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Predictors of Academic Success for the National Board Dental Hygiene Examination and the Southern Regional Testing Agency Clinical Exam

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Predictors of Academic Success for the National Board Dental Hygiene Examination and the
Southern Regional Testing Agency Clinical Exam

Predictors of Academic Success for the National Board Dental Hygiene Examination and the
Southern Regional Testing Agency Clinical Exam

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Education in Workforce Development

By

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Abstract

The purpose for conducting this study was to investigate and describe the relationship between applicant criteria for a dental hygiene program and subsequent outcomes on credentialing exams: the National Board Dental Hygiene Exam and the Southern Regional Testing Agency clinical exam. Because admission criteria play a crucial role in applicant selection, choosing students, that will successfully complete the program as well as the necessary credentialing exams, is a particularly crucial task for admission committees. The study had three elements. First, it investigated the relationship between the variables of age, undergraduate GPA and scores from the Psychological Services Bureau Health Occupations Aptitude Examination (PSB) and successful student performance on the NBDHE and a regional clinical exam, namely the Southern Regional Testing Agency. Second, it investigated the validity of the predictive value of the PSB entrance exam as one of the admission criteria for the selected program. Third, it investigated the strength of the relationship of age, undergraduate GPA, and PSB scores as a predictor of program completion and subsequent success on credentialing licensure exams.

This study analyzed secondary data from an accredited dental hygiene program that awards an Associate's of Applied Science Degree in the mid-south United States. The results revealed a weak, if any, correlation between the candidate selection criteria and the subsequent outcomes on post-graduate credentialing exams. Age was a negative weak correlation, if any, for the dependent variable NBDHE with a Pearson Correlation value of $r = -.037$ for the NBDHE and $r = -.142$ for the SRTA clinical exam. Undergraduate GPA revealed a weak relationship to NBDHE scores with a Pearson Correlation of $r = .312$ and a negative weak relationship, if any, to the SRTA clinical exam scores with a Pearson Correlation of $r = -.050$. The PSB score was a moderate predictor for NBDHE scores with a Pearson Correlation of $r = .364$. The PSB score

however, was a negative weak predictor of SRTA clinical exam scores with a Pearson Correlation of $r = -.134$.

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Dedication

This dissertation is dedicated to all of my dental hygiene students: past, present and future. Time spent with dental hygiene students' in the clinic and classroom are some of the best moments of my life. Thank you for your enthusiasm for the profession that I love.

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I offer my deepest thanks and gratitude to those who provided me with the opportunity to pursue this effort. Dr. Michael Miller was invaluable as my dissertation chair. His confidence in me was motivational from the very beginning. I also thank my other committee members, Dr. Adam Morris and Dr. Kit Kacirek. The guidance and recommendations I received from my committee are evidenced in this body of work. Dr. Kenda Grover was instrumental in my decision to take this educational journey and I thank her for all of her support and kind words. Additionally I want to thank Dr. David Deggs for his encouragement and belief in my research interest. Dr. Deggs gave me the nuts and bolts to get off to a strong start and I never looked back.

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I would not be the dental hygienist that I am today if I had not been nourished by an example of dentistry at its best. I want to acknowledge and thank Dr. James Saviers for his dedication to excellence in patient treatment. He is the ultimate professional and I thank him for instilling in me excellence in clinical skills.

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Table of Contents

Chapter I – Introduction	1
Statement of the Problem	5
Statement of the Purpose	6
Statement of Research Questions	6
Definitions	7
Assumptions	11
Delimitations/Limitations	12
Significance of the Study	13
Chapter Summary	15
Chapter II – Literature Review	16
Historical Perspective	17
The History of Dental Hygiene	17
Dental Hygiene Aptitude Exams	19
Dental Aptitude Exams	21
Credentialing Exams	22
Licensure	22
NBDHE Credentialing Exam	23
State Boards of Dental Examiners	26
Clinical Exams as Credentialing Exams	29
Student Success Rates Reported by ADA	32
Chapter Summary	37
Chapter III – Methods	38

Sample	41
Design	41
Instrumentation	42
Collection of Data	43
Data Analysis	43
Chapter Summary	45
Chapter IV – Results of the Study	47
Summary of the Study	47
Data Analysis	50
Question 1	50
Question 2	55
Question 3	56
Question 4	56
Summary of Results	58
Chapter V – Conclusions	59
Summary of the Study	59
Conclusions	60
Recommendations for Further Study	61
Discussion	63
Chapter Summary	64
References	66
Appendices	69
Appendix A	69

Appendix B	71
Appendix C	75
Appendix D	78

List of Tables

Table 1 Admission Criteria for Dental Hygiene Programs	4
Table 2 Trend in Failure Rates for NBDHE	28
Table 3 Pass Fail Rates for SRTA Clinical Exams	32
Table 4 Student Profile	52
Table 5 Shape of the Distribution	53
Table 6 Correlation of Age, GPA, and PSB with NBDHE and SRTA	57

List of Figures

Figure 1 Histogram for Age	56
Figure 2 Histogram for GPA	56
Figure 3 Histogram for PSB	57
Figure 4 Histogram for NBDHE	57
Figure 5 Histogram for SRTA	57

Chapter I

Introduction

As licensed oral health professionals, dental hygienists focus on preventing and treating oral diseases in order to protect the oral cavity, and also to protect the patient's total health (American Dental Hygienists Association, Dental Hygiene Education, 2012). In order to practice as a dental hygienist in the United States, a person must obtain a license. Information from the American Dental Hygienists' Association (ADHA) website provide the following comprehensive outline of criteria for licensure

Licensure is granted by each individual state. Dental hygienists practice in accordance with requirements of individual state dental practice acts. In virtually every state, several steps are required before a license can be granted: graduation from an accredited dental hygiene program; successful completion of the written National Board Dental Hygiene Examination; successful completion of a regional or state clinical board examination. Once these steps have been completed, an applicant for licensure must then contact the state licensing authority in the state where he/she wishes to practice. As licensing requirements vary from state to state, it is necessary to contact each licensing authority in a given state for its specific application requirements and procedures (www.adha.org/careerinfo/licensure, 2012).

The 2010 Joint Commission on National Dental Examination's Technical Report for The National Board Dental Hygiene Examination reported

In the licensing of dental hygienists in the US, all candidates for licensure must meet many criteria before they are licensed to practice in a state. Each state has the authority for issuing the license, although in dental hygiene, as in many other professions, national standards exist (p. 9).

Although it is to be expected that the nature and quality of instruction and learning while enrolled in the dental hygiene program will prepare the student for success on the written National Board Dental Hygiene Examination (NBDHE) and regional clinical exams, graduation from an accredited program does not ensure state licensure. The NBDHE and regional clinical exams are administered to ensure competency in dental hygiene knowledge and clinical skills.

As a branch of the American Dental Association (ADA), the Commission on Dental Accreditation (CODA) is the recognized accrediting body for dental, advanced dental, and allied dental education programs in the United States (CODA, 2007). The CODA “Accreditation Standards for Dental Hygiene Education Programs” consists of six standards developed for the following reasons: to protect the public welfare; to serve as a guide for dental hygiene program development; to serve as a stimulus for the improvement of established programs; and to provide criteria for the evaluation of new and established programs (CODA, 2007). The standards are national in scope, representing the minimum requirements for accreditation (CODA, 2007). As a specialized accrediting agency recognized by the dental profession and by the U.S. Department of Education, the goal of CODA is to improve the quality of dental hygiene education through the following policies: evaluate dental hygiene education programs on the basis of the extent to which program goals, institutional objectives, and approved accreditation standards are met; support continuing evaluation of and improvements in dental hygiene education programs through institutional self-evaluation; encourage innovations in program design based on sound educational principles; and provide consultation in initial and ongoing program development (CODA, 2007). The mission statement of the Commission on Dental Accreditation, revised January 30, 2001, is

The Commission on Dental Accreditation serves the public by establishing, maintaining, and applying standards that ensure the quality and continuous improvement of dental and dental related education and reflect the evolving practice of dentistry. The scope of the Commission on Dental Accreditation encompasses dental, advanced dental, and allied dental education programs (p. 3).

As of July 2009, the Commission on Dental Accreditation (CODA) accredited 309 dental hygiene programs (ADA Survey of Allied Dental Education, 2011). There are three types of entry level programs for dental hygiene: certificate, associate degree, and baccalaureate degree

programs. An essential requirement is successful completion of a high school program or its equivalent (ADA 2009-10 Survey of Allied Dental Educators, 2011).

Admission criteria vary among accredited dental hygiene programs in the United States. Grades are the most widely used criteria in the admission process at accredited dental hygiene education programs. Grade criteria cited by the ADA 2009-10 Survey of Allied Dental Educators are: high school science GPA; high school non-science GPA; overall high school GPA; college science GPA; college non-science GPA; overall college GPA with college GPA scores far out ranking high school GPA (2011). Overall college GPA (72.2% of programs) and college Science GPA (73.5% of programs) are the most regularly used GPA admission criteria for dental hygiene programs (ADA 2009-10 Survey of Allied Dental Educators, 2011). The survey included “other” as a category for criteria selection with the most common “other” criteria being: completion of high school specific courses taken (at the high school level); and GPA in required prerequisite classes (at the college level).

In addition to various high school and college GPA, some programs utilized additional criteria that factor into the admission decision. The various additional criteria reported by the ADA 2009-10 Survey of Allied Dental Educators (2011) were: American College Testing (ACT) scores, Scholastic Aptitude Test (SAT) scores; “other” test scores; manual dexterity exam; pre-admission interview; letters of recommendation; and dental office experience. Various entrance exams utilized were calculated in the “other” test scores. The different entrance exams were not specified (ADA 2009-10 Survey of Allied Dental Educators, 2011). Table 1 provides the ranking in a percentage form for the number of dental hygiene programs using GPA criteria in the Admission Process (ADA 2009-10 Survey of Allied Dental Educators, 2011). Worth noting, is the 150 (48.5%) dental hygiene programs that felt dental office experience was also an important

factor and took this into account during the admission process (ADA 2009-10 Survey of Allied Dental Educators, 2011). While GPA may be considered valid criterion, it does not take into consideration the institution where the GPA was earned and therefore does not level the field by utilizing a standardized criterion referenced test.

Table 1.

Admission Criteria/Number of Accredited Dental Hygiene Programs Using GPA, ACT, SAT, and Pre-admission Interviews for the Admission process, 2009-2010

High School	College	Other
Science GPA 22% DH Programs	Science GPA 74.4% DH Programs	ACT 33% DH Programs
Non Sciences GPA 10% DH Programs	Non Sciences GPA 48% DH Programs	SAT 19.1% DH Programs
Overall GPA 23.6% DH Programs	Overall GPA 72.1% DH Programs	Pre-Admission Interviews 31.1% DH Programs

The 2006 Dental Hygiene Education Program Director Survey (2008) conducted by the ADHA revealed the following insight relevant to the issue of recruiting and retaining dental hygiene students: a large pool of applicants, resulting in generally high application rates and generally low acceptance rates. Although admission criteria between programs differ, each program has the same goal; choosing applicants that not only succeed in their program, but will also pass post-graduation credentialing exams. The 2006 Executive Summary of Dental Hygiene Education Program Directors Survey (ADHA, 2008) indicated that most attrition was attributed to students dismissed for poor academic performance.

Statement of the Problem

One of the most difficult tasks for admissions committees of dental hygiene programs is the annual selection of students. Due to state licensure requirements, successful completion of a

dental hygiene program does not guarantee the granting of a license to practice dental hygiene. Due to limited enrollment in dental hygiene programs, the selection process becomes a challenge to ensure the most qualified applicants are chosen. The stress of failure, on high-stakes licensure credentialing exams, on students, their families, and educational institutions is also cause for concern. Previous studies have investigated the variables that predict success in dental hygiene programs and on subsequent credentialing exams (Alzahrani, Thompson, & Bauman, 2007; Bauchmoyer, Carr, Clutter, & Hoberty, 2004; Downey, Collins, & Browning, 2002; Gadbury-Amyot et al., 2005; Kissell, Moore, & Carr, 2008; Mills & Harmer-Beem, 2008; Ward, Downey, Thompson, & Collins, 2010; Williams, Schmidt, Tilliss, Wilkins, & Glasnapp, 2006). Variables investigated included: Scholastic Aptitude Test (SAT); American College Testing (ACT) scores; high school grade point average (GPA); high school science GPA; Dental Hygiene Aptitude test score; college science GPA, mock examinations, and college grades in pre-requisite coursework. The 2005 Gadbury-Amyot et al. study and the 2001 Patrick study were the only ones to address clinical licensure examinations and predictive validity of traditional and nontraditional dental competency assessment measures (Gadbury-Amyot et al., 2005; Patrick, 2001). All other studies addressed predictive variables for the NBDHE only. Predictive reliability of admission criteria is twofold: successful program completion as well as success on credentialing exams. As such, admission criteria play a vital role for dental hygiene program admissions committees.

Statement of the Purpose

Because admission criteria play a crucial role in applicant selection, choosing students that will successfully complete the program as well as the necessary credentialing exams is particularly crucial for admission committees. Previous studies have investigated the role of admission criteria as a predictor of academic success as well as success on written and clinical

credentialing exams for licensure. The purpose for conducting the study was to investigate and describe the relationship between applicant criteria and subsequent outcomes on credentialing exams: the NBDHE and the Southern Regional testing Agency (SRTA) clinical exam. The study had three elements: to investigate the relationship between the variables of age, undergraduate GPA and scores from the Psychological Services Bureau Health Occupations Aptitude Examination (PSB) and successful student performance on the NBDHE and a regional clinical exam, namely the Southern Regional Testing Agency, for graduates from an accredited dental hygiene program that awards an Associate's of Applied Science Degree in the mid-south United States; to validate the predictive value of the PSB entrance exam currently used as one of the admission criteria for the selected program; and to investigate the strength of the relationship of age, undergraduate GPA, and PSB scores as a predictor of program completion and subsequent success on credentialing licensure exams. Research will be conducted utilizing secondary data from an accredited dental hygiene program that awards an Associate's of Applied Science Degree in the mid-south United States.

