

Old Dominion University ODU Digital Commons

Dental Hygiene Theses & Dissertations


Dental Hygiene

Fall 2016

Dental Hygiene Alternative Practice Models: Preparedness and Confidence of 2015 Graduates

Futun Nasser Alkhalifah
Old Dominion University

Follow this and additional works at: https://digitalcommons.odu.edu/dentalhygiene_etds

 Part of the [Dental Hygiene Commons](#), and the [Educational Assessment, Evaluation, and Research Commons](#)

Recommended Citation

Alkhalifah, Futun N.. "Dental Hygiene Alternative Practice Models: Preparedness and Confidence of 2015 Graduates" (2016). Master of Science (MS), thesis, Dental Hygiene, Old Dominion University, DOI: 10.25777/m380-qd95
https://digitalcommons.odu.edu/dentalhygiene_etds/4

This Thesis is brought to you for free and open access by the Dental Hygiene at ODU Digital Commons. It has been accepted for inclusion in Dental Hygiene Theses & Dissertations by an authorized administrator of ODU Digital Commons. For more information, please contact digitalcommons@odu.edu.

DENTAL HYGIENE ALTERNATIVE PRACTICE MODELS: PREPAREDNESS AND
CONFIDENCE OF 2015 GRADUATES

by

Futun Nasser Alkhalifah
B.S.D.H. February 2011, King Saud University

A Thesis Submitted to the Faculty of
Old Dominion University in Partial Fulfillment of the
Requirements for the Degree of

MASTER OF SCIENCE

DENTAL HYGIENE

OLD DOMINION UNIVERSITY
December 2016

Approved by:

Susan Daniel (Director)

Tara Newcomb (Member)

Denise Claiborne (Member)

ABSTRACT

DENTAL HYGIENE ALTERNATIVE PRACTICE MODELS: PREPAREDNESS AND CONFIDENCE OF 2015 GRADUATES

Futun Nasser Alkhalifah
Old Dominion University, 2016
Director: Dr. Susan Daniel

Purpose: evaluate dental hygiene graduates' perceived preparedness and confidence to practice in alternative settings. Methods: a survey was sent through ADHA to all members who graduated within the last year (2015-2016) with a minimum of one-week work experience. The survey consisted of demographics, and two alternative practice scales. Independent variables characterized as follows: (1) graduate of a baccalaureate degree dental hygiene program within an allied health science program, (2) graduate of a baccalaureate degree dental hygiene program within a dental school, or (3) graduate of an associate degree dental hygiene program. The dependent variables were preparedness, confidence and practice management skills. Results: A total of 319 responses were received; 303 participants met inclusion criteria. The majority (97.7%) of the sample was female. Over two thirds of respondents (68.5%) were aged 20 to 30 years. Most respondents (85.8%) worked in a private setting. Only 2 dental hygienists worked under direct access. Most respondents had an associate degree. Dental hygienists aged 20–30 years showed significantly higher level of preparedness over those above 30 years, $p = 0.043$. Dental hygienists practicing under direct supervision demonstrated significantly lower levels of preparedness than the other hygienists, $p = 0.030$. Graduates from programs located in a collage of allied health reported being less prepared for alternative practice than graduates from programs located in a dental school; $p = 0.032$. Conclusions: Most hygienists from this study were working in dentists' offices; however, majority felt prepared to pursue careers in alternative settings. Hygienists showed a high level of confidence in their clinical skills but they were not confident enough with their practice management skills. No differences were identified for self-confidence or practice management skills.

ACKNOWLEDGMENTS

I would like to express my sincere gratitude to Dr. Susan Daniel for her continuous support, motivation, and guidance. Also, this thesis would not be successfully conducted without Ms. Tara Newcomb and Ms. Denise Claiborne valuable comments and input. Also, I want to thank my family for their continuous encouragement and support throughout my studies and through the process of researching and writing this thesis. This achievement would not have been possible without all of you. Thank you

TABLES OF CONTENTS

LIST OF TABLE	v
LIST OF FIGURE	vi
Chapter	
I. INTRODUCTION	1
PROBLEM STATEMENT	2
DEFINITION OF TERMS.....	3
RESEARCH GROUPS	4
RESEARCH QUESTIONS	4
SPECIFIC AIMS AND RELEVANCE	5
RESEARCH HYPOTHESES	5
II. REVIEW OF THE LITERATURE	7
III. METHODS AND MATERIALS.....	11
IV. RESULTS	20
V. DISCUSSION	35
VI. CONCLUSIONS.....	40
REFERENCES	41
APPENDICES	46
VITA.....	58

LIST OF TABLES

Table	Page
1. Reliability of the Data Collection Measures	13
2. Frequency Distribution of Study Respondent's Gender	16
3. Frequency Distribution of Study Respondent's Age	16
4. Frequency Distribution of Study Respondent's Employment Supervision	16
5. Crosstabs (Employment Setting with Age).....	22
6. Graduates' Perception of Self-Confidence (Practice Management Skills).....	26
7. Correlations Among Dependent Variables and Between Subjects Effects	27
8. Independent Samples Test/ Preparedness Among Different Age Groups	28
9. Independent Samples t-test/ Preparedness Among Different Supervision	29
10. ANOVA Test/ The Overall Model Predicting Preparedness	29
11. Coefficients/ Significant Predictor of Dependent Variable Preparedness	30
12. Regression/ Pairwise Comparisons.....	31

LIST OF FIGURES

Figure	Page
Continuous Variable Preparedness	17
Continuous Variable Practice Management.....	18
Continuous Variable Self-confidence	19
Frequency Distribution of Study Respondent’s Employment Setting.....	20
Frequency Distribution of Study Respondent’s Employment Supervision	21
Frequency Distribution of Study Respondent’s Program Type	22
The Self-Perception of Readiness for Alternative Practice	23
The Self-Perception of Readiness for Alternative Practice	24
Graduates’ Perception of Self-Confidence (Clinical Skills).....	25
Graduates’ Perception of Self-Confidence (Practice Management Skills).....	26

CHAPTER I

INTRODUCTION

Access to dental care continues to be of epidemic disproportion in many regions of the U.S. Vulnerable populations such as indigenous children, the elderly, and minority groups are disproportionately effected.¹ Dental and dental hygiene shortages have been reported in West Virginia, Mississippi, Montana, South Dakota, and North Dakota.² Several states have responded to this shortage by passing general supervision or independent practice laws. Dental hygienists are uniquely qualified to improve access to oral health care through, in general, preventive and in some states restorative practice.³

State laws, regulated by dentistry, include therapeutic and preventive services, supervision parameters, and locations in which dental hygienists can provide care— dental hygiene scope of practice is limited by state and regulatory restrictions both in education and practice.³ The decrease in dental hygiene supervision requirements provides dental hygienists a variety of professional practice opportunities especially in alternative practice settings independent from a dentist.³ The American Dental Hygienists' Association (ADHA) position is that dental hygienists are primary care providers⁴ and ADHA has supported this position through organized governmental advocacy efforts. Currently, dental hygienists are permitted to initiate care in 39 states without authorization from a dentist.⁵ States with broad scope of practice laws report improved access to dental care in their populations, for example, California , Colorado, Maine, Oregon, and New Mexico.³ Low-income children in these states have received their first preventive visit by age one and approximately 42 percent reduction in dental treatment cost was noted.⁶ In some states, fees for service in dental hygiene practices were also found to be lower than their counterparts providing services in private practice dental offices –direct

reimbursement to the dental hygienist lowered cost to the patient.⁷ The high cost of dental care is a contributing factor limiting access to care.¹ Despite these known benefits of expanded practice laws, some states such as Alabama, Georgia, Mississippi and North Carolina have made little or no changes in dental hygiene regulations over the past three years.³

Problem Statement

The dental hygiene profession is rapidly increasing in numbers with opportunities for practice in alternative settings and with less restrictive laws and regulations. Growth of 28 percent from 2012-2025 has been projected.⁶ However, today there is an overwhelming number of dental hygienists working in private practice under direct supervision where the dentist collects fee for service.³ While practicing in a private setting has been the primary employment site for dental hygienists, it has contributed to lack of access to dental care and alternative and advance practice settings for dental hygienists.³ Approximately 180,240 dental hygienists were employed in a private dental practice while only 690 dental hygienists worked in alternative and advance practice settings.³

Dental hygiene programs exist at the associate, baccalaureate, graduate and post-graduate level. Most dental hygienists in the workforce today have an associate's degree. Moreover, associate degree programs exist in every state totaling 332 accredited programs.³ Certificate or associate degree programs require an average of 2,860 hours of instruction with an average of 535 hours of supervised clinical instruction.³ In comparison, there are only 58 dental hygiene programs that provide a bachelor's degree which require approximately 3,073 hours of instruction.³ Interestingly, all accredited dental hygiene programs are held to the same CODA standards and dental hygiene national and regional board licensure is required of any new graduate prior to practice—in this way there is standardization for basic competency within the

curriculum and dental hygiene practice. However, some proposals advocate that current dental hygienists in the workforce should have advanced degree and additional education in order to practice independently.³

Definition of Terms

For this study, the following key terms are defined:

1. Alternative workforce models: dental hygiene workforce models that operate under direct-access requirement. Dental hygienists in this model are allowed to initiate treatment based on their assessment without specific authorization of a dentist.¹
2. General Supervision: the dentist has seen the patient or specifically authorized the hygienist to provide service to that patient.³
3. Direct Supervision: the dentist is physically present while the hygienist provides care.³
4. Direct Access: the hygienist initiates the service without authorization from the dentist. In some cases, the hygienist is required to have a relationship with the dentist; in two states, the hygienist can practice independently.³
5. Newly Graduated Students: dental hygiene students who graduated within the last year (2015-2016).
6. Public Health Dental Hygienist (PHDH): a registered dental hygienist who provide care without the supervision of a dentist in: schools; correctional facilities; health care facilities; personal care homes; domiciliary care facilities; older adult daily living centers; continuing-care facilities; federally qualified health centers; public or private institutions under the jurisdiction of a local, state, or federal agency; and free and reduced-fee nonprofit health clinics⁵

7. Expanded Practice Dental Hygienist (EPDH): dental hygienist may practice without supervision by a dentist in settings approved by the board.⁵
8. Independent Practice Dental Hygienists (IPDH): dental hygienist may practice without supervision by a dentist in all settings.⁵
9. Direct reimbursement: dental hygienist needs to be an independent contractor, self-employed or own a dental hygiene practice or business to receive payment sent in his/her name.⁸

Research Groups

- Group 1: consisted of students graduated from baccalaureate degree dental hygiene programs within an allied health science college.
- Group 2: were students who graduated from baccalaureate degree dental hygiene programs within a dental school.
- Group 3: was comprised of students who graduated from associate degree dental hygiene programs.

