PREDICTING ACADEMIC AND NATIONAL BOARD DENTAL HYGIENE EXAMINATION PERFORMANCE BASED ON ACADEMIC FACTORS

A Thesis

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ABSTRACT

Numerous studies have been published exploring reliable variables to predict success within dental hygiene programs and on subsequent National Board Dental Hygiene Examination (NBDHE). Variables include demographics, American College Testing (ACT), Scholastic Aptitude Test (SAT), high school grade point average (GPA), Dental Hygiene Aptitude test, college science GPA, mock examinations, college grades in sociology, general psychology, nutrition and anatomy as some possible predictors of pass/fail status on the NBDHE. However, no studies were found using data collected since the NBDHE format changed in 1998 to investigate if traditional predictors persevere.

The objective of this study was to examine the relationship between pre-admission requirements, the cumulative dental hygiene GPA (CDHY GPA), basic college science requirements, the site of academic preparation and the NBDHE score. Data from the academic records of the 133 graduates of the dental hygiene program of The Ohio State University from 1998 through 2002 were entered into an Excel spreadsheet under identification numbers. Demographic information for the description of the subjects, course transfer data, course grades in program prerequisites, course grades in basic science requirement, CDHY GPA and NBDHE scores were entered. Data were imported
into the Statistical Package for the Social Sciences (SPSS) for analysis and summarized using frequencies, percentage, and means. Specific research questions were answered using Pearson's r correlations, regression analysis and analysis of variance (ANOVA) with a pre-determined level of significance at .05.

Results indicate the existing prerequisites for the dental hygiene program remain strong predictors for success. However, a stronger correlation was noted between Human Nutrition and the CDHY GPA. Thus admission committees should consider rearranging its position within the curriculum to a pre-admission requirement to add more validity to predictors. Other core science courses completed while in the program, Anatomy, Physiology and Microbiology also rendered a moderately strong correlation to the CDHY GPA. Regression analysis verifies Human Nutrition to be the greatest predictor of the CDHY GPA with Anatomy, Biology and Chemistry 1 following in descending order. The single greatest predictor for success on the NBDHE was the student’s CDHY GPA. Consistency in site of science preparation also revealed a positive correlation to the CDHY GPA and NBDHE. Regression analyses of the variables that account for NBDHE performance were the CDHY GPA and the prerequisite 3-science GPA. However, coefficients of regression show them to be moderately weak predictors.
Dedicated to my family.
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v
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CHAPTER 1
INTRODUCTION

The annual selection of students is one of the most difficult and important activities for admission committees within dental hygiene programs across the country. Currently, there are 265 entry-level accredited dental hygiene programs in the United States. Two hundred thirty six two-year programs offer a certificate or associate degree in dental hygiene and 46 programs offer a four-year baccalaureate degree. Fourteen of these programs offer multiple degree options. Although pre-admission requirements differ significantly between schools, each school faces the complex task of selecting students who they predict will succeed within their program. Studies indicate that students who are better prepared academically will perform better in their health-related programs and also are more likely to pass credentialing exams. (1)

To practice dental hygiene in virtually all of the licensing jurisdictions in the United States, a student must achieve a passing grade of 75 or higher on the National Board Dental Hygiene Examination (NBDHE). Although other examinations are typically administered on a regional and state level, the NBDHE is recognized as a major portion of written examination requirements in all jurisdictions. (2) The examination has been administered in many forms since its adoption in 1962 and its most recent modification occurred when concern was raised regarding its effective
integration/application of basic science content and clinical relevance. It was believed that the older examination format did not assess the ability of the dental hygiene student to apply basic knowledge into everyday situations and demonstrate problem-solving or critical thinking skills. (1) Older examinations stressed lists of functions and likely omitted the more complex issues involved in patient care. (3)

To date, numerous studies have been published exploring reliable variables to predict success within dental hygiene programs and on subsequent NBDHE. Variables include, demographics, American College Testing (ACT), Scholastic Aptitude Test (SAT), high school grade point average (GPA), high school science GPA, Dental Hygiene Aptitude test, college science GPA, mock examinations, college grades in Sociology, general Psychology, Nutrition and Anatomy as some possible predictors of pass/fail status on the NBDHE. (1,4,5,6) However, no studies were found using data collected since the NBDHE format changed in 1998 that determine if traditional predictors do or do not persevere.

