and they were asked to select one of these options for each question. If they marked a question with "Revise" or "Delete", they then provided suggestions for strengthening that question. Expert Panel Review packets were collected back and each expert panel member's review instrument was delegated a number for identification purposes. Feedback from was compiled into an Excel document. See Appendices D and E for the health and oral health professional's Expert Panel Review Instruction Letters for more information.

Step 4: Organize Research Draft of Instrument

Results from the Expert Panel Review were reviewed by the primary investigator and her research chair. Modifications were made to OHKBB directions, individual questions, scales, and the use of the HBM constructs within the instrument per expert panel suggestions. Specifically, requests were made by the panel members to make a slight edit to the OHKBB scales: "I Do Not Know" was changed to "Not Sure" on two different measures. Special attention was made to suggestions that were made by multiple members of the Expert Panel Review.

Many questions throughout OHKBB were considered double-barreled, thus asking more than one question. Questions of this sort can weaken results because they are seen as confusing to a responder due to the inability to know how to answer the questions as a whole. Revisions were made to these particular questions throughout the entire OHKBB. These questions were either deleted or revised into additional questions, each addressing one question rather than two or more questions.

Edits were made to the demographics section and it was moved to the end of the survey after a suggestion was made by a panel member that it may increase the compliance of OHKBB. Feedback was also given regarding the demographics section: racial background question. It was stated that there may be a need for an ethnic question and to revise the question similar to how studies by National Health and Nutrition Examination Survey (NHANES) ask their racial and ethnic questions. It was also suggested to have the participants choose as many categories for race and ethnicity that they felt described them. Only allowing them to choose one choice limited their ability to describe their identity. Suggestions were considered and a decision was made to add an ethnic question and to ask participants to select all categories that described their race and ethnicity. Questions were revised to uphold the standards of NHANES and the CDC (Centers for Disease Control and Prevention [CDC], National Center for Health Statistics [NCHS], and National Health and Nutrition Examination Survey [NHANES], 2010). See Table 10 for a breakdown of Expert Panel Comments and revisions made on the original demographics racial question.

It was suggested by many panel members to shorten the length of the survey. The OHKBB expert panel survey consisted of 69 questions (60 for thesis purposes and 9 for non-thesis study). Efforts were made to reduce this number throughout the edits. After all revisions were made from the Expert Panel Review, 61 questions were contained in the second draft (52 for thesis purposes and 9 for non-thesis). Rationales behind why questions were eliminated after the Expert Panel Review will be explained throughout this section.

Table 10

Demographics Racial/Ethnic Question Comments and Revisions

Original Question: Demographics Racial Background Question	Expert Panel Review Comments	Revisions Per Expert Panel Review Feedback
1.) Please indicate your Racial Background (Check only ONE): <ul style="list-style-type: none"> - Native American Indian/Alaska Native - African-American - Asian - Caucasian - Hispanic or Latino/a - Native Hawaiian or other Pacific Islander - Other (if other, please indicate)_____ 	<ul style="list-style-type: none"> - Include Ethnic for the Racial Background section - Change to racial/ethnic and revise directions to: Check the one that you believe best describes you? - Why only one Racial Background? - See how other researchers (in major studies like NHANES) ask their race/ethnicity question 	1.) How would you describe <i>your</i> race (Check ALL that apply): <ul style="list-style-type: none"> - Native American Indian/Alaska Native - African-American - Asian - Caucasian - Native Hawaiian or other Pacific Islander - Other (if other, please indicate)_____ 1.) How would you describe your ethnicity (Check ALL that apply): <ul style="list-style-type: none"> - Hispanic or Latino/a - Non-Hispanic - Other (if other, please indicate)_____

Edits for the set of knowledge questions were completed after the panel review. These questions measured the brushing, flossing, routine dental exams, tobacco, and STD knowledge of the college-aged population. Overall, knowledge questions were changed from plural to singular in sentence structure and STDs were changed to STIs per request of expert panel members. The items measuring brushing (n=3) and flossing (n=2) were not consistent in number of questions asked to evaluate this measure. One item was deleted from the brushing measure in effort to make items consistent. Finally, it was requested by many members of the oral health expert panel group to add the phrase, “In addition to brushing and flossing the teeth...” in front of the knowledge questions regarding dental visits. This was requested because dentists can diagnose and treat, but it is up to the patients’ diet and hygiene efforts, brushing and flossing, to reduce their risk of oral diseases. See Table 11 for revisions made to OHKBB knowledge questions after the Expert Panel Review.

Table 11

Edits for Knowledge Questions for OHKBB after Expert Panel Review

Knowledge Questions by Parameters and Topic Developed for Expert Panel Review	Number of questions developed	Edits made to Knowledge Questions after Expert Panel Review	Number of questions developed
<p><i>Brushing the Teeth</i></p> <p>1.) People can reduce their risk of getting cavities by using fluoride toothpaste.</p> <p>2.) People can reduce their risk of getting cavities by brushing their teeth.</p> <p>3.) People can reduce their risk of getting gum disease by brushing their teeth.</p>	3	<p><i>Brushing the Teeth</i></p> <p>1.) A person can reduce his/her risk of getting cavities by brushing their teeth with fluoride toothpaste</p> <p>2.) A person can reduce his/her risk of getting gum disease by brushing their teeth with fluoride toothpaste</p>	2
<p><i>Flossing the Teeth</i></p> <p>1.) People can reduce their risk of getting cavities by flossing their teeth.</p> <p>2.) People can reduce their risk of getting gum disease by flossing their teeth.</p>	2	<p><i>Flossing the Teeth</i></p> <p>1.) A person can reduce his/her risk of getting cavities by flossing their teeth.</p> <p>2.) A person can reduce his/her risk of getting gum disease by flossing their teeth.</p>	2
<p><i>Dental Visits</i></p> <p>1.) People can reduce their risk of getting gum disease by going to the dentist.</p> <p>2.) People can reduce their risk of getting cavities by going to the dentist.</p>	2	<p><i>Dental Visits</i></p> <p>1.) In addition to brushing and flossing the teeth, a person can reduce his/her risk of getting cavities by going to the dentist a minimum of one time a year.</p> <p>2.) In addition to brushing and flossing the teeth, a person can reduce his/her risk of getting gum disease by going to the dentist a minimum of one time a year.</p>	2
<p><i>Tobacco</i></p> <p>1.) Tobacco products can contribute to the build-up of plaque and/or stains on the teeth.</p>		<p><i>Tobacco</i></p> <p>1.) Tobacco products (cigarettes, dip, snuff, che etc.) can contribute to the build-up of plaque in the mouth.</p>	

Table: 11 Continued

Knowledge Questions by Parameters and Topic Developed for Expert Panel Review	Number of questions developed	Edits made to Knowledge Questions after Expert Panel Review	Number of questions developed
<i>Tobacco (Continued)</i> 2.) Tobacco products can contribute to bad breath, oral cancers, and/or diseases of the gums. 2.) Tobacco products negatively affect your teeth. 3.) Tobacco products negatively affect your gums.	4	<i>Tobacco (Continued)</i> 2.) Tobacco products (cigarettes, dip, snuff, chew, etc.) can contribute to stains on the teeth. 3.) Tobacco products (cigarettes, dip, snuff, chew, etc.) can contribute bad breath. 4.) Tobacco products (cigarettes, dip, snuff, chew, etc.) can contribute to oral cancer.	4
<i>STDs</i> 1.) People can get a sexually transmitted disease (STD) in their mouth.	1	<i>STIs</i> 1.) A person can get a sexually transmitted infection (STI)(genital warts, gonorrhea, chlamydia, etc.) in his/her mouth.	1
Total:	12	Total:	11

Edits were made among the behavior question sets oral piercing, oral decorative dental encasements, and tobacco use. Comments were made by the oral health expert panel members regarding the oral piercing questions. They mentioned that the questions about piercings were misleading because once a piercing is made the effects will always remain. Suggestions towards rewording the question set to be time related, such as: “Do you currently have any tongue piercings where you wear any foreign object in the piercing?” The phrase “foreign object” was suggested to refer to the “jewelry” worn in the piercing because different piercings sites require their own type of piercing jewelry. The term, “foreign object” served as a general phrase for the particular piercing jewelry.