Statement of Research Questions

In order to investigate the predictors of academic success for the NBDH and SRTA the research questions included:

1. What is the profile of the students from a mid-southern dental hygiene program that awards an Associate's of Applied Science degree? Profile data will include: age, undergraduate GPA upon admission to the program, and pre-entrance aptitude exam, PSB, score.

2. How the variable age predicts success on the written National Dental Hygiene Examination and Southern Regional Testing Agency Clinical Exam for graduates of a dental hygiene program?
3. How does undergraduate GPA predict success on the written National Dental Hygiene Examination and Southern Regional Testing Agency Clinical Exam for graduates of a dental hygiene program?
4. How does a pre-entrance aptitude exam score on the Psychological Service Bureau (PSB) Health Occupations Aptitude Exam predict success on the written National Dental Hygiene Examination and Southern Regional Testing Agency Clinical Exam for graduates of a dental hygiene program?

Definitions

The terms utilized in the study are defined below.

American College Test: ACT - A standardized college entrance examination that measures standard written English and rhetorical skills; mathematical skills; reading comprehension; the interpretation analysis, evaluation, reasoning, and problem-solving skills required in the natural sciences; and writing skills emphasized in high school English classes and in entry-level college composition (www.actstudent.org)

American Dental Association: ADA - The American Dental Association was founded in 1859 and is the oldest and largest national dental society in the world (www.ada.org). As the professional association of dentists, the ADA operates under the mission statement to foster the success of a diverse membership in order to advance the oral health care of the public (www.ada.org).

American Dental Education Association: The sole national organization representing academic dentistry, the American Dental Education Association is the voice of dental education. Members include students, faculty, staff, and administrators from all of the United States and Canadian dental schools, many allied and advanced dental education programs, and numerous corporations working in oral health education (www.adea.org).

American Dental Hygienists' Association: ADHA - The American Dental Hygiene Association is a national professional association formed in September, 1923 to govern dental hygienists in the United States (Motley, 1986). The American Dental Hygienists' association is recognized as the largest professional organization representing the interests of the more than 150,000 registered dental hygienists in the United States (www.adha.org).

Commission on Dental Accreditation: CODA is a branch of the ADA recognized by the U.S. Department of Education as the national accrediting body for dental, advanced dental and allied dental education programs in the United States (www.ada.org). As the accrediting body for dental education, CODA has standardized and guided dental and allied dental education for over a century (www.ada.org).

Competency: The skills, understanding, and professional values of an individual ready to begin practicing independently (Gadbury-Amyot et al., 2005).

Dental Hygiene Aptitude Testing Program: DHAT is a testing program initiated in 1956 by the American Dental Hygienist' Association to assist with the selection of students for entrance into dental hygiene programs to ensure success. It consists of four separate tests dealing with numeric ability, general knowledge of science, verbal-vocabulary, and study- reading of scientific information (Longenbecker & Wood, 1984; Motley, 1986).

Joint Commission on National Dental Examinations: JCNDE develops and conducts highly reliable state of the art cognitive examinations that assist regulatory agencies in making valid decisions regarding licensure or oral health care professionals, develops and implements policy for the orderly, secure, and fair administration of its examinations, and is a leader and resource in assessment for the oral health care profession. This branch of the American Dental Association administers the written National Board Dental Hygiene Examination. Technical reports are published by The Joint Commission on National Dental Examinations and are annual technical reports concerning the National Board Dental and Dental Hygiene Examinations in order to provide examination users with information to help them evaluate the validity of examination scores they interpret and use (Technical Report, The National Board Dental Hygiene Examination, 2010; ADA Update on National Board Dental Hygiene Examinations, 2012).

National Board Dental Hygiene Examination: NBDHE is a standard criterion-referenced written exam that every dental hygiene student/graduate must pass in order to obtain a license to practice. Students/graduates must score 75% or better (100% is the highest score possible) in order to pass this exam (www.ada.org).

Psychological Service Bureau: PSB - Health Occupations Aptitude Exam are entrance exams that are part of the application/entrance process for many dental hygiene programs. The Psychological Service Bureau Health Occupations Aptitude Exam is a popular pre-entrance exam that is utilized by many allied health occupations in the United States. The highest score that can be obtained on this exam is 380. The PSB Health Occupations Aptitude Exam measures the abilities, skills, knowledge, and attitudes important to successful performance by students interested in health-related

education programs. It is comprised of a battery of five tests in the following areas: academic aptitude (verbal, arithmetic, nonverbal); spelling; reading comprehension; information in the natural sciences; and a vocational adjustment index (www.info@psbtests.com).

Registered Dental Hygienist: RDH is a licensed oral health provider that has graduated from an accredited dental hygiene program or equivalent to an accredited program ((NBDHE Technical Report, 2010). In addition, the graduate must successfully pass national, regional and state credentialing exams in order to apply for a license to practice dental hygiene from the state governing body that regulates dental/dental hygiene practice.

SAT: - Previously known as the Scholastic Assessment Test, the SAT and SAT Subject Tests are a suite of tools designed to assess academic readiness for college by measuring the skills required for success in the 21st century. The SAT is used by many colleges for admission and course placement (satcollegeboard.org)

Southern Regional Testing Agency: The United States is divided into regions, with several states joining to form a region. Students/graduates must pass a regional board which includes the state that they wish to practice. The regional boards utilized for this study are the Southern Regional Testing Agency (SRTA). In order to obtain licensure, students must score 75% or better to pass the SRTA clinical boards, with 100% being the highest score (www.srta.org).

Survey of Allied Dental Education: The American Dental Association's Surveys of Allied Dental Education is completed annually by the director of dental hygiene programs that are accredited by the Commission on Dental Accreditation (CODA). The annual survey

gathers the following information; demographic data, class capacities, enrollment levels, graduate statistics, and tuition costs from allied dental education programs in the United States (American Dental Association Survey of Allied Dental Education, 2011). These annual surveys are conducted to support the accreditation of allied dental education programs by collecting trend information that in turn will be utilized in the Commission's scheduled site visits during the accreditation process (American Dental Association Survey of Allied Dental Education, 2011). Information obtained from the surveys is also used by CODA to continually monitor programs between site visits (American Dental Association Survey of Allied Dental Education, 2011). Because survey completion is a requirement for the accreditation process, a 100% response rate was obtained in December 2009 for all programs in full operation (American Dental Association Survey of Allied Dental Education, 2011).

Validity: Defined by the Standards for Educational and Psychological Testing as: "the degree to which evidence and theory support the interpretations of test scores entailed by proposed uses of tests". (American Educational Research Association, American Psychological Association, and National Council on Measurement in Education, 1999; apa.org).

Assumptions

The assumptions of the study were: 1) higher undergraduate GPA and higher PSB pre-entrance exams scores will correlate with higher scores on the NBDHE and SRTA clinical exam for an accredited dental hygiene program that awards an Associate's of Applied Science Degree; 2) higher undergraduate GPA and higher PSB pre-entrance exams scores will also be a predictor of success/higher scores on the NBDHE and SRTA clinical exam for an accredited dental

hygiene program that awards an Associate's of Applied Science Degree; 3) age may also be a predictor of success on the NBDHE and SRTA clinical exam in that older students are expected to score higher on the NBDHE and SRTA clinical exam for an accredited dental hygiene program that awards an Associate's of Applied Science Degree; and 4) data are accurate and will be provided in a manner appropriate to allow for statistical analysis.

A secondary assumption was that higher PSB pre-entrance exams scores are better predictor of success on the NBDHE and SRTA clinical exam than age and undergraduate GPA for an accredited dental hygiene program that awards an Associate's of Applied Science Degree. An underlying assumption was that higher PSB pre-entrance exam scores are a stronger predictor of success on the NBDHE but may not be as strong of a predictor for the SRTA clinical exam. Higher academic skills may not always correlate with better clinical skills and therefore may not correlate result in as strong of a positive correlation with SRTA clinical exam scores.

Delimitations and Limitations

Entrance criteria are standard procedures for the medical, dental, and allied health programs of study. The study investigated entrance criteria of a single associate's degree dental hygiene program in the mid-south United States. Although all dental hygiene programs have specific entrance criteria; the study investigated the following criteria: PSB scores, undergraduate GPA upon acceptance into the program, and age as an indicator of maturity for an accredited dental hygiene program that awards an Associate's of Applied Science Degree.

Predictors of academic success were limited to: completion of the program of study; to passing scores on the NBDHE; and passing scores on the SRTA clinical exam. Age as a predictor of success was measured as a maturity level (adult learner) but not in terms of a non-

traditional student. Dental hygiene education at this program is a lockstep cohort educational program and all students are on the same track.

The study did not investigate the validity of post-graduate credentialing exams or address the ongoing controversy surrounding the validity and reliability of clinical licensure examinations.

Significance of the Study

Professional programs of study differ from other academic disciplines due to credentialing exams which are required for licensure. Credentialing exams exist for disciplines such as: accounting; medical fields; nursing; law; dentistry; dental hygiene; and some technical fields. Due to limited enrollment in most professional programs, the relationship between discipline specific pre-entrance exams and credentialing exams may prove useful for other academic disciplines. Higher education may benefit from discipline specific pre-entrance aptitude exams. In addition such exams may aid entering college students to determine strengths and weaknesses in a way not identified by current college admissions exams namely the ACT and SAT.

Because licensure is the goal of dental hygiene education, the candidates most likely to succeed within the program and on credentialing exams must be identified by admissions committees. Due to the wide range of admission criteria used for dental hygiene programs throughout the United States, information gained will supplement the body of knowledge for all dental hygiene programs. Dental hygiene programs desire to efficiently identify the students who have the greatest potential for success within the dental hygiene programs as well as success on credentialing exams. Successful admissions criteria for dental hygiene programs will aid college administrators/admission committees in the following areas: to be better situated to respond to

questions of accountability by aligning students who will be successful with the programs in which they are best suited to complete; students can potentially be selected who are more likely to be successful and to learn better in these programs; faculty members will have to worry less about attrition, and can focus on the better preparation of dental hygiene students.

Information gained is also useful for dental hygiene programs in the United States who desire to adhere to the CODA Accreditation Standards for Dental Hygiene Educations Programs. CODA Accreditation Standard 1 addresses institutional effectiveness and Standard 1-1 addresses defining, planning, and assessment, as a formal and ongoing planning and assessment process that is systematically documented (CODA, 2007). Under Standard 1-1, measures of student achievement outcomes should be assessed and evidenced by: program completion rates, success of graduates on state licensing examinations, and success of graduates on national boards (CODA, 2007). CODA Accreditation Standard 2-3, which addresses policy/procedures for admissions, states

Admission of students must be based on specific written criteria, procedures and policies. Previous academic performance and/or performance on standardized national tests of scholastic aptitude or other predictors of scholastic aptitude and ability must be utilized as criteria in selecting students who have the potential for successfully completing the program. Applicants must be informed of the criteria and procedures for selection, goals of the program, curricular content, course transferability and the scope of practice of and employment opportunities for dental hygienists (CODA, 2007, p. 16).

The research results clarify the usefulness of current criteria for applicant evaluation and selection in order to enhance the selection process for an accredited dental hygiene program that awards an Associate's of Applied Science Degree. The resulting composite profile of classes since the inception of the program is helpful for future recruitment efforts for the program utilized for the study. In addition the legitimacy of utilizing the Psychological Service Bureau (PSB) Health Occupations Aptitude Exam was determined by the strength of the

relationship of PSB scores with the scores on the NBDHE and the strength of the relationship of PSB scores with the scores on the SRTA clinical exam for an accredited dental hygiene program that awards an Associate's of Applied Science Degree.

Chapter Summary

In order to utilize best practice for admission criteria, the study was conducted to investigate and describe the relationship between applicant criteria for a dental hygiene program and subsequent outcomes on credentialing exams: the National Board Dental Hygiene Exam and the Southern Regional Testing Agency clinical exam. Because admission criteria play a crucial role in applicant selection, choosing students, that will successfully complete the program as well as the necessary credentialing exams, is a particularly crucial task for admission committees.

Chapter II

Literature Review

An exhaustive review of the literature on this topic did not yield an abundance of previous studies. The libraries consulted were the Boreham Library at the University of Arkansas - Fort Smith and the Miller Library at the University of Arkansas Fayetteville. Literature searches were conducted using the following databases: Academic OneFile; Academic Search Premier; CINAHL Plus; ERIC via EBSCO; JSTOR; and Health Source. In addition to database searches the professional websites of the ACT, ADA, ADHA, ADEA, PSB, and SAT were consulted to gain surveys, technical reports and historical information on entrance criteria utilized for dental hygiene programs. The Journal of Dental Hygiene and the Journal of Dental Education yielded the best information from previous studies. Personal communication was also conducted via e-mail and phone conversations with personnel from SRTA, ADA, and ADHA to gather information and clarify information included in surveys and reports. Information utilized in this study includes: peer reviewed journals; books; technical reports; professional web-sites; and dental hygiene program surveys.

The major sections of the literature review include historical and current information for academic predictors of success including information on: NBDHE; SRTA; state boards of dentistry with regards to licensure; and failure rates for post-graduate credentialing exams. Entrance criteria to dental hygiene programs were contrasted and described to show the diversity of this process across the nation. Contrasted to the variations for entrance criteria, licensure credentialing exams are uniform for the United States on some if not all levels. Although the decision to license a dental hygienist is based on meeting many criteria, high-stakes credentialing examinations are provided as a safety net for public welfare and safety and could prevent a

candidate from practicing as a dental hygienist after other criteria for licensure have been met (ADA, 2010 Technical Report, 2011). As such, the entities administering these examinations as well of the admissions committees that choose students for entrance into a dental hygiene program bear a heavy responsibility.

Historical Perspective

As an oral health care provider, dental hygienists serve society by providing oral health services that contribute to the health and well-being of individuals (Joint Commission of National Dental Examinations, 2011). The nature and scope of dental hygiene practice have been rapidly changing in some areas and remained oppressively stagnant in others. The problems that face dental hygienists are multifaceted and rooted in the genesis of the profession. In order to provide a historical perspective of the profession of dental hygiene, *The History of The American Dental Hygienists' Association 1923 -1082* (1986) by Wilma E. Motley was consulted. Wilma Motley devoted much of her career to accumulating material in order to provide a rich history of the beginning of dental hygiene as a profession. *The History of The American Dental Hygienists' Association 1923 -1082* (1986) is recognized as the most exhaustive work chronicling the first sixty years of the profession.