Additionally, the possible affect of the site of academic preparation such as community college preparation as opposed to four-year university preparation has not been explored in the literature. Students come to four-year institutions with a variety of educational experiences. It is estimated that 15%-20% of students transfer from community colleges to four-year institutions. (7) Dual-credit programs enable high school students to earn college and high school credits simultaneously. Additionally, some students enrolled in four-year colleges elect to attend classes at community colleges concurrently. The growth of on-line distance education in recent years has also added a
new dimension in formal education. It is estimated that 75% of all the United States universities now offer online coursework and 5.8 million students have taken online college courses. (8)

The dental hygiene program at The Ohio State University is a three-year professional program leading to the degree Bachelor of Science in Dental Hygiene. During the pre-professional year, prospective students schedule dental hygiene program prerequisites and enough general education curriculum requirements (GEC) to meet the 45-hour requirement. GEC requirements are vital to every undergraduate student to ensure that a broad acquaintance with the basic areas of academic study. GEC’s seek to enhance the student’s ability to write, speak, read and listen critically with comprehension. For admission, these courses must be completed by the end of the spring quarter preceding the autumn quarter of desired enrollment. Students matriculate in autumn quarter only. Program prerequisites include twenty-nine to thirty quarter hours of the following:

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<tr>
<td>Biology</td>
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<tr>
<td>English</td>
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<tr>
<td>Mathematical/Logical Analysis</td>
<td>4 or 5</td>
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<td>Chemistry</td>
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Twenty quarter hours of basic sciences are required before or within the dental hygiene curriculum, which include:

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<td>Anatomy</td>
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Admission to this Dental Hygiene Program is selective and competitive. Currently the overall GPA and the prerequisite sciences GPA are important factors used in the admission process. Students who attend college for more than one year prior to enrollment in Dental Hygiene may take basic sciences and additional GEC's in advance. However, the sequencing of the dental hygiene major still requires three years to complete including specific courses within a thirteen to fifteen quarter hour area of specialization. A sample schedule of the dental hygiene curriculum can be found in Appendix 1.

In conclusion, as students, the profession and the NBDHE evolve, it is valuable to investigate if traditional predictors of success continue to have merit. The purpose of this study is to determine if established predictors of success within the dental hygiene program and predictors for success on the NBDHE are viable. This study will also evaluate the possible effect of community college preparation on the cumulative dental hygiene (CDHY GPA) and success on the NBDHE. This study can provide other baccalaureate dental hygiene programs with more efficient means to identify students who have the greatest potential for success within dental hygiene programs and on the NBDHE. In a time of accountability to educational institutions, students and parents, the ability to accurately predict success is very important.

There are several limitations that may influence the findings of this study. The collection of data is limited only to the information available in the student database and the principle investigator is unable to contact subjects for clarification of transcripts. Using only graduates of The Ohio State University Dental Hygiene Program limits the
ability to generalize results/conclusions to other programs. A further limitation of the study is the attrition rate of students. The potential study sample size is decreased due to the incomplete data of some subjects and conclusions regarding these students eventual academic success cannot be drawn. Additionally, the site of academic preparation does not explore variables in course format. For example, some courses were taught on-line in contrast to the more traditional face-to-face on-campus courses. Other variables include students who were required to re-take a course due to lack of success, the rigor of a student’s academic load each quarter and the demographic homogeneous nature of most dental hygiene classes.
Research Questions

The objective of this study is to examine the relationship between preadmission requirements, the CDHY GPA, basic college science requirements, the site of academic preparation and the NBDHE score. Three specific questions were examined.