Questions referring to the responders past behaviors (n=2) were removed after the Expert Panel Review. The purpose of OHKBB was to accurately assess the college-aged

populations' current oral health behaviors. These questions were removed because they did not fit the scope of the OHKBB because they assessed past behaviors.

Tobacco questions were reworded after the Expert Panel Review. Helpful suggestions were made among the health group of panel members regarding the more accurate way to assess current tobacco behaviors. There are many different types of smokers, such as, casual, social, or more regular/habitual smokers, and substantial differences exist between them (Nichter, Vuckovic, Quintero, and Ritenbaugh, 1997). Suggestions were made concerning the benefit of developing tobacco type questions similar to those used by NHANES. Two questions were developed to assess the responder's use of both smoke and oral smokeless tobacco products in the last seven days, per NHANES recommendations (CDC et al., 2010). See Table 12 for revisions made to the behavior questions after the OHKBB Expert Panel Review.

The Expert Panel Review identified a consistent problem throughout the questions developed along the HBM constructs: perceived benefits, susceptibility, and severity. These questions better fit the constructs of the Theory of Planned Behavior (TPB), for they seemed to measure beliefs as a value rather than beliefs as an attitude for HBM. Edits were made to make these questions better fit the HBM constructs. Perceived severity questions were altered to measure the severity of developing a "dental disease" rather than either a cavity or gum disease. This decision was made because of the research behind the dangers of both diseases, and because of this, the primary investigator did not feel it was important to assess the dangers of one over the other. Also, six questions, one from each construct and one from each parameter of perceived benefits, were deleted to strengthen OHKBB as a shorter instrument. Questions for the HBM constructs, perceived barriers and cues to action were modified per overall suggestions of the Expert Panel Review to strengthen their sentence structure and readability.

Table 12

Edits for Behavior Questions after OHKBB Expert Panel Review

Behavior Questions by Topic for Expert Panel Review	Number of questions developed for OHKBB	Edits made to Behavior Questions by Topic after Expert Panel Review	Number of questions developed for OHKBB
<p><i>Oral Piercings</i></p> <p>1.) Do you currently have any tongue piercings?</p> <p>2.) Do you currently have any lip piercings?</p> <p>3.) Do you currently have any cheek piercings?</p> <p>4.) Do you currently have piercings anywhere else not mentioned from the cheek to the jawbone?</p> <p>5.) In the past, have you ever had any oral piercings like those mentioned in questions 15-18?</p>	5	<p><i>Oral Piercings</i></p> <p>1.) Do you currently have any tongue piercings where you wear any foreign object in the piercing?</p> <p>2.) Do you currently have any lip piercings Where you wear any foreign object in the piercing?</p> <p>3.) Do you currently have any cheek piercings where you wear any foreign object in the piercing?</p> <p>4.) Do you currently have piercings anywhere else between the cheek to the jawbone that was not mentioned in questions 15-17?</p>	4
<p><i>Oral Decorative Dental Encasements</i></p> <p>1.) Do you currently wear oral decorative dental encasements, also known as grillz, grills, fronts, plates, golds, shines, and caps, which snap over your teeth as an oral accessory?</p> <p>2.) In the past, have you ever worn an oral decorative dental encasement, as defined above in question 20?</p>	2	<p><i>Oral Decorative Dental Encasements</i></p> <p>1.) Do you currently wear an oral decorative dental encasements, also known as grillz, grills, fronts, plates, golds, shines, and caps, which snap over your teeth as an oral accessory?</p>	1
<p><i>Tobacco</i></p> <p>1.) Do you smoke cigarettes?</p> <p>2.) Do you use any oral tobacco products (besides cigarettes), such as dip, snuff, chew, or chew-tobacco?</p>		<p><i>Tobacco</i></p> <p>1.) During the past 7 days, did you use any smoke producing product that contains nicotine (cigarettes, pipes, cigars, Hookah, or any other smoke producing product that contains nicotine)?</p>	

Table 12 Continued

Behavior Questions by Topic for Expert Panel Review	Number of questions developed for OHKBB	Edits made to Behavior Questions by Topic after Expert Panel Review	Number of questions developed for OHKBB
<i>Tobacco (Continued)</i>		<i>Tobacco (Continued)</i>	
	2	2.) During the past 7 days, did you use any oral/smokeless product that contains nicotine (dip, snuff, chew, chew-tobacco, or any other oral/smokeless product that contains nicotine)?	2
<i>Brushing the Teeth</i>		<i>Brushing the Teeth</i>	
1.) I brush my teeth...	1	1.) I brush my teeth...	1
<i>Flossing the Teeth</i>		<i>Flossing the Teeth</i>	
1.) I floss my teeth...	1	1.) I floss my teeth...	1
<i>Routine Dental Visits</i>		<i>Routine Dental Visits</i>	
1.) How often do you visit the dentist?	1	1.) How often do you visit the dentist?	1
Total:	12	Total:	10

Step 5: Administer Research Draft of Instrument to Sample of Student Participants

A second draft of OHKBB was developed from the suggestions made by the Expert Panel Review members. The draft contained modified forms of 52 of the 60 original thesis study questions. This draft was administered to two Participant Panel Reviews: 1.) Discussion Validation Study and 2.) Timed Validation Study. The Discussion Validation Study consisted of a group of sample participants who were asked to review the contents of OHKBB. Participants each completed a review questionnaire and then were asked to participate in a facilitated discussion and were encouraged to express their thoughts and concerns about OHKBB. Changes were made according to the collaboration of comments among the participant panel. Feedback from this review was used to refine and clarify questions in the survey, thus making it more specific for the target population. The main reason a discussion-based participant panel review was held was to identify any problems associated with the survey instrument. This review helped increase validity among the developed instrument.

One objective of the Participant Panel Review: Timed Validation Study was to identify the average length of time it took participants to complete the survey. It also was used to see which questions participants may skip or refuse to answer if they were taking this survey for a research study. This review helped increase validity among the developed instrument. Results from individual questions were not analyzed for this studies purpose.

Step 6: Analyze Test Items from Each Respondent

Results from the Participant Panel Review Discussion Validation Study were compiled into a word document. Suggestions for survey items that were made by multiple panel members were highly considered for revision. The results from this study were discussed among the primary investigator and her research chair. Changes were made to OHKBB per suggestions on grammar, sentence structure, and clarity changes for questions, by panel review members.

Results from the Participant Panel Review Timed Validation Study showed that many students did not fully complete OHKBB. Some students did not completely respond to all survey questions, some did not complete the entire demographics section, and some did not entirely complete both the responses to all survey questions and responses to all demographics section. Since this was the timed validation study, participants were not asked to discuss the questions on OHKBB. The primary researcher and research chairman analyzed the questions that were consistently left blank by participants and modifications were made accordingly. Changes for these questions are explained in Step 8.

Step 7: Apply Statistical Criteria for Revisions of Test Items

Data from the Participant Panel Review Timed Validation Study were analyzed through SPSS Version 16. The mean, median, and mode time of survey completion were analyzed. The study consisted of n= 34 college-aged participants. All participants followed directions for the study. See Appendix F for a copy of the rights and information sheet given to participants in the timed validation study.

During the mean time of survey completion, seven minutes after the start of the study, many participants finished OHKBB and did as instructed: they turned in OHKBB before collecting their belongings. When this occurred, a high volume of participants were finishing OHKBB and a lot of traffic and congestion occurred where students were to turn in their surveys. Some students would turn in their surveys then continue to stand there and asked questions. This caused a line to form in front of where other students were to turn in their completed survey, and this caused a lot of confusion and waiting among participants. This may have also caused a lag or failure to report more accurate times for survey completion because of the wait. Overall, best efforts were done to collect OHKBB from all participants and record accurate time for data.