Research Questions

- What is the perceived level of preparation of dental hygiene graduates to practice in alternative workforce models?
- What is the self-confidence level of dental hygiene graduates to practice in alternative workforce models?
- What is the perceived level of confidence of dental hygiene graduates to utilize practice management skills?
- What are the differences among the groups in perceived preparedness, self-confidence and practice management skills for alternative workforce models?

Specific Aim and Relevance

According to the revised research agenda by ADHA (2014-2016), the priority areas of National Dental Hygiene Research Agenda (NDHRA) are to evaluate the extent current dental hygiene curricula prepare dental hygienists to meet the needs of changing workforce models, and to evaluate the differences between baccalaureate-and associate-level educated dental hygienists.^{9, 10} Focusing on dental hygiene research priority areas would help in advancing the profession and generate knowledge that is unique to the dental hygiene discipline.¹⁰ Registered dental hygienists are gaining more responsibilities in decision-making in addition to, practicing intra- and interprofessionally.¹¹ The aim of this study was to evaluate dental hygiene graduates' perceived preparedness and self-confidence to practice in alternative workforce models in order to gain an understanding of how well current dental hygiene curricula are preparing hygienists for the evolving profession. Additionally, this study compared the level of preparedness of students graduated from baccalaureate degree programs within an allied health science college, baccalaureate degree within a dental school and associate degree dental hygiene programs. This was the first national study that investigated dental hygienists' confidence and preparedness for alternative practices.

Research Hypotheses

The hypotheses were tested at .05 level of significance:

- H₀ 1: There is no statistically significant difference in the perceived preparedness for alternative practice among the three study groups.
- H₀ 2: There is no statistically significant difference in the perceived self-confidence for alternative practice among the three study groups.

- H₀ 3: There is no statistically significant difference in the perceived level of confidence in utilizing practice management skills among the three study groups.

CHAPTER II

REVIEW OF THE LITERATURE

Supervision Requirements for Dental Hygienists

Supervision requirements vary widely in state law and regulations throughout the country. A common categorizes of supervision levels are direct supervision, general supervision and direct access.³ Direct supervision can be defined as a dental hygienists who provide services only when a dentist is physically present.³ Only seven states require direct supervision for providing prophylaxis, application of fluoride, and sealants.³ Twenty states allow general supervision, defined as providing prophylaxis and other therapeutic and diagnostic services by written prescription from a dentist of record.⁵

The majority of U.S. states (39) legalized direct access dental hygiene practice—in most of these states, completion of additional continuing education courses and defined levels of experience are required.⁵ Additionally, a written agreement between hygienists and dentists is needed in some states.⁵ Direct access provides the greatest amount of autonomy to dental hygiene practitioners when compared to direct and general supervision.³ Direct access means dental hygienists initiate treatment without specific authorization from a dentist and exclusive to the dental hygiene assessment and diagnosis.³ Generally, supervision requirements differ based on whether services are provided in a private practice or a public setting. Higher level of supervision is required in private settings than in public settings.³

Barriers Limiting Dental Hygiene Practices

There are many barriers for dental hygienists to practice in advanced and alternative settings. One significant barrier is reimbursement policies.³ For instance, state Medicaid reimbursement policies are not always aligned with state laws that delineate the dental hygiene

scope of practice.³ For example, the state allows dental hygienists to provide preventive services on a direct access or independent practice; however, dental hygienists may not be able to bill Medicaid directly for those services.⁸ As a result, the only form of reimbursement for these services is to bill directly from the practice or through donations.³ Another barrier is the state dental board, restricting dental hygienists from practicing in unsupervised settings.¹²

Further, the lack of curriculum competencies and standards, as developed and mandated by CODA, prevent practice in alternative settings. Competency-based education in dental hygiene assists in measuring students' skill acquisition and their preparedness for practice.¹³ The American Dental Education Association policy statement of Guidelines and Recommendations for Academic Dental Institutions states that educational institutions are encouraged to prepare students for the evolving workforce models.¹³ Therefore, the competency-based curriculum was developed to ensure that dental hygiene students would be competent upon graduation for different workforce models.¹³ Hence, adding professional competencies that dental hygienists will need to successfully practice in alternative practice settings becomes a necessity with the changing dental hygiene professional practice acts.

Accordingly, dental hygiene curricula should expand with the changing scope of practice. Additional curricular experiences are needed such as coursework on organizational structure, billing, coding, prescription writing and the public health delivery system.¹⁴ Coplen & Bell stated several barriers facing expanded practice dental hygienists including lack of practice management skills and the inability to make a living wage.¹⁴ If dental CODA standards address curriculum and state legislative barriers, the potential number of dental hygienists working in alternative practice settings would increase.¹⁴

Independent Practice Dental Hygienists (IPDHs) in Maine did not feel prepared for their chosen career path as IPDHs.¹⁵ On the contrary, these hygienists felt more prepared for the traditional private practice.¹⁵ Vannah et al. suggested that elective courses such as business and communication could be added to the dental hygiene curriculum for students interested to practice independently and additional training for referrals beyond the dental hygiene scope of practice is needed to optimally prepare dental hygienists to practice independently.¹⁵

Contributing Factors to Lack of Preparedness in the Workforce

The dental hygiene literature mainly attributes the lack of preparedness among new graduates to the inadequacy of the dental hygiene curriculum, as mandated by CODA, in preparing a practice-ready workforce.^{14, 15} In comparison, the nursing literature thoroughly discusses factors contributing to a lack of preparedness among new nursing' graduates.^{16, 17} Some of these factors included gaps between educational institutions and practice setting, the quality of undergraduate clinical placements and clinical experience, the need for students to feel a sense of belonging within the clinical environment, and the lack of socialization to the 'real' world of nursing.¹⁶ Additionally, the physical location of the nursing program has been reported to have a significant impact on the students' preparedness. The clinical school model, which is a university-based nursing program within a hospital, shows an advantage of bringing the real world practice into the classroom.¹⁶ Watt and Pascoe conducted a study to measure graduate nurses' preparedness for practice after completing a university-based nursing program within a hospital and the results showed that participants felt prepared for practice as new graduates.¹⁶ Unlike the dental hygiene literature, the nursing education literature has a continuing discussion about how nursing education and practice sectors can be more adequate in preparing new graduate nurses.^{16, 17}

Dental Hygiene Students' Clinical Readiness for Practice

The transition from dental hygiene student to clinician can be challenging. Students tend to recall prior experiences and interpretations at their first “real world practice” experiences.¹⁸ Accordingly, they will construct a new or revised perspective, which will have a significant impact on their performance as clinicians.¹⁸ Dental hygiene students should feel competent and confident to apply what they have learned into the work environment. Accordingly, dental hygiene education and CODA standards must prepare students with skills and knowledge needed to become a competent professional and ensure that students perceive themselves as such.¹⁸ However, according to Taylor, newly graduated dental hygienists’ did not perceive themselves as competent while transitioning from a student to clinician.¹⁹ Particularly, they struggled in applying client centered care due to the fact that many private practices’ main goal is increasing revenue through dental hygiene services.¹⁹ Moreover, newly graduated hygienists were losing their dental hygiene autonomy created in school by lack of awareness of the private practice expectation.¹⁹ Pursuing this further, dental hygienists claimed that their employment applications were limited to general dental practice and that they lacked the knowledge and the skills needed to apply for public health or alternative practice careers.¹⁹ Dental hygiene students must be competent upon graduation and more importantly; they need to recognize their own competence to confidently apply knowledge and perform acquired skills.¹⁸

CHAPTER III

METHODS AND MATERIALS

Target Population and Sampling Methods

The target population was dental hygienists who received licensure within the last year and who had a minimum of one-week work experience. A stratified random sampling technique was used to ensure every participant would have the same probability of being selected. The American Dental Hygienists' Association (ADHA) membership base provides an accessible sample of the study target population. Therefore, ADHA Student Research Program was selected for survey distribution. ADHA membership base had 4,000 members who graduated from 2015-2016. Following approval of the institutional review board (IRB), the survey was sent through ADHA to all members who graduated within the last year (2015-2016) (Appendix A). A second distribution of the survey was launched one week after the initial distribution and was available for two weeks. All responses were anonymous. Participants who did not meet the inclusion criteria were excluded in order to meet the objectives of the study.

Research Design

A non-experimental, cross-sectional study design was followed. Qualtrics Survey Software was used to develop and deliver the study survey to the year 2015, dental hygiene graduates with a minimum of one-week work experience. Respondents received an email with a URL to access the survey (Appendix B). The survey consisted of 40 items including three categories of question types: demographics, the self-perception of preparedness for alternative practice and perception of self-confidence for alternative practice. Using a five point Likert-scale from 1 (strongly agree) to 5 (strongly disagree), the second section determined the level of the perceived level of preparedness for alternative practice. The third section, a five point Likert-

scale from 1 (totally confident) to 5 (not at all confident), assessed the level of confidence to practice in alternative settings.

The indicated level of measurement in this survey was ordinal, which quantifies the variables by ordering the response categories from most to least. There was no meaningful number to determine the distance between the categories. The demographic categorical variables were gender, age, program type, current employment setting, current employment supervision and length of current employment. Degree and type of school attended by respondent were the independent variables characterized as follows: (1) graduate of a baccalaureate degree dental hygiene program within an allied health science college, (2) graduate of a baccalaureate degree dental hygiene program within a dental school, or (3) graduate of an associate degree dental hygiene program. The dependent variables were preparedness, self-confidence and practice management skills.

Procedures, Materials and Data Collection Instruments

The survey questions were presented in a logical sequence to enhance the understanding and flow of the survey items. Questions were categorized into subgroups with simple headings. The survey responses were close-ended, which have higher reliability, higher degree of anonymity, and less interviewer and social desirability bias.²⁰ The survey included three validated scales; “dental hygienists preparedness for alternative practice”, “dental hygiene students’ self-confidence” and “practice management knowledge and experience”. The preparedness for alternative practice scale was validated by a convenience sample of 6 recent graduates actively practicing as IPDHs in Maine¹⁵. The clinical self-confidence scale questions are based on the American Dental Hygienists’ Association’s (ADHA) Standards for Clinical Dental Hygiene Practice.²¹ Additionally, a pilot test of the self-confidence scale was conducted

with 6 dental hygiene graduates from the University of North Carolina.²² Dental faculty members from the University of Michigan pilot tested the practice management and experience scale.²³ For content validity, a panel of experts from Old Dominion University, dental hygiene department agreed upon the adequacy of these instruments. Regarding scales' reliability, Cronbach's Alpha test showed excellent reliability for the three data collection measures (Table 1).