1. What academic prerequisites for admission are predictors of the CDHY GPA and student performance on the NBDHE?

2. What effect does community college preparation have on the baccalaureate CDHY GPA and student performance on the NBDHE?

3. Is there a correlation between Anatomy, Human Nutrition, Microbiology or Physiology with CDHY GPA and student performance on the NBDHE?

In this study the dependent variables are the NBDHE score and the CDHY GPA. Independent variables represented prerequisite and non-dental hygiene courses required of all students. These courses include course grades in Biology, Chemistry, English, Psychology, Mathematical/Logical Analysis, Anatomy, Human Nutrition, Microbiology, Physiology and site of academic preparation (i.e. community college or university)
Definition of Terms

National Dental Hygiene: “is intended to fulfill or partially fulfill the written examination requirement for local licensing boards by assessing the ability of the applicant to recall important information from basic biomedical, dental and dental hygiene sciences and also the ability to apply such information in a problem-solving context.” (9)

Licensure: the granting of a license, especially to practice a profession or successful completion of a written national board examination and a state or regional clinical examination in order to be eligible for practice within a given state.

Licensing Jurisdictions: the level of government responsible for licensure in a state or district.

Dental Hygienist: “is a licensed health professional, oral health educator, and clinician who as a co-therapist with the dentist, provides preventive, educational and therapeutic services supporting total health for the control of oral diseases and the promotion of oral health.” (10)
In 1928 the National Board of Dental Examiners (NBDE) was established by the American Dental Association to administer written examinations to provide a national standard for the basic and clinical sciences necessary for competent dental practice. These examinations were to be used at the discretion of state dental boards for licensure. The first test editions were an essay design and as testing modalities advanced, the examination was changed to a multiple-choice format in the 1950’s. This led to norm-referenced scoring and the appointment of subject-matter specialists to aid in test construction. In 1961 the NBDE’s were charged with the development and administration of a similar examination for dental hygienists and four examinations of 100-test items each covering three subjects was introduced in 1962. In 1973, the four-examination battery was replaced by a single 400-test item examination. This examination was structured to address the delegatable duties of a dental hygienist in the majority of states.

The early 1980’s marked the institution of a procedure by the Joint Commission on National Dental Examinations to ensure a consistent standard for minimum acceptable performance by means of common anchor items within the examination thus ending the
era of norm-referenced testing. In 1992 the dental examination format was again restructured to include a portion of comprehensive case-based questioning utilizing a criterion-referenced performance standard. The NBDHE followed in 1998 by also administering a portion of the examination in a case-based format. A similar criterion-referenced method of establishing the performance standard was used. This change to include the comprehensive examination format was believed to improve the validity of the examination by assessing the dental hygiene candidates ability to solve realistic problems encountered by dental hygienists in actual practice. (11)

In 2002, the dental hygiene examination consists of approximately 350 multiple-choice test items. (200 discipline-based items and 150 case-based items.) Test items continue to be selected by test construction committees that represent basic sciences, radiology, periodontics, dental hygiene curriculum, clinical dental hygiene and community dental health. (2) Currently all 53 licensing boards which includes all 50 states in the United States, the Virgin Islands, Puerto Rico, and the District of Columbia utilize the National Board as a major portion of their written examination requirement. (9) To be eligible to take the examination, the director or a designee of an accredited dental hygiene program must certify that it is anticipated the candidate will be issued a dental hygiene certificate within the next 4 months. If the dental hygiene program is a non-accredited program, other supporting documents must be filed. Accredited dental hygiene programs require an average of 1,948-clock hours of curriculum within a minimum of two years but can be as long as four years. General education requirements include English, speech, psychology and sociology. Basic science course requirements
include general chemistry, anatomy, physiology, biochemistry, microbiology, pathology, nutrition, and pharmacology. Required dental science coursework includes oral health education, medical and dental emergencies as well as basic life support legal and ethical aspects of dental hygiene practice. Five hundred eighty five clock hours of supervised instruction in pre-clinical and clinical practice are also required. (10)