The statistical findings for this data set were as follows: In the continuous variable frequency test, there was a total sample size was 34 participants ($n=34$) with zero values missing. The mean time for OHKBB completion of 7.882 minutes and the mode and median times were 8.0 minutes. The standard deviation was 1.472. Within one standard deviation, 66%, the range of this data falls between 6.41-9.354 minutes. Within two standard deviations, 95% of the data fall between 4.938-10.826 minutes. The skewness (-.209) and kurtosis (-.165) both fall within normal range, so normal distribution of time can be assumed. This concludes that the data seems to be normal in tendency. See Table 13 for frequency statistics and Table 14 for Time Frequency Statistics.

Normal tendency is also explained through the histogram below (Figure 1). Figure 2 shows that the data fits well under the curve with only a slight drop and skew to the right. Still, we will assume normal distribution of data.

Table 13

Frequency Statistics

Time Valid N	34.0
Missing Data	.000
Mean	7.882
Standard Error of Mean	.252
Median	8.000
Mode	8.000
Standard Deviation	1.472
Variance	2.168
Skewness	-.209
Standard Error of Skewness	.403
Kurtosis	-.165
Standard Error of Kurtosis	.788
Range	6.000
Minimum	5.000
Maximum	11.000
Sum	268.000

Table 14

Time Frequency Statistics

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 5	3	8.8	8.8	8.8
6	2	5.9	5.9	14.7
7	8	23.5	23.5	38.2
8	9	26.5	26.5	64.7
9	8	23.5	23.5	88.2
10	3	8.8	8.8	97.1
11	1	2.9	2.9	100.0
Total	34	100.0	100.0	

Figure 1

Normality Graph of Time

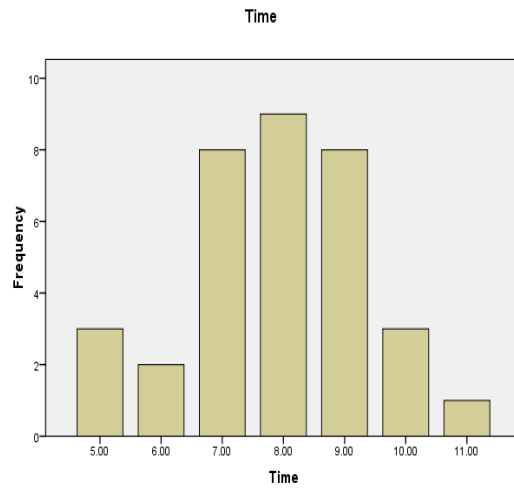
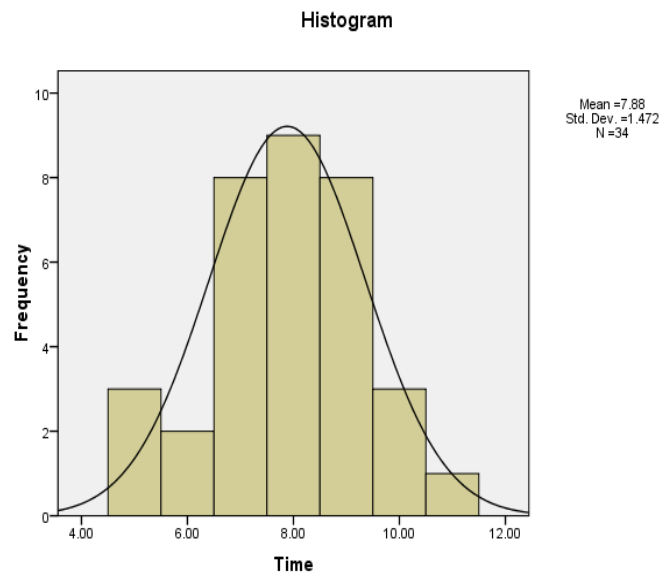


Figure 2

Normal Tendency Graph of Time



During the Participant Panel Review Discussion Validation Study, students were asked about the question length of OHKBB. Comments from the discussion are listed below in Table 15 below. This qualitative data as well as the quantitative data from the Participant Panel Review Timed Validation Study indicates that OHKBB is a fairly quick survey to complete by college-aged participants.

Table 15

Comments from Participant Panel Review: Discussion Validation Study regarding OHKBB length

Participant Panel Review: Discussion Validation Study Comments Regarding Length of OHKBB	
<i>Question</i>	
How do you feel about the length of this survey? Is it too long?	
<i>Student Participant Responses</i>	
-	This survey was long enough to be thorough but not repetitive.
-	Ok because questions were not repetitive.
-	This was a good series of survey questions.
-	Very fair.
-	Looks great!
-	It was a fine survey.

Step 8: Revision of Instrument for the Final Version

Results from both Participant Panel Reviews were used to revise OHKBB into its final form. The primary investigator and her research chairman analyzed all results and comments and made changes for OHKBB accordingly. Suggestions made by multiple participants were highly considered for change.

Particularly, knowledge questions were changed from singular back to plural in tense. Participants in this panel were asked about the clarity and comprehension of the piercing behavior questions. Census from this discussion explained that the wording of these questions seemed awkward and did not make sense to the participants. Members of this panel recommended changing the word “foreign object” (recommended by the oral health Expert

Panel Review group), to jewelry. See Table 16 for the evolution of questions for the behavior, oral piercings.

Table 16

Edits for Behavior Questions: Oral Piercings

Original Behavior: Oral Piercings	Edits to Behavior: Oral Piercings after Expert Panel Review	Edits to Behavior: Oral Piercings after Participant Panel Review: Discussion Study
<p style="text-align: center;"><i>Oral Piercings</i></p> <p>1.) Do you currently have any tongue piercings? 2.) Do you currently have any lip piercings? 3.) Do you currently have any cheek piercings? 4.) Do you currently have piercings anywhere else not mentioned from the cheek to the jawbone? 5.) In the past, have you ever had any oral piercings like those mentioned in questions 15-18?</p>	<p style="text-align: center;"><i>Oral Piercings</i></p> <p>1.) Do you currently have any tongue piercings where you wear any foreign object in the piercing? 2.) Do you currently have any lip piercings where you wear any foreign object in the piercing? 3.) Do you currently have any cheek piercings where you wear any foreign object in the piercing? 4.) Do you currently have piercings anywhere else between the cheek to the jawbone that was not mentioned in questions 15-17?</p>	<p style="text-align: center;"><i>Oral Piercings</i></p> <p>1.) Do you currently have any tongue piercings in which you wear jewelry? 2.) Do you currently have any lip piercings in which you wear jewelry? 3.) Do you currently have any cheek piercings in which you wear jewelry? 4.) Do you currently have piercings anywhere else between the cheek and the chin bone that was not mentioned in questions 15-17?</p>

Mentioned above in Step 6, many participants did not fully complete OHKBB. The following Table (17) displays the items on OHKBB that were left incomplete by the Participant Panel Review Time Validation Study and the frequency of participants who left them incomplete.

Table 17

Frequency of Incomplete OHKBB Questions

OHKBB Question	Frequency of Incomplete Responses
If you have not seen a dentist in the last year, please choose the main reason why you have not visited.	9
If you brush your teeth less than twice a day, please choose why.	7
If you do not floss your teeth daily, please choose why.	4
If you have dental insurance but have not seen the dentist in the last year, please choose why.	2
How would you describe your ethnicity	8

The primary investigator and research chair made the decision to make changes to make these questions more clear and concise. Changes were made because they felt that after the participant reads these questions the way it was originally written, the participant may immediately decide if it is relevant to them. If they believe that this question is relevant to them, participants answered the question and then moved on to the next in series. If the participant did not believe this question was relevant to them, in more cases than none, they skipped ahead to the next question without reading the answer choices. If the answer choices were read, regardless if they felt the question was targeted towards them or not, the participant may have seen that each question did indeed have an answer choice that was relevant to their behavior. New versions of these questions were transposed into either a two or three sequence question. Specific instructions were placed with each question to insure participants were aware of what was asked. In addition more research was completed on the racial and ethnic questions and modifications were made according to the most recent efforts used in the latest U.S. Census Bureau's American Communities Survey (U.S. Census Bureau, 2009). The new direction for each question is outlined below in Table 18.