Table 1: Reliability of the Data Collection Measures

Scale	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Preparedness	0.877	0.879	11
Self-confidence	0.942	0.944	20
Practice Management	0.908	0.907	9

Statistical Analysis

Descriptive analyses included: frequencies and percentages for categorical variables, independent variables, and dependent continuous variables. Central tendency and dispersion were calculated for dependent continuous variables. The preliminary analysis examined the relationship among demographics and independent variables using crosstabs and chi-square. Pearson's correlation was used to determine the relationship between dependent variables.

The perceived level of preparedness, self-confidence, and knowledge of practice management were tested by a series of independent sample t-tests and ANOVA. One-way Analysis of Covariance (ANCOVA) and multivariate analysis of variance (MANOVA) were

used to determine the differences of graduates on perceived preparedness, self-confidence, and practice management skills from the three types of dental hygiene programs. Non-parametric tests were used for the self-confidence variable. Those tests were Spearman's correlation, Mann-Whitney test and Kruskal-Wallis test. Significance was set at the .05 level. Statistical analysis was performed using IBM Statistical Package for the Social Sciences (SPSS) version 23.

During data preparation, invalid cases were identified and considered for removal. Out of 319 cases, 14 cases were excluded, as they did not meet inclusion criteria. In five cases the respondents did not answer the question regarding employment length of time. As a result, it cannot be determined if these five respondents had been employed for at least a week. Nine respondents did not graduate within the last year and were removed from analyses.

The time for completion of the survey was noted in Qualtrics and it ranged from 8-12 minutes. Researchers suggest removing cases that take less than 2 seconds per item because responses at this rate are indicative of careless and inattentive answering.²⁴ In this study, one respondent took 80 seconds to complete the survey and the response was excluded from dataset. Moreover, respondents who dropped out midway through the survey were determined as invalid response and removed. According to Johnson respondents who stopped participating in a survey should be removed if they did not complete more than 50% of the questionnaire.²⁵ Only one respondent stopped taking the survey halfway and was excluded from dataset. Consequently, the original sample size was reduced from 319 to 303 cases.

After preparing the data for analysis, it was observed that out of 303-recorded cases, 40 cases contained missing data (13.2%). Additionally, 5 variables contained missing data (10.9%) out of the 46 variables, which amounted to a total of 0.99% missing information in the dataset. To assess whether the pattern of the not completed responses was missing completely at random

(MCAR), Little's MCAR test was conducted.²⁶ The null hypothesis of Little's MCAR test is that the pattern of the data is MCAR and follows a χ^2 distribution. Using an expectation-maximization algorithm, the MCAR test estimates the univariate means and correlations for each of the variables. The results revealed that the pattern of missing values in the data was MCAR, $\chi^2(1040) = 1107.90, p = .071$. Accordingly, data was not treated with any missing data procedures and analysis was conducted using pairwise deletion.

A total of 137 cases had unknown program type due to a technical error in the survey software. Those participants could not view the program type question during the first launch of the survey. However, statistical analyses that involved program type were conducted with and without the 137 participants.

Basic assumptions were created before conducting inferential analyses to avoid bias in the study's findings. Variables of interest were determined and included: gender, age, current employment setting, current employment supervision, length of current employment, program type, preparedness, self-confidence and practice management.

Regarding sample sizes, at least 10% of the sample should be in each group to avoid uneven splits between categories, which may lead to problems in multivariate analyses.²⁷ Three variables in this study showed insufficient sample size in some categories for running inferential statistics. Those variables were gender (Table 2), age (Table 3), and current employment supervision (Table 4). Gender was removed from a covariate and only included as a descriptive variable. Age was collapsed into two groups: 20-30 and above 30. The variable, "current employment supervision", subcategories were merged into two groups (direct supervision and others) rather than three groups.

Table 2: Frequency Distribution of Study Respondent's Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	7	2.3	2.3	2.3
	Female	296	97.7	97.7	100.0
	Total	303	100.0	100.0	

Table 3: Frequency Distribution of Study Respondent's Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-30	207	68.3	68.5	68.5
	31-40	76	25.1	25.2	93.7
	41-50	15	5.0	5.0	98.7
	> 50	4	1.3	1.3	100.0
	Total	302	99.7	100.0	
Missing	System	1	0.3		
Total		303	100.0		

Table 4: Frequency Distribution of Study Respondent's Employment Supervision

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Direct Supervision	135	44.6	45.2	45.2
	General Supervision	162	53.5	54.2	99.3
	Direct Access	2	0.7	0.7	100.0
	Total	299	98.7	100.0	
Missing	System	4	1.3		
Total		303	100.0		

In agreement to normality, continuous variables preparedness (Figure 1) and practice management (Figure 2) fell within the standard skewness and kurtosis cutoffs. Because of the overall sample size ($N = 303$), Shapiro-Wilks and Kolmogorov-Smirnov tests were not examined. In addition, the histograms, Q-Q plots, and box plots demonstrated adequately normal distributions for these two variables.

Figure 1: Continuous Variable Preparedness

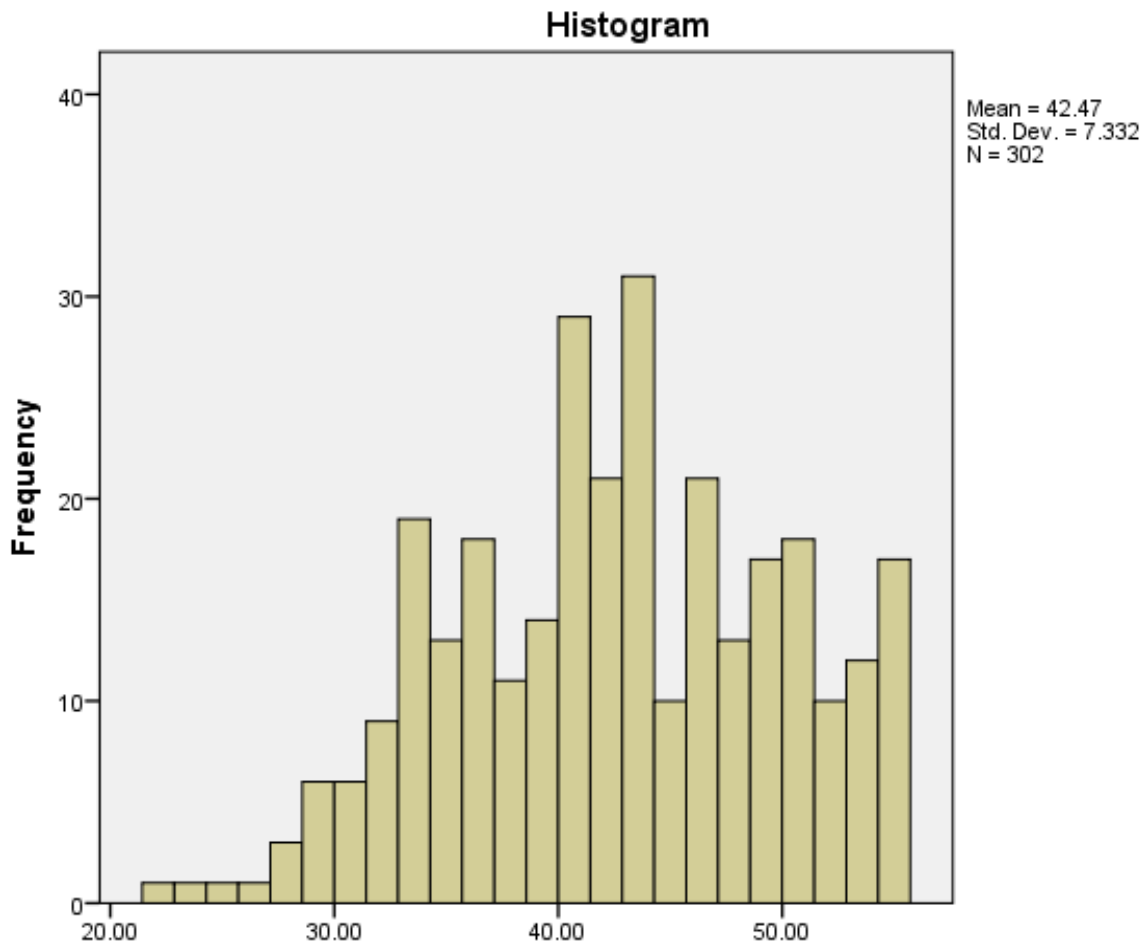
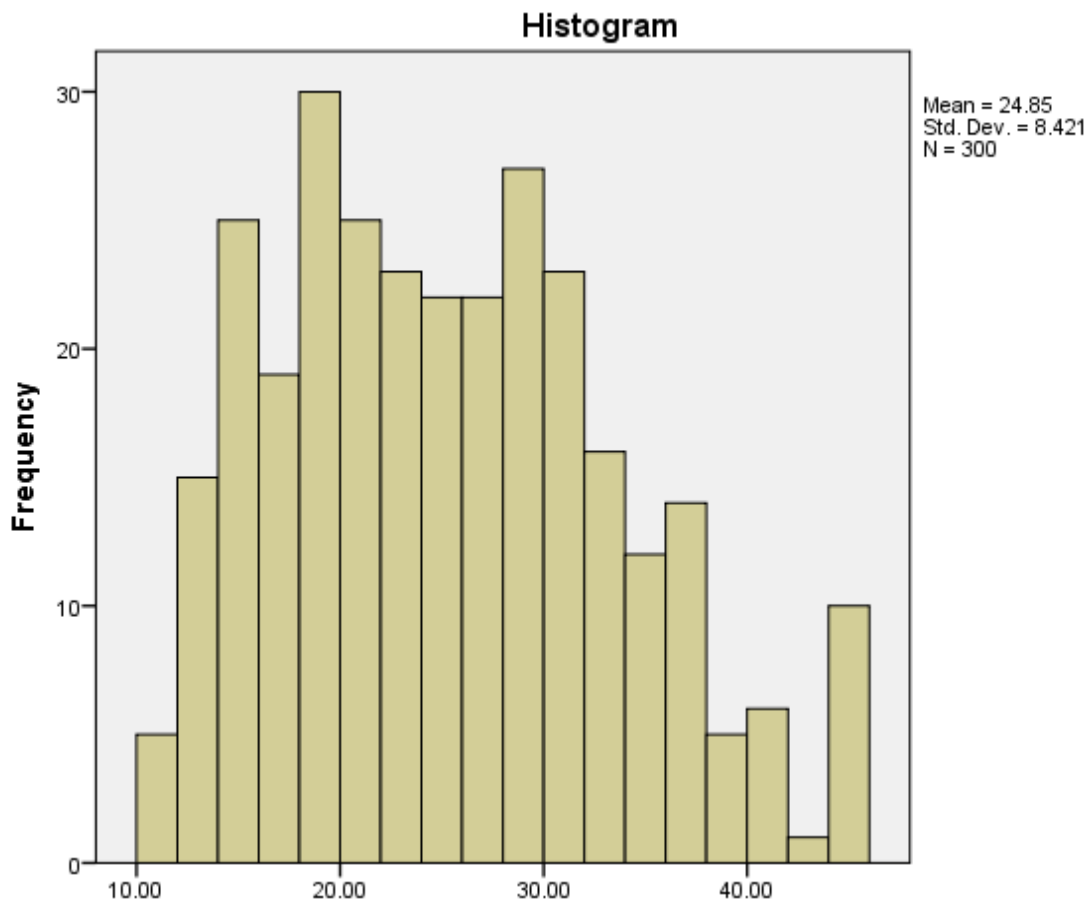