Researchers and program administrators have studied many potential predictors of success within the dental hygiene program and on the NBDHE. Single program studies, (1,5,6,12,13) and studies which examine multiple programs (4) have attempted to expand the reliability of admission criteria used in student selection and to provide powerful predictors of success on the NBDHE. Shannon (4) examined the overall science grades of three accredited associate degree programs. Correlation between high school GPA, grades in college biological, physical and behavioral science courses and the CDHY GPA were found to be positive and significant in all pairings. A stepwise multiple regression analysis revealed the grades in Anatomy, Nutrition, Sociology, Chemistry and Physiology were the best predictors of the CDHY GPA and that the CDHY GPA was the best predictor of the pass/fail status of the NBDHE. Overall high school GPA, college GPA, age and marital status were not useful predictors in Shannon’s study. Rowe and Collins (6) also found the predictive ability of the high school GPA less successful than in previous years within the same school.

Edenfield and Hanson (1) examined the relationships between dental hygiene course grades, a mock board dental hygiene examination, and the NBDHE. This study was similar in collection of data, choice of data analysis, findings of other studies
exploring specific variables to predict success on the NBDHE. They concluded early
course averages showed a strong probability of success or failure in subsequent classes
and were a major influence on the score of the NBDHE. Additionally, Edenfield and
Hansen suggested future studies to determine predictors of success on the new case-based
NBDHE once it is implemented.

Bearden, Robinson and Deis (12) explored the potential differences between
students enrolled in a nutrition class on-line and students enrolled in an on-campus class.
Data was measured in course grades and the score on the NBDHE. Both simple and
multiple regression models using the nutrition course average and GPA to predict board
scores were unimpressive for on-line only and on-campus only sections. Student
demographics such as marital status (6) or age (6,12) reveal no additional predictive
value.

The predictive validity of the American College Test (ACT) with respect to the
NBDHE was examined by Vitasek and Parker (5) later again by Shannon (4). Vitasek
and Parker used the Pearson product-moment correlation coefficients to provide a
measure of the relationship between the ACT and the NBDHE for each year. (5) “Based
on the correlation analysis of 11 years of ACT and NBDHE scores from one
baccalaureate dental hygiene program, it was concluded that the ACT cannot be a strong
or consistent predictor of the NBDHE performance.” Of the ACT scores, Shannon ‘s
study in 1998 found only ACT-social studies to be a predictor. (4)

DeAngelis (13) referenced the lack of consensus regarding valid predictors and
looked beyond traditional predictors of success to factors such as work experience. Her
sample of 132 dental hygiene students explored previous dental assisting experience as a possible predictor of success for the dental hygiene program and on the NBDHE. Results revealed that dental assisting experience seems to be beneficial in the area of clinical competence and cumulative clinic GPA but there was no significant differences observed in other performance measures such as the first-year GPA, CDHY GPA, dental materials, preclinical dental hygiene instrumentation, dental anatomy, and national and regional board performance.

Dental Hygiene is not unique in its desire to recognize the factors that may predict success for perspective students. Other allied health professions struggle with a similar dilemma in identifying admission criteria to identify students whom will succeed within their respective program and ultimately pass credentialing examinations. Op’t Holt and Dunleavy (14) found a positive correlation between pre-professional GPA, science-math GPA, interview points (based on a structured interview form to evaluate pre-established non-academic criteria related to knowledge of and commitment to the profession, goals and personal attributes) and the program completion GPA within the respiratory therapy program at The Ohio State University. They also cited concern regarding the usefulness prerequisite course grades as predictors of future academic success in situations where students transfer from “community colleges and universities where the rigor of courses varies with the nature of the institution, their requirements for awarding grades and the academic characteristics of the student body.” (14)

Mills, Sampel, Pohlman and Becker (15) studied pre-admission criteria as predictors of success on the nursing credentialing exam and found admission variables
(age, sex, high school GPA, ACT social science, ACT natural science, ACT math and ACT English) to be weak predictors of success. Yet in a study of predominately black schools published in 1984, SAT verbal, SAT quantitative, high school GPA, and a pre-nursing admissions test were found to significantly differentiate between students whom eventually graduated from their program and non-graduates. (16)