Table 18

Modifications to OHKBB after Participant Panel Review: Timed Validation Study

Original Question from Participant Panel Review OHKBB	Modifications Per Participant Panel Review
<p>1.) If you have not seen the dentist in the last year, please choose the main reason why you have not visited them.</p> <p>a.) Fear, apprehension, nervousness</p> <p>b.) My dental insurance has poor coverage</p> <p>c.) I do not have dental insurance</p> <p>d.) I do not have a dentist</p> <p>e.) Causes pain or discomfort</p> <p>f.) My dentist is not in the same town that I live in right now</p> <p>g.) Cost</p> <p>h.) No reason to see a dentist</p> <p>i.) Never thought about going to the dentist</p> <p>j.) I have seen the dentist in the last year</p> <p>k.) Other</p>	<p>1.) Have you seen the dentist in the last year?</p> <p>- Yes</p> <p>- No</p> <p>- Not Sure</p> <p>2.) If you chose "Yes" for the question above, please skip to the next question. If you chose "No" for the question above, please choose the main reason why you have not visited the dentist in the last year. (Select only ONE)</p> <p>a.) Fear</p> <p>b.) My dentist is not in the same town that I live in right now</p> <p>c.) Nervousness</p> <p>d.) I do not have a dentist</p> <p>e.) Causes pain/discomfort</p> <p>f.) No reason to see a dentist</p> <p>g.) Expensive/costs lots of money</p> <p>h.) Never thought about going to the dentist</p> <p>i.) I do not have dental insurance</p> <p>j.) I have seen the dentist in the last year</p> <p>k.) My dental insurance has poor coverage</p> <p>l.) Other</p>
<p>1.) If you brush your teeth less than twice a day, please choose why.</p> <p>a.) I forget</p> <p>b.) I do not know how</p> <p>c.) Causes pain/discomfort</p> <p>d.) I do not see a reason to brush 2 times a day</p> <p>e.) Time</p> <p>f.) It causes bleeding</p> <p>g.) Cost of products</p> <p>h.) Laziness</p> <p>i.) I do not like to brush my teeth</p> <p>j.) I do brush my teeth two or more times a day</p> <p>k.) Other</p>	<p>1.) On most days, do you brush your teeth at least twice a day?</p> <p>- Yes</p> <p>- No</p> <p>- Not Sure</p> <p>2.) If you chose "Yes" for the question above, please skip to the next question. If you chose "No" for the question above, please choose WHY you brush your teeth less than twice a day. (Select ALL that apply)</p> <p>a.) I forget</p> <p>b.) Cost of product(s)</p> <p>c.) Time</p> <p>d.) I do not see a reason to brush my teeth twice a day</p> <p>e.) Laziness</p> <p>f.) I do not like to brush my teeth</p> <p>g.) Inconvenient</p>

Table 18 Continued

Original Question from Participant Panel Review OHKBB	Modifications Per Participant Panel Review
	<ul style="list-style-type: none"> h.) I do not know how to brush my teeth i.) Causes pain/discomfort j.) I do brush my teeth two or more times a day k.) It requires planning l.) Other
<p>1.) If you do not floss your teeth daily, please choose why.</p> <ul style="list-style-type: none"> a.) I forget b.) I do not know how c.) Causes pain/discomfort d.) I do not see a reason to floss everyday e.) Time f.) It causes bleeding g.) Cost of products h.) Laziness i.) I do not like to floss my teeth j.) I do floss my teeth daily k.) Other 	<p>1.) On most days, do you floss your teeth daily?</p> <ul style="list-style-type: none"> - Yes - No - Not Sure <p>2.) If you chose "Yes" for the question above, please skip to the next question. If you chose "No" for the question above, please choose WHY you do not floss your teeth daily. (Select ALL that apply)</p> <ul style="list-style-type: none"> a.) I forget b.) Cost of product(s) c.) Time d.) I do not see a reason to floss my teeth daily e.) Laziness f.) I do not like to floss my teeth g.) Inconvenient h.) I do not know how to floss my teeth i.) Causes pain/discomfort j.) I do floss my teeth daily k.) It requires planning l.) Other
<p>1.) If you have dental insurance but do not use it, please choose why.</p> <ul style="list-style-type: none"> a.) Fear, apprehension, nervousness of the dentist b.) I forget that I have dental insurance c.) My dentist is not in the same town that I live in right now d.) Cost: My co-pay or deductible is still too high e.) I do not see a reason to go to the dentist f.) Never thought about going to the dentist g.) I have dental insurance & always use it h.) I do not have a dentist i.) I do not have dental insurance 	<p>1.) Do you have dental insurance?</p> <ul style="list-style-type: none"> - Yes - No - Not Sure <p>2.) If you chose "No" or "Not Sure" for the question above, please skip to the next question. If you chose "Yes" for the question above, please answer the following question: Have you seen the dentist in the last year?</p> <ul style="list-style-type: none"> - Yes - No - Not Sure <p>3.) If you chose "Yes" or "Not Sure" for the question above, please skip to the next</p>

Table 18 Continued

Original Question from Participant Panel Review OHKBB	Modifications Per Participant Panel Review
j.) Other	Question. If you chose “No” for the question above, please choose WHY you have not seen the dentist in the last year. (Select ALL that apply) <ul style="list-style-type: none"> a.) Fear b.) I do not have a dentist c.) Nervousness d.) My dentist is not in the same town that I live in right now e.) Causes pain/discomfort f.) Never thought about going to the dentist g.) Expensive/costs lots of money h.) I have seen the dentist in the last year i.) My dental insurance has poor coverage j.) I do not have dental insurance k.) No reason to see a dentist l.) Other
1.) How would you describe your race (Check ALL that apply): <ul style="list-style-type: none"> - Native American Indian/Alaska Native - Caucasian - African-American - Native Hawaiian or other Pacific Islander - Asian - Other (if other, please indicate) _____ 	1.) How would you describe your race (Check ALL that apply): <ul style="list-style-type: none"> - Native American Indian/Alaska Native - Native Hawaiian or other Pacific Islander - Asian - Caucasian or White - African-American or Black - I Do Not Know - Other (please specify) _____

Changes for these questions made in effort from both Participant Reviews and the Expert Panel Review led to the final version of OHKBB. The final version of OHKBB consisted of 61 items (n=9 were not relevant to thesis study). This 61-item OHKBB assessed the following variables: Knowledge, attitudes, and behaviors. See Chart 19 for an outline of items specifically assessed on OHKBB.

Items were arranged by content for readability and questions also were arranged in ascending order of difficulty. This was done so that the harder questions were at the end, allowing for students to not get discouraged early on in the survey completion. The Demographics Section consisted of seven quick questions at the end of OHKBB. OHKBB

neatly fit on five, 8 ½ X 11 sheets of paper. The survey length and the average of ~8 minutes to complete the survey, make it feasible for administration.