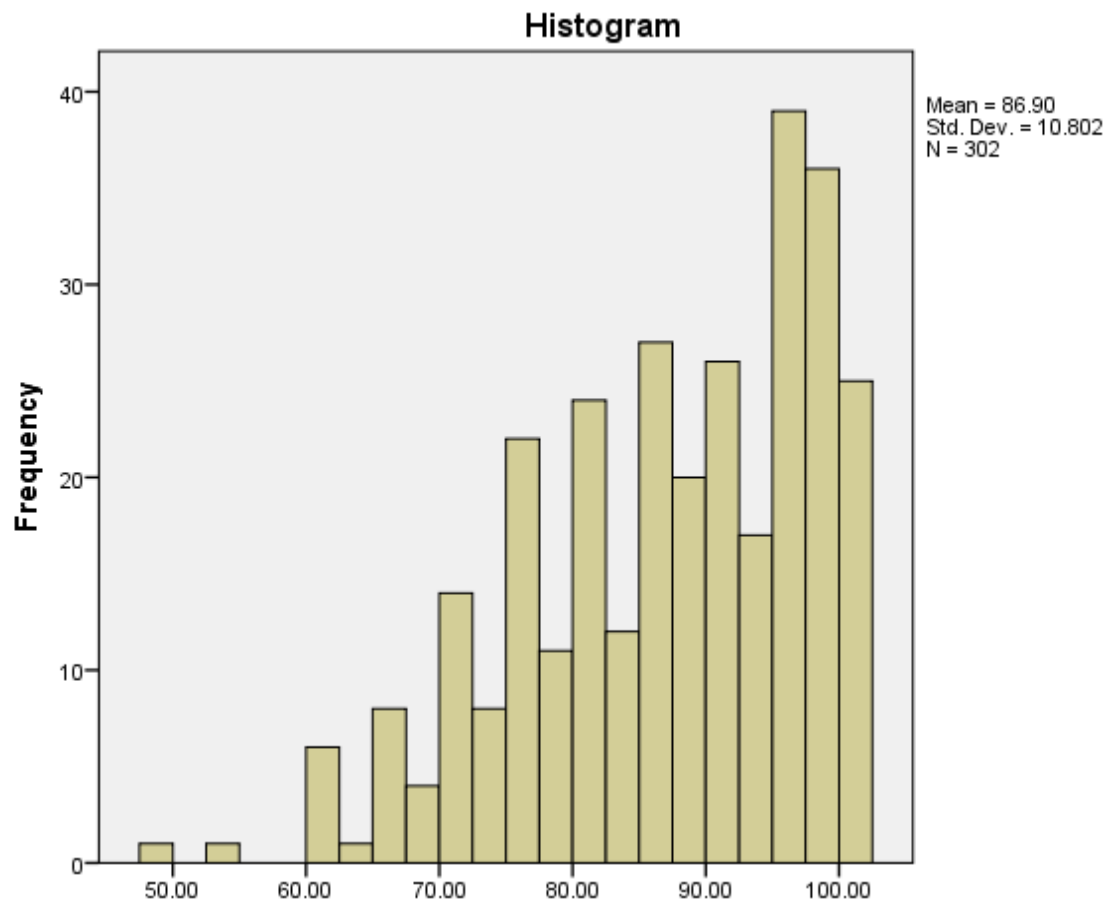
Figure 2: Continuous Variable Practice Management



However, the distribution of self-confidence (Figure 3) was shown left skewed.

Accordingly, nonparametric confirmation analysis was conducted. Although self-confidence contains some extreme values, they are not as extreme as outliers; therefore, none of the values was removed.

Figure 3: Continuous Variable Self-confidence



CHAPTER IV

RESULTS

Descriptive and Preliminary Analyses

A total of 319 responses were received from forty-one different states. Of those responses, 303 respondents met inclusion criteria. The majority of the sample was female (97.7%). Over two thirds of respondents (68.5%) were aged 20 to 30 years. Most of respondents worked in a private setting (85.8%) (Figure 4). Over half of the respondents were practicing under general supervision (54.2%), and about 45.2% of respondents were practicing under direct supervision. Only 2 hygienists reported practicing with direct access (Figure 5). Most respondents had graduated from associate dental hygiene programs (69.3%), followed by baccalaureate dental hygiene programs located in an allied health science college (17.5%), and baccalaureate dental hygiene programs within a dental school (13.2%) respectively (Figure 6).

Figure 4: Frequency Distribution of Study Respondent's Employment Setting

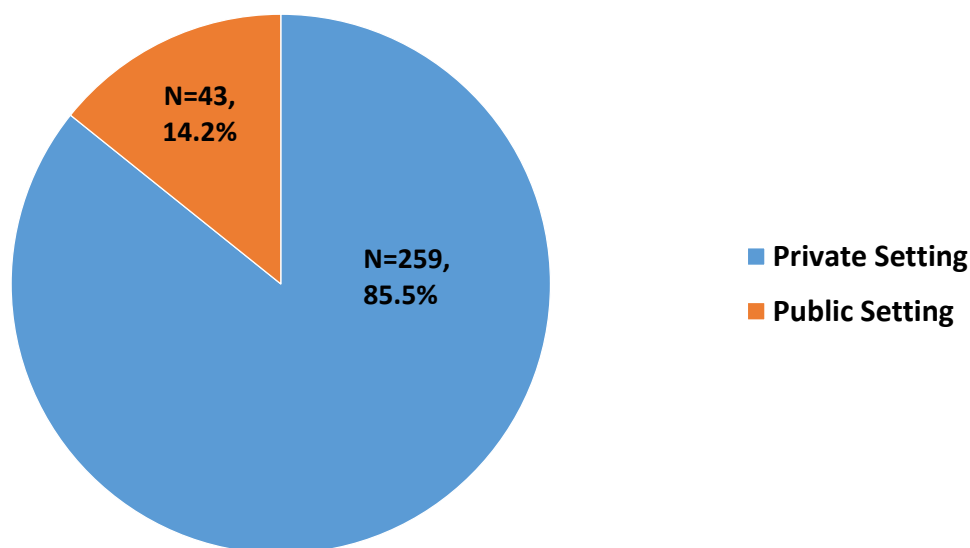


Figure 5: Frequency Distribution of Study Respondent's Employment Supervision

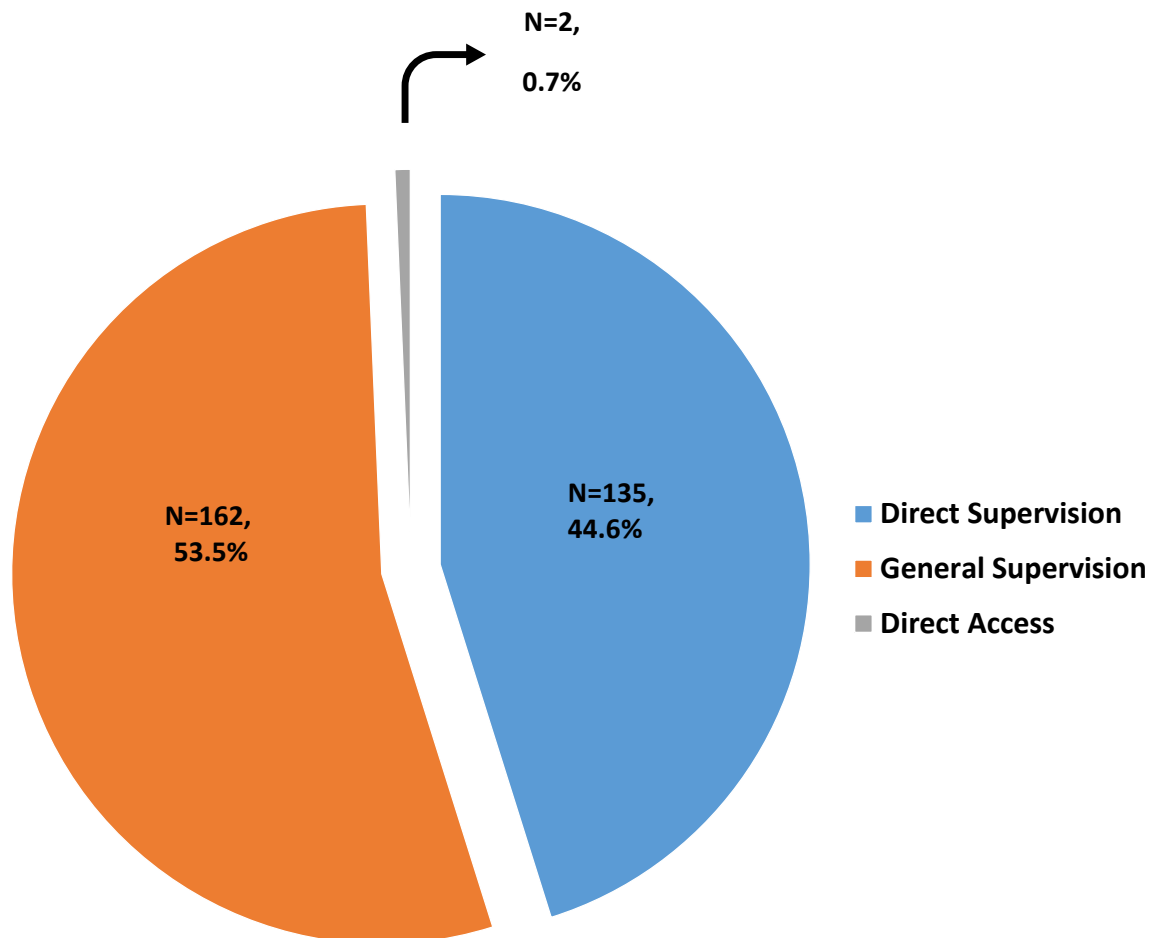
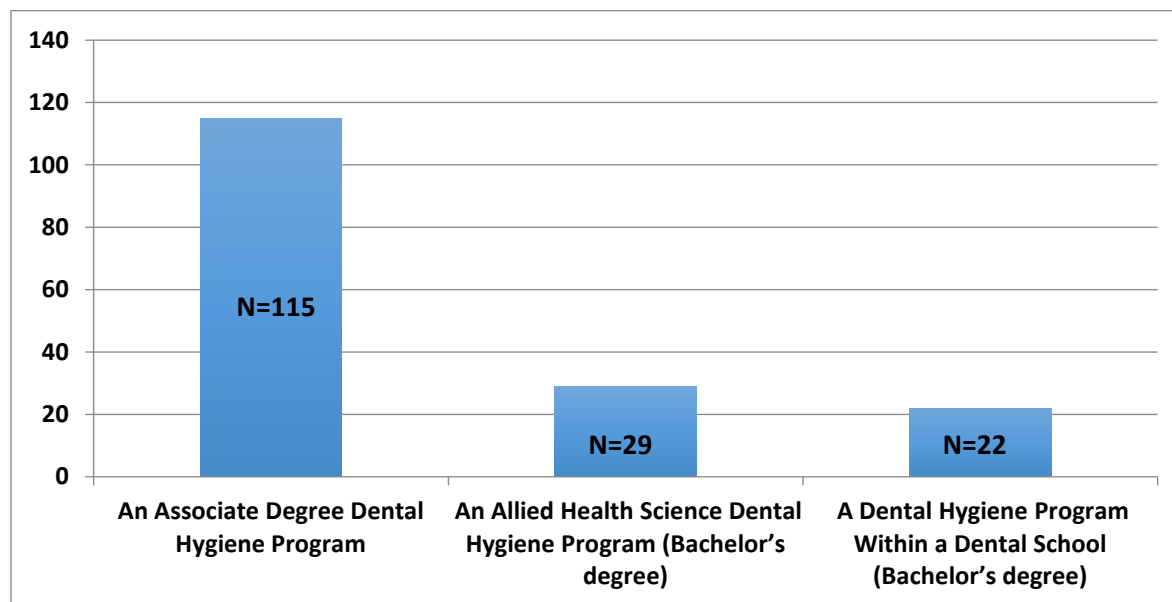