Dental schools are also faced with the task of identifying predictors of success to aid in the admission process. Currently most schools use a Dental Admission Test (DAT) in conjunction with the other selection factors such as interviews, pre-dental science GPA and a Perceptual Ability Test score. In a survey of postdoctoral dental educational institutions, (17) over sixty-six percent of schools responding ranked the DAT as the most important admission criteria. Concern regarding the perception that standardized tests are somehow inherently unfair to females and minority has caused admission procedures from dental schools to be under scrutiny. Kramer (18) examined the validity of the DAT test content relevance, representativeness, and correlation with external variables and found that “DAT performance is equally predictive of dental school performance regardless of race or ethnicity and for males and females”. (18) Clearly Kramer’s study supports the use of the DAT score in the admission process for all applicants.

The selection of students into the health professions is often very competitive. (13,19) As public funding to universities becomes increasingly scarce and college administration, students and parents scrutinize program outcomes, administrators cannot afford to lose students who cannot academically complete the program or cannot
successfully meet licensure requirements. The need for reliable and valid assessment measures for pre-admission is obvious. Admission committees must strive to base their difficult decision on the best data available. Thus the outcomes of this study could present the dental hygiene program at The Ohio State University and similar programs across the country with valuable factors to use when making effective selection decisions.
CHAPTER 3
METHODOLOGY

The objective of this study was to examine the relationship between pre-admission requirements, CDHY GPA, basic college science requirements, the site of academic preparation and the NBDHE score to investigate if traditional predictors persevere since the NBDHE changed test format to include case-based testing beginning in 1998. The data from 132 dental hygiene student records at The Ohio State University who graduated between 1998 and 2002 were assigned a number and manually entered in an Excel spreadsheet without names under identification numbers. A research protocol under exempt status was submitted to the Office of Responsible Research Practices and approved. Demographic information for the description of subjects, course transfer data, course grades in program prerequisites (Biology, Chemistry 1, Chemistry 2, English, Mathematical and Logical Analysis and Psychology), course grades in basic science requirement (Anatomy, Human Nutrition, Microbiology and Physiology), CDHY GPA and NBDHE scores were entered. The GPA for all collegiate courses was recorded on a 4.0 grading system.

Twenty students were not included in this study as a result of incomplete data due to withdrawal from the dental hygiene program. Fifteen students withdrew due to family, medical, relocation and change in vocation issues. Five students were dismissed due to
academic difficulty. Single grades were missing from 6 student transcripts and the researcher assigned an estimated grade based on other similar discipline coursework grades within the student’s transcript. Four students were exempt from taking a single course due to success on placement examinations. A grade for these 4 students was also assigned in a similar manner based on transcript grades in similar discipline coursework. One student was deleted from this study during analysis due to unusable transcript data from a foreign university.

Data was imported into the Statistical Package for the Social Sciences (SPSS - Version 10) for analysis. Data was summarized using frequencies, percentage, and means. Specific research questions were answered using Pearson's r correlations, regression analysis and analysis of variance (ANOVA) with a pre-determined level of significance at .05.
CHAPTER 4
RESULTS OF DATA ANALYSIS

This study sought to examine the relationship between pre-admission requirements, CDHY GPA, basic college science requirements, the site of academic preparation and the NBDHE score to investigate if traditional predictors should continue to aid in admission decisions and determine if other predictors/variables should be addressed. Of the 132 graduates in this study, 91% (n=121) were Caucasian, 5.3% (n=7) were Asian, 2.3% (n=3) were African American and .8% (n=1) were Hispanic. There were 130 females (98.5%) and 2 males (1.5%) with a mean age for the year of graduation of 25. (SD=4.88)

The first research question focused on determining what academic prerequisites for admission are predictors for the CDHY GPA and student performance on the NBDHE. Pearson’s r correlation was used to analyze the program prerequisite grades, basic science course requirement grades, the CDHY GPA and the score on the NBDHE. (Table 1) For the program prerequisites, the analysis revealed that overall entering GPA had the strongest correlation with the CDHY GPA. This was followed in strength by the prerequisite sciences, including the 3-science GPA combining Biology, Chemistry 1 and
Psychology, then by Chemistry 2. Based on the correlation, English was worse than math (which did correlate).

Table 1 also summarizes the correlations of the independent variables with the NBDHE. The strongest correlation for the NBDHE was the CDHY GPA. Prerequisite courses following in strength were the 3-science GPA, entering GPA, Biology, Chemistry 1 and Chemistry 2. The course grade in English was not correlated and the course grades in psychology and math were only weakly correlated with NBDHE.

The second research question explored the effect community colleges on the baccalaureate CDHY GPA and student performance on the NBDHE. Students were divided into 3 broad categories for comparison purposes. Group 1 was comprised of students who completed all of their science preparation at a 4-year institution. Group 2 consisted of students who completed science courses in a fairly equal mix of both the community college settings and 4-year institutions (1-3 courses) and group 3 consisted of students who completed all but 1-3 courses of their science preparation at a community college.

Table 2 summarizes the means for CDHY GPA and NBDHE by site of preparation. The results of the ANOVA comparison of site of preparation groups are given in Table 3. There was a significant effect of site of preparation on the CDHY GPA, but not on the NBDHE. The post-hoc Scheffe’ comparisons (Table 4) indicated a significant difference in the CDHY GPA between group 1 that completed science preparation at a 4-year institution and group 2 that had inconsistent science sites of preparation.
The final research question sought to determine if a correlation existed between Anatomy, Human Nutrition, Microbiology and Physiology with CDHY GPA and student performance on the NBDHE. As to the non-dental hygiene courses in the professional program, the course grade in Human Nutrition was most strongly correlated with the CDHY GPA as noted in Table 1. This is followed in decreasing order by the course grades in Anatomy, Physiology, and Microbiology. As to the non-dental hygiene courses in the professional program, Physiology had the strongest correlation with NBDHE followed in strength by Anatomy, Microbiology, and Human Nutrition.

Regression analysis verifies Human Nutrition to have much more influence on the CDHY GPA than the other variables Anatomy, Biology and Chemistry 1 as noted in Table 5. The results of the stepwise regression analyses are noted in Table 6.

Regression analyses of variables that account for NBDHE are noted in Table 7. CDHY GPA and 3-science GPA were moderately weak predictors of NBDHE and together only account for .407 of the variability. The results of the stepwise regression analysis are noted in Table 8.
CHAPTER 5
DISCUSSION, CONCLUSIONS, IMPLICATIONS

This study examined the academic prerequisites for admission to the dental hygiene program at The Ohio State University to determine if current admission standards were utilizing the best predictors for success within the program or on the NBDHE. It also attempted to determine if site of science preparation might have an effect upon the CDHY GPA or the NBDHE. Finally this study sought to determine if any of the core science coursework currently within the program correlated with the CDHY GPA or the NBDHE. Following the change in format of the NBDHE in 1998 to include case-based questioning, no studies have been published to address the validity of previously determined predictors.

Current prerequisites for the program include Biology, 2 sequential Chemistry courses, English, Math or a Logical Analysis course and an introductory Psychology course. Among these courses, the best predictor for success, as measured by CDHY GPA, was the GPA of all prerequisites. The strongest predictor in a single course within the prerequisites was the Biology. Op’t Holt and Dunlevy (14) cited similar findings within a respiratory therapy program citing the Math-Science GPA and pre-professional
GPA as accounting for the greatest variance in the their exit GPA. Interestingly, within this study the strongest predictor of the CDHY GPA was found to be one of the core science courses, Human Nutrition, typically completed after matriculation during the first quarter of the dental hygiene curriculum. Perhaps admission committees should consider rearranging its orientation within the program’s curriculum to a pre-admission requirement to add more validity to predictors. Within the other core science courses completed while in the program, anatomy, physiology and microbiology also rendered moderate correlation to the CDHY GPA. This possibly indicates that to be successful on the new NBDHE format which includes case based questioning, the student may not need to recall facts from any one class, but critically analyze and use information from a variety of courses to effectively problem solve and address a variety of issues related to comprehensive patient care.

As mentioned in the introduction, students come to 4-year institutions with a variety of educational experiences. In today’s mobile society, transfers between 2-year community colleges and 4-year institutions and among 4-year institutions are common. It is also common for students to take classes concurrently in 2-year and 4-year institutions to facilitate complex work and family scheduling issues. The author speculated the site of academic preparation to possibly have an effect on academic performance as noted in studies by Op’t Holt, DunLevy (14) and Mills, Sampel, Pholman, and Becker (15). This study sought to determine if site of science academic preparation effected CDHY GPA or NBDHE scores. Consistency in site of science preparation seemed to play the largest role. Students who only took classes within a 4-year institution and students who
predominately took classes in 2-year institutions performed similarly on the NBDHE and had similar mean dental hygiene GPAs. However, students who mixed their science coursework preparation between community colleges and 4-year institutions exhibited lower mean GPA at the end of the dental hygiene program than did students who completed their course work only at 4-year schools.

Ultimately, an outcome goal of every program is for graduates to successfully pass the profession’s NBDHE on their first attempt. Predictors found to more closely correspond with success on the NBDHE were the CDHY GPA and the 3-science GPA of students entering the program. Interestingly, this study concurs with Shannon (4) in identifying the single greatest predictor for success on the NBDHE as the student’s CDHY GPA. Endenfield’s (1) study also reported a combination of dental hygiene coursework as notably affecting the probability of passing the NBDHE. Other disciplines cite similar findings. Mills, Sampel, Pholman and Becker (15) found using students cumulative program GPA to increase the likelihood of predicting success on the credentialing exam in nursing. In this study, single courses with a similar, weaker correlation were Physiology, Biology, Microbiology, Nutrition and the first of 2 chemistry courses. Shannon’s (4) research also found grades in Nutrition, Physiology and Chemistry to be among the predictors. She also cited grades in Sociology as a predictor that was not examined in this study. This information could be helpful for administrators and faculty who search to identify courses or subject matter for remediation and students who would benefit from review courses before taking the NBDHE.
This study confirmed findings noted in previous investigations and identified possible predictors of success, which may aide admission committees in their selection process. It also may provide data to justify exploring changes within the timing and structure of the curriculum. Although data was not collected to fully address the impact of the timing of coursework, further studies should seek to investigate its possible effect. Another consideration for further study would be to examine the correlation of specific dental hygiene courses with NBDHE scores since this study found the CDHY GPA to be the greatest predictor for success on this exam. However, because much of the variability in the CDHY GPA and NBDHE remain unexplained by academic factors, researchers and admission committees should possibly investigate other non-academic, non-traditional variables. For example, perhaps psychomotor skills, current employment status, self-management skills, motivation, professional and/or ethical behavior should be addressed to determine if they provide a better understanding the factors that may influence student success in professional programs, credentialing exams and beyond.
LIST OF REFERENCES


APPENDIX A

Autumn Quarter (year 1 of program)
- Oral Anatomy and Tooth Morphology 4 hours
- Introduction to Dental Hygiene 1 hour
- Human Nutrition 5 hours
- Microbiology 5 hours

Winter Quarter (year 1 of program)
- Introduction to Periodontology 3 hours
- Pre-clinical Laboratory 4 hours
- Oral Histology and Embryology 2 hours
- Oral Radiology 2 hours
- Oral Radiology Laboratory 1 hour
- General Anatomy 5 hours

Spring Quarter (year 1 of program)
- Topics in Preventive Care for the Dental Hygienist 2 hours
- Dental Hygiene Therapy – Clinic 2 hours
- DHY 230 2 hours
- Introduction to General Pathology 2 hours
- Restorative Dentistry 1 hour
- Dental Materials Laboratory 2 hours
- Physiology 5 hours

Summer Quarter (year 1 of program)
- Elective Clinic 1 hour

Autumn Quarter (year 2 of program)
- Topics in Dental Hygiene Patient Care 2 hours
- Dental Hygiene Therapy – Clinic 3 hours
- Intermediate Topics in Periodontology 1 hour
- Pediatric Dentistry 2 hours
- Introduction to Oral Diagnosis 2 hours
- Community Dental Health (GEC) 2 hours
- Community Dental Health (GEC) 5 hours

Winter Quarter (year 2 of program)
- Pain and Anxiety Control 2 hours
- Supportive Periodontal Therapy 1 hour
- Dental Hygiene Therapy – Clinic 3 hours
- Pharmacology 3 hours
GEC Course within Specialization* 5 hours

Spring Quarter (year 2 of program)
Supportive Periodontal Therapy 1 hour
Dental Hygiene Therapy – Clinic 3 hours
Assessment and Management of the Geriatric Patient 1 hour
Dental Materials for the Dental Hygienist 2 hours
Introduction to Research and Statistical Methods 5 hours
Course within Specialization* 3 hours
Elective 1 hour

Summer Quarter (year 2 of program)
Elective Clinic 1 hour

Autumn Quarter (year 3 of program)
Dental Hygiene Therapy – Clinic 3 hours
Analysis and Interpretation of Research in Oral Health Care 2 hours
Oral Radiology and Interpretation 1 hour
Senior Seminar 1 hour
GEC 5 hours
Course within Specialization* 3 hours
Electives 2 hours

Winter Quarter (year 3 of program)
Dental Practice and Economics, Management and Employment Issues 3 hours
Occlusion 1 hour
Dental Hygiene Therapy – Clinic 3 hours
GEC 5 hours
Course within Specialization* 3 hours
Electives 2 hours

Spring Quarter (year 3 of program)
Current Concepts in Dental Hygiene Practice 2 hours
Practicum in Dental Hygiene 6 hours
GEC 5 hours
Course within Specialization* 3 hours

* Area of specialization requires 13-15 hours form an approved list. Specific courses and schedules vary by specialization.
APPENDIX B

<table>
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<tr>
<th>Course</th>
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Table 1. Pearson's r Correlation between prerequisites courses and core science for CDHY GPA and score on the NBDHE. (n=132)

* Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)

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<th>MEAN</th>
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Table 2. Descriptive summary of mean CDHY GPA and NBDHE by site of preparation
### Table 3 ANOVA comparing site of academic preparation on CDHY GPA and NBDHE.

<table>
<thead>
<tr>
<th>DEPENDENT VARIABLE</th>
<th>(I) SCISITES</th>
<th>(J) SCISITES</th>
<th>MEAN DIFFERENCES (I-J)</th>
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Table 4. Post-hoc multiple comparisons using Scheffe' test to compare the effect of site preparation on the CDHY GPA and the NBDHE.

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<th>DEPENDENT VARIABLE</th>
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<th>(J) SCISITES</th>
<th>MEAN DIFFERENCES (I-J)</th>
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Table 5. Regression summary of variables and CDHY GPA (n=132)

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Table 6. Coefficients of regression of CDHY GPA on variables.

Model 2: $y^1 = 2.644 + .168(nutrition) + .120(anatomy)$

Model 4: $y^1 = 2.323 + .130(nutrition) + .0832(anatomy) + .0942(biology) + .0833(chem.1)$

(n = 132)
Table 7. Regression summary of variables and NBDHE. (n=132)

<table>
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<tr>
<th>VARIABLES</th>
<th>R SQUARE CHANGE</th>
<th>F CHANGE</th>
<th>df 1</th>
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Table 8. Coefficients of regression of NBDHE on variables.
Model 2 \( y = 51.979 + 7.45 \text{ (CDHY GPA)} + 1.33 \text{ (3-Sci GPA)} \) (n = 132)