Table 19

Distribution of Scope and Parameter Variables within OHKBB

Specific Scope and Parameter Variables Measured on OHKBB	Item Number(s) on OHKBB
Knowledge associated with the behavior, brushing the teeth	1-2
Knowledge associated with the behavior, flossing the teeth	3-4
Knowledge associated with the behavior, routine dental visits	5-6
Knowledge associated with tobacco	7-10
Knowledge associated with STIs	11
Oral piercing behavior	15-18
Decorative dental encasement behavior	19
Behavior involving tobacco products	20-21
Perceived benefits of brushing the teeth	22-26
Perceived benefits of flossing the teeth	27-31
Perceived benefits of visiting the dentist	32-36
Perceived severity of dental diseases (cavities, gum disease, etc.)	37-41
Perceived susceptibility of dental diseases (cavities, gum disease, etc.)	42-46
Behavior of flossing the teeth	47
Behavior of brushing the teeth	48
Behavior of routine dental visits	53
Cues to actions towards positive oral health and hygiene	54
Barriers toward positive oral health and hygiene	14 & 55-58
Extra questions developed for non-thesis purposes	12-13, 49-52, 59, & 60-61

CHAPTER 5 DISCUSSION

Introduction

The purpose of this research study was to develop a valid survey instrument based on constructs from the Health Belief Model (HBM) to measure the knowledge, beliefs, and behaviors of college students regarding oral health and hygiene. An 8-step approach was developed to construct the test item, *Oral Health Knowledge, Behaviors, and Beliefs of College Students* (OHKBB). The need for an instrument of this kind was recommended in the literature on oral health and hygiene. The process behind development for OHKBB was prescribed in the literature on instrument development and validation (Espie, et al., 2001; Leung, et al., 2005; Maciel et al., 2009; Mueller, 1986; Perko, 1999; Wiersma and Jurs, 1990). The procedures regarding development of OHKBB, as well as the results from development, are outlined in this chapter. Recommendations for future studies will also be discussed.

Overview of Instrument Development and Validation

Step 1: Identify the Scope and Parameters of the Instrument

The domains of the scope and parameter for OHKBB were determined by an extensive review of the literature and national standards set for oral health and hygiene (Academy of Dentistry International [Academy], 2008; American Dental Association [ADA], 2008). The first step in developing OHKBB was to identify the parameters, or core areas, that were pertinent to the college-aged population. The three areas of brushing, flossing, and routine dental exams became the parameters of the instrument since oral health education emphasizes their importance (Broadbent, Thomson, & Poulton, 2006). The three areas of knowledge, beliefs, and behaviors, were identified as the scope of OHKBB. Dental caries and periodontal disease, two major dental diseases, were identified as the parameter at which questions were developed due to the many different oral health risks associated with negative behaviors and lack of oral

care (Ndiokwelu, 2004). Finally, the HBM was used as a basis for question development. Items of the OHKBB were developed to measure the core and focus areas through the constructs: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and cues to action, from the HBM.

Step 2: Collect a Pool of Test Items

An initial pool of 69-test items was written to ensure all areas of OHKBB's scope and parameter were measured. In addition, five questions per HBM constructs: perceived severity, susceptibility, and benefits were developed in order to help increase the rate of reliability success in later studies. Scale selections were developed for all OHKBB item sets that allowed for a thorough measure of the item. A demographics section was developed to assess the participant's basic information.

Step 3: Submit Draft of Test Items to Expert Panel for Review

An Expert Panel Review was held to identify problems associated with the initial version of OHKBB. Expert participation in the Expert Panel Review was vital for the success of the instrument. Experts (n=13) in the fields of health education, health behavior theory, survey development, and oral health, were identified for the review of OHKBB. The initial draft of OHKBB, an instruction sheet, as well as an evaluation sheet to critique the developed survey, were electronically sent and hand delivered to each member of the review. Experts were asked to provide feedback regarding OHKBB directions, individual items, scales, theoretical application, and the overall instrument (including language level, readability, terms used, layout and design, and the use of the HBM constructs within the instrument, etc.).

Step 4: Organize Research Draft of Instrument

Fifty-two items were retained, with modifications, from the initial version of OHKBB after the Expert Panel Review (9 additional items that are not related to this study were also retained), with ratings to support content validity. A second draft of OHKBB was constructed

from the Expert Panel Review comments and suggestions. The second draft contained 61-items.

Step 5: Administer Research Draft of Instrument to Sample of Student Participants

This 61-item draft of OHKBB was administered to two Participant Panel Review groups:

1.) Participant Panel Review Discussion Validation Study and 2.) Participant Panel Review Discussion Validation Study.

Participants in the Participant Panel Review Discussion Validation Study (n=27) were used to increase face and content validity among the developed instrument OHKBB. They were asked to complete a review questionnaire and participate in a facilitated discussion concerning the overall instrument, OHKBB. Panel participants in the discussion group were encouraged to provide feedback regarding OHKBB directions, questions, scales, and the overall instrument (including language level, readability, terms used, and layout and design). Feedback was used to refine and clarify questions in OHKBB. Students within this expressed their thoughts and concerns about the survey instrument, and changes were made accordingly. The main reason a discussion-based Participant Panel Review was held was to identify any problems associated with the survey instrument. This review helped increase validity among OHKBB.

Participants in the Participant Panel Review Timed Validation Study (n=34) were asked to participate for the purpose of time validation of OHKBB. The objective of this study was to identify the average length of time it took students to complete OHKBB. It also was used to see which questions participants may skip or refuse to answer if they were taking this survey for a research study. This review helped increase validity among OHKBB. Data from this study were used to determine the mean time spent among participants taking OHKBB as well as to find any questions that students skipped while completing the OHKBB. Results from individual questions were not analyzed for this studies purpose.

Step 6: Analyze Test Items from Each Respondent

Results from the Participant Panel Review Discussion Validation Study were analyzed and reviewed collectively by the primary investigator and research chair. Changes were made to OHKBB per suggestions on grammar, sentence structure, and clarity changes for questions, by panel review members.

Results from the Participant Panel Review Timed Validation Study were analyzed and reviewed by the primary investigator and research chair. These results were used to increase validation and make modifications for the proposed and developed OHKBB. Frequencies in questions left blank, or unanswered, were noted and changes were made for these questions in order to increase the success of response rate in future studies.

Step 7: Apply Statistical Criteria for Revisions of Test Items

The results from the Participant Panel Review Timed Validation Study included statistical data. The mean, median, and mode time of survey completion from this study were analyzed using a factor analysis test in SPSS Version 16 to verify normal distribution among the OHKBB completion times.

Step 8: Revision of Instrument for the Final Version

Results from both Participant Panel Reviews were used to revise OHKBB into its final form. The primary investigator and her research chair analyzed all results and comments and made changes for OHKBB accordingly. Suggestions made by multiple participants were highly considered for change. Questions that were frequently left blank, or unanswered, by participants in the timed validation study were modified and changed to increase later turnover of completed surveys. The retention of the 61-item instrument into the final version of OHKBB (n=9 not relevant to thesis study) was based on question analysis completed by the panel of experts and both panels of participants. Items were arranged by content for readability and questions also were arranged in ascending order of difficulty, with a demographics section

placed at the end of OHKBB. The survey length and the average of ~8 minutes to complete the survey, make it feasible for administration.

Summary of Results

OHKBB modifications and edits were made per Expert Panel Review and Participant Panel Review suggestions. Particularly, minor theory changes were made to OHKBB throughout these processes. In the early planning stages of OHKBB, the Theory of Planned Behavior (TPB) was thought to be used as the theoretical background for instrument development. Shortly after questions development began, the theoretical application was adjusted to HBM. This was decided due to evidence in the literature revealing past successful instruments using HBM (Ndiokwelu, 2004). Although questions were initially developed with the theory HBM, some of them had ancestral roots, linked to TPB. Many suggestions from the Expert Panel Review regarded this matter, and questions were modified and reworded to more clearly and accurately fit the constructs within the HBM.

The final draft of OHKBB consisted of a 61-item questionnaire that is able to assess the college-aged population's oral health knowledge, beliefs, and behaviors. OHKBB has an average of ~8 minutes for completion time making for a quick survey for participants to complete. OHKBB is quickly completed by participants because of its easy to read format. OHKBB is taken in ease by participants because many items throughout ask the same question, only with a new concept or idea, which is distinguished in either italicized or bolded font. The design of OHKBB is appealing to the eye and is not overwhelming in survey size, for it neatly fits on five standard pieces of paper, making it feasible for administration among the college-aged population.

Contributions to the Discipline

A review of the literature confirms that few studies conducted on individual's oral health have analyzed their knowledge of oral health, beliefs about outcomes of performing the oral health behavior, and actual individual behaviors and unique behaviors that they partake in.