Figure 6: Frequency Distribution of Study Respondent's Program Type



Respondents above 30 years of age showed a higher percentage of work in a public setting than respondents aged 20-30 years (Table 5). Similarly, graduates from dental hygiene programs within a dental school presented a higher percentage (22.7%) of work in public settings than graduates from dental hygiene programs within an allied health science school (3.6%).

Table 5: Crosstabs (Employment Setting with Age)

		Age		Total
		20–30	Above 30	
Current Employment Setting	Private Setting Count	181 _a	77 _a	258
	% Within Age	87.4%	81.9%	85.7%
Count	Public setting Count	26 _a	17 _a	43
	% Within Age	12.6%	18.1%	14.3%
Total				
Count		207	94	301
% Within Age		100.0%	100.0%	100.0%

Note. Each subscript letter denotes a subset of Age categories whose column proportions do not differ significantly from each other at the .05 level.

According to the continuous variable preparedness, the sum scores were ranged from 22 to 55 ($M = 42.47$, $Mdn = 42$, $SD = 7.33$). The majority of respondents (88.8%) were satisfied with the preparedness they received during their dental hygiene education for their chosen career path. Thirty-seven participants (12.2%) felt the skills necessary for their current practice were not included in their education and forty-eight respondents (15.9%) felt unprepared for clinical practice outside the private practice dental office (Figure 7). Most respondents (84.2%) felt prepared to practice under general or no supervision. However, almost half of respondents (47.9%) felt unprepared to operate an independent dental hygiene practice (Figure 8).

Figure 7: The Self-Perception of Readiness for Alternative Practice

Likert Item Statement: My dental hygiene education prepared me well for clinical practice environments outside of the private practice dental office.

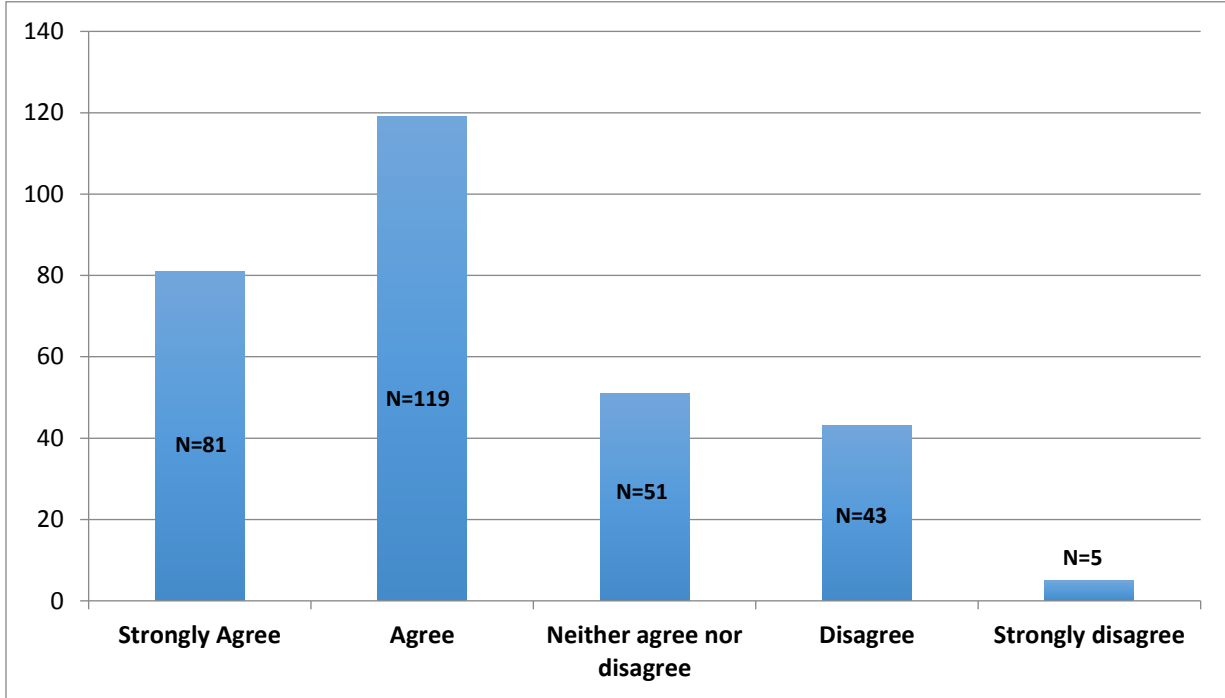
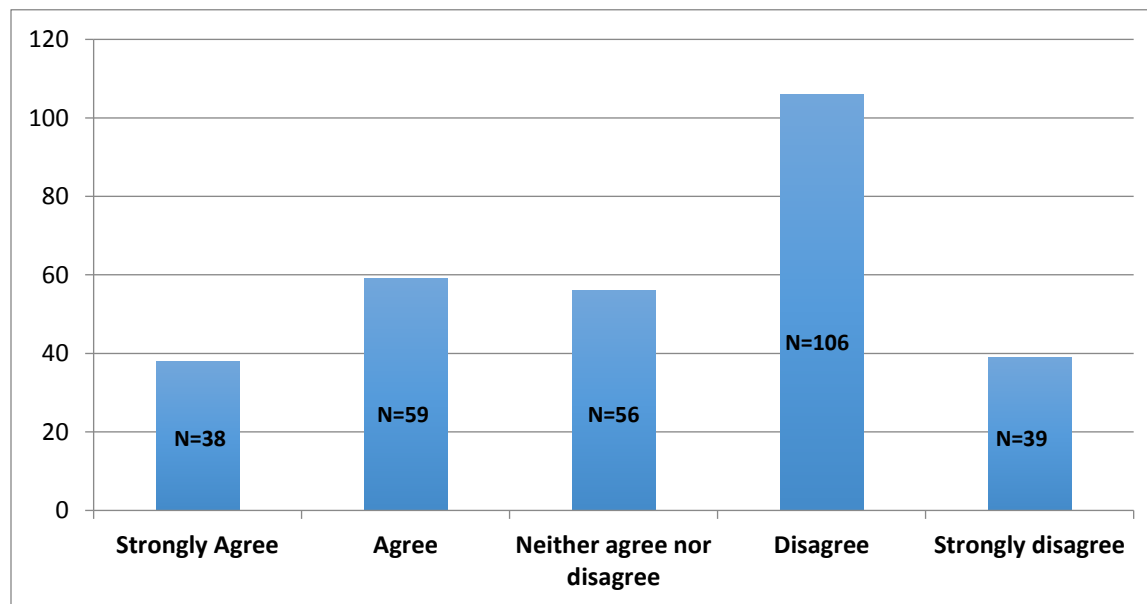


Figure 8: The Self-Perception of Readiness for Alternative Practice

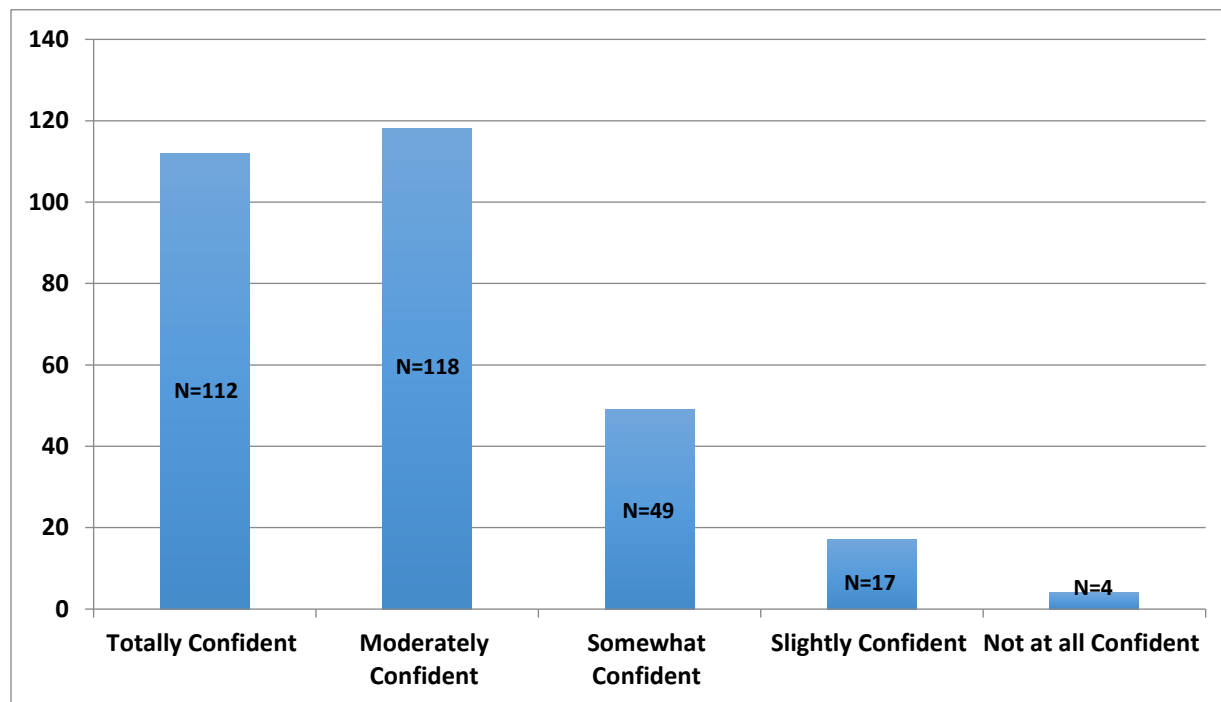
Likert Item Statement: My dental hygiene education prepared me to operate an independent dental hygiene practice.