The History of the Dental Hygiene Profession

The profession of Dental Hygiene began almost one-hundred years ago with a preventive oriented focus that was overlooked and disregarded in dentistry at the dawn of the early twentieth century. The Fones School of Dental Hygiene opened in 1913, in Bridgeport, Connecticut (Connecticut Dental Hygiene Association, 2007). Known as the “Father of Dental Hygiene”, Dr. Alfred Civilion Fones was a visionary leader ahead of his time when he trained Irene Newman to be the first dental hygienist (Connecticut Dental Hygiene Association, 2007).

Dr. Fones was concerned about the number of patients losing their teeth due to dental caries and periodontal disease. He coined the term dental hygienist rather than dental nurse to emphasize the importance of mouth cleanliness as a therapeutic regimen for the prevention and treatment of some oral diseases (Mingee, 2003). Esther Wilkins (2009) quotes Dr. Fones from the first textbook for dental hygienists:

It is primarily to this important work of public education that the dental hygienist is called. She must regard herself as the channel through which dentistry's knowledge of mouth hygiene is to be disseminated. The greatest service she can perform is the persistent education of the public in mouth hygiene and the allied branches of general hygiene (p. 5).

In 1915, Connecticut enacted a second amendment to its dental practice law to regulate the practice of dental hygienists and the field of operation of the dental hygienist was legally defined for the first time (Motley, 1986). As the first state to license dental hygienists, Connecticut issued Irene Newman the first license to practice dental hygiene on July 1, 1917 (Motley, 1986). The next state to allow the practice of dental hygiene was Massachusetts in 1915, followed by New York in 1916 (Motley, 1986). Other states followed suit with New Mexico and Texas being the last states to approve licensure in 1951 (Motley, 1986).

California dental hygienists presented a resolution to the American Dental Association for the formation of the American Dental Hygienists Association (ADHA) and were granted approval (Motley, 1986). As the young profession grew, legislation and education became the important issues of the ADHA. Because not all states licensed dental hygienists, the primary goal was to ensure legal practice for the profession in all states with standardization of requirements and performance to issue licensure (Motley, 1986). The first dental hygiene training programs of nine months to one year duration were deemed inadequate with more time needed for formal instruction (Motley, 1986). The first educational survey of dental hygiene curricula was

completed in 1931, with most respondents favoring a two year educational program and a few suggesting even longer (Motley, 1986). The response rate was considered large enough to validate the findings and by 1939 it was recommended that all dental hygiene programs be a minimum of two years (Motley, 1986).

The Origin of the Commission on Dental Accreditation

Standardization of dental hygiene education continued to be a concern. The process of dental hygiene accreditation began in 1952 with the initiation of an accreditation program specifically designed for dental hygiene educational programs (Motley, 1986). The Council on Dental Education was recognized as the national accrediting organization for dentistry and dental- related educational programs from 1940's until 1975 (CODA, 2007). The Council on Dental Education's accreditation authority was transferred to the Commission on Accreditation of Dental and Dental Auxiliary educational programs and in 1979 the name of the Commission was changed to the Commission on Dental Accreditation (CODA, 2007).

Dental Hygiene Aptitude Exams

After accomplishing the goals of a standardized curriculum, the Committee on Education of the Dental Hygienist considered the possibility of establishing a standardized testing program for admission to dental hygiene training programs (Motley, 1986). In 1954, 1,500 students from 29 of the 33 dental hygiene schools took a battery of aptitude tests as part of an experimental program being conducted by the American Dental Hygienists' Association with the guidance of the American Dental Association's Council on Dental Education (Motley, 1986). The purpose of the pilot program was to determine whether a nation-wide aptitude testing program for applicants to dental hygiene schools was feasible or needed (Motley, 1986). In 1955 preliminary plans were approved by the ADHA to establish a nationwide aptitude testing program for prospective dental

hygiene students (Motley, 1986). A pilot study for a dental hygiene aptitude testing program was proposed in 1956 by the Psychological Corporation of New York (Motley, 1986). Due to the unavailability of funding, from the Psychological Corporation, the ADA or the ADHA to conduct the study, funds were sought through a grant from the W.K. Kellogg Foundation (Motley, 1986). The resulting Dental Hygiene Aptitude Test (DHAT) consisted of four separate tests dealing with: numeric ability; general knowledge of science; verbal vocabulary; and study-reading of scientific information (Longenbecker & Wood, 1984). In 1959 a total of 1,339 applicants took the DHAT and 1,176 had been tested by the end of the 1960 (Motley, 1986). In the following years the aptitude examination became known as the Dental Hygiene Aptitude Testing Program. In 1972, the ADHA board approved and recommended that the Certifying Board of the American Dental Assistants Association assume responsibility for administering the Dental Hygiene Testing Program (Motley, 1986).

The Revised Psychological Services Bureau (PSB) Health Occupations Aptitude Exam is another popular entrance exam used by allied health professions. Originating in 1959, the Psychological Services Bureau continues to develop and produce psychological tests (Revised PSB - Health Occupations Aptitude Examination Technical Manual, 1994). The PSB Health Occupations Aptitude Exam is an aptitude examination that measures a combination of abilities and characteristics to demonstrate an individual's capacity to learn (Revised PSB - Health Occupations Aptitude Examination Technical Manual, 1994). The PSB Health Occupations Aptitude Exam measures the abilities, skills, knowledge, and attitudes important to successful performance by students interested in health-related education programs with a battery of five tests in the following areas: academic aptitude (verbal, arithmetic, and nonverbal); spelling; reading comprehension; information in the natural sciences; and a vocational adjustment index

(www.psb.org). All items in the Revised PSB Exam have been extensively reviewed and tested for bias against socio-economic groups, race, and sex (Revised PSB - Health Occupations Aptitude Examination Technical Manual, 1994). The 1994 Revised PSB - Health Occupations Aptitude Examination Technical Manual reports that the Psychological Services Bureau provides educational and psychological testing services for forty-three allied health practitioners.

In the years that followed some dental hygiene programs continued to use the Dental Hygiene Testing Program or the Psychological Services Bureau (PSB) Health Occupations Aptitude Exam while other programs discontinued aptitude testing altogether (ADA 2009- 10 Survey of Allied Dental Education, 2011). The review of the literature did not reveal information to address or explain why a dental hygiene program chooses to use a pre-entrance aptitude test or eliminate this as entrance criteria. Additionally, the review of the literature did not address why a specific pre-entrance aptitude exam was chosen over another. Worth noting is the fact that the only pre-entrance exams mentioned in the review of the literature was the Dental Hygiene Aptitude Test (DHAT) and the PSB Health Occupations Aptitude Exam.

Dental Aptitude Exams

Pre-entrance aptitude exams are common among other health professions, dentistry being no exception. The 2012 ADEA Official Guide to Dental Schools provides the following information regarding general admission requirements

Dental schools consider many factors when deciding which applicants to accept into their programs. Utilizing “whole” application review, admissions committees assess biographical and academic information provided by the applicant and by the undergraduate and graduate schools the applicant attended. These committees generally also assess the applicant’s results from the Dental Admission Test (DAT), grade point average (GPA), additional information provided in the application, letters of evaluation, and interviews (www.adea.org/publications/Pages/OfficialGuide, p. 14).

While dental school admission requirements vary from school to school, in contrast to dental hygiene programs, all U.S dental schools require students to take the Dental Admission Test (2012 ADEA Official Guide to Dental Schools). Designed to measure general academic ability, comprehension of scientific information, and perceptual ability, the DAT is conducted by the ADA and is administered at Prometric Testing Centers on computer in various sites around the country (2012 ADEA Official Guide to Dental Schools).

Credentialing Exams

Credentialing exams have evolved over the years. Credentialing exams are testimony to the rigors of dental hygiene educational programs and support the need for identification of best practices for the selection of students for admission into dental hygiene programs. As a requirement for licensure, dental hygiene credentialing exams serve to protect the public from unsafe oral health care providers by providing evidence of competence, not only in knowledge but also in the skills necessary to treat dental and oral diseases. Credentialing exams consist of the NBDHE and a regional or state clinical board examination. Credentialing exams for dental hygiene licensure are typically taken at or near program completion upon recommendation of the department chair/program director.

Licensure

In addition to credentialing exams, all practicing dental hygienists must obtain a license to practice dental hygiene. Licensure is the strongest form of regulation used today. Licensed individuals are the only ones who meet the qualifications necessary to practice their profession. Because licensure is granted on a state-to state basis, a hygienist's scope of practice must be within the parameters of the dental practice act of the state granting the license. State boards of dentistry utilize a dental practice act to regulate the practice of dentistry, dental hygiene, dental

assisting, and dental laboratories. As the regulating body for the dental profession they have the power to: revoke and/or suspend licenses; place practitioners on probation; impose fines; and conduct disciplinary hearings.

The NBDHE Credentialing Exam

In 1928, the National Board of Dental Examiners was established as a standing committee of the American Dental Association for the purpose of providing and conducting written examinations for use at the discretion of state boards of dentistry in licensing dentists (NBDHE Technical Report, 2010). In the 1950's interest grew for creating a written dental hygiene national board/exam (Motley, 1986). Prior to 1962, states gave achievement tests upon completion of dental hygiene educational programs. Upon recommendation of The Committee on Dental Education, a workshop was held to discuss the results of the achievement tests to date (Motley, 1986). The development of a National Board Examination for Dental Hygiene was considered at the workshop and in March 1961, the American Dental Association authorized development of a program for the examination (Motley, 1986).

Twenty two states indicated they would accept the National Board Certificate in lieu of the written examination given by their state board licensing agency (Motley, 1986). In April 1962, the first National Board Dental Hygienist Examination was given when the NBDHE program was introduced (Motley, 1983; NBDHE Technical Report, 2010). The results of the first examination reported the following: 1,569 took the examination; 993 were 1962 graduates; 576 were graduates of prior years; 1,490 passed the exam (Motley, 1983, p. 214). In 1966, *The Journal* (re-named *The Journal of Dental Hygiene* in 1972) reported that 40 of the 52 licensing boards accepted and used National Board Examination for Dental Hygiene and three more states were considering recognition (Motley, 1986). By 1990, all United States licensing jurisdictions

accepted the NBDHE as fulfillment of the written examination requirement for licensure (NBDHE Technical Report, 2010, p.5). Currently, all US licensing jurisdictions recognize National Board results. These jurisdictions include all 50 states, the District of Columbia, Puerto Rico, Guam, and the Virgin Islands of the United States (NBDHE Technical Report, 2011, p. 1).

The first NBDHE consisted of four examinations of 100 test items: each exam covered three subjects (NBDHE Technical Report, 2010). The exam format was changed in 1973 to a single comprehensive dental hygiene examination of approximately 400 test items organized around functions that a dental hygienist could be asked to perform: only functions that may be delegated to dental hygienists in a majority of states were covered (NBDHE Technical Report, 2010). The NBDHE was restructured again in 1998 to include two components totaling 350 items: 200 discipline-based items; and 150 case-based items (NBDHE Technical Report, 2011). The discipline-based component items address three major areas: scientific basis for dental hygiene practice; provision of clinical dental hygiene services, and community health/research principles (NBDHE Technical Report, 2011). The case-based component includes 150 case-based items that refer to twelve to fifteen dental hygiene patient cases which present information dealing with adult and child patients by means of: patient histories; dental charts; radiographs; and clinical photographs (NBDHE Technical Report, 2011). There is at least one patient case regarding geriatric, adult-periodontal, pediatric, special needs, and medically compromised patient for each exam (NBDHE Technical Report, 2011). Additionally the case-based items address knowledge and skills in the following areas: assessing patient characteristics; obtaining and interpreting radiographs; planning and managing dental hygiene care; performing periodontal procedures; using preventive agents; providing supportive treatment service; and professional responsibility (NBDHE Technical Report, 2011). The restructured NBDHE examination items cover functions

that a dental hygienist is expected to be able to perform and only functions that may be delegated to dental hygienists in a majority of states are included in the examination (NBDHE Technical Report, 2011). Test construction committees select the NBDHE examination items which have been constructed by examination constructors (NBDHE Technical Report, 2011). The examination constructors are appointed based on expertise in the following six areas: basic sciences; radiology; periodontics; dental hygiene curriculum; clinical dental hygiene; and community dental health (NBDHE Technical Report, 2011).

The Joint Commission on National Dental Examinations made considerable recent changes to the format of the National Dental Board Examinations for dental and dental hygiene students. Dr. Tsung-Hsun Tsai, manager research and development/psychometrics, reported that scores released in 2012 will no longer be reported as a percentage rather as a pass/fail (personal communication, October 14, 2011). Dr. Tsai also stated the following information will be reported in a new monthly format to dental hygiene programs: the difference between the program's z-score and the national average for each of the disciplines covered on the examination; the number of candidates taking the examination for the first time (dental hygiene program vs. nation); the percentage of candidates failing (dental hygiene program vs. nation); the difference between the program's z-score and the national average for each of the disciplines covered on the examination; and a bar graph showing the program's z-score relative to the national average for each of the disciplines covered on the examination (personal communication, October 14, 2011). This is contrasted to previous years program reports which included individual percentage scored for each student for each of the disciplines covered on the examination.

Eligibility for re-examination follows the following policy stated by the JCNDE in the 2012 Technical Report

Candidates who have passed the NBDHE may not retake the examination unless required to do so by a state board or relevant regulatory agency. Candidates who have not passed may apply for reexamination at any time. However, a minimum of 90 days must separate each re-examination attempt on the NBDHE. NBDHE candidates who have not passed an examination after three attempts will be required to wait 12 months after their third attempt before they can apply for re-examination. This policy includes any previous examination attempts. An examination attempt is defined as any examination administered where the candidate has been seated at a testing center and electronically agreed to the confidentiality statement to start the examination. After the 12-month waiting period has lapsed, a new cycle will apply. Candidates are encouraged to seek formal remediation before re-examination. Candidates shall be limited to successful completion of the NBDHE within five years of testing or five examination attempts, whichever comes first. This policy applies to testing attempts beginning January 1, 2012 (p. 6).

State Boards of Dental Examiners

State government agencies that administer dental hygiene licensure are typically called state boards of dentistry. State boards of dentistry accept specific regional clinical board examinations or administer their own clinical board exam (Dental Hygiene Clinical Examinations Summary, 2011). The candidate must apply for licensure from the state in which they wish to practice by providing evidence to the state board that they have graduated from an accredited dental hygiene program, passed the NBDHE, and passed the required clinical board (Dental Hygiene Clinical Examinations Summary, 2011). A jurisprudence exam is given by the individual state board of dentistry and addresses ethics as well as the scope of practice for dental hygiene specific to that state. The 2012 NBDHE Technical Report provides the following information regarding dental hygiene licensure, state boards of dentistry, and the NBDHE

Licensure of dental hygienists in the United States is the responsibility of an individual state, district or dependency. A license issued by one such jurisdiction is applicable only within the geographic confines of that particular jurisdiction. Specific dental hygiene licensure requirements vary among jurisdictions, but all

jurisdictions have three basic requirements: an educational requirement, a written examination requirement; and a clinical examination requirement. Most jurisdictions accept graduation from a dental hygiene program accredited by the Commission on Dental Accreditation (CODA) of the American Dental Association as fulfilling the educational requirement, and based on reciprocity, graduation from a Canadian dental hygiene program accredited by the Commission on Dental Accreditation of Canada (CDAC). The NBDHE is intended to fulfill or partially fulfill the written examination requirement, but acceptance of National Board results is completely at the discretion of the individual state. Currently, all US licensing jurisdictions recognize National Board results. These jurisdictions include all 50 states, the District of Columbia, Puerto Rico, Guam, and the Virgin Islands of the United States (NBDHE Technical Report, 2011, p.1).

The 2010 NBDHE Technical Report emphasized the importance and concern for validity for such high-stakes examination programs as validity relates to the degree to which logic and evidence support the interpretation and use of examination scores for making pass/fail decisions affecting candidates for licensure or certification. Objectivity is a critical step in setting the standard or pass/failing score, and is an important part of the overall exam validation process (Tsai, Neumann, & Littlefield, 2012). As such, The Joint Commission of National Dental Examinations realizes its obligation to inform state boards of dentistry that it is providing the highest quality examination programs possible to the best of its ability (NBDHE Technical Report, 2010). National, regional, and state credentialing exams are stressful and costly. The number of times credentialing exams may be repeated is limited and specific parameters must be followed in order to re-test. The trend in the failure rates for the NBDHE which are reported in the 2011 ADA Update on the National Board Dental Hygiene Examination are shown as a percentage in Table 2.

Table 2.
Trend in Failure Rates for the NBDHE 2001-2010
Expressed as a Percentages

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Failure Rate	5.8%	6.5%	5.0%	5.0%	5.6%	6.4%	4%	5%	4.2%	3.8%

Current practice for student eligibility for the NBDHE is determined by the dental hygiene program director (or designee), and certifies that the student is prepared for examination and is within four months of anticipated issuance of a dental hygiene diploma (NBDHE Technical Report, 2010). Graduates of an accredited dental hygiene program are eligible following the Joint Commission's receipt of evidence of graduation (NBDHE Technical Report, 2010). According to Judy L. Friend (personal communication, December 2, 2011) candidates for the NBDHE are eligible to submit an application to schedule a testing appointment upon approval by the dental hygiene program director (or designee). The dental hygiene program director deems the candidates eligible to take the NBDHE when candidates have satisfactorily completed coursework in all subjects presented on the NBDHE. Testing appointments are available year round per availability at the Pearson VUE testing centers.

As of January 1, 2012, limits placed on examination eligibility for the NDHE are limited to successful completion of an examination within five years of testing or five examinations attempts, whichever comes first (American Dental Association and Joint Commission on National Dental Examinations, 2012). Additional changes to the NBDHE include: the application eligibility period has been reduced from one year to six months; and score reports

will now include a history of scores for all examination attempts (ADA Update on NBDHE, 2012).

Clinical Exams as Credentialing Exams

Licensure also has a clinical exam component. Regional and state clinical dental hygiene examinations evaluate the clinical competency of candidates for dental hygiene licensure by providing a reliable third party assessment of candidates' clinical skills and are used by state dental boards in making valid licensing decisions (ADHA Dental Hygiene Clinical Examinations Summary, 2011). Clinical exams for dental hygiene programs evolved from the guidelines and standards that were already in place for dental schools in the United States. In 1973 The Clinical Evaluation Project was conducted by the ADHA through a government grant (Motley, 1986). As a subcommittee of the Committee on Dental Hygiene education, The Clinical Evaluation Project had the following goal

To find a means of offering a demonstration of a uniform method of clinical evaluation which would be open to all examiners of dental hygiene applicants for licensure nation-wide. The instrument should be a simple, easily learned, reliable rating index to assess clinical performance (Motley, 1983, p. 283).

Three years were devoted to developing a unique dental hygiene clinical board examination and the Clinical Evaluation Study was completed in 1978 (Motley, 1986). In order to evaluate the reliability and document the precision of the examination, the task force evaluated 348 actual board candidates (Motley, 1986). The current clinical exam format consists of skill-specific patient treatment in a clinical setting administered at various times throughout the year at various host institutions (ADHA Dental Hygiene Clinical Examinations Summary, 2011). Clinical exams are administered on a regional and/or state basis and require a passing grade determined by the examining agency. At this time there are five regional clinical exam testing agencies known as: Council of Interstate Testing Agencies (CITA); Central Regional Dental Testing Service

(CRDTS); North East Regional Board of Dental Examiners (NERB); Southern Regional Testing Agency (SRTA); and Western Regional Examining Board (WREB); (ADHA Clinical Hygiene Examinations Summary, 2011). Four states, California, Delaware Florida and Nevada, administer independent exams; however, California and Nevada also accept WREB while Delaware and Florida only accept their independent clinical exam for state licensure (ADHA Clinical Hygiene Examinations Summary, 2011). The following clinical exams: CITA; CRDTS; NERB; SRTA; and WREB all require a score of 75% or higher to pass the clinical examination (ADHA Clinical Hygiene Examinations Summary, 2011). NERB is the only agency that administers the American Dental Hygiene Licensing Examination; the dental hygiene examination approved by the American Board of Dental Examiners, Inc. (ADHA Clinical Hygiene Examinations Summary, 2011). The American Dental Hygiene Licensing Examination is a private not-for-profit consortium of state and regional dental boards with a mission to provide the dental community a national uniform dental and dental hygiene clinical licensure examination (ADHA Clinical Hygiene Examinations Summary, 2011). Some of the stakeholders for dental and dental hygiene education advocate for a uniform national licensing agency. While regional and/or state clinical exams have much in common, they differ in the following areas: patient treatment selection requirements; radiographic component; computerized component; permitted administration of local anesthesia; and exam scoring (ADHA Clinical Hygiene Examinations Summary, 2011). Due to these regional differences, a national licensing agency would require collaboration among regions that may not be possible unless there is an organized effort among the various stakeholders. Reciprocity for licensure is granted in some states based on factors such as previous boards taken and number of years in practice.

Controversy continues to surround the need for a clinical exam. There are dental hygiene educators who feel that clinical exams are not necessary. Their argument is: if a student successfully completes program requirements from a program accredited by the Commission on Dental Accreditation, why ask students to prove competence by performance on a one-shot clinical exam. The rationale for regional and/or state clinical boards provided by the ADHA is

Regional and state clinical dental hygiene examinations are administered to evaluate the clinical competency of candidates for dental hygiene licensure. Clinical examinations provide a reliable third party assessment of candidates' clinical skills and are used by state dental boards in making valid decisions" (ADHA Clinical Hygiene Examinations Summary, 2011, p. 2).

Southern Regional Testing Agency Clinical Exam Success Rates

The clinical exam utilized for the study was the Southern Regional Testing Agency (SRTA). The following information was obtained through personal communication with Suzanne Y. Porter, SRTA Senior Manager, Examination Division, on March 15, 2012.

SRTA was incorporated in 1975 and member states included: Virginia; Kentucky; Tennessee; and Arkansas. In 1993 Georgia became a member. In 1996 South Carolina became a member. In 2003 West Virginia joined SRTA. In December, 2005 Georgia leaves SRTA. SRTA examiners are current and previous dental board members of the member states. After three unsuccessful examination attempts, the candidate must contact the state in which he/she plans to seek licensure and request a letter of approval/permission for a fourth examination attempt. This letter must be submitted with the SRTA application for examination. The same procedure is followed for all subsequent examination attempts.

Pass fail rates for 2008 – 2011 were also provided by personal communication with Ms. Porter and are displayed in Table 3.

Table 3.
*Pass Fail Rates for SRTA Clinical Exams
 Administered January- June 2008-2011*

Year	Total # of 1 st Time Attempt	Passed 1st Attempt	% Passing on 1 st Attempt	Passed 2nd Attempt	% Passing on 2 nd Attempt	Passed 3rd Attempt	% Passing on 3 rd Attempt
2011	524	452	87%	31	6%	1	0%
2010	594	520	88%	100	17%	3	1%
2009	530	438	83%	78	15%	5	1%
2008	585	554	95%	13	2%	0	0%

Student Success Rates Reported by ADA

As with other professional programs, dental hygiene programs are of limited capacity. The following was reported in 2011 by the American Dental Association 2009-10 Survey of Allied Dental Education: first-year capacity in dental hygiene programs increased 12 percent from 7,696 in 2005-2006 to 8,620 in 2009-2010; first year enrollment increased 6.3 percent from 7,323 in 2005-2006 to 7,784 in 2009-2010 (p. 3). For the reporting period of 2005-2006 to 2009-2010 no program reported full capacity enrollment. The American Dental Association 2009-2010 Survey of Allied Dental Education noted that programs that have no defined capacity or enroll students continuously throughout the year (open-ended enrollment) are excluded from the capacity totals (2011). The American Dental Association 2009-2010 Survey of Allied Dental Education did not offer details for lack of capacity enrollment for the program

report. The American Dental Association 2009-10 Survey of Allied Dental Education (2011) reported the following outcomes assessment for dental hygiene class of 2008

Of the 7,029 students originally enrolled in the dental hygiene class of 2008 at schools where complete information was available, 6,158 (87.6 percent) completed the program. Of those that completed the program, 98.8 percent passed written national board exams, 98.5 percent passed state/regional board exams, and 92.2 percent were participating in dental or dental related activity for which they were trained, or were in further dental or dental-related education as of the survey date (p. 97).

While the overall success rates for licensure credentialing exams may be considered acceptable, the program completion rate is cause for concern.

Retention and Success on Post Graduate Credentialing Exams

Due to the lock-step nature of dental hygiene programs, it is difficult if not impossible to replace students who drop out or are not retained due to academic failure. Previous studies have investigated predictors of student success for dental hygiene programs. One of the first studies conducted by Longenbecker and Wood (1984) investigated the 1978-1981 graduates of the Dental Hygiene Program of Lima Technical College in Ohio. The NBDHE scores served as the criterion variable to compare the predictive validity of the DHAT and the tests of the ACT Assessment Program (Longenbecker & Wood, 1984). The results of the study revealed the DHAT as more predictive of the NBDHE scores than the ACT Assessment tests (Longenbecker & Wood, 1984). The DHAT- Science and DHAT - Verbal tests combined to produce the highest multiple - correlation with the NBDHE scores ($r = .46$) while the Composite score from the ACT and the Science test of the ACT produced correlations of .26 and .28, respectively, with NBDHE scores (Longenbecker & Wood, 1984). Worth noting is the fact that many schools identified the ACT Assessment program as their “other” criteria used in the admissions process (ADA 2009-10 Survey of Allied Dental Education, 2011).

Bauchmoyer, Carr, Clutter, and Hoberty (2004) examined the relationship between pre-admission requirements, basic college science requirements, site of academic preparation, cumulative dental hygiene GPA and the NBDHE score from 173 graduates of the dental hygiene program at Ohio State University from 1998 through 2002. Their results supported the continued use of the three science GPA pre-requisite and entering GPA for predicting success in the Ohio State University Dental Hygiene program and on the NBDHE but did not examine the relationship between pre-admission requirements and success on clinical board exams (Bauchmoyer et al., 2004). Alzahrani, Thompson and Bauman (2007) measured the utility of various predictors used by the Old Dominion University Gene W. Hirschfield School of Dental Hygiene Baccalaureate Degree Dental Hygiene Program. The goal of the study was to select dental hygiene students most likely to graduate and be successful in passing the NBDHE (Alzahrani et al., 2007). The academic records of dental hygiene students admitted to the program from 1998 to 2002 (n = 235) were examined with the following: GPA; science GPA; final grade in various prerequisite courses; final grade in first-year dental hygiene courses; academic setting where prerequisite courses were completed; multiple attempts to achieve a passing course grade; and admission criteria points (Alzahrani et al., 2007). Their study concluded that final grades in oral pathology and oral anatomy and histology can significantly predict graduation and NBDHE success at this institution; however these predictors are from courses taken after acceptance into the program and as such are not useful for applicant selection (Alzahrani et al., 2007). DeWald, Gutmann, and Solomon investigated the effect of GPA and enrollment in a dental hygiene national board review course on student performance on the NBDHE (2004). While the study did find a strong correlation (0.71, Pearson r) between exiting GPA and NBDHE score, the results did not appear to support participation in an external

preparation course as a means of increasing student's performance on the NBDHE (DeWald, et al., 2004). In a study conducted at the University of Maryland, undergraduate (entering) science GPA was the strongest predictor of performance on the NBDHE (DeWald, et al., 2004).

Downey, Collins, and Browning (2002) studied 134 individuals comprising the 1996-2001 dental hygiene graduating classes of the Medical College of Georgia ranging in age from nineteen to forty-five years of age. They compared five cognitive admissions criteria variables: incoming college GPA; incoming math/science college GPA; total Scholastic Aptitude Test (SAT) score; verbal SAT score; and math SAT score with NBDHE scores and dental hygiene GPA at graduation (DeWald, et al., 2004). They reported that the most efficient model to predict NBDHE performance at this institution included only the incoming college GPA and that total SAT scores did not add significantly to the ability to predict performance on the NBDHE (DeWald, et al., 2004). Based on the findings they question the usefulness of the total SAT scores in the admissions process (DeWald, et al., 2004). In a follow-up study, Ward, Downey, Thompson, and Collins (2010) investigated academic information from students in the 2002 to 2007 dental hygiene graduating classes of the Medical College of Georgia using the same variables as the previous study. A moderate correlation ($r = .581, p = .01$) was found for predicting dental hygiene GPA and a moderate correlation ($r = .465, p = .01$) was found for predicting NBDHE scores. Based on the results, they recommended the current admissions criteria remain in place and to implement a formal remediation program for academically weaker students after completing the first year of the dental hygiene program (Ward, et al., 2010). They did not provide information for the nature and structure of the remediation program. Gadbury-Amyot et al., in a study to address predictors of success on clinical licensure examinations, utilized: overall GPA; clinical GPA; NBDHE scores; Central Regional Dental Testing Service

(CRDTS) scores; and nontraditional assessment data in the form of portfolio scores to assess the predictive validity of the measures on clinical licensure examination (Gadbury-Amyot, et al., 2005). This study questioned the ability of a one-shot initial clinical licensure examination as sufficient evidence to evaluate clinical competency to begin practicing independently (Gadbury-Amyot, et al., 2005). Studies which address inconsistencies between student performance at accredited schools and performance on clinical licensure, as well as the ongoing controversy surrounding the validity and reliability of clinical licensure examinations were addressed in the Gadbury-Amyot study (Gadbury-Amyot, et al., 2005). They conclude a lack of concordance between previously validated measures of dental hygiene student competency predictors of student success and a one-shot clinical licensure examination; the CRDTS. Additionally they expressed concern about the validity of current dental hygiene licensing procedure to make decisions about granting licenses to practice (Gadbury-Amyot, et al., 2005). In a brief study by Beatty and Ray (2001) success rates of candidates who initially failed the Western Regional Examination Board (WREB) from 1997 to 1999 were investigated. Of the 311 graduates examined, the success rate for graduates taking the exam for the first time was 89% (N = 277) (Beatty & Ray, 2001). Thirty-two of the thirty three graduates that took WREB a second time were successful with a time lapse of over two months between exams (Beatty & Ray, 2001). Due to the high success rate on the second examination attempt Beatty and Ray (2001) also question the validity of clinical examination for licensure and conclude that the validity and reliability of using clinical boards as the ultimate indicator of dental hygiene entry level competency deserves research by the dental hygiene profession. A statistical analysis was conducted for dental hygiene students in online and on-campus courses and performance on the NBDHE by Bearden, Robinson, and Deis (2002). The results indicated a weak r^2 value (0.291)

for GPA as a predictor of course performance and a low r^2 value (0.074) for GPA as a predictor of the NBDHE score (Bearden, Robinson, & Deis, 2002). They also reported no difference in course average and performance on NBDHE tests between the online and on-campus students (Bearden, et al., 2002). In a Delphi study of dental hygiene program directors, Patrick (2001) concluded that dental hygiene clinical competence is best determined throughout a continuum of process and product examinations, rather than a one-time product evaluation. Patrick also acknowledged the CODA accreditation process for dental hygiene programs as an important element in standardizing the assessment of clinical competence (2001).

Chapter Summary

Entrance criteria are unique to each program, with some form of GPA being the most common entrance criteria utilized and ACT scores and SAT scores being the next most common criteria (ADA 2009-10 Survey of Allied Dental Education, 2011). In order to select the best candidates for entrance into a dental hygiene programs, it would seem a “best practice” should be developed from the review of the literature based on those programs with the best program outcomes: retention; graduation; and successful completion on post-graduate credentialing exams. The study was conducted at a mid-south university awarding an AAS Degree in Dental Hygiene. The current entrance criteria; age, college GPA; and scores on the PSB pre-entrance exam were investigated.

Chapter III

Methods

Entrance criteria to admit students into dental hygiene programs are varied among dental hygiene programs in the US with no set criteria being defined. Undergraduate GPA is a deciding factor in the selection process for many dental hygiene programs in the United States. Entrance exams to determine aptitude are part of the application and selection process for some dental hygiene programs. However some programs do not require an entrance exam but use high school GPA or pre-requisite course GPA. Stakeholders have not defined set criteria for this process nor is there a consensus on the best practice/predictors.

Previous studies have been conducted to determine the relationship of entrance criteria with retention in the program and/or success on post-graduation credentialing exams. Most were conducted to determine the relationship of entrance criteria with retention in the program and success on the NBDHE. Only two studies addressed the relationship of entrance criteria with success on a post-graduate clinical credentialing exam. The study focused on the variables of age, PSB score and entrance undergraduate GPA as predictors for success on both post-graduate credentialing exams: NBDHE and SRTA.

The study investigated a mid-south dental hygiene program which utilizes a quality point system and an interview score for the applicant selection process. Quality/ranking points are a number value assigned to the grade a student makes in a course taken. To calculate the quality points for a course, you multiply the value of each grade (i.e., A = 4, B = 3, and C = 3) times the number of credit hours for the course. For example, an “A” in a 3 credit hour course would be calculated as; 4 (“A”) x 3 credit hours = 12 quality points. Interviews are granted to the top 25 students based on the quality/ranking points from the GPA in pre-requisite courses and any

additional courses on the dental hygiene degree plan and the PSB score. The interview is scored and the following equation is utilized to select the top 16 for admittance into the program: Quality/ranking points are added to the interview points and the sum is multiplied by 0.25; the result is the final score. See appendix B for a sample interview scoring rubric. Selection is based on the following weighted system: Quality Points 35% (points earned for prerequisites and any additional courses on the dental hygiene degree plan); score earned on the PSB Exam 35%; and interview score 30%. College credit through CLEP or AP for a course will not be used for ranking purposes. Because the program admits sixteen students per academic year, the selection process is competitive. The qualified applicant pool varies from approximately fifty to sixty-five qualified applicants per year. Based on the quality point system, the top twenty five applicants are granted an interview. The quality points are then re-calculated to include the interview points. After the re-calculation, the top sixteen applicants admitted into the program.

The NBDHE is a standard written exam that every dental hygiene graduate in the United States must pass in order to obtain a license. Graduates must score 75 percent or better with 100 percent being the highest score. This exam establishes criteria for hygienists who seek licensure to practice. Since its adoption in 1962, the NBDHE has been administered in many forms (American Dental Association, 2002). The format was changed in 1998 to improve assessment of effective integration and application of basic science content and clinical relevance (NDHE Technical Report, 2010). Part I of the NBDHE assesses the dental hygiene student's comprehension from the dental hygiene curriculum in the following subtests: Anatomical Science; Physiology; Biology; Nutrition; Microbiology and Immunology; Pathology; Pharmacology; Patient Assessments; Radiology; Dental Hygiene Care; Periodontology; Preventive Agents; Supportive Treatments; Professional Responsibility; and Community Dental

Health. Part II assesses the student's ability to comprehend significant information from case based scenarios to answer questions related to patient care (American Dental Association, 2002).

The United States is divided into regions. Four or five states join forces to form regional testing agencies. Students/graduates must pass a regional clinical exam which includes the state in which they wish to practice. The SRTA clinical exam member states include: Arkansas; Kentucky; Tennessee; South Carolina; West Virginia; and Virginia (Dental Hygiene Clinical Examinations Summary, 2911). States accepting the SRTA clinical exam as a fulfillment of the clinical board requirement are: Alabama; Arkansas; Colorado; Connecticut; District of Columbia; Illinois; Indiana; Kansas; Kentucky; Louisiana; Maine; Massachusetts; Missouri; Montana; New Hampshire; New Mexico; Ohio; Pennsylvania; Rhode Island; South Carolina; Tennessee; Texas; Utah; Virginia; West Virginia; and Wyoming (Dental Hygiene Clinical Examinations Summary, 2911). In order to obtain licensure, students must score 75 percent or better to pass the SRTA clinical exam, with 100 percent being the highest score. The clinical exam is a hands-on application of clinical skills. Students must provide a patient that meets specific exam criteria. After a check in procedure, to assure the patient meets qualification criteria, the student performs the required procedure in a specified amount of time. The patient is assessed once again by SRTA examiners to ensure competency for clinical skills.

The purpose of this study was to examine the existence of a relationship between the variables of age, undergraduate grade point average (GPA) and scores from the Psychological Services Bureau Health Occupations Aptitude Examination (PSB) and successful student performance on the written NBDHE and regional clinical exam, namely the SRTA clinical exam for graduates of a mid-south dental hygiene program awarding an AAS in Dental Hygiene. This information defines criteria for applicant evaluation and selection and will enhance the selection

process. It provides composite profiles of classes since the inception of the program which are valuable for future recruitment/retention efforts. Success in selecting dental hygiene students was measured by those who graduate and complete national and regional clinical exams. Identifying best practices for admissions committees is helpful for future students as well as dental hygiene programs. Predictors of successful program completion will serve as predictors of program retention.

Sample

This study was conducted at a dental hygiene program awarding an AAS Degree in the mid-south United States. The program utilized for the study began in 1999 accepting 12 students per year. In 2004 the program increased class size to 16 students per year. In the 13 year history of the program eleven students did not complete the program. The sample size is approximately $n=156$. The sample size is adequate for generalizability. Gender was not utilized as a variable. To date only two male students have entered the program. One withdrew from the program after approximately six weeks; one is currently enrolled with an anticipated graduation date of 2013. The range for student age during this study was; twenty years to forty-two years of age. The sampling technique was justified because the results allowed the researcher to determine the extent to which undergraduate GPA, age and the PSB should be considered for future applicants. The results add to the body of knowledge regarding the justification for a pre-entrance exam.

Design

A nonexperimental quantitative correlational study was conducted to determine the extent and the direction of the relationship between the independent variables: age, undergraduate grade point average, and PSB score to the dependent variables: NBDHE scores and SRTA clinical exam scores. Two or more quantitative variables from the same group of subjects justified a

correlational study. Correlational research defined the study design due to: gathering data from individuals on two or more variables to determine if the variables are related; the extent to which the variables are related either directly which yields a positive correlation or inversely which yields a negative correlation (Ary, Jacobs, & Sorensen, 2010). In addition to the direction of the relationship, the strength of the relationship was determined. The Pearson product moment correlation coefficient (Pearson r) was appropriate due to the variables being measured on an interval or ratio scale (Ary et al., 2010). Due to limited class size and competitive selection into dental hygiene programs the variability of the criteria variables was somewhat limited because students with higher entrance criteria were chosen. However, the Pearson r was applicable in order to determine if a relationship existed and the strength of the relationship between the criteria variables and the NBDHE scores and if a relationship existed and the strength of the relationship between entrance criteria and the SRTA clinical exam. While correlation does not necessarily indicate causation, or that changes in one variable are caused by changes in the other variable, it does indicate that relative positions in one variable are associated with relative positions in the other variable (Ary et al., 2010).

Instrumentation

Archival/secondary data was utilized for the study, the target population was the students who were accepted and successfully completed an AAS Degree in Dental Hygiene at a mid-south university in the United States and completed the NBDHE and the SRTA clinical exam. Since the inception of the program the following data has been collected for each applicant: PSB scores, age, undergraduate GPA, NBDHE scores, and SRTA clinical exam scores. This data is owned by a mid-south university that awards an AAS Degree in Dental Hygiene. The variables: age; PSB scores; undergraduate GPA; NBDHE scores; and SRTA clinical exam scores were

utilized with permission from the Dean of the College of Health Sciences. All scores and undergraduate GPA were entered anonymously to maintain anonymity of the students. Because archival data was utilized for this study, the following Human Subjects Considerations were included the following:

1. Approved application to Human Subjects in Research Review Committee of the University of Arkansas – Fort Smith (IRB).
2. Approved application to Human Subjects in Research Review Committee of the University of Arkansas at Fayetteville (IRB).
3. Approval from the Dean of the College of Health Sciences at a dental hygiene program awarding an AAS Degree in the mid-south United States.

Collection of Data

Using a de-identified retrospective dataset, scores were obtained from a dental hygiene program awarding an AAS Degree in the mid-south United States for the graduating classes of 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, and 2011. The dataset was comprised of 156 graduates with pre-entrance PSB scores and NBDHE scores. Due to archival data being used, subjects were not contacted. All information was entered anonymously to maintain anonymity of students for this non-experimental research design.

Data Analysis

Data from the archives a dental hygiene program awarding an AAS Degree in Dental Hygiene from a mid-south university were coded and entered into an excel spreadsheet. Data was transferred to SPSS statistical software to investigate the following:

1. The relationship of entrance undergraduate GPA and performance on the NBDHE and the SRTA clinical exam.

2. The relationship of age on performance on the NBDHE and the SRТА clinical exam.
3. The relationship of PSB Health Aptitude Test scores on performance on the NBDHE and the SRТА clinical exam.

The independent continuous variables; age, PSB score, and undergraduate GPA were used as a predictor of success for the continuous dependent variables; NBDHE scores and SRТА clinical exam scores. In order to investigate the predictors of academic success for the NBDH and SRТА the research questions were:

1. What is the profile of the students from a mid-southern dental hygiene program that awards an Associate's of Applied Science degree? Profile data included: age, undergraduate GPA upon admission to the program, and pre-entrance aptitude exam, PSB, score.
2. How the variable age predicts success on the written NBDHE and the SRТА clinical exam for graduates of a dental hygiene program?
3. How undergraduate GPA predicts success on the written NBDHE and the SRТА clinical exam for graduates of a dental hygiene program?
4. How a pre-entrance aptitude exam score on the Psychological Service Bureau (PSB) Health Occupations Aptitude Exam predicts success on the written NBDHE and the SRТА clinical exam for graduates of a dental hygiene program?

PSB, SRТА, and NBDHE exam scores, along with entrance GPA and age were entered into a series of multiple regression formulas to determine those equations that most accurately predict the written NBDHE and the SRТА clinical exam scores. Descriptive statistics provide the mean and standard deviation for all variables: entrance undergraduate GPA age; PSB scores; NBDHE scores and SRТА clinical exam scores. Pearson Product Moment Correlation

coefficient (Pearson's r) (.10 alpha) was conducted to determine the relationship between age, GPA, and PSB scores with scores on the written NBDHE the SRTA clinical exam. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity (Pallant, 2010). Because several variables were utilized, multiple regression procedures were performed to find the best possible weighting of two or more dependent variables, NBDHE scores and SRTA clinical exam scores, to yield a maximum correlation with a single independent variable, age, PSB score, and undergraduate GPA (Ary et al., 2010). Multiple regression allowed the researcher to predict a single dependent continuous variable from a group of independent variables and test the predictive power of a set of variables in order to assess the relative contribution of each individual variable (Pallant, 2010). The coefficient of determination calculated how much variance the variables share.

Chapter Summary

Successful completion of the dental hygiene program does not ensure licensure to practice. Upon graduation from an accredited dental hygiene program the student must also successfully complete the written NBDHE Parts I and II, and a regional clinical exam; SRTA. For these exams the student must achieve a score of 75% or higher. The number of times that both exams can be re-taken is limited and proof of remediation must be shown. Due to limited enrolment in dental hygiene programs the selection process is a challenge to ensure the most qualified applicants are chosen. It is to be expected that the nature and quality of instruction and learning while enrolled in the dental hygiene program will prepare the student for success on the written NBDHE and the SRTA clinical exam. The data analysis identified the best use of entrance criteria for acceptance of dental hygiene students into a limited enrollment dental hygiene program for retention in the program and success on credentialing exams to ensure

licensure.

An expected outcome was that students with higher GPA and PSB scores were a predictor of success on the NBDHE. However higher academic skills were not always correlated with higher scores for the clinical exam and therefore were not as strong of a predictor for the SRTA clinical exam. The research analysis allowed the researcher to determine the extent, if any, that age upon entrance to the program was a predictor for successful scores for the NBDHE and the SRTA clinical exam.

Chapter IV

Results

This chapter presents the results of the statistical analyses of archival/secondary data that was utilized for the study of the academic predictors of success on the NBDHE and SRTA clinical exam for the four research questions previously presented in Chapter I. Included in the data analysis section are the descriptive statistics of the continuous independent variables: age; undergraduate GPA; and PSB score; as well as the continuous dependent variables: NBDHE scores and SRTA clinical exam scores. Data were anonymously entered into SPSS® and analyzed using descriptive and inferential statistics to answer each research question. Analyses were performed for 130 graduates of the program. Seven of graduates did not take the SRTA clinical exam and were excluded from the analyses. Additionally two students that took the SRTA exam had missing scores for the PSB exam and were excluded from the analyses. The result was a clean data set for 130 graduates from a mid-south University awarding an AAS degree in dental hygiene.

Summary of the Study

Because admission criteria play a crucial role in applicant selection, choosing students that will successfully complete the program as well as the necessary credentialing exams is particularly crucial for admission committees. Due to limited enrollment in dental hygiene programs, the selection process becomes a challenge to ensure the most qualified applicants are chosen.

One of the most difficult tasks for admissions committees of dental hygiene programs is the annual selection of students. Due to state licensure requirements, successful completion of a dental hygiene program does not guarantee the granting of a license to practice dental hygiene.

Credentialing exams are testimony to the rigors of dental hygiene educational programs and support the need for identification of best practices for the selection of students for admission into dental hygiene programs. As a requirement for licensure, dental hygiene credentialing exams serve to protect the public from unsafe oral health care providers by providing evidence of competence, not only in knowledge but also in the skills necessary to treat dental and oral diseases. Credentialing exams consist of the NBDHE and a regional or state clinical examination. Credentialing exams for dental hygiene licensure are typically taken at or near program completion upon recommendation of the department chair/program director.

Previous studies have investigated the variables that predict success in dental hygiene programs and on subsequent credentialing exams (Alzahrani, Thompson, & Bauman, 2007; Bauchmoyer, Carr, Clutter, & Hoberty, 2004; Downey, Collins, & Browning, 2002; Gadbury-Amyot et al., 2005; Kissell, Moore, & Carr, 2008; Mills & Harmer-Beem, 2008; Ward, Downey, Thompson, & Collins, 2010; Williams, Schmidt, Tilliss, Wilkins, & Glasnapp, 2006). Variables investigated included: Scholastic Aptitude Test (SAT); American College Testing (ACT) scores; high school grade point average (GPA); high school science GPA; Dental Hygiene Aptitude test score; college science GPA, mock examinations, and college grades in pre-requisite coursework. The 2005 Gadbury-Amyot et al. study and the 2001 Patrick study were the only ones to address clinical licensure examinations and predictive validity of traditional and nontraditional dental competency assessment measures (Gadbury-Amyot et al., 2005; Patrick, 2001). All other studies addressed predictive variables for the NBDHE only. Predictive reliability of admission criteria is twofold: successful program completion as well as success on credentialing exams. As such, admission criteria play a vital role for dental hygiene program admissions committees.

This study was focused on the variables of age, PSB score and undergraduate GPA upon

entrance into the program as predictors for success on both post-graduate credentialing exams: NBDHE and SRТА. Because licensure is the goal of dental hygiene education, the candidates most likely to succeed within the program and on credentialing exams must be identified by admissions committees.

The target population was the students who were accepted and successfully completed an AAS Degree in Dental Hygiene at a mid-south university in the United States and successfully completed the NBDHE and the SRТА clinical exam. Since the inception of the program the following data has been collected for each applicant: PSB scores, age, undergraduate GPA, NBDHE scores, and SRТА clinical exam scores. This data is owned by a mid-south university that awards an AAS Degree in Dental Hygiene. The variables: age; PSB scores; undergraduate GPA; NBDHE scores; and SRТА clinical exam scores were utilized with permission from the Dean of the College of Health Sciences. All scores and undergraduate GPA were entered anonymously to maintain anonymity of the students. The quantitative data consisted of: age; undergraduate GPA; PSB score; NBDHE score; and SRТА clinical exam score. Each research question is listed with the equivalent analysis results. The chapter concludes with a chapter summary.

The purpose for conducting the study was to investigate and describe the relationship between applicant criteria and subsequent outcomes on credentialing exams: the NBDHE and the Southern Regional Testing Agency (SRТА) clinical exam. The study had three elements: to investigate the relationship between the variables of age, undergraduate GPA and scores from the Psychological Services Bureau Health Occupations Aptitude Examination (PSB) and successful student performance on the NBDHE and a regional clinical exam, namely the Southern Regional Testing Agency, for graduates from an accredited dental hygiene program that awards an

Associate's of Applied Science Degree in the mid-south United States; to validate the predictive value of the PSB entrance exam currently used as one of the admission criteria for the selected program; and to investigate the strength of the relationship of age, undergraduate GPA, and PSB scores as a predictor of program completion and subsequent success on credentialing licensure exams. Research was conducted utilizing secondary data from an accredited dental hygiene program that awards an Associate's of Applied Science Degree in the mid-south United States.

Data Results

Question 1

Data were anonymously entered into SPSS® and analyzed using descriptive statistics to answer research question Research Question 1. What is the profile of the students from a mid-southern dental hygiene program that awards an Associate's of Applied Science degree. Profile data included: age, undergraduate GPA upon admission to the program, and pre-entrance aptitude exam, PSB, score. Descriptive statistics are provided for the continuous independent variables: age; undergraduate GPA; and PSB exam scores to determine the profile of the students entering the program. Student profile for the NBDHE scores and SRTA clinical exam scores are also discussed with research question one.

Age upon entrance into the program ranged from 19 to 42. The mean age was 24.02 with a range of 23 years and a standard deviation of 4.63. Ninety percent of the students were between the ages 19 – 29, with non-traditional students above the age of thirty being an exception to the rule and accounting for only 10% of the students. The kurtosis value for age was significantly leptokurtic due to the few students who were older when they entered the program. Table 4 provides a visual breakdown of the descriptive statistics for the continuous independent and

dependent variables. See Table 5 for the descriptive statistics value for Kurtosis. See figure 1 for a histogram display for age.

Undergraduate GPA upon entrance into the program ranged from 2.37 to 4.00 with a mean GPA of 3.41 and a standard deviation of .381. A GPA less than 2.98 occurred in 16.9% of students with 79.3% of students having an undergraduate GPA in the 3.00 – 3.97 range. Five students, 3.8%, had an undergraduate GPA of 4.00. The kurtosis value for GPA, -.513, was a slightly platykurtic distribution. Table 4 provides a visual breakdown of the descriptive statistics for the continuous independent and dependent variables. See Table 5 for the descriptive statistics value for Kurtosis. See figure 2 for a histogram display for GPA.

PSB scores ranged from 227 to 333 with a mean score of 270.08 and a standard deviation of 22.39. Half of the PSB scores fell below 271 and only 22 students, 25.4%, had a PSB score above 283. Eleven of those students, 9.2%, had a PSB score above 300. The kurtosis value for PSB, .117, was a value close to zero indicating that the shape of the bell for this distribution can be called normal. Table 4 provides a visual breakdown of the descriptive statistics for the continuous independent and dependent variables. See Table 5 for the descriptive statistics value for Kurtosis. See figure 3 for a histogram display of PSB scores.

NBDHE exam scores ranged from 76% to 96%, with a mean score of 85.86% a standard deviation of 4.27 and a variance of 18.244. Descriptive statistics for the NBDHE were: eight students, 6.2%, scored below 80%; 28 students, 21.5%, scored above 90%; with the majority of students, 72.3% scoring in the 80 to 90% range. The Kurtosis value for the NBDHE was -.582 revealing a distribution that was not significantly kurtosed. Table 4 provides a visual breakdown of the descriptive statistics for the continuous independent and dependent variables. See Table 5

for the descriptive statistics value for Kurtosis. See Figure 4 for a histogram display for NBDHE scores.

For the SRTA clinical exam one student's patient was rejected resulting in a score of 59%. This explains the high range for this dependent variable. For the remaining 129 students the range for the SRTA scores was 76 to 100% with mean score of 96.42%, and a standard deviation of 6.258 and a variance of 39.161. Additional descriptive statistics for the remaining 129 students on the SRTA clinical exam were: 14 students, 10.7%, scored below 90%; 115 students, 88.5%, scored 90% or above and 78 students, 60%, scored 100% on the SRTA clinical exam. The kurtosis value of 10.369 resulted in a distribution that did not display a normal curve, influenced by the one extreme score of 59% and the frequency/number of students scoring 100% on SRTA. The result was a flat/platykurtic distribution. Table 4 provides a visual breakdown of the descriptive statistics for the continuous independent and dependent variables. See Table 5 for the descriptive statistics value for Kurtosis. See figure 5 for a histogram display of SRTA clinical exam scores.

Table 4.
Student Profile/ Descriptive Statistics
N = 130

	Minimum	Maximum	Mean	Std. Deviation	Range
Age	19	42	24.02	4.63	23
GPA	2.37	4.00	3.41	.381	1.63
PSB	227	333	270.08	22.39	106
NBDHE	76	96	85.86	4.271	20
SRTA	59	100	96.42	6.258	41

Table 5.
Shape of the Distribution/Kurtosis
N = 130

	Statistic	Standard Error
AGE	3.422	.422
GPA	-.513	.422
PSB	.117	.422
NBDHE	-.582	.422
SRTA	10.369	.422

Figure 1.
Histogram for Age

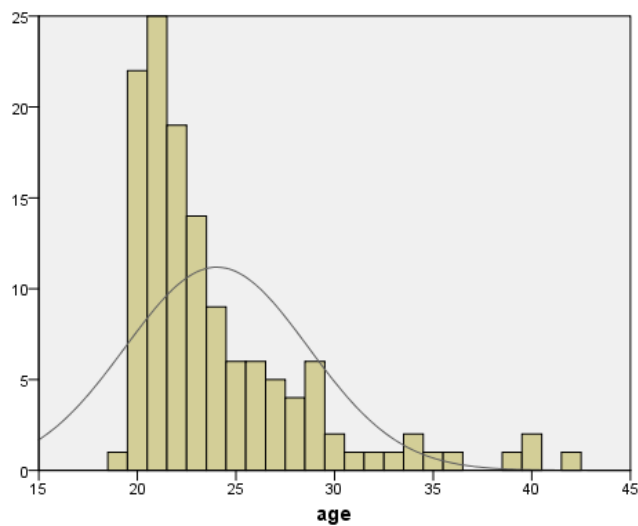


Figure 2.
Histogram for GPA

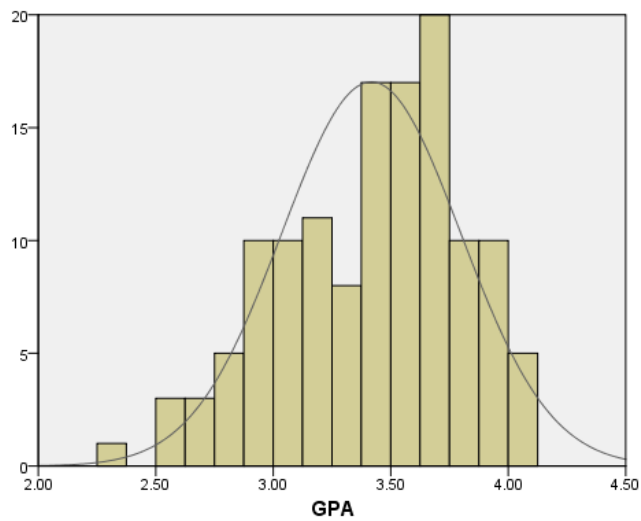


Figure 3.
Histogram for PSB Scores

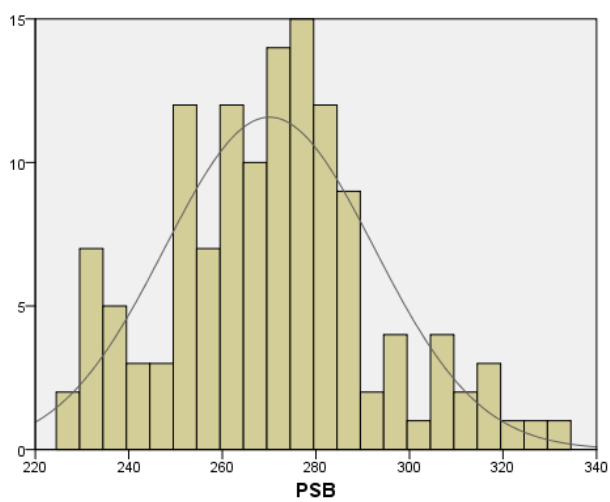


Figure 4.
Histogram for NBDHE Scores

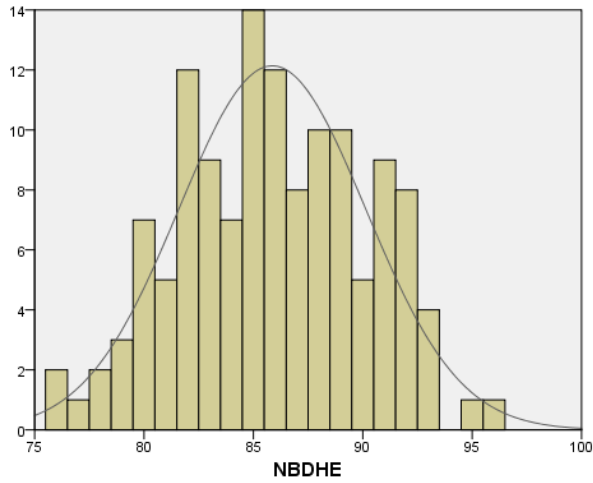
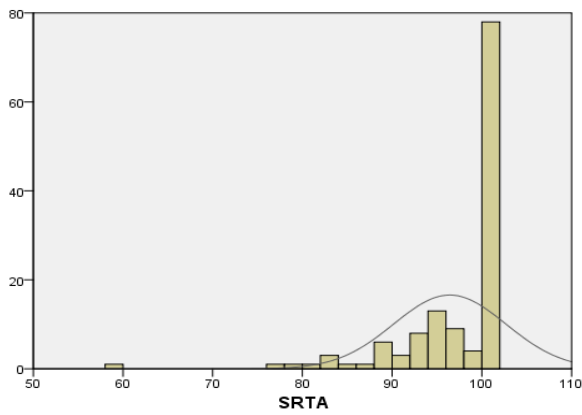


Figure 5.
Histogram for SRTAClinical Exam Scores



Question 2

Data were anonymously entered into SPSS® and analyzed using linear regression to answer research question 2: How the variable age predicts success on the written National Dental

Hygiene Examination and Southern Regional Testing Agency Clinical Exam for graduates of a dental hygiene program. Age was a negative weak correlation, if any, for the dependent variable NBDHE with a Pearson Correlation value of $r = -.037$ for the NBDHE and $r = -.142$ for the SRTA clinical exam. As age increased the success in terms of scores on the credentialing exams, NBDHE and SRTA, decreased but not significantly. Age was also weakly correlated, if any, with the two other independent variables with a Pearson Correlation value of $r = -.186$ for GPA and $r = .063$ for PSB scores. Table 6 provides the results of the Pearson Correlation for the independent variables age, GPA, PSB scores, and the dependent variables NBDHE scores and SRTA clinical exam scores.

Question 3

Data were anonymously entered into SPSS® and analyzed using linear regression to answer research question 3: How does undergraduate GPA predict success on the written National Dental Hygiene Examination and Southern Regional Testing Agency Clinical Exam for graduates of a dental hygiene program. Undergraduate GPA revealed a weak relationship to NBDHE scores with a Pearson Correlation of $r = .312$ and a negative weak relationship, if any, to the SRTA clinical exam scores with a Pearson Correlation of $r = -.050$. Undergraduate GPA revealed a negative weak relationship, if any, to the other independent variables age and PSB score with a Pearson Correlation of $r = -.186$ and $-.077$ respectively. Table 6 provides the results of the Pearson Correlations for the independent variables age, GPA, PSB scores, and the dependent variables NBDHE scores and SRTA clinical exam scores.

Question 4

Data were anonymously entered into SPSS® and analyzed using linear regression to answer research question 4: How does a pre-entrance aptitude exam score on the Psychological

Service Bureau (PSB) Health Occupations Aptitude Exam predict success on the written National Dental Hygiene Examination and Southern Regional Testing Agency Clinical Exam for graduates of a dental hygiene program? The PSB score was a moderate predictor for NBDHE scores with a Pearson Correlation of $r = .364$. The PSB score however, was a negative weak predictor of SRТА clinical exam scores with a Pearson Correlation of $r = -.134$. There was no correlation between NBDHE scores and SRТА scores with a Pearson r of $.009$. Table 6 provides the results of the Correlations for the independent variables age, GPA, PSB scores, and the dependent variables NBDHE scores and SRТА clinical exam scores.

Table 6.
Correlation of AGE, GPA, and PSB with NBDHE and SRТА
 $N = 130$

	AGE	GPA	PSB	NBDHE	SRТА
AGE					
Pearson r	1	-.186	.063	-.037	-.142
Sig. (2-tailed)		.034	.478	.676	.107
GPA					
Pearson r	-.186*	1	-.077	.312**	-.050
Sig. (2-tailed)	.034		.382	.000	.575
PSB					
Pearson r	.063	-.077	1	.364**	-.134
Sig. (2-tailed)	.478	.382		.000	.129
NBDHE					
Pearson r	-.037	.312**	.364**	1	.009
Sig. (2-tailed)	.676	.000	.000		.915
SRТА					
Pearson r	-.142	-.050	-.134	.009	1
Sig. (2-tailed)	.107	.575	.129	.915	

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Summary of Results

As academic predictors of success on the NBDHE and SRTA clinical exam, age, undergraduate GPA and PSB scores reveal mixed results. Undergraduate GPA and PSB scores were the most significant predictors of success for the NBDHE with a Pearson r value of .312 and .364 respectively however the correlation is still considered to be a weak relationship.

The mean age was 24.02 with a minimum age of 19 and a maximum age of 42 with a range of 23 years and a standard deviation of 4.63. The mean GPA score was 3.41 with a range of 1.63 and a standard deviation of .380. The mean PSB score was 270 with a range of 106 and a standard deviation of 22.393. Descriptive statistics for the NBDHE were: mean 85.86; range 20; standard deviation 4.271; and variance of 18.244.

Descriptive statistics for SRTA were: mean 96.42; range 41; standard deviation 6.258; and variance 39.161. One student received a score of 59 for the SRTA exam due to the patient being rejected and inadequate time to complete another patient. The PSB score was a moderate predictor for NBDHE scores with a Pearson Correlation of $r = .364$. The PSB score however, was a negative weak predictor of SRTA clinical exam scores with a Pearson Correlation of $r = -.134$. Neither age, undergraduate GPA, nor PSB scores were significant predictors of success for the SRTA with a Pearson r value of $-.142$, $-.050$, and $-.134$ respectively. The SRTA clinical exam had negative and low correlation with the dependent variables age, undergraduate GPA, and PSB scores. There was no correlation between NBDHE scores and SRTA scores with a Pearson r of .009.

Chapter V

Conclusion

Because admission criteria play a crucial role in applicant selection, choosing students that will successfully complete the dental hygiene program as well as the necessary credentialing exams is particularly crucial for admission committees. As lockstep cohort programs, criteria for application and subsequent student selection should be valid measures that reliably predict program success. Due to high applicant pools and limited enrollment, valid applicant criterions are desired in order to identify students who have the greatest potential for success on post graduate credentialing exams.

Summary of the Study

The purpose for conducting the study was to investigate and describe the relationship between applicant criteria and subsequent outcomes on credentialing exams: the NBDHE and the SRTA clinical exam. The study had three elements: to investigate the relationship between the variables of age, undergraduate GPA and scores from the Psychological Services Bureau Health Occupations Aptitude Examination (PSB) and successful student performance on the NBDHE and a regional clinical exam, namely the Southern Regional Testing Agency, for graduates from an accredited dental hygiene program that awards an Associate's of Applied Science Degree in the mid-south United States; to validate the predictive value of the PSB entrance exam currently used as one of the admission criteria for the selected program; and to investigate the strength of the relationship of age, undergraduate GPA, and PSB scores as a predictor of program completion and subsequent success on credentialing licensure exams. Research was conducted utilizing secondary data from an accredited dental hygiene program that awards an Associate's of Applied Science Degree in the mid-south United States.

Descriptive and inferential statistical analyses were performed for 130 graduates of the program. Seven of graduates did not take the SRTA clinical exam and were excluded from the analyses. Additionally two students that took the SRTA exam had missing scores for the PSB exam and were excluded from the analyses. The result was a clean data set for 130 graduates from a mid-south University awarding an AAS degree in dental hygiene.

Previous studies have investigated the variables that predict success in dental hygiene programs and on subsequent credentialing exams (Alzahrani, Thompson, & Bauman, 2007; Bauchmoyer, Carr, Clutter, & Hoberty, 2004; Downey, Collins, & Browning, 2002; Gadbury-Amyot et al., 2005; Kissell, Moore, & Carr, 2008; Mills & Harmer-Beem, 2008; Ward, Downey, Thompson, & Collins, 2010; Williams, Schmidt, Tilliss, Wilkins, & Glasnapp, 2006). Variables investigated included: Scholastic Aptitude Test (SAT); American College Testing (ACT) scores; high school grade point average (GPA); high school science GPA; Dental Hygiene Aptitude test score; college science GPA, mock examinations, and college grades in pre-requisite coursework. The 2005 Gadbury-Amyot et al. study and the 2001 Patrick study were the only ones to address clinical licensure examinations and predictive validity of traditional and nontraditional dental competency assessment measures (Gadbury-Amyot et al., 2005; Patrick, 2001). All other studies addressed predictive variables for the NBDHE only. Predictive reliability of admission criteria is twofold: successful program completion as well as success on credentialing exams. As such, admission criteria play a vital role for dental hygiene program admissions committees.

Conclusions

As academic predictors of success on the NBDHE and SRTA clinical exam, age, undergraduate GPA and PSB scores revealed mixed results. The range for age was 23 years with a mean age of 24.02 and a standard deviation of 4.636. Ninety percent of the students were

between the ages 19 – 29, with non-traditional students above the age of thirty being an exception to the rule and accounting for only 10% of the students. Age was not a significant predictor of success with a negative Pearson r value of $-.037$ for the NBDHE and $-.142$ for the SRTA clinical exam. As age increased the success in terms of scores on the credentialing exams, NBDHE and SRTA, decreased but not significantly.

Undergraduate GPA upon entrance into the program ranged from 2.37 to 4.00 with a mean GPA of 3.41 and a standard deviation of .381. A GPA less than 2.98 occurred in 16.9% of students with 79.3% of students having an undergraduate GPA in the 3.00 – 3.97 range. Five students, 3.8%, had an undergraduate GPA of 4.00. Undergraduate GPA was not a significant predictor of success with a low Pearson Correlation of $r = .312$ for the NBDHE and a negative Pearson Correlation of $r = -.050$ for the SRTA clinical exam.

PSB scores ranged from 227 – 333 with a mean score of 270.08 and a standard deviation of 22.39. Half of the PSB scores fell below 271 and only 22 students, 25.4%, had a PSB score above 283. Eleven of those students, 9.2% had a PSB score above 300. The PSB score was a moderate predictor for NBDHE scores with a Pearson Correlation of $r = .364$.

Neither age, undergraduate GPA, nor PSB scores were significant predictors of success for the SRTA with a negative Pearson r value of $-.142$, $-.050$, and $-.134$ respectively. There was no correlation between NBDHE scores and SRTA scores with a Pearson r of $.009$.

Recommendations for Further Study

Because the PSB exam score served as a moderate predictor of academic success on the NBDHE, a future study to investigate the strength of the relationship between the individual tests within the battery of the five different tests: academic; spelling; reading comprehension; information in the natural sciences, and the vocational adjustment index with the NBDHE score

and the SRTA clinical exam score would be justified. Perhaps one particular test of the PSB battery is a stronger predictor of academic success for the NBDHE and/or the SRTA clinical exam. Investigating the relationship of the vocational adjustment index score to the NBDHE score and the SRTA clinical exam may also reveal insight that would prove useful as criteria for applicant selection.

A survey of dental hygiene program directors to question the underlying assumption of the choice of applicant selection criteria is needed. This in turn may provide insight into the lack of a standardized pre-entrance exam if program directors were queried regarding the use of the PSB and the DHAT or the reason for not incorporating a pre-entrance exam. As mentioned earlier in Chapter II, all dental schools in the United States require the DAT as a pre-entrance exam for admission to dental school. Should all dental hygiene programs require a standardized pre-entrance exam for dental hygiene programs? Due to the dental hygiene program accreditation process required by the CODA, curriculum is standardized while applicant selection criteria vary considerably.

More studies need to be conducted to investigate a one-shot clinical licensure examination as a valid measure of competency to practice dental hygiene. There is a paucity of studies that have investigated the validity of a one-shot dental hygiene clinical licensure examination. Amyot et al. (2005) investigated the predictive validity of dental hygiene competency assessment measures on one-shot clinical licensure examinations and discussed the toll of failure on students, their families, educational institutions, and the public at large. The Amyot study questioned justification of the clinical licensure exam if the data is not sufficient to demonstrate the validity of these high stakes examinations (Amyot et al., 2005). The ability of a

one-shot clinical licensure examination could be described as a snapshot only of a student's clinical ability.

Finally, it is interesting to note that dental hygiene programs do not require a manual dexterity test as a determinant of aptitude for post graduate credentialing clinical exams. A simple experimental study conducted over a three to five year period would allow a program to investigate the value of a manual dexterity test as a predictor of success for the SRTA clinical exam. A strong positive correlation between a pre-entrance manual dexterity test and post graduate clinical credentialing exams would be of benefit to all dental hygiene programs.

Discussion

Due to a large applicant pool and limited enrollment in dental hygiene programs, one would hope that the applicant criteria would be a moderate predictor of success on post graduate credentialing exams. Not only to ensure the success on the post graduate credentialing exams, the stress of failure on high-stakes licensure credentialing exams, on students, their families, and educational institutions is also cause for concern. Analyses of the relationship, between applicant criteria and subsequent outcomes on credentialing exams the NBDHE and the SRTA clinical exam, reveal a weak, if any, correlation. While the PSB score was a moderate predictor for NBDHE scores with a Pearson Correlation of $r = .364$, it was a negative weak predictor of SRTA clinical exam scores with a Pearson Correlation of $r = -.134$.

With a low Pearson Correlation of $r = .312$ for the NBDHE and a negative Pearson Correlation of $r = -.050$ for the SRTA clinical exam undergraduate GPA does not appear to be a valid predictor of success for post graduate credentialing exams. One possibility for this result is the site of academic preparation. Bauchmoyer et al. (2004) discussed the site of academic preparation, such as community college preparation as opposed to four year university

preparation. The results of their study found that the cumulative dental hygiene program GPA corresponded more closely with success on the NBDHE at The Ohio State University from 1998 through 2002 (Bauchmoyer et al., 2004). While cumulative dental hygiene program GPA as an academic predictor for success on the NBDHE was identified it does not address criteria for applicant selection. Because of the lockstep cohort nature of dental hygiene programs and the CODA curriculum requirements the lack of standard, or at least similar, applicant selection criteria is a concern. The competitive nature of a high applicant pool with limited enrollment may serve admissions committees indirectly as they allow for the students with the highest criteria to be chosen. As the profession evolves a more standardized applicant selection process may be needed if the applicant pool decreases and/or becomes more equal. Additionally, criteria to predict success on post graduate clinical credentialing exams may be needed.

Chapter Summary

The purpose for conducting the study was to investigate and describe the relationship between applicant criteria and subsequent outcomes on credentialing exams: the NBDHE and the Southern Regional testing Agency (SRTA) clinical exam. The study had three elements: to investigate the relationship between the variables of age, undergraduate GPA and scores from the Psychological Services Bureau Health Occupations Aptitude Examination (PSB) and successful student performance on the NBDHE and a regional clinical exam, namely the Southern Regional Testing Agency, for graduates from an accredited dental hygiene program that awards an Associate's of Applied Science Degree in the mid-south United States; to validate the predictive value of the PSB entrance exam currently used as one of the admission criteria for the selected program; and to investigate the strength of the relationship of age, undergraduate GPA, and PSB scores as a predictor of program completion and subsequent success on credentialing licensure

exams. Research was conducted utilizing secondary data from an accredited dental hygiene program that awards an Associate's of Applied Science Degree in the mid-south United States.

Chapter V concluded by answering the questions presented in Chapter I. There were four conclusions developed and five recommendations for further study. This research study provided insight for dental hygiene programs by identifying the strengths as well as the weaknesses for the applicant selection process.

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Appendix A

University of Arkansas Internal Review Board (IRB) Approval



UNIVERSITY OF ARKANSAS

Office of Research Compliance
Institutional Review Board

July 23, 2012

MEMORANDUM

TO: Melissa Efurd
Mike Miller

FROM: Ro Windwalker
IRB Coordinator

RE: New Protocol Approval

IRB Protocol #: 12-07-017

Protocol Title: *Predictors of Academic Success for the National Board Dental Hygiene Examination and the Southern Regional Testing Agency Clinical Exam*

Review Type: EXEMPT EXPEDITED FULL IRB

Approved Project Period: Start Date: 07/23/2012 Expiration Date: 07/22/2013

Your protocol has been approved by the IRB. Protocols are approved for a maximum period of one year. If you wish to continue the project past the approved project period (see above), you must submit a request, using the form *Continuing Review for IRB Approved Projects*, prior to the expiration date. This form is available from the IRB Coordinator or on the Research Compliance website (<http://vpred.uark.edu/210.php>). As a courtesy, you will be sent a reminder two months in advance of that date. However, failure to receive a reminder does not negate your obligation to make the request in sufficient time for review and approval. Federal regulations prohibit retroactive approval of continuation. Failure to receive approval to continue the project prior to the expiration date will result in Termination of the protocol approval. The IRB Coordinator can give you guidance on submission times.

This protocol has been approved for 160 participants. If you wish to make any modifications in the approved protocol, including enrolling more than this number, you must seek approval *prior to* implementing those changes. All modifications should be requested in writing (email is acceptable) and must provide sufficient detail to assess the impact of the change.

If you have questions or need any assistance from the IRB, please contact me at 210 Administration Building, 5-2208, or irb@uark.edu.

210 Administration Building • University of Arkansas • Fayetteville, AR 72701
Voice (479) 575-2208 • Fax (479) 575-3846 • Email irb@uark.edu

The University of Arkansas is an equal opportunity affirmative action institution.

Appendix B

University of Arkansas – Fort Smith Internal Review Board (IRB) Approval

University of Arkansas – Fort Smith

HUMAN RESEARCH

EXEMPT CERTIFICATION FORM

To Be Completed Only If Protocol is to Receive Exempt Review

IRB Use Only	UAFS IRB Registration No.	E-mail to: rwallace@uafortsmith.edu sfulbrig@uafortsmith.edu
	Date Rec'd:	
Principle Investigator	Last Name: Efurd	First Name: Melissa
	Telephone Number: 479-651-3450	E-mail: mitzi.efurd@uafs.edu
	Investigator Status:	
	<input checked="" type="checkbox"/> 1. Faculty <input type="checkbox"/> 2. Staff <input type="checkbox"/> 3. Undergraduate Student <input checked="" type="checkbox"/> 4. Graduate Student	
Faculty Advisor	Last Name: Miller	First Name: Mike
	Department: College of Education and Health Professions	Office Address: 320 Graduate Education Building, Fayetteville Arkansas 72701
	Telephone Number: 479-575-3582	E-mail: mtmille@uark.edu
Project Type	<input type="checkbox"/> 1. Faculty Research <input type="checkbox"/> 2. Staff Research <input type="checkbox"/> 3. Class Project	

	<input type="checkbox"/> 4. Honors Project <input checked="" type="checkbox"/> 5. Thesis/Dissertation <input type="checkbox"/> 6. Other _____	
Project Title	Predictors of Academic Success for the National Board Dental Hygiene Examination and the Southern Regional Testing Agency Clinical Exam	
Funding	Is the project receiving extramural funding: If yes, specify source: N/A	

Please indicate which of the following categories applies to your research:

<input type="checkbox"/> 1. Educational Research	45CFR46.101(b)(1)
--------------------------------------------------	-------------------

- a. Normal Educational Practices and settings. Study of normal educational practices that will be conducted in commonly accepted settings.

<input type="checkbox"/> 2. Research using surveys, interviews, educational testing	45CFR46.101(b)(2)
-------------------------------------------------------------------------------------	-------------------

- a. Anonymous Education Tests, Surveys, Interviews, or Observations. Involves the use of education tests, survey procedures, interview procedures, or observations of public behavior. May not include identifiers.

<input type="checkbox"/> 3. Research using surveys, interviews, educational testing involving elected/appointed public officials or where confidentiality of data is protected by federal statute	45CFR46.101(b)(3)
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------

- a. Identifiable Subjects in Special Circumstances. If section b subjects are elected or appointed public officials or candidates for public office or federal statutes require without exception that the confidentiality be maintained.

<input checked="" type="checkbox"/> 4. Research using existing specimens/data	45CFR46.101(b)(4)
-------------------------------------------------------------------------------	-------------------

- a. Collection or Study of Existing Data; Permission to use the existing data is data that is routinely collected for all UAFS applicants that are in turn selected for the dental hygiene program.

5. Research or Demonstration Projects Approved by Federal Department/Agency Head
45CFR46.101(b)(5)

- a. Public Benefit or Service Programs. Must be conducted by or subject to the approval of department or agency head, designed to study, evaluate, or examine public benefit or service programs, procedures, changes in or alternative under the programs, etc.

6. Taste and food quality evaluation or consumer acceptance 45CFR46.101(b)(6)

- a. Taste and Food Evaluation and Acceptance Studies. Limited to taste and food quality evaluation studies that do not involve risks of indigestion or vitamin deficiencies. Studies involving consumption of alcohol, vitamins, or supplements are not eligible for exempt status. (Bankhart & Amdur, 2006).

Appendix C
Applicant Interview Scoring Rubric

Applicant Interview Scoring Rubric

Dental Hygiene Applicant:

1. Tell me a little about yourself:
2. Why do you think you would be a good candidate for the dental hygiene program?
3. If you are not accepted into the program this year, what will be your plans?

Interview Component:	Value: 0/lowest	10/highest
Background (Shares career interest, goals, strengths, and weakness)	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10	
Work ethic/experience	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10	
Commitment to DH (Educational preparation, multiple applications, retakes classes, extra observation)	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10	
Professional appearance	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10	
Poise, Self-Confidence	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10	
Knowledge/Understanding of DH (Able to articulate observation experience or other knowledge)	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10	
Verbal communication skills (Consider articulation, clarity, and ability to relate goals)	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10	
Overall impression of candidate's interview performance (Consider verbal skills; organized thoughts; attentiveness; composure; poise; and appearance)	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10	

In Class Writing Exercise: 20 Points:

Critical thinking (Writing demonstrates student's ability to express thoughts in logical, concise manner)	1 - 2 - 3 - 4 - 5
Grammar/Punctuation/Spelling	1 - 2 - 3 - 4 - 5

(5 = no errors, 4 = 2 errors, 3 = 3 errors, 2 = 4 errors, 1 = more than 4 errors)

Written communication 1 - 2 - 3 - 4 - 5

Overall Impression of candidates 1 - 2 - 3 - 4 - 5
writing performance

Total Interview Points: _____/100

Quality/Ranking points _____ + Interview points x 0.25 _____ = Total _____

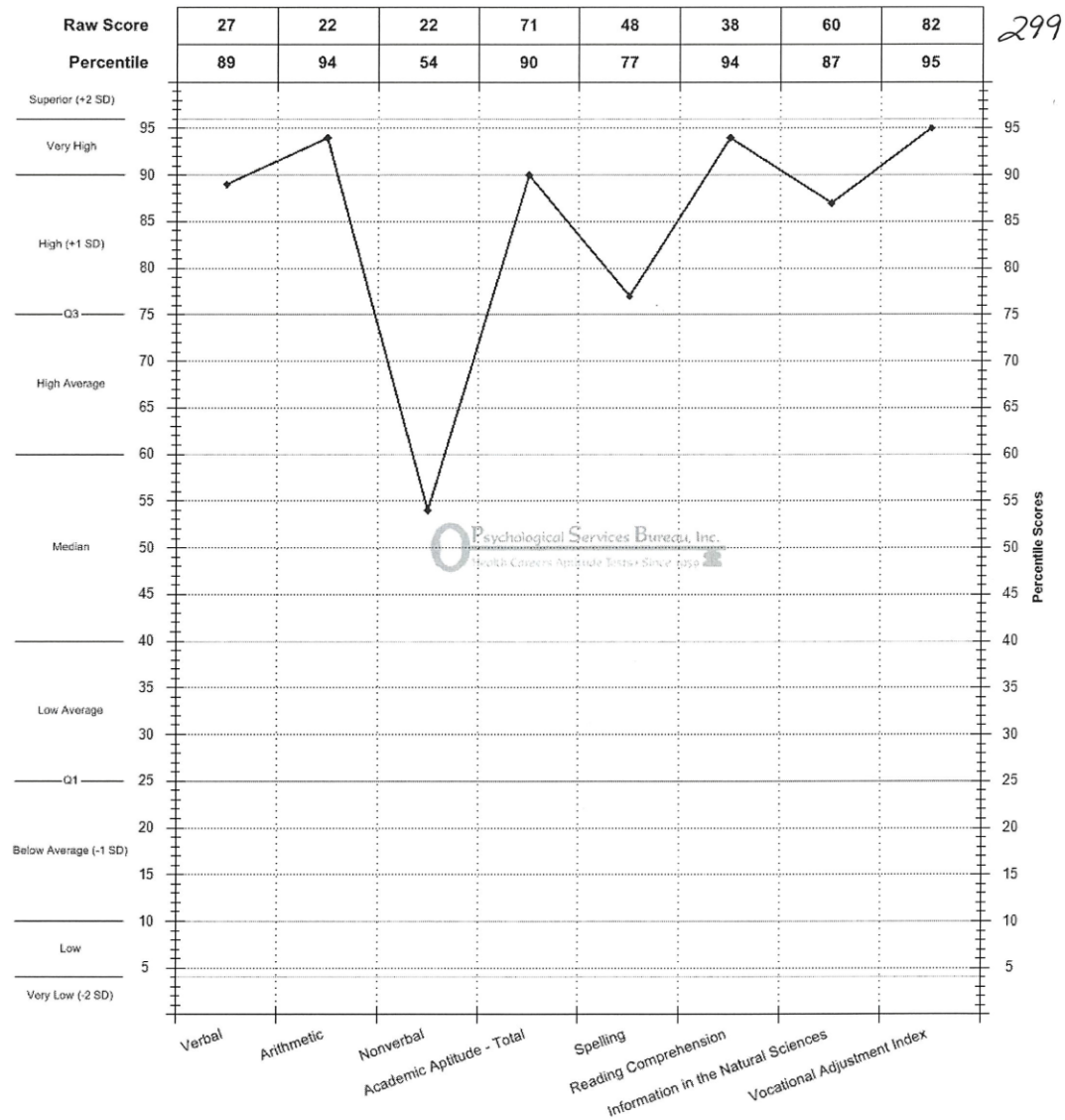
Appendix D
PSB Score Graph

PSYCHOLOGICAL SERVICES BUREAU, INC.
PSB HEALTH OCCUPATIONS APTITUDE EXAMINATION
 Test Record And Profile Chart

Class Record: University of Arkansas-Fort Smith
 Individual Record > 3/12/2012 12:00:00 AM > Efurd, Mitzi G
 Name: Efurd, Mitzi G

Norming Group: Dental Hygienist

ID: Age: 53 Sex: F Education: 16 years



Percentile ranks are based on scores earned by applicants for admission to schools throughout the United States.

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