Combined, these three factors may indeed influence an individual oral hygiene (Broadbent et al., 2006). Of the studies conducted on this topic, the majority have been from countries outside the United States, where translation to the English language is not acquired easily. Also, it is difficult to generalize these results from foreign studies and accurately apply them to individuals in the United States because many cultural factors influence individual's knowledge, attitudes, beliefs, and behaviors relating to oral health and hygiene (Komabayashi, Kwan, and Hu, 2005).

The oral health of the college-aged population (United States Department of Health & Human Services [USDHHS], 2000), any individual between the ages of 18-25 years (United States Census Bureau [USCB], 2008), can be used as a reliable measure of this population's overall health (USDHHS, 2000). This population is thoroughly disregarded when it comes to health care and problems (Grace, 1997), specifically, the oral health among this population has received the least amount of attention (Percy, 2008).

The development of OHKBB is monumental for the discipline of oral health and hygiene. Specifically, it will assess the population's oral health knowledge, beliefs, and behaviors. These efforts are the first of their kind, for this is the first instrument to be developed for oral health and the college-aged population. In addition to being the first developed survey for this specific target population, it uses a sound theory, the HBM. This will help researchers better understand the unique behaviors of the college-aged population (DeBarr, 2004) and help clarify why individuals do not participate in oral health prevention practices such as brushing and flossing the teeth and visiting the dentist (McKenzie et al., 2005). From this, interventions or health education can focus on the findings in order to help address and encourage the importance of healthy oral health behaviors. Application of the HBM to oral health related beliefs of college students will also provide insight for their oral health behaviors.

Healthy People 2010 announced a call to action to decrease oral health disparities among the college population (Healthy People 2010 [Healthy People], 2010). The development of OHKBB and its addition to the discipline will help contribute to these efforts requested by

Healthy People 2010. OHKBB will help identify many factors that may contribute to the oral health disparities among the college aged population and identify a ground area, or focus, for behavior change. Based on these results from the assessment by OHKBB, experts can develop oral health programs. With this, future oral health projects or interventions can aim towards prevention of the factors identified as perceived severity, susceptibility, barriers, and/or benefits towards positive oral health and hygiene. Developed programs can then assess and increase perceived susceptibility and severity among the college aged population. Ultimately, problems associated with oral health, cavities and gum disease, can be reduced through these prevention efforts (Ndiokwelu, 2004) and oral health education (Alperin & Miner, 1993; Broadbent et al., 2006; Coalition of National Health Education Organizations [CNHEO], 2001; Glanz et al., 2002).

Implications for Future Research

OHKBB has been tested for validity while reliability tests still need to be ran. Validity looks at what is meant to be measured and was checked for OHKBB through an Expert Panel Review and two student Participant Panel Reviews. These three validation tests measured that the OHKBB did indeed ask what it was intended to analyze. Reliability measures the consistency of the survey responses among participants. The intraclass correlation coefficient (ICC), Wilcoxon signed rank test, and Cohen's kappa statistics should be used to evaluate the test-retest consistency for ordinal and nominal variables. Test-retest reliability is confirmed using Cronbach's alpha. Cronbach's alpha needs to be ≥ 0.80 . Cronbach's alpha will also be used to assess internal consistency reliability among the ordinal and nominal variables. Significance levels for all variables are recommended to be set at ($\alpha = .05$). Finally, statistical analysis using the software Statistical Package for the Social Sciences version 16 (SPSS) can be used to evaluate results of OHKBB (Gliner & Morgan 2000).

The most effective way to treat oral health related problems is through prevention (Broadbent et al., 2006). Oral health education for the college-aged population is needed to

ensure that they are aware of the risks and the prevention of oral diseases (Coalition of National Health Education Organizations [CNHEO], 2001; USDHHS, 2000). Throughout interventions and health promotion programs, patient education is important for adoption of informed lifestyle choices among individuals (Alperin & Miner, 1993). Since the 1950s, public health workers have discussed the importance of individuals taking initiative in their own healthcare practices (Glanz, Rimer, & Lewis, 2002). The proposed research, OHKBB, will pave the way for programs to help individuals improve their oral hygiene and reduce their risks of oral health related problems through education by identifying college aged student's oral health related knowledge, beliefs, and behaviors affecting their oral health.

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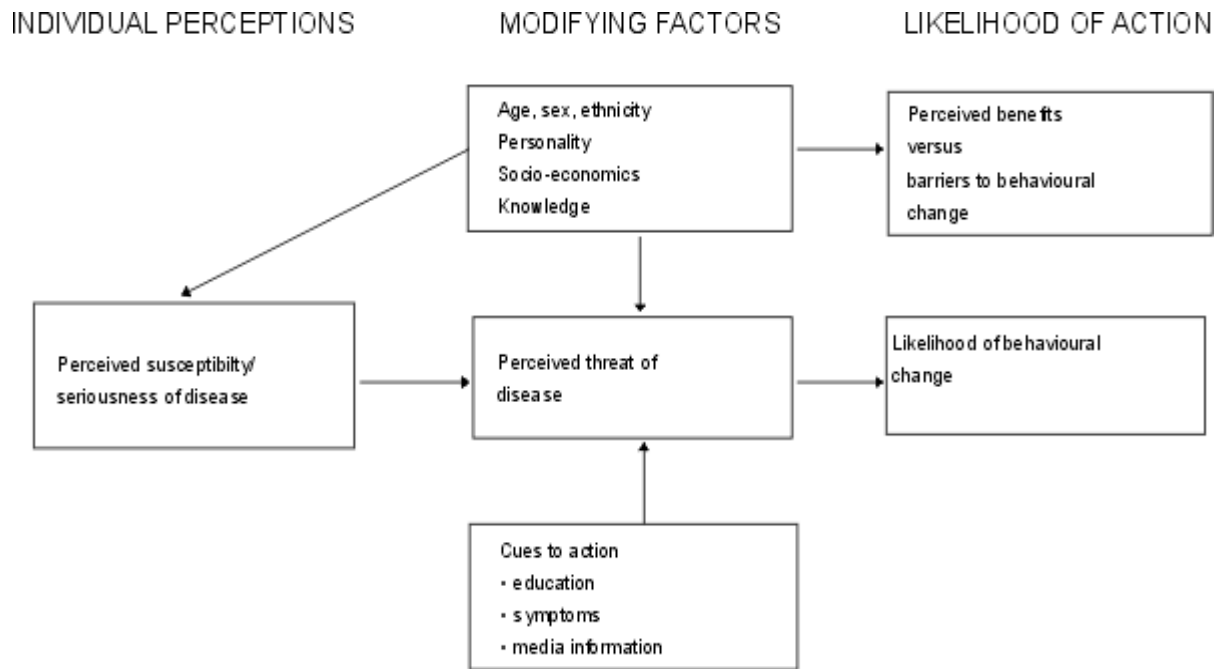
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APPENDIX A

The Health Belief Model (HBM)



Appendix A: Flow chart explaining the constructs within the Health Belief Model (HBM).

APPENDIX B

2009 IRB Approval

Office for Research
Office of the Chair,
Institutional Review Board for the
Protection of Human Subjects

THE UNIVERSITY OF
ALABAMA
R E S E A R C H

January 5, 2009

Stellina Aubuchon
Department of Health Science
College of Human Environmental Sciences
The University of Alabama

Re: IRB # 09-OR-001 "Assessing the Oral Health Related Knowledge,
Attitudes, and Behaviors among Students at The University of Alabama"

Dear Ms. Aubuchon:

The University of Alabama Institutional Review Board has granted approval for your proposed research.

Your protocol has been given expedited approval according to 45 CFR part 46. You have also been granted the requested waiver of informed consent. Approval has been given under expedited review category 7 as outlined below:

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Should you need to submit any further correspondence regarding this proposal, please include the assigned IRB application number. Please provide participants with a copy of the attached participant information sheet.

Good luck with your research.