In regard to self-confidence, the sum scores were ranged from 49 to 100 ($M = 86.90$, $Mdn = 89$, $SD = 10.80$). The majority of respondents (94%) were totally to moderately confident to create and implement dental hygiene treatment plan. Over two-thirds of respondents (86.8%) felt totally to moderately confident to evaluate outcomes of dental hygiene care and determine the need for further treatment or referral. Almost one-fourth of the sample (23.1%) was somewhat to not at all confident to communicate with dental specialists' and medical providers' (Figure 9). Ninety-three participants (30.8%) were somewhat to not at all confident to detect suspicious restorations and/or areas of possible decay.

Figure 9: Graduates' Perception of Self-Confidence (clinical skills)

Likert Item Statement: utilize all possible resources to facilitate patient care including communication with dental specialists and medical providers.



Practice management skills sum scores ranged from 10 to 45 ($M = 24.85$, $Mdn = 24$, $SD = 8.42$). More than half of the sample (59.4%) felt totally confident to moderately confident to manage any type of emergency. The majority of respondents (80.9%) were somewhat to not at all confident in financial management (Figure 10). Also, most respondents were somewhat to not at all confident in personal and human resource management (Table 6), retirement planning and purchasing and overhead equipment and supplies (78.6%, 78.5%, 78.2%) respectively. More than two-third of respondents (72%) felt somewhat to not at all confident to utilize knowledge and experience regarding third party

payer. Almost two-third (63.4%) of the sample felt somewhat to not at all confident in legal aspects of practice.

Figure 10: Graduates' Perception of Self-Confidence (Practice Management Skills) Likert Item
Statement: Utilize knowledge and experience in financial management.

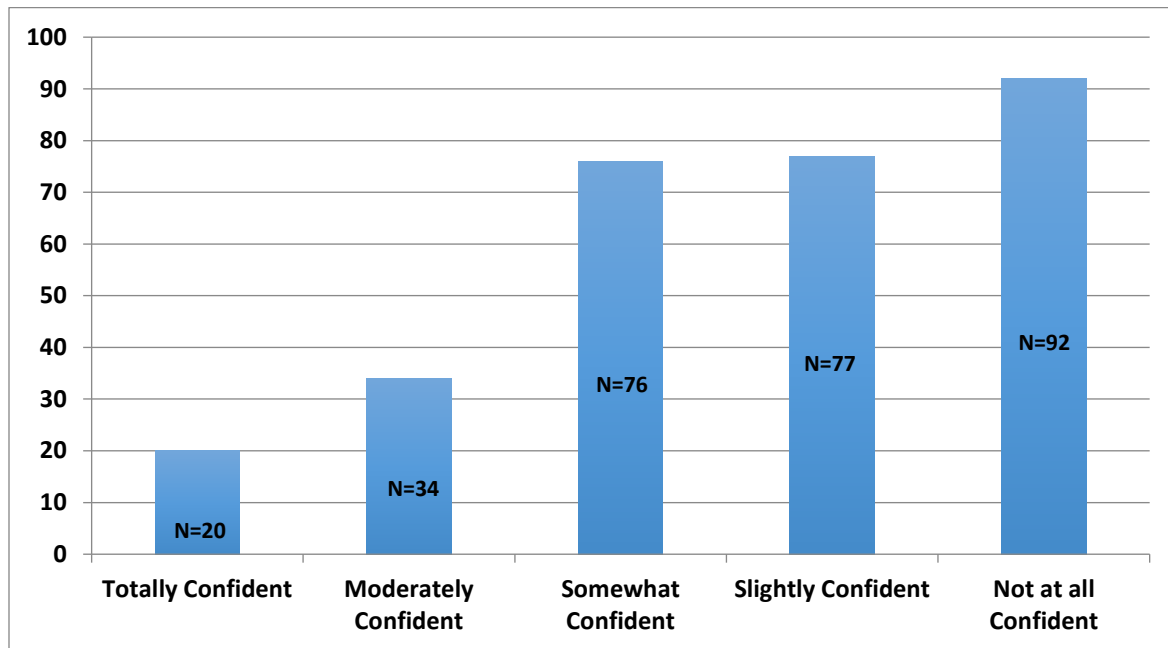


Table 6: Graduates' Perception of Self-Confidence (Practice Management Skills)

Statement: Utilize knowledge and experience in personnel and human resource management.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Totally Confident	24	7.9	8.0	8.0
	Moderately Confident	37	12.2	12.4	20.4
	Somewhat Confident	75	24.8	25.1	45.5
	Slightly Confident	65	21.5	21.7	67.2
	Not at all Confident	98	32.3	32.8	100.0
	Total	299	98.7	100.0	

In regard to the relationship among dependent variables, there were significantly positive associations among preparedness, self-confidence, and practice management skills and the effect size was strong for all of these relationships; $p=.000$ (Table 7).

Table 7: Correlations among Dependent Variables and Between Subjects Effects

Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Preparedness	185634.2	1	185634.2	3601.481	.000**	.957
Self Confidence	767903.0	1	767903.0	6270.367	.000**	.975
Practice Management	61682.81	1	61682.81	874.336	.000**	.845

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

An Independent Samples t-test revealed a significantly higher level of preparedness by ages 20–30 years ($M=43.08$, $SD=7.42$) over those 30 years and above ($M= 41.25$, $SD= 6.97$); $t(299)=2.03$, $F=. 087$, $p=0.043$ (Table 8). However, hygienists practicing under direct supervision ($M=41.48$, $SD=7.55$) demonstrated significantly lower levels of preparedness than the other hygienists who were practicing under general supervision or who had direct access ($M=43.34$, $SD=7.10$); $t(296)=-2.19$, $F=. 509$, $p=0.030$ (Table 9). No significant differences were identified for “self-confidence” or “practice management”.

Table 8: Independent Samples Test/ Preparedness among Different Age Groups

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Preparedness	Equal variances assumed	.987	.321	2.032	299	.043*
	Equal variances not assumed			2.080	193.674	.039*
		t-test for Equality of Means				
		Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		
				Lower	Upper	
Preparedness	Equal variances assumed	1.83505	.90306	.05788	3.61221	
	Equal variances not assumed	1.83505	.88242	.09466	3.57544	

Note: The mean difference is significant at the 0.05 level.

Table 9: Independent Samples t-test/ Preparedness among Different Employment Supervision

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Preparedness	Equal variances assumed	.509	.476	-2.187	296	.030*
	Equal variances not assumed			-2.175	278.585	.030*
		t-test for Equality of Means				
		Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		
				Lower	Upper	
Preparedness	Equal variances assumed	-1.85959	.85018	-3.53275	-.18643	
	Equal variances not assumed	-1.85959	.85510	-3.54287	-.17631	

* The mean difference is significant at the 0.05 level.

Primary Analysis

Multiple linear regression was used to predict preparedness from program type based on research hypothesis one. The overall model predicting preparedness from program type was significant, which indicates a significant difference among the three dental hygiene programs ($F=2.717, p=.020$) (Table 10).

Table 10: ANOVA Test/ the Overall Model Predicting Preparedness

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	709.816	5	141.963	2.717	.020*
Residual	15257.76	292	52.253		
Total	15967.57	297			

* The mean difference is significant at the 0.05 level.

Graduates from programs located in a collage of allied health reported being less prepared for alternative workforce models than those who attend dental hygiene programs located in a dental school; $p=0.032$ (Table 11). Therefore, the null hypothesis one was rejected. However, null hypotheses two and three were accepted because there was no statistically significant difference for self-confidence and practice management.

Table 11: Coefficients/ Significant Predictor of Dependent Variable Preparedness

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	44.590	1.662		26.832	.000*		
Age	-1.701	.905	-.108	-1.880	.061	.992	1.008
Current employment Supervision	1.612	.847	.110	1.903	.058*	.987	1.013
Program type allied health	-4.452	2.068	-.179	-2.153	.032*	.474	2.110
Program type associate degree	-2.159	1.700	-.143	-1.270	.205	.258	3.881
Program type not asked	-2.708	1.679	-.184	-1.614	.108	.251	3.980

* The mean difference is significant at the 0.05 level.

Due to the significant correlations among preparedness, self-confidence, and practice management skills found in the preliminary analyses, multivariate analysis of variance (MANOVA) was conducted to examine how the three program types differed in the three dependent variables. The overall model was significant, but the univariate effects did not reach any significance. The non-significant difference was very likely due to the poor observed power. In the pairwise comparisons, graduates from programs within a dental school demonstrated significantly higher levels in the preparedness for practice in alternative settings than graduates from allied health science dental hygiene programs (Table 12).

Table 12: Regression/ Pairwise Comparisons

Dependent Variable	(I) Program type	(J) Program type	Mean Difference (I-J)	Std. Error	Sig.
Preparedness	An allied health science dental hygiene program (Bachelor's degree)	A dental hygiene program within a dental school (Bachelor's degree)	-4.882	2.030	.017*
		An associate degree dental hygiene	-2.522	1.496	.094
	A dental hygiene program within a dental school (Bachelor's degree)	An allied health science dental hygiene program (Bachelor's degree)	4.882	2.030	.017*
		An associate degree dental hygiene	2.361	1.674	.161

* The mean difference is significant at the 0.05 level.

CHAPTER V

DISCUSSION

Dental hygienists participating in this study reported perceived, adequate preparation to practice in alternative settings. However, the majority of dental hygienists worked in a private practice—a statistic supported by the National Governor's Association.³ There were several barriers that contribute to this finding: reimbursement policies, lack of competence to work in alternative practices, lack of awareness about employment opportunities, and level of education.

One significant barrier is reimbursement policies.¹⁴ Coplen and Bell stated that Expanded Practice Dental Hygienists (EPDHs) in Oregon cited insurance reimbursement as a challenge to practice as EPDH and half specified that they have never received insurance reimbursement.¹⁴

Lack of competencies for preparation of dental hygienist to practice in alternative settings is another possible barrier. The findings from this study reported forty-eight hygienists felt their education did not prepare them for clinical practice environments outside the private practice dental office.

Dental hygienists may not be aware of employment opportunities in alternative practice. According to Taylor, dental hygienists' employment applications were limited to general dental practice and lack of knowledge and the skills needed to apply for public health or alternative practice careers was reported.¹⁹

Entry-level education may also be a barrier. Recent proposals advocate that current dental hygienists in the workforce should have degree more advanced than an associate degree in order to practice in alternative settings.³ Limited number of hours in a two-year dental hygiene program does not allow sufficient time in the curriculum to address knowledge and skills required to practice in alternative settings and with greater autonomy.

The recent CODA list of accredited programs revealed that associate degree programs exist in every state with a total of 254 compared to 57 BS programs within allied health science and 25 BS programs located within schools of dentistry.²⁸ More bachelor's degree programs or avenues for students currently enrolled in associate programs are needed to assist preparing the workforce for alternative practice models. Dental hygiene CODA standards and scope of practice should include competencies and skills to support expanded practice for dental hygienists to work in school, hospital, senior living, rural and urban public health settings.

Dental hygienists in this study reported perceived confidence with their clinical skills while entering the workforce. This result was not consistent with findings by Taylor who found that newly graduated hygienists did not perceive themselves as competent while transitioning from a student to a clinician.¹⁹ According to Simoniah if a student reports being confident, it does not necessarily mean that the student is competent but they have enough knowledge and experience to feel comfortable with their skills.²² Confidence needed for practice and skills development in dental hygiene are often transformative in nature.¹⁸ In transformational learning, self-assessment is essential for students to develop a realistic perception of their own abilities and more importantly to teach students how to self-assess.²⁹

Participants between 20–30 years reported feeling prepared for alternative settings over those 30 years and above. Inversely, respondents above 30 years of age showed a higher percentage of work in a public setting; suggesting the desire to seek alternative settings as an experienced professional. Interestingly, hygienists ages 30 years and older with no prior experience in dental hygiene felt unprepared for alternative practice. Experience appears to be indicative of whether those 30 years and above choose to work in alternative practice settings.

Coplen and Bell revealed similar results in that dental hygienists over 50 who had been in private practice showed a strong interest in moving toward alternative settings.¹⁴ Identity formation is a lifelong process and new graduates may not fully understand what is expected of them as professionals which could be an explanation for new graduates not seeking alternative settings.³⁰ The graduate's perceptions of their ability to impact the community and their sense of professional responsibility would become stronger with time.³⁰

The study findings suggest that graduates from programs located in a college of allied health were less prepared for alternative workforce models than those who attend dental hygiene programs located in a dental school. Also, graduates from dental hygiene programs within a dental school reported a higher percentage working in public settings than other graduates. According to Brame et al., few dental, dental hygiene, and dental assisting programs are housed together in academic institutions.¹¹ However, some dental schools have implemented curricular changes to enhance intraprofessional education.¹¹ Data from this study showed that almost one-fourth of the sample was not confident to communicate with dental specialists' and medical providers'. Intraprofessional learning opportunities would prepare graduates for collaborative practice and improve communication skills, which are essential skills for alternative practice.¹¹

Dental hygienists who were practicing under direct supervision demonstrated lower levels of preparedness than dental hygienists practicing under general supervision or those with direct access. Dental hygienists practicing under direct supervision might feel unprepared to seek careers in an alternative practice due to uncertainty with autonomy and distrust in their ability to efficiently practice independently. Taylor suggest newly graduated hygienists practicing in a private setting lose their sense of dental hygiene autonomy created in dental hygiene school.¹⁹ If dental hygienists lose autonomy and confidence in their skills, they will not seek opportunities

where they have to work independently.¹⁹ It is critical for new graduates to recognize and validate the way they perceive their competence to be confident in practicing in any setting.²²

Most respondents were prepared to practice without supervision but not independently. This observation is consistent with findings by Naughton who stated few dental hygienists had considered the business of dental hygiene as a career option.³¹ Dental hygienists reported business skills deficits as the top barrier for independent practice.³¹ Practice management skills are an essential competency for success in independent practice.³¹ Results from this study showed that dental hygienists were less confident with their practice management skills compared to clinical skills. They lacked confidence in managing third party payer, retirement planning, purchasing and overhead, personnel and human resource management, and financial management. Naughton recommends that dental hygienists need to acquire practice management competencies such as scheduling, billing, insurance claims, collections, inventory, product and equipment research and marketing.³¹ Vannah et al. suggested that elective courses such as business could be added to the dental hygiene curriculum for students interested in practicing independently.^{15, 32}

Limitations

Several limitations could have influenced the study findings. Almost half of the respondents had unknown program type due to a technical error in Qualtrics software. As a result, the analysis had to be run twice with and without those respondents. Also, there were insufficient sample sizes in some groups for running inferential statistics including; age, gender and employment supervision. Gender had to be removed as a covariate and only included as a descriptive variable. Employment supervision and age were regrouped into two instead of three groups. Self-reported data is another limitation. Closed-ended questions may reduce the validity

of results because respondents may not agree with the predetermined choices. However, a neutral response was included in Likert scales to enhance result validity. Further, the survey was sent only to ADHA members and was not representative of non-ADHA members, which could have affected the study outcomes.

Future Studies

Based on the results from this study, the following research is suggested: dental hygiene graduates' preparedness for alternative practice in direct access state, competencies for alternative practice included in dental hygiene programs, opinions and actions of program directors to address curricula for the preparation to practice with greater autonomy and in alternative settings, and determine why graduates from a dental school setting felt more prepared for alternative practice compared to other graduates.

CHAPTER VI

CONCLUSIONS

The majority of responding dental hygienists reported working in private dental offices; however, half of participants felt prepared to pursue careers in alternative settings. Newly graduated dental hygienists showed a high level of confidence in their clinical skills but were not confident in practice management skills. Preparedness for employment in alternative practice models was significant for age and type of employment supervision. Dental hygienists aged 30 years and above felt less prepared for alternative practice settings. However, dental hygienists practicing under general supervision or who had direct access were more prepared for alternative settings than those who were practicing under direct supervision.

Dental hygienists who graduated from programs located in a dental school felt more prepared for alternative workforce models than those who attend dental hygiene programs located in a college of allied health. No differences between program locations were identified for self-confidence or practice management skills.

REFERENCES

1. Institute of Medicine and National Research Council. Washington (DC); Improving Access to Oral Health Care for Vulnerable and Underserved Populations. [Internet]. [updated 2011; cited 2014]. Available from:
<http://www.hrsa.gov/publichealth/clinical/oralhealth/improvingaccess.pdf>
2. National and State-Level Projections of Dentists and Dental Hygienists. [Internet]. [cited 2016 Nov 19]. Available from:
<http://bhw.hrsa.gov/healthworkforce/supplydemand/dentistry/nationalstatelevelprojectiondentists.pdf>
3. National Governor's Association. Washington (DC); The Role of Dental Hygienists in Providing Access to Oral Health Care. [Internet]. [updated 2014; cited 2014]. Available from: <http://www.nga.org/files/live/sites/NGA/files/pdf/2014/1401DentalHealthCare.pdf>
4. Motley W. The movement for independent practice of dental hygienists: from evolution to revolution. *Bull Hist Dent*. 1988; 36(2):108-19.
5. American Dental Hygienists' Association (ADHA). Direct Access states.[Internet]. [updated 2016; cited 2016]. Available from: www.adha.org/governmental_affairs/downloads/direct-access.pdf.
6. American Dental Hygienists' Association (ADHA). Facts about the Dental Hygiene Workforce in the United States. [Internet]. [cited 2016]. Available from:
http://www.adha.org/resources-docs/75118_Facts_About_the_Dental_Hygiene_Workforce

7. Pennsylvania State Board of Dentistry. Application for Certification as a Public Health Dental Hygiene Practitioner. [Internet]. [updated 2014; cited 2016]. Available from:
<http://www.dos.pa.gov/ProfessionalLicensing/BoardsCommissions/Dentistry/Documents/Applications%20and%20Forms/Initial%20Applications/IDHApp%20DH%20Public%20Health%20Practitioner.pdf>
8. American Dental Hygienists' Association (ADHA). Dental Hygiene: Medicaid Reimbursement Primer. [Internet]. [cited 2016]. Available from:
https://www.adha.org/resources/docs/7529_Report_Reimbursement_Pathways.pdf
9. American Dental Hygienists' Association (ADHA). National Dental Hygiene Research Agenda. [Internet]. [updated 2007; cited 2016]. Available from:
https://www.adha.org/resources/docs/7111_National_Dental_Hygiene_Research_Agenda.pdf
10. Lyle DM, Grill A, Olmsted J, Rothen M. National Dental Hygiene Research Agenda. [Internet]. [cited 2016]. Available from: [https://www.adha.org/resources-docs/7111_National_Dental_Hygiene_Research_Agenda.pdf](https://www.adha.org/resources/docs/7111_National_Dental_Hygiene_Research_Agenda.pdf)
11. Brame J, Mitchell S, Wilder R, Sams L. Dental and Allied Dental Students' Attitudes Towards and Perceptions of Intraprofessional Education. *J Dent Educ* [serial online]. June 2015;79(6):616-625.
12. DeSanti S, Feinstein R, Farrell J. Federal Trade Commission Office of Policy Planning, Bureaus of Competition and Economics, letter to Randall Vaughn, Division Director, Georgia Secretary of State, Professional Licensing Boards Division, Georgia Board of Dentistry. [Internet]. [updated 2010; cited 2013]. Available from:
<http://www.ftc.gov/os/2010/12/101230gaboarddentistryletter.pdf>

13. American Dental Education Association (ADEA). Statement on professionalism in dental education. *J Dent Educ* 2013;77(7):940-5
14. Coplen A, Bell K. Barriers Faced by Expanded Practice Dental Hygienists in Oregon. *J Dent Hyg* [serial online]. April 2015; 89(2):91-100.
15. Vannah C, McComas M, Taverna M, Hicks B, Wright R. Educational Deficiencies Recognized by Independent Practice Dental Hygienists and their Suggestions for Change. *J Dent Hyg* [serial online]. December 2014;88(6):373-379.
16. Watt E, Pascoe E. An exploration of graduate nurses' perceptions of their preparedness for practice after undertaking the final year of their bachelor of nursing degree in a university-based clinical school of nursing. *Int J Nurs Prac* [serial online]. February 2013;19(1):23-30.
17. Woods, C, West C, Mills J, Park T, Southern J, Usher K. Undergraduate Student Nurses' Self-reported Preparedness for Practice. *Collegian*.2015; 22(4): 359-68.
18. Springfield E, Smiler A, Gwozdek A. Measuring Curricular Impact on Dental Hygiene Students' Transformative Learning. *J Dent Educ* [serial online]. December 2015;79(12):1418-1428.
19. Taylor L. Dental Hygiene curriculum: An investigation of novice dental hygienists' assessment of how prepared they were for the transition from student to clinical practice. *Canadian J Dent Hyg* [serial online]. August 2011;45(3):173-174.
20. Ruel E, Wagner W, Gillespie B. *The Practice of Survey Research: Theory and Applications*. Thousand Oaks, CA: Sage Publications; 2016.