Sincerely,



Carantato T. Myles, MSM, CIM
Director & Research Compliance Officer
Office for Research Compliance
The University of Alabama

152 Rose Administration Building
Box 870104
Tuscaloosa, Alabama 35487-0104
(205) 348-5152
fax: (205) 348-8882

09-02-001

UNIVERSITY OF ALABAMA INSTITUTIONAL REVIEW BOARD FOR THE PROTECTION OF HUMAN SUBJECTS
REQUEST FOR APPROVAL OF RESEARCH INVOLVING HUMAN SUBJECTS

I. Identifying information

	Principal Investigator	Second Investigator	Third Investigator
Name:	Stefanie Auluckhor	Dr. Lori Turner, Ph.D.	Dr. Smart Uddan, Ph.D.
Department:	Health Science	Health Science	Health Science
College:	Human Environmental Sciences	Human Environmental Sciences	Human Environmental Sciences
University:	The University of Alabama	The University of Alabama	The University of Alabama
Address:	Box 870311, 108 East Annex Tuscaloosa, AL 35487-0311	Box 870311, 214 East Annex Tuscaloosa, AL 35487-0311	Box 870311, 214 East Annex Tuscaloosa, AL 35487-0311
Telephone:	(W) 205-348-2486	(W) 205-348-1292	(W) 205-348-8373
FAX:	205-348-7568	205-348-7568	205-348-7568
E-mail:	stauluckhor@ua.edu	lturner@ehsc.us.edu	suudan@ehsc.us.edu

Title of Research Project: Assessing the Oral Health Related Knowledge, Attitudes, and Behaviors Among Students at The University of Alabama

Date Printed: October 27, 2008

Funding Source: Self

Type of Proposal:	<input checked="" type="checkbox"/> New	<input type="checkbox"/> Revision	<input type="checkbox"/> Renewal	<input type="checkbox"/> Completed	<input type="checkbox"/> Exempt
Part 1: Pilot Study & Part 2: Study 1	<input type="checkbox"/> Attach a previous application <input type="checkbox"/> Attach a continuing review of similar data <small>Please enter the original IRB # at the top of the page</small>				

UA faculty or staff member signature: _____

II. NOTIFICATION OF IRB ACTION (to be completed by IRB):

Type of Review: Full board Expedited

IRB Action:

<input type="checkbox"/> Rejected	Date: _____
<input type="checkbox"/> Tabled Pending Revisions	Date: _____
<input type="checkbox"/> Approved Pending Revisions	Date: _____

Approved—this proposal complies with University and federal regulations for the protection of human subject
Approval is effective until the following date: 1/5/10

Items approved:

<input checked="" type="checkbox"/> Research protocol:	dated	1/5/09
<input checked="" type="checkbox"/> Informed consent:	dated	1/5/09
<input checked="" type="checkbox"/> Recruitment materials:	dated	1/3/09
<input type="checkbox"/> Other:	dated	

Approval signature _____ Date 1/5/09

APPENDIX C

2010 IRB Approval

November 25, 2009

Office for Research
Institutional Review Board for the
Protection of Human Subjects

THE UNIVERSITY OF
ALABAMA
R E S E A R C H

Stellina Aubuchon
Department of Health Science
College of Human Environmental Sciences
The University of Alabama

Re: IRB # 09-OR-001-R1 "Assessing the Oral Health Related Knowledge, Attitudes, and Behaviors among Students at The University of Alabama"

Dear Ms. Aubuchon:

The University of Alabama Institutional Review Board has granted approval for your renewal application.

Your renewal application has been given expedited approval according to 45 CFR part 46. You have also been granted the requested waiver of informed consent. Approval has been given under expedited review category 7 as outlined below:

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Your application will expire on November 23, 2010. If your research will continue beyond this date, complete the relevant portions of Continuing Review and Closure Form. If you wish to modify the application, complete the Modification of an Approved Protocol Form. When the study closes, complete the appropriate portions of FORM: Continuing Review and Closure.

Should you need to submit any further correspondence regarding this proposal, please include the above application number.

Good luck with your research.

Sincerely,



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Carpenlato T. Myles, MSM, CCM
Director & Research Compliance Officer
Office for Research Compliance
The University of Alabama

09-OR-0015-R1

UNIVERSITY OF ALABAMA INSTITUTIONAL REVIEW BOARD FOR THE PROTECTION OF HUMAN SUBJECTS
REQUEST FOR APPROVAL OF RESEARCH INVOLVING HUMAN SUBJECTS

I. Identifying Information

	Principal Investigator	Second Investigator	Third Investigator
Name:	Stellina Aubuchon	Dr. Lori Turner, Ph.D.	Dr. Stuart Usden, Ph.D.
Department:	Health-Science	Health-Science	Health-Science
College:	Human Environmental Sciences	Human Environmental Sciences	Human Environmental Sciences
University:	The University of Alabama	The University of Alabama	The University of Alabama
Address:	Box 870311, 108 East Annex Tuscaloosa, AL 35487-0311	Box 870311, 214 East Annex Tuscaloosa, AL 35487-0311	Box 870311, 214 East Annex Tuscaloosa, AL 35487-0311
Telephone:	(W) 205-348-2486	(W) 205-348-1292	(W) 205-348-8373
FAX:	205-348-7568	205-348-7568	205-348-7568
E-mail:	Smaubuchon@bama.ua.edu	lwtturner@ches.ua.edu	susden@ches.ua.edu

Title of Research Project: Assessing the Oral Health Related Knowledge, Attitudes, and Behaviors Among Students at The University of Alabama

Date Printed: October 27, 2008

Funding Source: Self

Type of Proposal: New Revision Renewal Completed Exempt

Part 1: Pilot Study & Part 2: Study 1

Attach a renewal application

Attach a continuing review of studies form

Please enter the original IRB # at the top of the page

UA faculty or staff member signature: _____

II. NOTIFICATION OF IRB ACTION (to be completed by IRB):

Type of Review: Full board Expedited

IRB Action:

- Rejected Date: _____
- Tabled Pending Revisions Date: _____
- Approved Pending Revisions Date: _____

Approved—this proposal complies with University and federal regulations for the protection of human subject

Approval is effective until the following date: 11-23-08

- Items approved: Research protocol: dated
- Informed consent: dated
- Recruitment materials: dated
- Other: dated

Approval signature: _____ Date: 11/33/08

APPENDIX D

Expert Panel Review: Health Professionals Instruction Letter

**Instrument Review for Proposed Study:
Development and validation of an instrument to assess college students' oral health
knowledge, beliefs, and behaviors**

Dear Panel Expert:

You have been identified as an expert in one or more of the following areas: survey design and development, the Health Belief Model (HBM), theoretical application, oral health, and/or college student's health related knowledge, beliefs, and behaviors. If you are an expert in one or more of these areas, you are being asked to complete a content review of the proposed instrument for the thesis study, "*Development and validation of an instrument to assess college students' oral health knowledge, beliefs, and behaviors.*" This instrument will be used to measure the oral health related knowledge, attitudes, and behaviors of college students at The University of Alabama. Please provide feedback regarding the theoretical application, survey directions, individual survey questions, survey scales, and the overall instrument (including language level, readability, terms used, layout and design, and the use of the HBM constructs within the instrument, etc.).

The proposed instrument was developed by incorporating previously used questions developed for past studies by the following researchers: Barbadoro, Lucrezi, Prospero & Annino, 2008; National Health and Nutrition Examination Survey (NHANES), 2006; and Poutanen, Lahti & Hausen, 2005. To better assess the target population of college students, additional questions were developed by the primary researcher and her thesis chair.

For this instrument review, you are receiving the following documents:

- The expert panel review of instrument 20 pages in length (paper & electronic copies)

Please refer to the designated sections labeled "*Expert Panel*" for specific instruction. In this box there will be three options: *Keep the question as is*; *Revise* the question; or *Delete* the question. Please select one of these options for each question. For questions marked "Revise" or "Delete", please provide suggestions for strengthening that question. The layout and design, as well as the length of this instrument have been distorted for the purpose of adding space for comments between each question.