21. American Dental Hygienists' Association (ADHA). Standards for clinical dental hygiene practice. [Internet]. [cited 2015 March 10]. Available from: https://www.adha.org/resourcesdocs/7261_Standards_Clinical_Practice.pdf
22. Simonian W, Brame J, Hunt L, Wilder R. Practicum Experiences: Effects on Clinical Self-Confidence of Senior Dental Hygiene Students. *J Dent Hyg* [serial online]. June 2015;89(3):152-161.
23. Barber M, Wiesen R, Arnold S, Taichman R, Taichman L. Perceptions of Business Skill Development by Graduates of the University of Michigan Dental School. *Journal Of Dental Education* [serial online]. April 2011;75(4):505-517.
24. Huang J, Curran P, Keeney J, Poposki M, DeShon R. Detecting and deterring insufficient effort responding to surveys. *J Bus Psychol*. 2012; 27; 99–114.
25. Johnson J, Ascertaining the Validity of Individual Protocols from Web-based Personality Inventories. *J Res Pers*. 2005; 39(1): 103-29.
26. Little R, *Statistical Analysis with Missing Data*. Wiley-Blackwell; 2016.
27. Tabachnick B, Fidell L. *Using Multivariate Statistics*. Boston: Pearson/Allyn & Bacon; 2007.
28. Commission on Dental Accreditation (CODA). [Internet]. [cited 2016 Nov 19]. Available from: <http://www.ada.org/coda>
29. Jackson S, Lipton Murif E. Effectively Teaching Self-Assessment: Preparing the Dental Hygiene Student to Provide Quality Care. *J Dent Educ* [serial online]. February 2011;75(2):169-179.
30. Blue C. Cultivating Professional Responsibility in a Dental Hygiene Curriculum. *J Dent Educ* [serial online]. August 2013;77(8):1042-1051.

31. Naughton D. The Business of Dental Hygiene – A Practice Experience in Nursing Homes. *J Dent Hyg* [serial online]. Fall2009 2009;83(4):193-194.
32. Catlett A. Attitudes of Dental Hygienists towards Independent Practice and Professional Autonomy. *J Dent Hyg* [serial online]. August 2016;90(4):249-256.

APPENDIX A**SURVEY TOOL****PREPAREDNESS AND SELF-CONFIDENCE FOR ALTERNATIVE DENTAL
HYGIENE PRACTICE**

Please answer each question as it relates to your dental hygiene education program. Choose only one response per item.

Demographics

What is your gender?

- Male
- Female
- Other

What is your age?

- 20-30
- 31-40
- 41-50
- > 50

Type of dental hygiene program

- An allied health science dental hygiene program (Bachelor's degree)
- A dental hygiene program within a dental school (Bachelor's degree)
- An associate degree dental hygiene program

What is your year of graduation?

What is your current employment setting?

- Private Setting
- Public Setting

What is your current employment supervision?

- Direct Supervision
- General Supervision
- Direct Access

What is the Length of time of your current employment?

- One week
- More than one week _____

The Self-Perception of Readiness for alternative Practice

	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
I am satisfied with the preparedness I received during my dental hygiene education program for my chosen career path (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel I was given ample opportunity to learn, explore, and pique my curiosity about alternative dental hygiene careers (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel all skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<p>necessary for my current practice choice were included in my education (3)</p>					
<p>Upon graduation I felt very well informed about how to make an impact on the underserved population. (4)</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p>My dental hygiene education program helped me identify an underserved population I could serve. (5)</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p>My dental hygiene education prepared me to provide oral health care services under general or no supervision. (6)</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<p>I feel I gained adequate clinical experience in alternative practice environments to prepare me for my chosen career in dental hygiene (7)</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p>My dental hygiene education exposed me to variety of practice environments available to dental hygienists. (8)</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p>My dental hygiene education prepared me well for clinical practice environments outside of the private practice dental office (9)</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p>My dental hygiene education prepared me</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

with practice management skills (10)					
My dental hygiene education prepared me to operate an independent dental hygiene practice (11)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Graduates' Perception of Self-Confidence

	Totally Confident	Moderately Confident	Somewhat Confident	Slightly Confident	Not at all Confident
Practice as a registered Dental Hygienist in a private practice setting. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Evaluate a patient's medical history and vital signs and incorporate findings into a dental hygiene treatment plan (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Accurately perform an extraoral/intraoral assessment and use findings to create and implement dental hygiene treatment plan (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Determine a patient's level of risk to develop periodontal disease by using medical history and assessment findings (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Determine a patient's level of risk to develop caries by using medical history and assessment findings (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Utilize assessment data to formulate a dental hygiene diagnosis and incorporate this data into patient's overall treatment plan (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Determine the necessity for a patient to be referred (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Graduates' Perception of Self-Confidence

	Totally Confident	Moderately Confident	Somewhat Confident	Slightly Confident	Not at all Confident
Determine which of the following procedures are needed: a prophylaxis, periodontal maintenance, or	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<p>periodontal debridement (1)</p> <p>Expose diagnostic radiographs and interpret them to assist in making a dental hygiene diagnosis and treatment plan (2)</p> <p>Create a dental hygiene diagnosis and treatment plan with the priorities arranged according to the patient's clinical assessment, need, and values (3)</p> <p>Utilize all possible resources to facilitate patient care including communication with dental specialists and medical providers (4)</p> <p>Communicate with the dentist about a patient's overall care (5)</p> <p>Detect suspicious restorations and/or areas of</p>	○	○	○	○	○
	○	○	○	○	○
	○	○	○	○	○
	○	○	○	○	○
	○	○	○	○	○

possible decay (6)					
Discuss dental hygiene treatment plan with a patient (and/ or their legal/ caregiver) including rationale, risks, benefits, possible outcomes, alternatives, and prognosis (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Treat all patient types, including all ages of patients, medical conditions, physical or mental disability, economic status, or culture (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use hand instruments and determine where and when an unfamiliar instrument is to be used based on its design (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Treat multiple patients per day in a timely and thorough manner. (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Evaluate outcomes of dental hygiene	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<p>care and determine the need for further treatment, oral hygiene instruction, or referral (11)</p> <p>Document all parts of the dental hygiene process of care: assessment, dental hygiene diagnosis, dental hygiene treatment plan, implementation, and evaluation (12)</p> <p>Document discussion and interactions between the patient and all dental personnel that are relevant to the patient's dental care. (13)</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Graduates' Perception of Self-Confidence in Practice Management Skills

	Totally Confident	Moderately Confident	Somewhat Confident	Slightly Confident	Not at all Confident
Utilize knowledge and experience regarding third party payer (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Utilize knowledge and experience for retirement planning (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Utilize knowledge and experience to provide incentives and use motivation tools (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Utilize knowledge and experience of purchasing and overhead. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Utilize knowledge and experience in personnel and human resource management (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Utilize knowledge and experience in financial management (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Utilize knowledge and experience in legal aspects of practice (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Utilize knowledge and experience to establish associates in the practice (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Utilize knowledge and experience to manage any type of emergency (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

APPENDIX B
SURVEY INVITATION EMAIL

Dear participants,

My name is Futun Alkhalifah and I am currently enrolled in the dental hygiene program at Old Dominion University in Norfolk, VA, and I am in the process of writing my Master's Thesis. You are invited to participate in a research study entitled "Dental Hygiene Graduates' Perceived Preparedness and self-confidence for alternative Dental Hygiene Practice". The purpose of the research is to evaluate dental hygiene students' perceived preparedness to practice beyond the traditional setting and to determine their self-confidence level.

Your participation in this research project is voluntary and you may refuse to participate at any time. There are no known risks to participation. Also, your responses will remain confidential and anonymous. To be eligible for participation, you should have graduated from a dental hygiene program within the last year (2015-2016) with at least one-week of work experience.

If you agree to participate in this study, complete the questionnaire in the link below. It should take approximately 10 minutes or less to be completed.

https://odu.co1.qualtrics.com/SE/?SID=SV_4M9HAWTyUR3WHkN

If you have any questions please do not hesitate to contact: Dr. Susan J. Daniel, Chair and Associate Professor, School of Dental Hygiene, Old Dominion University, [757-683-5232](tel:757-683-5232), sjdaniel@odu.edu or Futun Alkhalifah, Dental Hygiene Master Degree Candidate, [+1\(757\)-9270265](tel:+1757-9270265), falkh003@odu.edu.

Sincerely,

Futun Alkhalifah
Master of Science Degree in Dental Hygiene Candidate
Old Dominion University
Office: 3013 Health Science Building

VITA**Futun N. Alkhalifah, BSDH, MSDH**

4608 Hampton Blvd
3013 Health Science Bldg
Norfolk, VA 23529

EDUCATION:

King Saud University
Riyadh, Saudi Arabia
February 2011

Old Dominion University
Norfolk, Virginia
Master of Science in Dental Hygiene Candidate
Expected graduation December 2016

ACADEMIC APPOINTMENTS:

August 2015-present

Graduate Teaching Assistant
School of Dental Hygiene
Old Dominion University, Norfolk, Virginia.
Responsible for teaching labs and completing
tasks for dental hygiene faculty such as
grading assignments, proctoring exams and
conducting literature reviews.