Please take the next two weeks to review this instrument. Feel free to complete this instrument review electronically and submit it through email (smaubuchon@crimson.ua.edu) or you may review a hard copy of the instrument and I will pick it up when completed. If you choose to review a hard copy and need more space to leave comments or suggestions, please make those on the back of the page or and clearly label which question the comment is for.

If possible, please have the review completed and emailed back or ready for pick-up by Tuesday November 3rd by 5:00pm. If you have any questions, please do not hesitate to call Stellina Aubuchon at (314) 221-8495 or email me at smaubuchon@crimson.ua.edu. Thank you for your time in completing this instrument review.

Sincerely,
Stellina Aubuchon

APPENDIX E

Expert Panel Review: Oral Health Professionals Instruction Letter

**Instrument Review for Proposed Study:
Development and validation of an instrument to assess college students' oral health
knowledge, beliefs, and behaviors**

Dear Panel Expert:

You have been identified as an expert in oral health and/or college student's health related knowledge, attitudes and behaviors. If you are an expert in one or more of these areas, you are being asked to complete a content review of the proposed instrument for the thesis study, "*Development and validation of an instrument to assess college students' oral health knowledge, beliefs, and behaviors.*" This instrument will be used to measure the oral health related knowledge, beliefs, and behaviors of college students at The University of Alabama. Please provide feedback regarding the survey directions, individual survey questions, survey scales, and the overall instrument (including language level, readability, terms used, layout and design, etc.).

The proposed instrument was developed by incorporating previously used questions developed for past studies by the following researchers: Barbadoro, Lucrezi, Prospero & Annino, 2008; National Health and Nutrition Examination Survey (NHANES), 2006; and Poutanen, Lahti & Hausen, 2005. To better assess the target population of college students, additional questions were developed by the primary researcher and her thesis chair.

For this instrument review, you are receiving the following documents:

- The expert panel review of instrument 14 pages in length (paper & electronic copies)

Please refer to the designated sections labeled "*Expert Panel*" for specific instruction. In this box there will be three options: *Keep the question as is*; *Revise* the question; or *Delete* the question. Please select one of these options for each question. For questions marked "Revise" or "Delete", please provide suggestions for strengthening that question. The layout and design, as well as the length of this instrument have been distorted for the purpose of adding space for comments between each question.

Please take the next two weeks to review this instrument. Feel free to complete this instrument review electronically and submit it through email (smaubuchon@crimson.ua.edu) or you may review a hard copy of the instrument and I will pick it up when completed. If you choose to review a hard copy and need more space to leave comments or suggestions, please make those on the back of the page or and clearly label which question the comment is for.

If possible, please have the review completed and emailed back or ready for pick-up by Tuesday November 3rd by 5:00pm. If you have any questions, please do not hesitate to call Stellina Aubuchon at (314) 221-8495 or email me at smaubuchon@crimson.ua.edu. Thank you for your time in completing this instrument review.

Sincerely,
Stellina Aubuchon

APPENDIX F

Participant Panel Review IRB Approved Information and Rights Sheet

Participant Panel Review: *“Development and validation of an instrument to assess college students’ oral health knowledge, beliefs, and behaviors.”*

Participant Information:

Thank you for agreeing to participate in the research study *Development and validation of an instrument to assess college students’ oral health knowledge, beliefs, and behaviors*. You are a vital asset to this study and your input will help identify any potential oral health risks affecting students here at the University. At anytime, if you decide that you would not like to continue in this study, you have the right to withdraw with no questions asked.

Your information will be kept completely confidential. No one but you will ever know that you participated in this research study. Your name and Campus Wide ID will not be asked and all data will be destroyed after the completion of this study. There is no foreseeable harm associated with participation in this study.

This survey asks for your opinion – there is no right or wrong answers. After reading each question, take only a few seconds to answer the question asked.

Participant Rights:

In exchange for participation in College of Human Environmental subject pool, you will personally contribute to the research collected on the oral health related knowledge, attitudes, and behaviors among your colleagues at The University of Alabama.

Each person asked to be in a research study has rights. As a research participant, your rights are written out **below** and are given to you to keep. As a research participant, your rights are as follows:

- If you wish to withdraw from the present research study, you have the right to do so at any given time.
- It is important that you be aware of any risks from your participation, and understand how the research may affect you.
- As a participant, you may have questions about the study even after you have given your consent. Do not hesitate to discuss these questions with the Principal Investigator, research personnel, or department chair. It is important for you to understand exactly what the study is about and why.
- You have the right to completely refuse to participate in the study
- If you change your mind about participation even after the study has begun, you can withdraw from the study with no questions asked.
- You have the right to be told who to contact with questions about the research study and about your rights as a research participant.
- If you, for whatever reason, are not comfortable participating in health related studies you may choose not to do so, no questions asked
- Any additional questions relating to your rights and the presented study are encouraged.

If you have any questions regarding this study and/or its purpose, please do not hesitate to ask. Contact information for the primary investigator and faculty supervisor are provided **below** for your convenience. Contact either of these individuals for further assistance or questions regarding the study. Thank you again for your time.

Stellina Aubuchon:

Principal Investigator
108 East Annex
(205) 348-8248
smaubuchon@bama.ua.edu

Dr. Lori Turner:

Faculty Supervisor & Department Chair
210 East Annex
(205) 348-1292
lwturner@ches.ua.edu

APPENDIX G

2009 Graduate School Grant Approval

Office of the Dean and
Assistant Vice President
for Academic Affairs

January 29, 2009



MEMORANDUM

TO: Dr. Lori Turner
FROM: Dave Francko
SUBJECT: Graduate Student Research and Travel Support Fund-Spring 2009

I am pleased to inform you that we will award the following.

Ms. Stellina Aubuchon \$197.

We funded 201 of the 203 students who applied to the Spring 2009 RFP, an increase of 80 funded students over the same period in 2007. With your cost sharing support, we have already funded 375 students for \$224,517 so far in 2008-09. With the April RFP still to come, already exceeding last years record total of \$216,539.

Priority was given to those requests that met the criteria listed in my January 6, 2009, call for requests. If you have students who need additional research or travel funds, the GSA's Research and Travel Committee is funding graduate student research. For information, call Graduate Student Association, at 348-7592 or contact Whit Whitfield at gwhitfieldvi@comcast.net, or Latrice Vinson at latricevinsons@yahoo.com.

Remember too that the Graduate School will issue a third RFP in early April for travel during Summer 2009.

You should notify your students about these awards.

These funds can be used only for the purpose indicated in the application.

If you have any questions, please call Mr. John Chambers at 348-8282.

DF/kn

c: Budget Personnel ✓

102 Rose Administration
Box 870118
Tuscaloosa, Alabama 35487-0118
(205) 348-5921 fax: (205) 348-0400
graduate.ua.edu

APPENDIX H

Participant Panel Review: Discussion Validation Study Review Sheet

Participant Panel Review Sheet: *Development and validation of an instrument to assess college students' oral health knowledge, beliefs, and behaviors.*

Directions to Participants: You have been selected to review an instrument that will be used to evaluate the current oral health knowledge, attitudes, and behaviors of college students. Please take a few minutes to read over the presented instrument. You are not required to answer the survey questions, but if answering the questions helps you evaluate the instrument, feel free to do so. Throughout this review, please make marks/edits on the survey. Also for this review, please answer the following questions:

- 1.) The table below asks you to evaluate each set of directions within the survey instrument. For each direction set, please specify whether or not the directions are easily understood by circling "Yes" or "No" in the designated spot in the table. If you feel the direction set is hard to understand or needs to be reworded, please make necessary changes next to the "Comments" section.

	Are the directions for this set of questions easily understood?
	Yes or No
Directions for questions 1-13	Comments:
	Yes or No
Directions for questions 14-21	Comments:
	Yes or No
Directions for questions 22-46	Comments:
	Yes or No
Directions for questions 47-52	Comments:
	Yes or No
Directions for questions 53-55	Comments:
	Yes or No
Demographics Section (at end of survey)	Comments:

