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DOES FACULTY-STUDENT MENTORING IMPROVE PROGRAM PERFORMANCE
AND MEDIATE STRESS FOR FIRST-YEAR DENTAL HYGIENE STUDENTS?

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AND MEDIATE STRESS FOR FIRST-YEAR DENTAL HYGIENE STUDENTS?

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Does Faculty-Student Mentoring Improve Program Performance and Mediate Stress for First-Year Dental Hygiene Students?

Abstract

Dental hygiene education requires students to connect classroom learning with patient care very early in the scholastic process. This challenge can be a considerable source of stress for first-year students who are disproportionately, compared to second year students, at-risk for dropping out. In student surveys, first-year dental hygiene students routinely highlight a need for an improved support system when navigating through their degree programs. Although scholars have theorized that faculty-student mentoring may provide critical support for students in health care programs, little empirical research has tested these relationships. A quantitative method was utilized, surveying 472 first-year dental hygiene students during their first year of the program to gain a better understanding of the faculty-student mentoring programs and the role they play in supporting student stress, clinical competence and academic improvement. A pilot tested survey was administered to students after the completion of the first semester of their dental hygiene education but before the termination of the second semester. Results from this study provide evidence regarding factors associated with the effects of the mentoring on program success for the first-year dental hygiene students. This study will add to the body of knowledge that dental hygiene academic programs may reference when investigating the possible benefits of faculty-student mentoring.

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Chapter One: Introduction

Background of the Problem

The attraction to employment in the healthcare profession industry is still frequently reported in both the nursing and dental fields (Ferri et al., 2016, & Gallagher et al., 2007). Factors influencing the motivation for employment in both of these occupations are a desire to help others, an interest in science and disease prevention, with job security being reported as the most significant (Ferri et al., 2016; & Gallagher et al., 2007). According to the Bureau of Labor and Statistics, employment of dental hygienists is projected to grow eleven percent from 2018 – 2028, which is much faster than the average for all occupations (Bureau of Labor Statistics, 2017).

Admittance into these professional academic programs is highly competitive, as only one third of total applicants will be admitted (ADA, 2014). Learning in the health science industry requires the ability to perform well in both didactic and clinical courses simultaneously, possibly initiating student stress. The three most frequently cited factors linked to student stress in professional programs are competition, heavy workload and finances (Murphy et al., 2009). If students are not academically or clinically competent, they may require remediation, be asked to repeat a semester, or drop out of the program all together (Wood et al., 2014). If students choose to remain in the program, this can add to their financial stress.

In examining possible interventions to reduce student stress leading to attrition, faculty-student mentor relationships have been employed in a multitude of professional education programs (Hamshire et al., 2012), however these relationships have not been documented regarding the perceived effectiveness amongst first-year dental hygiene students when enrolled in these professional programs.

Admission into the Dental Hygiene Program

Similar to nurses, the dental hygiene profession yields diversity of opportunity in the workplace. According to the American Dental Hygienists Association (2009), dental hygienists are “licensed oral health professionals who focus on preventing and treating oral diseases-both to protect teeth and gums, and also to protect patients’ total health.” In addition to the traditional chairside role designed for the dental hygienist to provide educational, clinical and consultative services to individuals and populations of all ages, there are additional avenues to explore such as corporate positions, educators, public health officials and entrepreneurs (ADHA, 2019). According to the Bureau of Labor and Statistics, employment of dental hygienists is projected to grow eleven percent from 2018 – 2028, which is much faster than the average for all occupations (Bureau of Labor Statistics, 2017). The demand for dental services is also predicted to increase as the population ages and as research continues to link oral health to overall health. (Bureau of Labor Statistics, 2017). Admittance into these professional academic programs is highly competitive, as only one third of total applicants will be admitted (ADA, 2014). Admissions criteria consider both science and cumulative college grade point averages, standardized college entrance exam scores, as well as personal interview scores. Acceptance into many programs is committee generated and limited numerically by clinic facilities (ADHA, 2014). Many applicants have been through the admissions process multiple times prior to finally being admitted to the program. Therefore, the desire to succeed can become even greater, due to the years spent in the application process. The processes for admissions set the stage for both the emotional and financial investments required of the students in these high-stake professional programs.

Although the number of entry level dental hygiene programs has remained consistent over the last several years, only 24 of the 327 exist within dental schools. The remainder of the programs operate in 4-year college university settings, 181 in community colleges, and 26 in vocational schools. There were 8,289 dental hygiene students who matriculated into United States' dental hygiene programs for the 2015-16 academic year, even though the number of positions available in that year were 9,510. In 2012, 7,097 students graduated, and 7,323 graduated in 2015 (Theile, 2017). The number of graduates can be much less than the number of openings available, because some enrollees leave the programs for various reasons. The rigorous program can overwhelm students, causing them to doubt their abilities.

Table 1

Program Institutional Distribution

Institution	Number of Programs
School of Health Sciences (4 yr. Institution)	39
Dental School (4 yr. Institution)	24
Separate Dental Department (4 yr. Institution)	05
Other: Four-year Institution Setting	19
Four Year Institutions	87
Community College (2 yr. Institution)	181
Technical College (2 yr. Institution)	38
Vocational School (2 yr. Institution)	26
Other: Two-year Institution Setting	3
Total Two-year Institution	248

(ADA, 2016)

Stress Associated with Dental Hygiene Programs

Learning in the health science industry requires the ability to perform well in both didactic and clinical courses simultaneously. Together, both areas of instruction require different skills, knowledge and expectations. Didactic or academic courses are taught throughout the program, containing structured lessons that focus on the foundational material necessary for application in the clinical teaching portions of the education. The clinical courses incorporate information learned in the academic courses and contain activities and competencies that reinforce the classroom learning. The lock-step, curriculum-based programs, have specific, pre-planned educational objectives, based on a structured plan for learning, and clear learning outcomes associated with learning performance.

These programs are considered rigid and do not allow much latitude for poor performance in either clinical or academic environments (Bowen & Freudenthal, 2010; Freudenthal et al., 2006; Navickis et al., 2010). The clinical portions of a dental hygiene program are competency based, employing a unique component that measures a learner's ability to perform professional tasks similar to real-life work situations (Wood, et al., 2014). The clinical requirements can cause considerable frustration for students who understand what they need to do to demonstrate competency, yet may have a difficult time executing the proper skill. In some instances, the level of student frustration may become so great, that the student seems to experience a sort of paralysis of skill, causing their level of performance to decline. Traditionally, dental hygiene curricula have been constructed so that students learn all current scientific and clinical content during their educational program. Over time, new discoveries and applications force students to work harder, faster and longer if they do not want to neglect content deemed important by

faculty (ADEA CCI, 2006). Adding more content and competencies to an already full curriculum only magnifies student stress.

The three most frequently cited factors linked to student stress in professional programs are competition, heavy workload and finances (Murphy et al., 2009). A critical part of the professional educational process for the entering dependent learners is the ability to become self-directed learners through the channels of ongoing self-assessment. Dental hygienists must think critically and develop problem-solving strategies during their formal education to ensure ongoing development of their personal knowledge and skill related to providing comprehensive, evidence-based patient care. The heavy workload and long hours tend to hinder the time necessary to foster self-directed learning (ADEA CCI, 2006). Also, the costs of the programs continue to rise due to the increasing costs of dental materials, adding to increased student financial stress.

Dental hygiene programs typically have some of the highest operating expenses in an institution's budget (ADEA CCI, 2006). The programs house at least one on-site dental clinic containing expensive equipment and materials. Also, the Commission on Dental Accreditation mandates a 1:5 faculty to student teaching ratio in all clinical courses, as well as a licensed dentist to read radiographs and complete patient exams. This creates a need for hiring an increased number of professional faculty, increasing the expense of the program. In 2015-16, the average cost of tuition ranged from \$27,404 for in-state tuition to \$39,392 for out-of-state programs, and average first-year tuition ranged from \$11,382 at four-year institutions and \$16,756 at dental schools (Theile, 2017). This does not include the one to two years of prerequisite courses that must be completed prior to beginning this educational journey. Since these professional programs are integrated into the realm of higher education, consideration

should be given to how the intense pressure affects student's emotional well-being and work-life integration. What were once positive emotions associated with the acceptance into a highly competitive program may change into negative-deactivating emotions, due to poor academic or clinical performance, which could further be hindering performance all together.

It has been shown that student emotions can greatly impact performance in academic settings. Goetz et al. (2003) completed a study involving academic emotions and how they related to students in a mathematics course. This study focused on how emotions were directly related to learning and achievement. In Pekrun's 1992 model, discrete academic emotions are assumed to have specific effects on learning and achievement. Negative-deactivating emotions would include feelings of boredom, hopelessness or disappointment and can affect overall performance. Results from this study indicated that students do experience different levels of positive and negative emotions according to their level of academic achievement (Pekrun, 1992).

If students are not academically or clinically competent, they may require remediation, be asked to repeat a semester, or drop out of the program all together (Wood et al., 2014). The remediation process could include an additional course, adding a few thousand dollars to the already costly tuition. In some cases, students have been required to repeat an entire year if the course outcomes are not favorable enough to be advanced to the next semester, resulting in a significant tuition increase. In any case, adding additional course work to an already full curriculum can create additional stress, since workload and financial responsibility will be increased.

A dental hygiene program curriculum is delivered in a lockstep fashion meaning courses are only offered in a specific sequence. This type of curriculum typically offers courses being offered only once per year. Dental hygiene programs typically have only one admission cycle per

academic year, usually in the Fall semester. If a student is unsuccessful in a course and is allowed back into the program, the student must wait a full term to re-enter the program, when the course is offered again. If they do have to wait a full term to repeat the class, their seat will remain empty until that cohort graduates (Holt, 2005). An empty seat results in lost tuition for the institution. Therefore, student retention is of great concern in dental hygiene education, and resourceful measures to reduce this concern may be beneficial to both the student and the program.

Possible Interventions

In examining possible interventions to reduce student attrition, faculty-student mentor relationships have been employed in a multitude of professional education programs according to Hamshire et al., (2012), however these relationships have not been documented regarding the perceived effectiveness amongst first year dental hygiene students when enrolled in these professional programs. The reported attrition may be related to stresses reported by students which are associated with didactic or clinical performance, workload, finances or personal circumstances (Freudenthal & Bowen, 2010). The effectiveness of improving either didactic or clinical skills in dental hygiene education programs may require adjunct services such as tutoring or remediation, which could be quite costly. Students who perform well in the didactic courses may or may not perform well in clinical courses, and vice versa. Curricula for dental hygiene students emphasize both academic performance and preclinical performance. However, the incongruence between academic and clinical performance has been a growing problem and concern within dental hygiene programs (Evans et al., 2011). Successful academic performance does not always been successful clinical performance. Additional challenges that may affect clinical performance include assigned student clinical partners, patient assignment, and lack of

clinical preparedness. Internal factors affecting performance may include manual dexterity and motivation.

Clinical remediation, remediation of clinical skills, may be challenging for both the faculty and students due to scheduling constraints as well as clinic or equipment availability. All of the instructional methods regarding clinical skills require a certain amount of faculty participation. This participation can add to the heavy faculty workload and is often a barrier in conducting successful remediation plans (Freudenthal & Bowen, 2010). Faculty reported an average work week of 50.5 hours, which includes 46.9 hours spent on paid activities and 3.6 hours spent on unpaid activities (Collins et al., 2007).

Without direction or guidance from an experienced faculty member, skill deficiencies may be the determining factor of program success or failure. Therefore, an exploration of a faculty-student mentoring program in dental hygiene programs is warranted.

Faculty-Student Mentoring

Faculty-student mentoring programs have been implemented as a specific career advancement tool in the training and further education of various groups in the medical profession (Buddeberg-Fischer & Herta, 2006). Existing research examining faculty-student mentoring in higher education predicts that greater student contact with mentors can be associated with greater academic gains by the students (Campbell & Campbell, 1997). This may indicate that more extensive mentoring will bring about greater academic performance (Campbell et al., 1997). Even though mentoring programs have been widely reported in a review of the published dental literature, research failed to reveal any previous studies regarding the use of faculty-student mentoring in dental hygiene programs (Blanchard & Blanchard, 2006).

Considering the effects that mentoring experiences may have on the reduction of student stress, which may ultimately result in a decline of student drop outs, an investigation into the mentoring relationship may prove to be advantageous. Therefore, a study developed to assess the perceived effectiveness of faculty-student mentoring for first-year dental hygiene students would provide insight into this professional relationship.

Theoretical Framework

With an increase in enrollment of diverse populations in dental hygiene programs, the efforts to enhance academic success becomes even more critical. As these efforts have intensified, colleges and universities have implemented a variety of support programs (Campbell & Campbell, 1997). Some scholars have demonstrated that a very important factor to success in their educational experience was related to their relationship with faculty (Lechuga, 2011). There is general consensus among scholars that faculty-graduate student mentoring relationships are a significant aspect of the graduate education experience that fosters student success (Heinrich [1995](#); Patton [2009](#); Patton & Harper [2003](#)).

At the undergraduate level, this tradition has been given somewhat less of an emphasis in recent decades but has increasingly been considered one strategy for improving the experience of an undergraduate education (Anderson et al., 1997).

Mentoring is a valuable resource that has been underutilized worldwide, but as student support and accountability expectations rapidly increase for many professions, the widespread importance of mentoring is magnified (Mullen, 2005). As originally presented, the learning organization of adult learning does not include mentoring. Much like an athletic coach, the mentor suggests specific strategies for accomplishing work objectives, for achieving recognition, and for achieving success in career aspirations (Kram, 1985). In dental hygiene curricula,

knowledge is transferred from the basic science into the preclinical setting “by tuning and restructuring” what has already been learned in the classroom (Gerzainia, 2005).

Mentoring relationships provide important experiential and collaborative learning opportunities that support adult learning (Klinge, 2015). For decades, mentoring has been utilized in business, journalism, law and medicine – fields that are clinically based – serving apprentices in their academic and career goals, and personal and social adjustment to a new environment, as well as skills development, capacity building and professional identity (Kariuki et al., 2001). When included in the educational domain, mentoring becomes increasingly aligned with human performance and institutional reform in areas such as career readiness, group creativity, leadership responsibility, minority support, reflective practice, and student learning (Mullen, 2005). Mentoring also includes role modeling, protection, acceptance and affirmation, teaching, counseling and friendship (Allen & Eby, 2007).

Transformative Learning

Transformative learning is communicative learning and is what relationships are involved in the learning process, creating communities of care (Southern, 2007). Mentoring uses the transformational learning theory as it can include the andragogical principal, the practice of teaching adult learners, through a critical lens which addresses the fact that experiential learning is a rich source of adult learning (Klinge, 2014). According to Mezirow (1994), transformative learning is central in adult education as it derives meaning from experience.

Transformative learning involves an enhanced level of awareness of the context of one’s beliefs and feelings, a critique of their assumption and particularly premises, an assessment of alternative perspectives, a decision to negate an old perspective, in favor of a new one or to make a synthesis of an old and a new, an ability to take action based upon

the new perspective, and a desire to fit the new perspective into a broader context of one's life (Mezirow, 1978).

By openly sharing the challenges which have previously been encountered and what others have learned through personal journeys as faculty, a relationship of trust can be developed. Faculty mentors have the ability to connect their own life-worlds with the life-worlds of the students, creating opportunities to reinterpret their current life experience through a different perspective (Southern, 2007). Faculty mentoring allows both teachers and students the ability to learn from one another's life experiences and perspectives. Academic service-learning opportunities, a teaching method which combines meaningful service to the community with curriculum-based learning, can also provide students with transformational learning experiences when the students are mentored in their preparation to work in a nonclinical community environment (Keselyak et al., 2006). The care and encouragement built from these relationships may help students overcome a fear or stressor that contributes to a decline in the performance in the educational environment. Student reflection is an important part of this learning process.

Critical reflection is how one works through beliefs and assumptions, assessing their validity in the light of new experiences or knowledge, considering their sources, and examining underlying premises (Keselyak et al., 2006). It helps to talk to others, exchanging opinions and ideas, receiving support and encouragement, and engaging in discourse where alternatives are seriously weighed and evidence brought forth (Cranton, 2002). In an academic-service learning experience performed by twenty-three senior dental hygiene students, student reflections captured their feelings as they described the judgements they made, the learning they applied, the creative applications of previous and new knowledge, and the recommendations they suggested

for future interactions (Keselyak et al., 2006). The ability to reflect on professional issues places them in a personal context.

Communities of care are individual communities in which we all belong and can participate together in shaping our learning environment and discovering how we can act together to create change. When faculty bring who they are to their teaching and learning, share traditions, joys, struggles, and aspirations, and appreciate the richness of our diversity and common purpose, they can then create communities of care in which they participate together, learn from one another, and work together to take transformative experiences out into the world (Southern, 2007).

Achievement Emotions

An additional theory to consider for the faculty-student mentoring relationship involving emotions in education is the control-value theory of achievement emotions. Achievement emotions play a vital role in learning in general and foreign language (FL) theory as well. (Dewaele et al., 2018; Pekrun & Perry, 2014). This theory provides a framework for analyzing the antecedents and effects of emotions experienced in achievement and academic settings (Pekrun, 2006). Achievement can be defined simply as the quality of activities or achievement outcomes as evaluated by some standard of excellence (Heckhausen, 1991). Emotions are defined in modern research as multiple component processes that comprise specific affective, cognitive, physiological and behavioral elements (Scherer, 2000). Positive and negative emotional states consume attentional resources by focusing attention on the object of the emotion and this consumption of neurological resources results in fewer neurological resources being available to aid in the task completion, negatively impacting the achievement (Meinhardt & Pekrun, 2003). Achievement emotions are tied directly to achievement activities or achievement

outcomes. The enjoyment arising from learning, boredom experienced in the classroom instruction, or anger and frustration when dealing with difficult tasks are examples of activity related achievement emotions (Pekrun, 2006). Thus, such emotions pertain to ongoing achievement related activities, and outcome emotions pertain to the outcomes associated with these activities (Pekrun et al., 2006). Outcome emotions often receive more attention in the literature, and may be described as the joy or accomplishment felt by students when a particular academic goal is met or the frustration and shame when reaching the goal fails. (Pekrun et al., 2007).

The differentiation of activity versus outcome emotions once again pertains to the object focus of achievement emotions which may be grouped according to their valence (positive vs. negative), and to the degree of activation implied (activating vs. deactivating). Thus, there are 4 basic categories: positive activating emotions, such as enjoyment, hope and pride; positive deactivating emotions, such as relief and relaxation; negative activating emotions, like anger, frustration, anxiety and shame; and negative activating emotions like boredom, sadness, disappointment and hopelessness (Pekrun, 2007). The crux of this theory draws attention to the fact that individuals experience specific achievement emotions for when they are either in or out of control of achievement activities and outcomes that are highly important to them. “Control” appraisals and “value” appraisals are the determinants of these feelings (Pekrun et al., 2006). For achievement emotions, Pekrun’s (2006, 2018) control-value theory (CVT) suggests that these emotions are closely linked to appraisals of achievement-related control and value. When students feel in control over their learning and value achievement, positive emotions such as enjoyment of learning, hope, and pride are promoted, and negative emotions such as anxiety, hopelessness, or boredom are reduced. Genetic disposition, physiologically bound temperaments

and social environments are not excluded from the factors influencing control-value appraisals. Simply stated, the factors which influence an individual's control-value appraisals, should affect the individual's achievement emotions (Pekrun et al., 2006).

In the context of dental hygiene program education, a student may feel as though the high-quality lab instruction positively influences the student's value of learning, however, if the course expectations are perceived as too high, the student may feel as though they have no control over their performance. The student's overall appraisal of their control and value perception affect their achievement emotions. Their achievement emotions will then affect their overall task outcome (Pekrun, 2006). Although the research on student emotions and their effect on performance in educational settings is vast, an understanding of the integrative influence it may have on achievement and outcomes is important when mentoring students.

Research Question

Considering the interference stress can cause in both learning, performance and even completion of professional programs, a survey was written to assist in answering the following question: Does faculty-student mentoring improve program performance and mediate stress for first-year dental hygiene students?

Proposed Study

The purpose of this proposed study was to explore the contribution of faculty-student mentoring in providing student support in dental hygiene programs. This study utilized a quantitative research design with a potential of surveying 291 cohorts of first-year dental hygiene students enrolled in various CODA accredited US dental hygiene programs. Quantitative data sources included an online survey which was administered to the program director mid-way through the second semester of the program. The survey outcomes will help to determine what

effect, if any, the mentor relationship has on the reduction of student stress, increase in student success, and diminishing the program attrition rate.

Researcher's Role

As a practicing, registered dental hygienist who is both a current faculty member as well as a Dental Hygiene Program Director, student stress is understood and recognized as a component of the program. Student support is a topic which has been discussed over time in health profession disciplines. Dental hygiene faculty often spend a great amount of time with the students during the time they are enrolled in the program since they pair as both academic and clinic faculty. Therefore, it was important to survey students from other programs to determine if they have experienced any benefits from faculty-student mentoring among first-year dental hygiene students.

Definition of Terms

Academic Service Learning	A teaching method that combines meaningful service to the community with curriculum-based learning
Achievement Emotions	Emotions tied directly to achievement activities or outcomes
ADA – The American Dental Association	The professional, not-for-profit dental association of dentists dedicated to serving both the public and the profession of dentistry
ADHA – The American Dental Hygienists' Association	The largest national organization representing the professional interests of the more than 226,000 registered dental hygienists (RDHs) across the country
Attrition	The unit of measurement used to determine the rate of dropout of students who do not return for or during their first and second-year of college
Clinical	Relating to, or conducted in or as if in a clinic
CODA	The Commission on Dental Accreditation serves the

public and profession by developing and implementing accreditation standards that promote and monitor the continuous quality and improvement of dental education programs.

Cohort	A group of individuals having a statistical factor (such as age or class membership) in common.
Cultural Competence	The ability to understand, appreciate and interact with people from cultures or belief systems different from one's own.
Curriculum Based Program	A program which has specific, pre-planned educational objectives, based on a structured plan for learning, and clear learning outcomes in mind when coming to your site.
Didactic	Designed to convey instruction and information
Evidenced Based Patient Care	Integrating individual clinical expertise with the best available external clinical Evidence from systematic research." Sackett, DL, et al. BM1996;312(7023):712.
Lockstep Curriculum	Require that students follow the same prescribed curriculum simultaneously
Mentor	An experienced and trusted advisor
Persistence	A student's ability to carry on to the next term
Retention	Return rates from one year to another
Stress	A feeling of emotional and/or physical tension

Chapter Two: Review of the Literature

The History of Dental Hygiene

Dental hygiene is defined as the science and practice of the recognition, treatment and prevention of oral diseases (Bowen, 2012). The inception of the dental hygiene profession was supported by research conducted over 100 years ago. Dr. Albert C. Fones opened the first dental hygiene program, educating and training individuals that could provide preventive interventions to children. He trained his personal assistant, Irene Newman, to treat his patients' oral health needs. In 1917, she was granted the world's first dental hygiene license in Bridgeport, Connecticut (Bowen, 2012). A proposed scientific theory of reviewing assessments regarding oral prophylaxes and teaching students about oral hygiene, would reinforce disease prevention measures and impact overall health (McCarthy, 1939). The growth of knowledge in the field led to information grounded in a decade of research documenting the effectiveness of oral cleanliness in the prevention of dental diseases, which led to greater validation for the growth of the profession (Brooker, 1926).

Early dental hygiene programs were eight months to a year in length with the first two-year program established in 1947 (Motley, 1988). Today, the two-year academic and clinical program requirements are still in existence and must abide by the strict accreditation standards established by the Commission on Dental Accreditation (CODA). The Commission is comprised of 30 members, and is the specialized accrediting agency recognized by the United States Department of Education to sanction dental hygiene programs which provide basic preparation for licensure or certification in dentistry and related disciplines.

Their mission states, "The Commission on Dental Accreditation serves the public and profession by developing and implementing accreditation standards that promote and monitor the

continuous quality and improvement of dental education programs” (CODA, 2019, p. 4). These standards have been developed for the following reasons: (1) to protect the public welfare, (2) to serve as a guide for dental hygiene development, (3) to serve as a stimulus for the improvement of established programs, and (4) to provide criteria for the evaluation of new and established programs (CODA, 2019). A dental hygiene program must meet the standards, which are national in the scope set forth by this organization, as they represent the minimum requirements for accreditation.

Educational standards drive the dental hygiene didactic and clinical requirements that are implemented in the dental hygiene curricula. Dental hygiene program rigor is enforced and must include courses in general education, biomedical sciences, dental sciences, and dental hygiene science (CODA, 2020). In evaluating the curriculum in institutions that are accredited by the U.S. Department of Education-recognized regional or national accrediting agency, the Commission will concentrate on those courses which have been developed specifically for the dental hygiene program and core courses developed for related disciplines (CODA, 2015).

Admissions Standards

Being considered for admission into a baccalaureate dental hygiene program is often a taxing and timely process. A review of college transcripts, standardized test scores, and performance associated with prerequisite coursework is carefully evaluated. The foundational courses, consisting of general education and biomedical sciences must be successfully completed before the applicant may qualify for an interview in the admissions process. However, not every dental hygiene program employs a selective preadmission criteria. Admission to dental hygiene programs is predetermined by class size, therefore applicants must meet the criteria to either be considered for selection or to be put on a wait list for entrance (Moore et al., 2016), for some.

Although the dental hygiene admissions criteria vary among programs, all strive to accept students who will successfully complete the program (Freudenthal, 2010). If the student is successful in the admission's journey, they will then enter a cohort driven program in either an associate or baccalaureate dental hygiene program. The specific issue of student retention in dental hygiene programs has not been addressed in many aspects of the literature.

Dental and Dental Hygiene Curricula

Professions exist to serve the needs of society, communities, and individuals who become clients or patients in a variety of settings. In the profession of dentistry, the purpose to serve society has been safeguarded by academic dental institutions that recruit, educate and develop the future members of the profession: practitioners, educators, researchers, administrators and the leaders of organized dentistry (ADEA CCI, 2006). There are a variety of factors which influence the curriculum at each institution including the focus on research, strengths among specialty education programs, approaches to clinical education, and pedagogical philosophies and practices (ADEA CCI, 2006). All United States dental and dental hygiene schools are fully accredited by the Commission on Dental Accreditation, and must follow and validate the educational requirements placed on the programs (ADHA, 2014).

Academic rigor is a key factor of all dental hygiene programs. These programs must include at least two academic years of didactic and clinical full-time instruction, or its equivalent, at the postsecondary level (CODA, 2015). Program components must include dental and dental hygiene sciences which provide students with knowledge of oral health and disease, preparing the clinician to assess, plan and implement dental hygiene patient care. Dental science curriculum includes tooth morphology, head and neck anatomy, oral anatomy, oral embryology and histology, oral pathology, radiography, periodontology, pain management and dental

materials (CODA, 2019). The dental hygiene science curriculum includes ten categories, which are all associated with ethical patient care as well as being an integral member of an oral health care team. Both the dental and dental hygiene curricula are taught by expert clinicians who, for the most part, have limited or no prior formal teaching training. In many of the health professions such as medicine, dentistry, dental hygiene, and nursing, effective teachers are produced by happenstance rather than design (Schonwetter et al., 2006). These individuals are hired to teach the associated clinical skills and many do not have any formal training in education. However, some have an innate ability to educate and may be further mentored to become effective instructors.

Dental hygiene programs must graduate competent students who have the level of knowledge and skills required to begin the practice of dental hygiene as an entry level practitioner when they enter the workforce (CODA, 2015). Students must pass the written standardized National Board Dental Hygiene Exam (NBDHE) at the culmination of their academic tenure to qualify for licensure. These complex exams employ a series of clustered items, known as testlets, comprised of patient cases with varying numbers of associated items per case (Tsai, 2013). Knowledge to pass the exam is acquired through the prerequisite and program components of a CODA approved curriculum (Fellman, 2017). National exam preparation courses have seeped their way into the marketplace to provide an organized review for students approaching graduation from their programs. These NBDHE Board Review courses are popular, yet expensive. They are held during one weekend and are enticing with the promise of board outcome success.

Clinical teaching can be very challenging for both the instructor and the students as it is an arena for both patient care and student instruction. In clinical settings, students are expected to

synthesize the skills and knowledge they have gained previously from course work and clinical lab experiences. In this setting the student is a trainee clinician responsible for patient care, as the clinic is both a patient care facility as well as a learning environment. Students are expected to demonstrate diverse competencies simultaneously, including a range of skills, professionalism, and empathetic ethical behavior (Gerzina et al., 2005). The competency of a student in the application of preclinical skills is used to assess a student's readiness to begin practicing as a dental hygienist independently (Gadbury-Amyot, 2005).

The Commissions on Dental Accreditation requires that dental hygiene students graduate from an accredited school with an approved competency-based curriculum (CODA, 2015). Clinical exams using hands-on skills are assessed based upon a competency-based curriculum which is designed to "assess an acceptable level of knowledge and skill related to patient care" (CODA, 2015). The five domains of competency a dental hygiene student must obtain include core competencies, health promotion and disease prevention, community health, patient care, and professional growth (Fellman, 2017). Standardized clinical competency documentation is required by each dental hygiene program, not only for student graduation, but also to remain accredited (CODA, 2015). Students must pass the required clinical competencies to earn an academic degree and pass a state/regional clinical exam to become a licensed oral health care professional known as a registered dental hygienist.

Regarding dental education, it has been suggested that "the clinic is the learning environment to which all of the enrolled students aspire," "requiring the transfer of knowledge from the basic sciences to the clinic by the restructuring of knowledge" (Rumelhart et al., 1978). Moreover, the clinical setting compounds the closer proximity of instructor to student, coupled with close and continuing communication with clinical instructors, which results in the teaching

style and rapport that instructors have with students. Therefore, instructors can have a potentially greater influence on dental and dental hygiene students' learning in clinic than in classroom settings (Schonwetter et al., 2006).

Self-Directed Learners

It has been observed by faculty that most students enter dental or dental hygiene school as dependent learners, dependent on the teacher to impart the information while de-emphasizing the responsibility of the students to learn on their own (ADEA CCI, 2006). In addition, the heavy workload tends to inhibit self-directed learning. The constant release of new scientific advancements makes it very difficult for students to comprehend and retain all of the information necessary to practice dentistry or dental hygiene for a lifetime. These professional students graduate from their respective programs as entry-level practitioners, deemed competent to function without instructor supervision, moving toward the expert level of the continuum with continued practice and knowledge (Mould et al., 2011).

Additionally, it cannot be assumed that upon entry into professional programs, students will possess knowledge of the self-assessment process needed to make sound decisions without assistance (Mould, 2011). It is a critical part of the professional educational process to provide instruction in clinical self-assessment which is crucial for the development and growth of the dental and dental hygiene student. Teaching students how to self-assess is an important step in preparing students for problem-solving and life-long learning (Mould, 2011). Students must "learn how to learn" and faculty must serve as mentors who understand and value of scientific discovery. Self-assessment is indicative of the extent to which students take responsibility for their own learning (ADEA CIC, 2006). It is a valuable tool for all populations and health profession disciplines.

Cultural Competence

The United States population is becoming increasingly more diverse. According to the U.S. Census Bureau, ethnic minorities account for almost one-third of the current US population and are expected to make up 54% of the total U.S. population by 2050 (Humes et al., 2016). These estimates foreshadow the cultural and ethnic diversity that will soon comprise the population seeking dental treatment.

Cultural competence may be defined as a process in which an organization and/or an individual have a continuous commitment to learn about cultural differences and to develop skills to understand the cultural dimensions of a health interaction and work effectively within the cultural backgrounds of a patient to achieve the best outcomes across cultural-ethnic groups (Campinha-Bacote, 2002). Cultural competence has been identified in the literature as a key component in addressing the needs of a diverse society and reducing health disparities among diverse populations (Institute of Medicine, 2002). A commonly utilized definition of cultural competence arises from the pediatric mental health literature: “a set of congruent behaviors, attitudes, and policies that come together in a system, agency or amongst professionals and enables that system, agency or these professionals to work effectively in cross-cultural situations” (Cross et al., 1989). Principal areas of cultural competency outlined in the health-care literature include awareness, attitude, knowledge and skills (Marino et al., 2016). Increasing one’s understanding of the patient’s beliefs, perspectives, opinions and psychosocial cultural contexts can have a vast impact on patient acceptance of treatment and treatment outcomes (Cross et al., 1989).

As health sciences who are dependent on a strong understanding of science, technology, engineering and mathematics (STEM) pipeline, veterinary medicine, pharmacy and others cannot

afford to ignore population trends and issues that are creating an increasingly diverse society in terms of identity. Medical education has shown that students who learn as part of a diverse student population are more likely to feel prepared to care for patients from diverse backgrounds than are those graduating from less diverse schools (Chisholm, 2004). Furthermore, in a global community, cultural competence may determine an organizations' success (Groves et al., 2015). Participating in educational experiences which will increase career success, may help to decrease stress upon graduation.

Stress in Professional Programs

In 1980, the Dental Environmental Stress questionnaire (DES), a thirty-eight-question survey instrument was developed by Garbee et al. to determine potential sources of stress for dental students. The questions were categorized into academic performance, faculty relations, patient and clinic responsibilities, personal life issues, professional identities, and financial obligations. The two most frequent causes of stress among these students were competition for grades and heavy workload. And although measures such as counseling services, tutoring services, crisis intervention, mentorship, ombudsman, and time management strategies may be offered, it is difficult to measure the effectiveness of these offerings (Murphy et al., 2009).

It has been reported that dental students have a 100% prevalence of stress while in dental school. Dental and dental hygiene students are typically high achievers and therefore experience high levels of stress during different times in their respective programs. "Increasing stress may result in decreased student performance and have a detrimental effect on the physical or mental health of students (Alzahem et al., 2014). Researchers in both dental and medical education have reported student frustration with the lack of social support from their schools or inadequate amount of time and relaxation (Westerman et al., 1993). Mounting financial responsibilities

were also found to be a significant source of stress for both medical and dental students (Murphy et al., 2009).

Increasing students' ability to cope with stress is also important and may help them in their future endeavors. Positive outcomes have been noted among dental and medical students who have attended stress management and wellness courses which discuss stress, time management, and realistic goal setting (Kay et al., 2008).

Attrition vs. Retention

The term "attrition" is defined as the loss of students who leave school or fail to reenroll in a successive semester. The term "retention" is used when a student is retained from admission to degree completion and graduation (Catalano & Eddy, 1993). As only one third of the total applicants will be admitted this year, dental hygiene programs with competitive admissions processes must identify the candidates who are most likely able to complete the rigors of the dental hygiene program (Sanderson, 2014).

Colleges and universities expend a significant number of resources to both identify and attract potential students. However, if students who are accepted into the program and do not complete the program, the institute's expenditure on these students become losses (Holt, 2005). This is a special concern for professional programs, including dental hygiene education. These programs are composed of lockstep sequential curricula, which suffer financially when students drop out of the program. Additionally, self-contained patient clinics have high budgetary expenditures. Dental hygiene students enter a program with a commitment to be successful and graduate, however, sometimes derailment occurs due to poor didactic or clinical performance, financial or family issues. If this negative occurrence does ensue, prescribed methods such as

faculty-student mentoring could be put in place to aid in necessary student support, positively redirecting the distressed student.

Mentorship

Traditionally, mentoring is defined as an interpersonal relationship between a less experienced individual (the protégé) and a more experienced individual (the mentor) where the goal is to advance the personal and professional development of the protégé (Kram, 1985). Regardless of the relationship, the literature suggests that both the mentor and the protégé benefit from mentoring (Rowland, 2012). Guidelines should be established to receive the most benefit from the mentor-mentee process. The program should be intentional, conducted in an organized fashion, not as an afterthought. Mutual respect, trust and comfort are essential components of this relationship and must be allowed to evolve naturally (Bierema & Merriam, 2002). Empirical studies of undergraduate mentoring relationships are often referred to as programmatic or administrative, rather than revealing the perspective of the mentee (Lunsford et al., 2017). Regardless of this focus, mentorship seems to be a widely accepted mechanism for positively influencing undergraduate students (Eby & Dolan, 2015). Further evaluation should occur regarding if mentoring affects persistence in a university or in specific disciplines such as science, technology, engineering and mathematics (STEM) and other high impact educational practices (Kendricks et al., 2013).

Types of Mentoring

Mentoring relationships are embedded in the higher learning educational process (Kram, 1985). Mentorship can either be delivered in a formal or informal process, depending on the intention of its structure and could be identified as either senior, peer, distance or virtual. It may also involve coaching, role modeling or collaboration (Henry-Noel et al., 2018). Much like

athletic coaching the senior colleague may impart a specific piece of knowledge which aids someone in achieving a defined goal (Kram, 1985). Role modeling is the demonstration of a particular task coupled with professional behaviors that may be mirrored by the mentee.

Collaboration emphasizes the partnership formed between the mentor and mentee in which one is not more knowledgeable and there is a mutual goal of development (Kram, 1985).

Formal mentoring programs are highly structured and recommended to contain a specific configuration (Tourigny et al., 2005). As an alternative to the formal process, informal mentoring is highly unstructured and there is no formal training, goals and outcomes are undetermined and the relationship between the mentor and mentee is very casual. This type of mentoring usually lasts longer than its formal counterpart (Tourigny et al., 2005). The roles of the mentor and mentee tend to be natural and are more dependent on the needs of the individuals and not the needs of the program.

In a study examining 24 US medical schools, individuals who had mentors experienced significantly higher career satisfaction results that those who did not have a mentor (Sambunjak et al., 2006). A formal mentoring program was also strongly associated with the passing rate of the American Board of Internal Medicine certifying exam. Residents were paired with Board Certified Internal Medicine physicians and they met on a regular basis to review mock board questions, aiding in the resident's preparation for the board exam. Despite the benefits of mentorship in medical programs, only 36% of third and fourth year undergraduate medical students have mentors (Sambunjak et al., 2006).

In a study performed by Janet Coleville et al., involving the Community College of Allegheny County (CCAC) in Pittsburgh, one third of the nursing students admitted are African American, and less than one third of those admitted successfully complete the program (2015).

Data from the American Association of Community Colleges (AACCC, 2013) describes community college students in the basis of the following characteristics: more than 60% of community college students place into developmental math and English courses indicating their lack of preparedness for the rigor of college course work (2015). To complicate the success of these students, 60% of the community college students nontraditional and have families and employment responsibilities outside of their academic responsibilities. A response for retention was sought due to an RN shortage that began a decade ago, particularly among underrepresented individuals entering nursing programs. Escallier and Fullerton (2009) highlighted the importance and benefit of the mentorship process, including increased student motivation, fostering of independence, and commitment to learning as well as the socialization of students to the nursing profession. Wilson et al. (2010) reported that a combination of services, such as mentoring and advising, helped to retain students who may have been underprepared for rigorous nursing programs. It has been reported by Georges and Wilson that mentoring programs, particularly faculty mentoring, have been successful in enhancing student relationships, the perceptions of nursing and eventually contributed to the success of the NCLEX (2012, 2010).

Conversely, honors education in nursing with targeted mentorship also offers a potential avenue to facilitate the professional development of high achieving students, supporting their lifelong engagement in nursing practice, education, and research (Navarra et al., 2018). Honors education is characterized by enhanced in class and extracurricular activities that occur with a close community of students and faculty, lending to mentorship relationships. It has also been reported that novice physical therapists face multiple challenges as they transition to autonomous, efficient and seasoned therapists. Mentoring is known to facilitate growth among novice therapists; however formalized mentoring programs within these programs are scarce.

(Buning et al., 2019). In general, mentorship appears to be an important career development strategy and works not only in diverse settings, but traditional settings as well. Although the level of impact associated with the mentoring practices varies in different academic settings, outcomes appear to have a positive impact towards academic success and career satisfaction.

(Buning, et al., 2019.)

Mentoring among students is understood to be beneficial and is typically not a formalized element of dental hygiene programs. The CODA standards do not include mentoring expectations in their accreditation documents. It has been suggested that one reason for the absence of this requirement is that mentoring programs tend to lack formal structure (Blanchard et al., 2006). In addition, time constraints limit the availability for the student and faculty member to meet in a formal setting. Therefore, it may be assumed that mentoring relationships should not be a once-a-semester meeting with a person the student hardly knows, but an ongoing set of conversations about issues students are facing in real time.

Faculty-Student Mentoring. The purpose of mentorship in an academic setting is to provide student support in order to improve student outcomes. Although more than 20 definitions of mentoring have appeared in the literature, Jacobi has identified the basic elements of a mentor relationship which focuses on the following: (1) achievement or acquisition of knowledge; (2) emotional and psychological support, direct assistance with career, and professional development; (3) is reciprocal where both mentor and (aka protégé) derive emotional or tangible benefits; (4) is personal in nature, involving direct interaction; and (5) emphasizes the mentor's greater experience, influence, and achievement within a particular organization (1991).

The literature on mentoring within the health care field has been diverse regarding the topic from describing the value of mentoring in leadership, (Hamilton, 1981), evaluating long-distance mentorship programs (Owens, et al, 1988), faculty mentoring (Al-Jewair et al., 2019), using preceptors or peers as mentors (Hryciw et al., 2013), and evaluating participation and administrative support in mentoring relationships (Jacobi, 1991). Although much has been written on mentoring in health care, the effectiveness of the mentoring relationship in an academic dental hygiene setting has not been explored.

While mentoring relationships are prevalent between faculty and undergraduate students, student relationships with university staff, peers, graduate students, family, friends, community members, and religious leaders have been shown to contribute to the educational success of students (Erickson et al., 2009). It was also noted that students may benefit from having more than one mentor who provides different forms of support. Findings by D'Abate, indicate that faculty regard their role to include teaching, sharing information, providing feedback and academic goal-setting, whereas roles such as introducing, affirming and befriending may be better provided by peer-mentors.

Enhancing student engagement by increasing student success through high-impact educational practices shows increased institutional retention (Kuh, 2008). These practices may take on many different forms depending on the institution priorities and the learner characteristics. Included in this group of practices are first-year seminars, learning communities, writing intensive courses, collaborative assignments and projects, undergraduate research, diversity and global learning, service-learning or community-based learning, internships, and capstone courses and projects (Kuh, 2008). One of the key components for the success of implementing these assignments is to integrate the faculty, having some of these practices

integrated into the course curriculum. These programs enhance written and oral communication, informational literacy, problem solving, and critical thinking in addition to building community with whom they are meeting. Undergraduate professional programs do implement many of these high impact community practices throughout their programs (Kuh, 2008).

An example of academic service-learning in a dental hygiene program was illustrated by students in community health project. Twenty-three female dental hygiene students beginning their fourth semester in the program provided preventive oral health services at eight community sites serving six diverse groups of people having special health care needs. The students had to identify the needs of the recipients of this care, partner with the community on this collaboration, implement the actual activity and then write reflections stating their thoughts, feelings and values of the project. Students reflected on the experience via commentaries written in self-reflection journals (Keselyak et al., 2006). Elyer and Giles describe reflection as providing the connection for students between their service and their learning as represented in the hyphen in the phrase, “service-learning.” The outcomes of this qualitative study suggest that service-learning pedagogy can facilitate a deeper understanding of the subject matter and provide an opportunity for students to use critical thinking strategies in addition to becoming aware of complex social and professional issues related to the oral health care of individuals with special needs (Keselyak et al., 2006).

While the activities involved in service-learning are diverse, the thought process prevails that service-learning must incorporate four essential elements: preparation, action, evaluation, and reflection. Student discussion with faculty during the process or at the close of the service experience can be an amalgamated mentoring experience, discussing the feelings of the experience, the professional connection, and possible suggested changes.

The learning environment of the dental clinic, challenges the roles and responsibilities of both the learner and the clinical teacher substantially. The clinical teacher can be seen as the role model, assessor, confidante, and facilitator for the student clinician (Gerzina et al., 2005). This individual has a key role in the overall clinical experience of the student. Mentorship between a faculty member and a student may be a source of support for the student who is suffering from low performance. In a study performed between medical students and their faculty, the role of the mentor was perceived as being more supportive than supplying knowledge (Kalen et al., 2010). Common topics discussed with the mentor were education in general, future career goals, the role of being a doctor, and the combination of work and private life (Kalen et al., 2010). Regarding the medical students' responses in this study where (N = 76), 98% felt that the mentor respected them, 89% that the mentor was interested in their needs and 81% said they received emotional support. In addition, 91% felt their mentor offered perspective, 87 % felt they received positive guidance, and 72% had support from the mentor in finding solutions to problems (Kalen et al., 2010).

A study on science and engineering performance indicators for African American STEM students revealed that the number of undergraduate degrees awarded were increased from 7.7 percent in 1997 to 8.3 % in 2006. This number remained constant between 8.3-8.4 % annually, from 2000 to 2006, suggesting that there is a strong need for better recruitment and retention programs, particularly for minorities, that address the academic, social and psychological need of the student (Kendricks et al., 2013). Mentoring was conducted through a network of faculty, or "family members", who had a common interest in the scholars' retention and academic success, and who nurtured the scholars by integrating professional academic advising into social and professional meetings with students. Student surveys on effectiveness of faculty mentoring

showed strong correlation between academic success of scholars and their degree of acceptance of mentoring as a positive experience in their learning (Kendricks et al., 2013).

Peer Mentoring. Peer mentoring is another form of informal mentoring that is interaction between two or more students. Hryciw et al. (2013) found this to be another form of student support that has been utilized in higher educational settings. Peer mentoring can be particularly critical to early university students since students who do not connect to a peer group, or who have negative peer interactions, are more likely to be lost to attrition (Bean & Metner, 1985; Tinto, 1975). Peer mentors are perceived differently from faculty since they are typically more readily available and are perceived as more approachable and understanding (Lunsford et al., 2017). Evaluation of a peer mentoring plan implemented in a cohort undergraduate paramedic baccalaureate program, developed to enhance learning in a bioscience course, revealed a positive outcome in both academic performance and student confidence. A limitation of the study was the participation in this mentoring program was voluntary, and previous participant knowledge of this subject matter was not measured prior to the (Hryciw et al., 2013). Li et al. (2010) reported findings of a peer-mentoring study involving nursing students who were seeking advanced degrees and were paired with first level undergraduate nursing students with no medical or surgical experience. Reduced stress in the clinical setting was concluded as a result of this mentoring relationship.

Botma et al. (2013) found disadvantages regarding peer-mentoring in a clinical setting. Experienced practitioners felt time constraints due to being understaffed in patient care units, and placed high performance expectations on their mentees so their employment responsibilities would not be interrupted. This relationship was reported as being very stressful for the mentees.

Although much has been written on mentoring in health care, the research has not addressed the effectiveness of the mentoring relationship in the professional academic setting. It appears that many positive aspects are gained from the mentor however, the tools to measure that effectiveness have not been provided. Therefore, that is why I am seeking to answer the following research question: Does faculty-student mentoring improve program performance and mediate stress for first-year dental hygiene students?

CHAPTER THREE: METHODOLOGY

Methodology

The first-year dental hygiene student enters a professional educational program which maintains both high standards and expectations regarding clinical skills and academic performance. In addition to the stress the students may be experiencing inside of the program due to these high standards, they may also be experiencing personal stress outside of the program as well. These combined stressors could potentially affect their overall program performance. Scholars have theorized that faculty-student mentoring may provide critical support for students in health care programs, enhancing student performance and mitigating student stress.

This chapter describes the methodology employed in this study to answer the following hypothesis: Does faculty-student mentoring improve program performance and mediate stress for first-year dental hygiene students? The level of measurement was an online survey. The target respondents of this survey were first-year dental hygiene students associated with US dental hygiene programs. The survey was initially piloted to increase validity and reliability of the instrument and was distributed through Qualtrics. Qualtrics is an independent electronic company that launches the survey, stores data, and provides data access to the researcher, all while maintaining the anonymity of the participants. The program directors were the initial email contact with a request to forward the survey to the first-year students only. The students were given a four-week time frame to complete the survey. A reminder request was sent via email to the program directors every Monday for three consecutive weeks. The data was analyzed after the four-week time frame had expired.

Research Design

A quantitative research design utilizing a chi-squared test, T-tests and a backward-forward stepwise regression procedure, beginning with the full model, was employed to determine if there was a difference in the active mentoring experience or the programmatic stress reduction for those students who participated in a formal mentoring program. The Chi-Square test was used to determine if the observed frequencies in the mentored and non-mentored group matched the expected frequencies. A correlation matrix and t-tests were then run to determine the difference between the mean in both the mentored and the non-mentored groups. The predictive relationship between the mentoring program and the dependent variables was illustrated through regression analyses. Creswell emphasizes that the regression analyses are a beneficial tool for investigators wanting to test the impact of an intervention on a sample population (Creswell, 2014). The independent variables utilized in this study were active mentoring, mentoring associated with academic stress and mentoring associated with clinical stress. The dependent variables were programmatic stress and the overall mentoring experience. For this study, survey results from first-year dental hygiene students were analyzed to gain better insight regarding the role that faculty-student mentoring could play in overall student success.

Study Population

There were 453 (N=453) first-year dental hygiene students participating in this study. Those respondents were from 2022 dental hygiene program cohorts nation-wide, consisting of both traditional and non-traditional students, primarily female, and either seeking an associate or baccalaureate degree in dental hygiene.

Instrument Development

A 68-question survey instrument was developed by the researcher, to determine what students have a mentoring program employed in their program structure. This survey questionnaire was pilot tested prior to the distribution for data collection to determine whether the survey questions were comprehensible and appropriate, and that the questions were well defined, clearly understood and presented in a consistent and concise manner. Prior to sending the survey, five dental hygiene instructors from various programs were consulted regarding the question content, as well as Dr. Doo Hun Lim, and the final survey verbiage was determined. The survey was then sent to the new second-year dental hygiene students at the University of Oklahoma College of Dentistry and Tulsa Community College. The responses were then analyzed by using Cronbach's alpha test, a measure of internal consistency reliability; it measures the extent to which the questions in the survey all measure the same underlying construct. For surveys or assessments with an even number of questions, Cronbach's alpha is the equivalent of the average reliability across all possible combinations of split-halves. It was then determined that 4 questions needed to be revised or omitted. None of the results from this pilot survey will be published as this data was used only to check the validity, reliability and practicality of the instrument. Without conducting a pilot study, there would be a much greater threat to the internal validity of the survey. Following this initial study, and after the necessary survey question revisions were made, the surveys were then distributed to the dental hygiene program directors who were requested to forward the surveys via electronic mail to the first-year students. These questions were strategically distributed close to the end of the first year of the program. The first question served as a filter to determine those who have participated in a faculty-student mentoring program versus those who have not. Skip logic was utilized so those

answering yes to the first question, which confirms that they participated in a formal mentoring program, were asked an additional nine yes/no questions asking other detailed information regarding the student's perception of the mentoring experience. At the culmination of the yes/no questions, the format then changed with the subsequent 41 questions incorporated in a 5-point Likert scale format offering fixed choice responses from *strongly agree*, *agree*, *neutral*, *disagree*, to *strongly disagree*. These questions were concerned with how the mentoring relationship or lack there-of, affected the students' academic experience, clinical experience, stresses related to the program as well as those outside of the program. A Likert scale assumes that the strength/intensity of an attitude is linear, i.e., on a continuum from strongly agree to strongly disagree, and assumes that attitudes can be measured (McLeod, 2019). A final category regarding the overall mentor experience precluded the demographic questions. The demographic questions were asked last to keep the respondent engaged in the survey questions since these questions are less interesting, less substantive and potentially sensitive.

The comparison of the effect that the independent variables active mentoring, academic mentoring and clinical performance mentoring has on the dependent variables, programmatic stress, and the overall mentoring experience in the program, gave insight to the effects of faculty-student mentoring on overall student success.

Quantitative Data Source

The data was extracted from the electronic survey questions which were distributed to the students through email via the forwarding of the survey instrument by institutions' Dental Hygiene Program Directors. The rating was determined regarding their experience as a first-year

dental hygiene student. The quantitative data sources included the following:

1. *Confirmation that the respondent attended a program that did or did not include a faculty-student mentoring program.*
2. *Students' perception of the academic portion of the program.*
3. *Students' perception of the clinical portion of the program.*
4. *Students' perception of the amount of stress they experienced which is related to the program.*
5. *Students' perception of the amount of stress they experienced which is related to occurrences outside of the program.*
6. *General questions regarding the students' perception of their mentoring relationship.*
7. *Demographic questions consisting of personal demographics regarding each respondent, including age, gender, highest level of parental education and type of program the respondents are attending.*

The above demographic questions utilized were similar to those included in a survey that is sent annually to Dental Hygiene Program Directors from the Commission on Dental Accreditation, (CODA).

Analysis

After examining the aforementioned survey question categories, once again, Chronbach's alpha was run on the actual survey responses to test for validity and reliability. Descriptive statistics were utilized to describe the results of the Chi-Square which was performed to compare the "Yes/No" responses of each question. A t-test was then utilized to determine the difference in the academic/clinical/stress outcomes depending on the existence of a mentoring program. A correlation matrix was used to determine the correlation coefficients between the independent variables. And finally, determining the potential predictive relationship between the independent variables, active mentoring, academic and clinical mentoring, and the dependent variables programmatic stress and the overall mentoring experience. This was evaluated by means of using

a stepwise regression analysis, determining if there were a set of independent variables significantly influencing the dependent variables.

Procedures

All data was collected under the auspices of the University's Institutional Review Board (IRB). Once IRB approval was granted, the surveys were distributed via email to the determined population sample. An email address list of all dental hygiene school program directors was obtained through the American Dental Hygienists' Association. An email containing participation instructions, respondent's consent, and a link to the survey was sent via Qualtrics. The time identified to respond to the survey was one week. Notification of this timeline was included in the invitation instructions. Data was then downloaded from Qualtrics and was analyzed by a statistician.

Intended Contributions

The rigorous academic schedule coupled with the significant financial responsibility associated with this program, can exacerbate student stress. This stress can affect overall performance, leading to program attrition. The purpose of this study was to determine if the contribution of faculty-student mentoring with first-year dental hygiene students in US dental hygiene programs, has an effect on student performance and support in the initial weeks of matriculation. The findings will help program directors determine whether the use of faculty-student mentorship programs should be incorporated in the student schedule and if formal faculty training should be developed. The results of this study will add to the body of knowledge regarding distinct ways to aid in student persistence by providing pathways of stress reduction for students in the areas of clinical instruction, didactics and personal matters. Future educators

will benefit from shared data reporting the outcomes of faculty-student mentoring with first-year dental hygiene students.

Conclusion

The primary goal of this research is to examine whether first-year dental hygiene students benefit from faculty-student mentoring during the first year of being enrolled in an entry-level dental hygiene program. Of particular interest is whether meeting with a faculty mentor during the student's first semester, helped to improve program performance and reduce overall stress. This study will help to provide a forthright answer regarding the benefits of faculty-student mentoring during the first year of a dental hygiene program.

CHAPTER FOUR: RESULTS AND FINDINGS

The purpose of this study was to explore the relationship between faculty-student mentoring and the reduction of stress and improved educational performance for first-year dental hygiene students in an educational setting. The retention rates are important for the involved educational institutions, the programs, as well as the profession. To gain a better understanding of the faculty-student mentoring programs and the role they play in supporting student stress, clinical competence and academic improvement, a quantitative method was be utilized, surveying 472 first-year dental hygiene students during their first year of the program.

Descriptive Statistics Results

Qualtrics was the electronic platform used to distribute the research survey to program directors of dental hygiene programs in the United States. Of the 327 programs contacted, 18 stated they would not allow their students to participate. There were 472 survey attempts entered into Qualtrics between 04/02/2021 and 05/01/2021. This is from an initial email list of 309 programs, assuming that the program director at each site forwarded the survey to their first-year dental hygiene students. Therefore, potentially there were approximately 3708 students allowed to take the survey, resulting in a response rate of 13%. Four participants declined to consent and 15 participants gave consent but did not provide any answers. Omitting these participants leaves 453 (N = 453) who were included in the analysis.

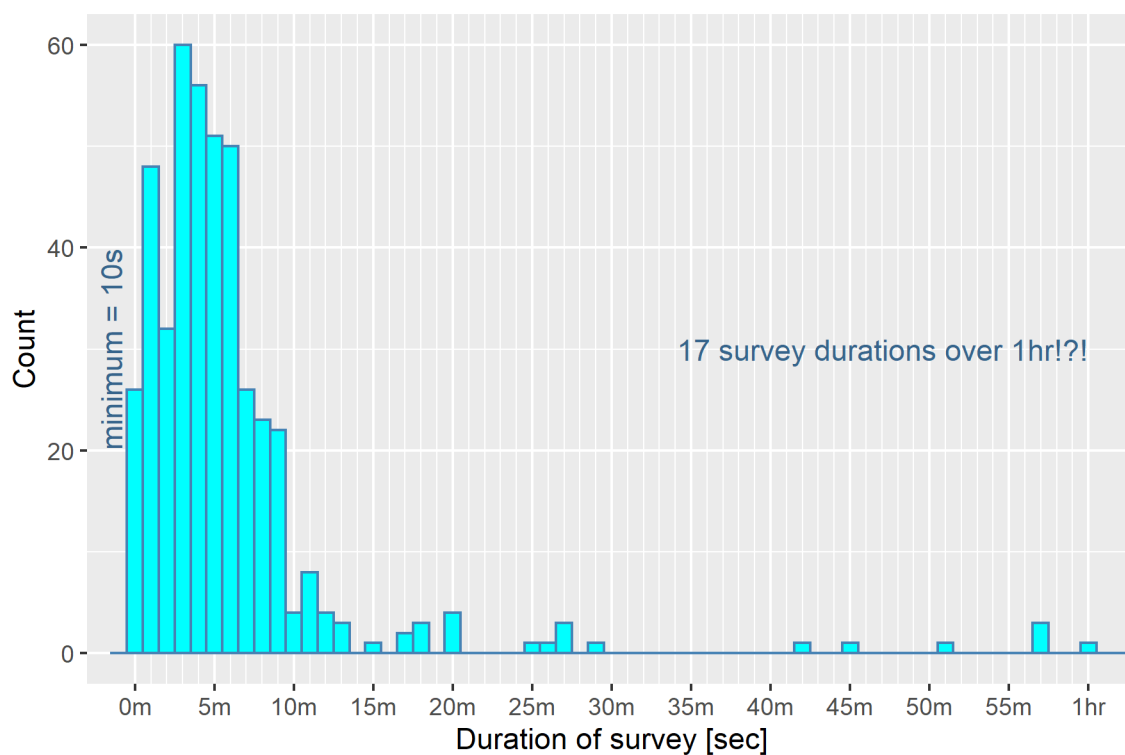
The survey was designed to not only ask students if they had a formal faculty-student mentoring program, but also what types of stress they felt while enrolled in the program. To conclude, if faculty-student mentoring is determined to be beneficial in the reduction of student stress, the presence of school related stress needs to be determined. The survey design included

skip logic which was integrated after the first question, compartmentalizing those who did participate in a mentoring program versus those who did not.

The duration of the survey lasted anywhere from less than one minute to over an hour, of which the latter is most likely associated with the students who just opened the survey and did not complete it in one sitting.

Figure 1

Duration of Survey



Survey Results – Mentored and Non-Mentored Students

General Question 1

Research question number 1 stated: “Do you have a faculty-student mentoring program in your dental hygiene educational program?” The exact setting of the dental hygiene program is relative given the data was analyzed regarding the institutional setting the respondent attended.

However, 111 respondents did not answer this question. A statistical analysis was run on 342 respondents which included the demographics of the different programs and reports both the “No” and “Yes” responses stated by the students in the varying programs. The demographic questions were similar to those sent to dental hygiene program directors in an annual survey. The “Yes” (n =194) responses are those students who reported they had a formal mentoring program and the “No” (148) responses are reported by those individuals who attended programs that stated they did not have a formal mentoring program.

Demographic Questions

Demographic Section: Survey Question 1

The largest number of respondents were from Community College settings, which was predictable since those programs out-number the baccalaureate programs 4:1. The data revealed that of the respondents who completed the survey, the largest number of formally mentored students (43.3%) (n = 84) attended a community college compared to (14.4%) (n = 48) who attended programs integrated in dental schools.

Table 2

Demographic - Survey Question 1

Which of the following educational settings best describes where your dental hygiene education program is administered?	Mentor program	
	Yes	No
University or four-year college: school of health sciences	49 (25.3%)	28 (18.9%)
University or four-year college: dental school	28 (14.4%)	16 (10.8%)
University or four-year college: separate dental department	17 (8.8%)	6 (4.1%)
Other university or four-year college setting	2 (1.0%)	1 (0.7%)

Which of the following educational settings best describes where your dental hygiene education program is administered?	Mentor program	
	Yes	No
Community college	84 (43.3%)	80 (54.1%)
Technical college or institute	12 (6.2%)	15 (10.1%)
Vocational school or career college	0 (0.0%)	0 (0.0%)
Other	2 (1.0%)	2 (1.4%)
	194	148

Test Ho - Yes is not significantly different from No: $p = 0.17$

Demographic Section: Survey Question 2

A second question requested: “Indicate the type of award granted at the completion of the entry-level accredited dental hygiene education program.” Three respondents .5% (n = 3) reported they received a diploma and 2% (n = 7) reported they received a certificate upon completion of the program. The largest group responding, receiving an associate degree was 58% (n = 198), while 4% (n = 15) respondents reported they received a baccalaureate degree in health sciences. Those receiving a baccalaureate degree in dental hygiene was 33% (n = 115) respondents, while 4 individuals did not report that they fit into any of these categories.

Demographic Section: Survey Question 3

A third question asked, “Does the program require any college courses as prerequisites prior to entering the program?” Of the mentored group, 96.8% (n = 183) stated that they did have science and general education courses required prior to entering the program and 94.4% (n = 134) of the students who were not part of the mentored group stated they did as well.

Demographic Section: Survey Question 4

Continuing with the demographics, a fourth question asked: “How many students are in your class or cohort?” The number of students in a cohort is relevant to this study since the larger

the class size, personal contact with instructors may be more of a challenge. However, that was not reported in the findings of one of the largest cohorts who reported their cohort size was greater than 100 and they did not have a formal mentoring program. Of those reporting they belonged to a cohort between 13-24 students, 32.5 % (n = 63) reported they did have a mentoring program while 58.1% (n = 86) reported they did not have a mentoring program. Regarding the cohorts ranging in size from 51-75 students, 56.2 % (n = 109) reported having a mentoring program as compared to 28.4% (n = 42) who reported they did not have a mentoring program. Therefore, it appears that as the cohorts became larger, more programs instituted faculty-students mentoring.

Demographic Section: Survey Question 5

A fifth question asked, “What type of term is your program?” That statement did not seem to have any effects on the survey results as again the results were very similar.

Demographic Section: Survey Question 6

A sixth question asked, “What is your highest level of completed education prior to entering the program?” There was not a great deal of difference between the mentored and non-mentored groups, with the majority falling in the category of two years of college without a degree, an associate degree or a baccalaureate degree. Of the mentored group, 25.8% (n = 50) had two years of college without a degree, 35.6% (n = 69) had an associate degree, and 12.4% (n = 24) had a baccalaureate degree. Of the non-mentored group, 29.3% (n = 29.3) had two years of college without a degree, 27.2% (n = 40) had an associate degree and 12.9% (n = 19) had a baccalaureate degree.

Demographic Section: Survey Questions 7 & 8

Neither nationality nor ethnicity appeared to play a role in the decision to institute mentoring programs in the educational process. Of the 453 respondents, only 342 answered this question, stating 72% (n = 247) were white, 4% (n = 14) were African American, 7% (n = 24) were Asian, 12% (n = 41) were Hispanic/Latino, and 2% (n = 7) were American Indian. The total number of these respondents who reported they did have a mentoring program was 194 compared to 148 who reported they did not.

Demographic Section: Survey Question 9

The following question stated: “What was your gender at birth?” This question was placed in the survey for more informational purposes as the female population greatly outnumbered the male population from n = 329 to n = 12. Since most programs are currently predominately female, it was not assumed that gender would affect the success of a mentoring program.

Demographic Section: Survey Question 10

The last question in the demographic section asked: Please identify your age in one of the following categories:

Table 3

Age Categories

Please identify your age in one of the following categories:	Mentor Program Yes	Mentor Program No
23 and under	103 (53.1%)	78 (52.7%)
24-29	57 (29.4%)	44 (29.7%)
30-34	22 (11.3%)	15 (10.1%)
35-39	7 (3.6%)	7 (4.7%)

Please identify your age in one of the following categories:	Mentor Program Yes	Mentor Program No
40 and over	5 (2.6%)	4 (2.7%)
	194	148

Yes is not significantly different from No: $p = 0.98$ which is $>$ than $.05$

This resembles a standard population spread as the majority of students enrolled in these programs are typically in their early twenties. In the 23 and under age category, 30% (n = 103) of students reported being mentored, while 23 % (n = 78) reported not taking part in a mentoring program. In the 24-29 age category, 17% (n = 57) reported having a mentoring program, while 13% (n = 44) reported not having a mentoring program. In the 30-34 age group, 6% (n = 22) reported being mentored and 4% (n = 15) reported they did not have a mentoring group.

Continuing with the non-traditional age groups, of those reporting to be between the ages of 35-39, 2% (n = 7) in both the no and the yes group. And finally, in the age 40 and over group, 1% (n = 5 mentored) (n = 4 non-mentored), both groups presented as the category containing the lowest number of students. Since there was not a significant difference in those being mentored and not being mentored, the p value of 0.98 validated the lack of statistical significance.

Yes is not significantly different from No: $p = 0.98$ which is $>$ than $.05$.

Academic Questions

The next category of insight was being investigated by asking individual questions regarding the respondents' experience in the academic realm. A 5-point Likert scale was utilized to categorize the experiences by choosing strongly disagree, disagree, neutral, agree, and strongly agree. The results of each question were then placed in the mentoring or non-mentoring group. Chronbach's alpha was utilized which is a procedure to remove questions until there was no increase in reliability as measured by Chronbach's alpha. However, all listed Chronbach's alphas were within the 95% confidence interval for the "all in" value so that omitting any of the questions did not give a significant increase in reliability.

Academic Section: Survey Question 1

The question asked: "I found the academic portion of the program more difficult than what I expected?" The information reported in this question is highly relative because many times the students are unaware of the rigors of the program until a few days after matriculation. Eighty-four (25%) of those students strongly agreed with this statement, 48% (n = 163) agreed, and 23% (n = 80) remained neutral. Only 9% (n = 34) respondents disagreed with the statement and 1% (n = 5) strongly disagreed. Of the eighty-four students who strongly agreed, 19.8 % (n = 42) were from the group who had a mentoring program in place and 28 % (n = 44) did not have a formal mentoring program in place. However, whether the respondents reported coming from the mentored or the none mentored group, the majority stated that did find this program to be more difficult than what they originally expected.

Academic Section: Survey Question 2

The question asked: "The semester was comprised of more hours than I have ever taken in a semester prior to entering the program." And again, 36% (n = 134) respondents reported

they strongly agreed while 25% (n = 93) of the respondents agreed. Of the 134 respondents who strongly agreed, 22.8% belonged to the mentored group while 13.5% belonged to the non-mentored group. Therefore, it is understood that a majority of the students have admitted that the first semester of the program is comprised of more hours than many have taken prior to entering the program. And, since the academic courses provide the foundational material necessary for application in the clinical teaching portions of the education, the material must be learned satisfactorily. The lock-step, curriculum-based programs are considered rigid and do not allow much latitude for poor performance, either clinical or didactic (Bowen & Freudenthal, 2010; Freudenthal, Gallant & Higuchi, 2006; Navickis, Bray, Overman, Emmons, Hessel & Cowan 2010). Therefore, success in both the academic and clinical portion of the curriculum is necessary to move through the program.

Academic Section: Survey Question 3

The question asked: "I was concerned about passing one or more classes." In the mentored group, 19.3% (n = 41) of the respondents strongly agreed and 25.9% (n = 55) agreed that they had experienced this concern sometime during their first semester of the program, while 18.9% (n = 40) remained neutral. Some 26.9% (n = 57) disagreed and 9% (n = 19) strongly disagreed. Paralleling this response was the non-mentored group who also had 24.2% (n = 38) of the respondents strongly agreeing, and 36.9% (n = 58) who agreed or strongly agreed that they had experienced the fear of failing one or more courses as well. Eleven percent (n = 18) of the non-mentored respondents remained neutral, 19.1% (n = 30) disagreed, and 8.3% (n = 13) strongly disagreed. Although $p = 0.039$ between the mentored and non-mentored group, the mentored group was less concerned about failing one or more classes than the non-mentored group.

Due to the skip logic survey design, the remaining questions in the academic section of the survey were only answered by those who originally answered that their program had a formal mentoring program. Those questions will be answered in Chapter 5.

Clinical Questions

Another category in question was if a faculty-student mentoring relationship affected clinical performance in dental hygiene programs.

Clinical Section: Survey Question 1

The question asked, “I found my clinical instruction to be more difficult than what I expected.” Of the 356 respondents, the mentored group had 203 respondents and the non-mentored group had 153. Of those who answered the question, 202 reported that they agreed or strongly agreed with the question. From the mentored group, 21.7% (n = 44) strongly agreed and 34% (n = 69) agreed. From the non-mentored group, 22.2% (n = 34) reported they strongly agreed and 35.9% (n = 55) agreed. Reporting they were remaining neutral regarding the question were 27.1% (n = 55) of the mentored group versus 24.2% (n = 37) of the non-mentored group. Slightly over 15 % (n = 31 for mentored group) (n = 24 for non-mentored group) of each group reported they disagreed, and 2% (n=4 for mentored group) (n=3 for non-mentored group) of each group reported they strongly disagreed with the question.

Clinical Section: Survey Question 2

Question 2 involved only the mentored group, and the results are reported in chapter 5.

Clinical Section: Survey Question 3

This was answered by both groups. It stated, “Learning instrumentation techniques was a challenge for me.” Over half of the respondents (200/357) (56%) reported that they agreed or strongly agreed with the question (n=114 of the mentored group, n= 86 of the non-mentored)

while 25% of the (n = 90) (n = 55 of the mentored and n=35 for the non-mentored) individuals remained neutral. Those who had worked in dental offices prior may have an advantage when answering this question, however that information was not sought in this question.

Clinical Section: Survey Question 4

This question was answered by both groups as well asking, “Our class worked on student partners in our pre-clinic instruction.” Of the mentored group, 87% (n = 179) stated they agreed or strongly agreed while 79.8% (n = 122) of the non-mentored group reported favorably as well. This question was asked to consider the degree of difficulty experienced when learning the instrumentation process. The pre-clinic lab typically occurs the first semester of the clinical curriculum. When working on student partners, it is very different from working on replicas of the oral cavity and tends to be more difficult. It resembles working on a live patient and can actually intimidate the new student clinician if he or she is not familiar with working in the mouth of a patient. Those who reported not learning by working on student partners are utilizing either manikins or working on dental typodonts, which are models of the oral cavity, including teeth, gingiva, and the palate.

Clinical Section: Survey Question 5

This question asked, “I was apprehensive about seeing my first “real” patient.” And although the majority of respondents were working on student-partners as they practiced learning their instrumentation skills, they did not have the opportunity to experience how they would need to interact with someone they did not feel comfortable conversing with them. Regarding the mentored group, 75.5% (n = 154) of the mentored group and 73.2% (n = 112) of the non-mentored group both reported they agreed or strongly agreed with the question that they were

apprehensive about treating their first patient, even though many of them have learned instrumentation skills on student-partners.

Due to the skip logic survey design, the remaining questions in the academic section of the survey were only answered by those who originally answered that their program had a formal mentoring program. Those questions will be answered in Chapter 5.

Programmatic Stress

Categorically changing the questions to a different topic, all of the respondents were asked questions related to how much stress they believe they were experiencing in the program. Dental and dental hygiene students are typically high achievers and therefore experience high levels of stress during different times in their respective programs. “Increasing stress may result in decreased student performance and have a detrimental effect on the physical or mental health of students” (Alzahem, et al., 2014). Therefore, I wanted to quantify the number of students who agreed that much of their reported stress was associated with internal stresses in the program.

Programmatic Stress: Survey Question 1

This question asked, “The first semester of the program was challenging for me academically.” Of the respondents 66.8% (n = 133) of the mentored group answered they agreed or strongly agreed, 19.6% (n = 39) were neutral, and only 13.6% (n = 27) either disagreed or strongly disagreed. Regarding the non-mentored group, 57.6% (n = 87) of the respondents agreed or strongly agreed, 21.2% (n = 32) were neutral, 19.2% (n = 29) disagreed and 2% (n = 3) strongly disagreed.

Programmatic Stress: Survey Question 2

This question asked if “Developing clinical skills was more difficult than anticipated.”, 58.8% (n = 117) of the mentored group agreed or strongly agreed, 25.1% (n = 50) were neutral

while 16.1 % (n = 32) of the mentored group disagreed or strongly disagreed. Fifty-four per cent (n = 82) of the non-mentored group agreed or strongly agreed, 24.5% (n = 37) were neutral and 21.2% (n = 32) of the non-mentored group disagreed or strongly disagreed.

Programmatic Stress: Survey Question 3

Moving from the actual stress caused by academic and clinical skill development, the survey asks in question 3 “If the financial stress was considerable since the program schedule was not conducive to employment?” Mounting financial responsibilities were also found to be a significant source of stress for both medical and dental students (Murphy et al., 2009). It appears to also be a concern since 62.8% (n = 125) of the “mentored” respondents reported that they agreed or strongly agreed, 20.1% (n = 40) remained neutral and 68.2% (n = 103) of the non-mentored group agreed or strongly agreed. A mere 17.1% (n = 34) of the mentored group disagreed and 17.2 % (n = 26) of the non-mentored group disagreed.

When students first enter the program, there is no doubt they have been engaged in a discussion at some point, either from knowing someone who is already attending the program or with an interviewer during their interview portion of the application process, regarding the difficulty level of the program.

Programmatic Stress: Survey Question 4

When asked in question 4 “I find this program to be more difficult than I originally thought”, 69.7% (n = 138) of the mentored group agreed or strongly agreed, while 71.5 % (n = 108) of the non-mentored group agreed or strongly agreed. Remaining neutral were 19.7% (n = 39) of the mentored group and 17.2% (n = 26) of the non-mentored group. Only 10.6 % (n = 21) of the mentored group disagreed or strongly disagreed and 11.3% of the non-mentored group disagreed.

Programmatic Stress: Survey Question 5

Asking a similar question regarding perception of the time involvement during their first semester, the survey asked in question 5, “I find this program to be more time consuming than I originally thought”. A high number of individuals agreed with this statement as 70.9% (n = 138) of the mentored group agreed or strongly agreed, and 76.8% (n = 116) of the non-mentored group was in agreement.

Non-Programmatic Stress

In trying to determine what the students perceive their stressors are associated with, it is apparent that each student’s life appears very different outside of the program. Therefore, this category of questions was designed to measure the different types of stress that is associated with their personal life.

Non-Programmatic Stress: Survey Question 1

This question stated “I experience stress outside of this program, such as family responsibilities, employment, etc.” Of the entire mentored group of respondents, 33.5% (n = 66) strongly agreed, 40.6% (n = 80) agreed and 12.7% (n = 25) remained neutral. Only 13.2% (n = 26) disagreed or strongly disagreed. There was a small increase in the non-mentored group with 38.4% (n = 58) strongly agreeing and 40.4% (n = 61) agreeing with the statement. Remaining neutral was 7.9% (n = 12) and 13.1% (n = 20) disagreed or strongly disagreed. Since much of the student population in the programs are comprised of non-traditional students, some may already be parents.

Non-Programmatic Stress: Survey Question 2

When asking question 2, “I do have children”, only 16.6% (n = 31) of the mentored respondents answered that they did, while 17.2% (n = 26) of the non-mentored group agreed that

they did have children. A much larger majority of both groups, 80.3% (n = 159) of the mentored respondents stated they did not have children, while 82.8% (n = 125) of the non-mentored students agreed that they did not have children.

Since these programs contain a clinical component, which is not able to occur in an electronic format, the students have to be present in a face-to-face format to learn clinical skills, as well as to treat patients. Although rare, some students may have a two – three-hour drive to the facility they are attending.

Non-Programmatic Stress: Survey Question 3

Therefore, question 3 asked “I do not live within 15 miles of my program location.” Of the mentored group, 43.9% (n = 87) of the respondents agreed or strongly agreed that they did not live within 15 miles of their program, while 51% (n = 93) disagreed. Regarding the non-mentored group, 57.6% (n = 87) agreed, while 40.4% (n = 61) disagreed.

Non-Programmatic Stress: Survey Question 4

Question 4 stated, “I live close to my family”, which may be beneficial to some and possibly a burden to others, the mentored group responded with 51.6% (n = 102) in agreement and 38.9% (n = 77) in disagreement. Of the non-mentored group, 49.7% (n = 75) stated they did live close to their family while 41.7% (n = 63) reported they did not. The remaining questions in the survey were only answered by those who stated that their educational institution had a formal mentoring program.

Standard Deviation

Standard deviation is useful when comparing the spread of two separate data sets that have approximately the same mean. The data set with the smaller standard deviation has a narrower spread of measurements around the mean and therefore usually has comparatively

fewer high or low values. Below is the standard deviation table utilized to compare the means of the independent variables as well as programmatic stress between the mentored and the non-mentored group.

Table 4

*Standard Deviations - Total Scores by Mentor Program (y/n).
Scores only include the reliable components*

	Mentor Program			
	Yes N=194		No N=148	
	(mean \pm SD)	Median [IQR]	(mean \pm SD)	Median [IQR]
Academic mentoring	7.4 \pm 1.9	8 [6 – 9]	7.6 \pm 1.6	8 [6 – 9]
Clinical mentoring	11.9 \pm 1.9	12 [11 – 13]	11.6 \pm 2.2	12 [10 – 13]
Programmatic stress	15.2 \pm 3.0	16 [13 – 17]	15.2 \pm 3.1	15 [13 – 17]
Non-Programmatic stress	4.8 \pm 2.4	5 [2.25 – 6]	5.2 \pm 2.3	6 [3 – 6]

IQR = InterQuartile Range = 25th percentile – 75th percentile “the bottom and top of the boxes”

There is no mentor experience score because that is not available for those without a mentor program.

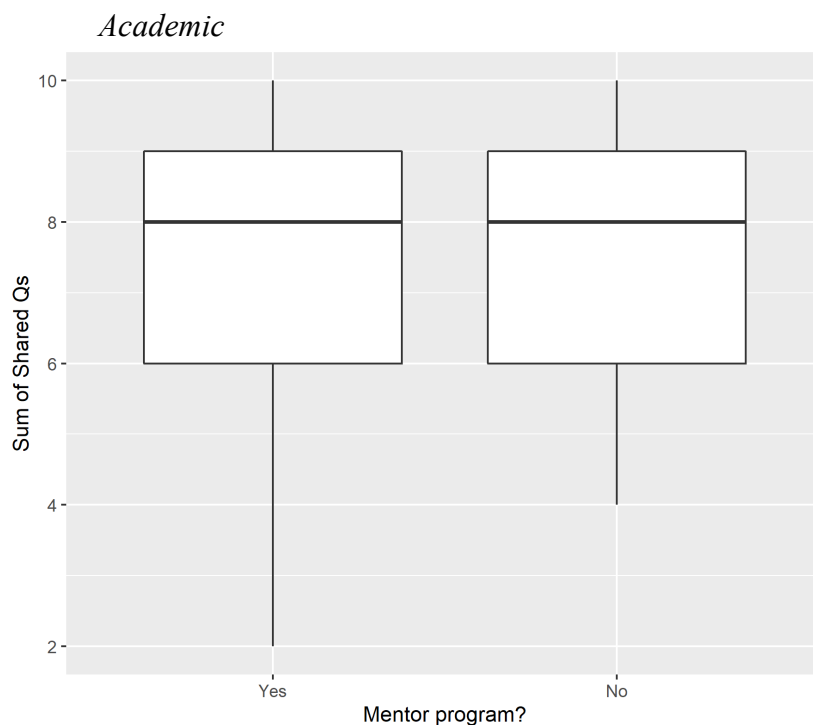
Descriptive statistics include the mean, median and standard deviation of the raw data. Out of 453 students who replied to the survey, 111 did not answer all questions, leaving the number of respondents as 342. Out of 342 students, 194 reported having mentoring in their program, while 148 reported they did not. Of the mentored students, the mean range of academic related stress was .2% (M = 7.4, SD = 1.9) lower in the mentored group than the non-mentored group (M = 7.6, SD = 1.6) with a slightly greater SD of .3% between both groups. Regarding clinical stress, the mean of the mentored group was slightly higher (M = 11.9, SD = 1.9) than that of the non-mentored group (M = 11.6, SD = 2.2), however the standard deviation was slightly lower. The programmatic stress shared extremely close means (M = 15.2, SD = 3), with the standard deviation being 1% lower in the non-mentored group (M = 15.2, SD = 3.1). The

non-programmatic stress category was not as heavily weighted by the respondents with the mentored group having a slightly lower mean ($M = 4.8$, $SD = 2.4$) than the non-mentored group ($M = 5.2$, $SD = 2.3$). These figures are illustrated in the following plots.

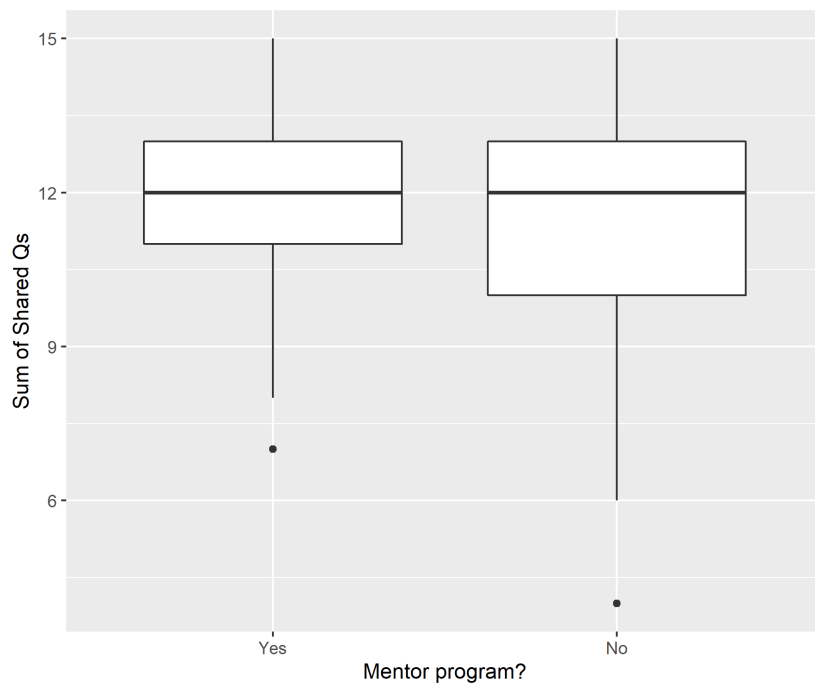
Box and Whisker Plots

When evaluating the questions in the four specific categories, academic, clinical, programmatic stress and non-programmatic stress, answered by both the mentored and the non-mentored respondents, a box and whisker plot, using the subdomain totals as outcomes and mentoring program yes/no as a predictor/independent variable, medians were used to illustrate the differences. Note that the subdomain totals are based on only the reliable, shared questions as determined in the previous section.

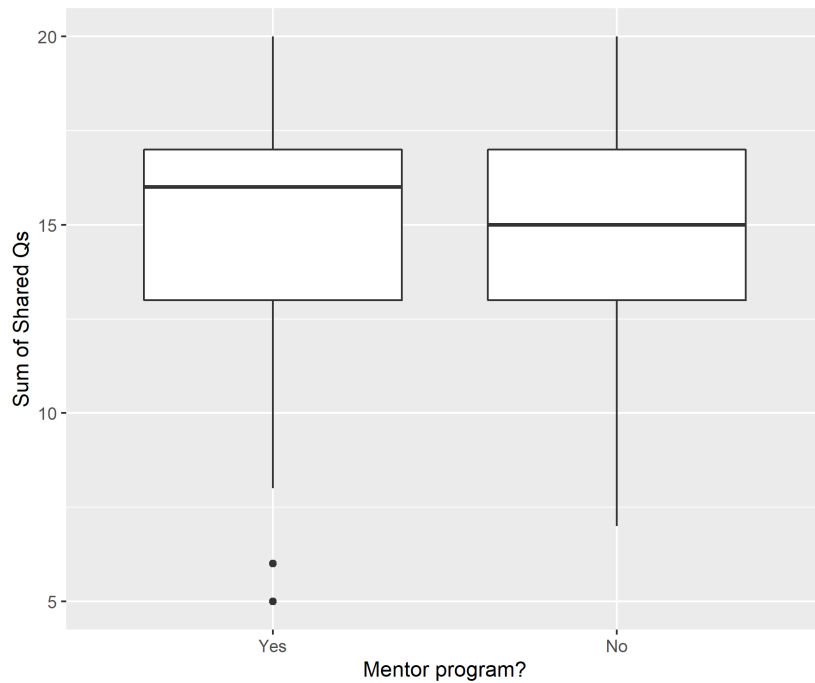
Figure 2



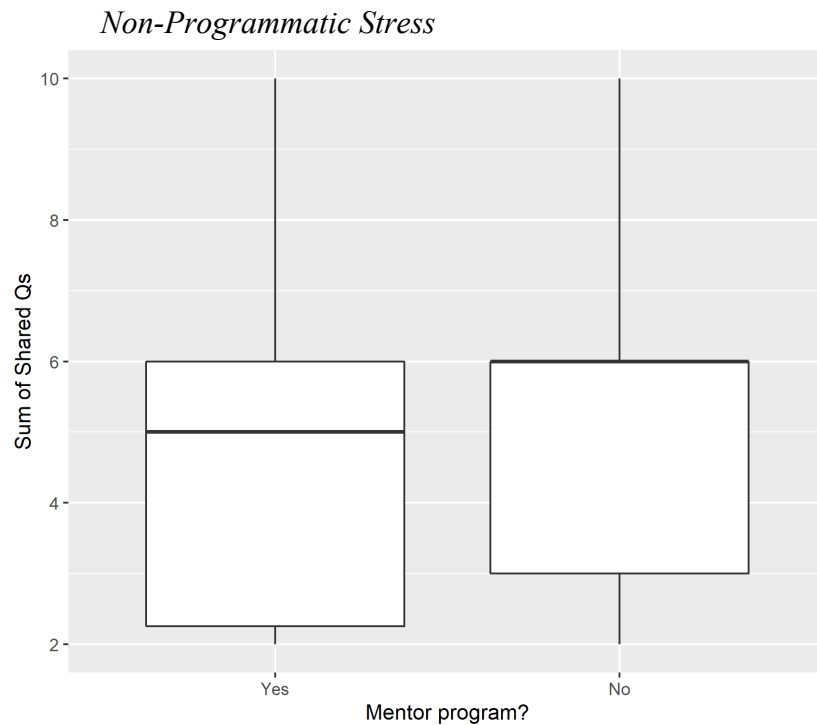
Test Ho - Yes is not significantly different from No: $p = 0.50$

Figure 3*Clinical*

Test Ho - Yes is not significantly different from No: $p = 0.2$

Figure 4*Programmatic Stress*

Test Ho - Yes is not significantly different from No: $p = 0.88$

Figure 5

Test Ho - Yes is not significantly different from No: $p = 0.16$

Therefore, it was determined there was no statistically significant difference between the answers of the two groups in any category.

Table 5*Correlation Matrix*
Mentor program - yes

	Academic Performance	Clinical Performance	Programmatic Stress	Non-Programmatic Stress
Academic Performance	1.000			
Clinical Performance	0.37***	1.000		
Programmatic Stress	0.60***	0.54***	1.000	
Non-Programmatic Stress	0.04	-0.07	0.03	1.000

***p < 0.0001

The correlation between academic performance and clinical performance is 0.37 which indicates these two variables are moderately positively correlated. The correlation between programmatic stress and academic performance is 0.60 which shows a high correlation. Non-programmatic stress and academic performance have a correlation of 0.04 which illustrates a lack of correlation. Therefore, non-programmatic stress does not correlate with any of these matters.

Clinical performance and programmatic stress have a correlation of 0.54 which again illustrates a moderate positive correlation. Clinical performance and non-programmatic stress have a non-significant correlation of -0.07. The positive correlations state that both clinical and academic performance are weakly correlated but both of those variables show a moderate correlation to programmatic stress.

Table 6*Correlation Matrix*
Mentor program – no

	Academic performance	Clinical performance	Programmatic stress	Non-Programmatic stress
Academic Performance	1			
Clinical Performance	0.14	1		
Programmatic Stress	0.45***	0.38***	1	
Non-Programmatic Stress	-0.01	-0.11	0.00	1

***p < 0.0001

Regarding the non-mentored students, the correlation between the clinical and academic performance was 0.14 which shows no significant correlation. Academic performance and programmatic stress have a correlation of 0.45 which shows a moderate correlation. Academic performance and non-programmatic stress have a correlation of -0.01 showing no correlation. Reviewing the clinical performance column, clinical performance and programmatic stress have a correlation of 0.38, making them moderately correlated. Clinical performance and non-programmatic stress have a correlation of -0.11. Therefore, among the non-mentored students, there is no significant correlation between academic and clinical performance and a moderate correlation between academic mentoring, clinic mentoring, and programmatic stress.

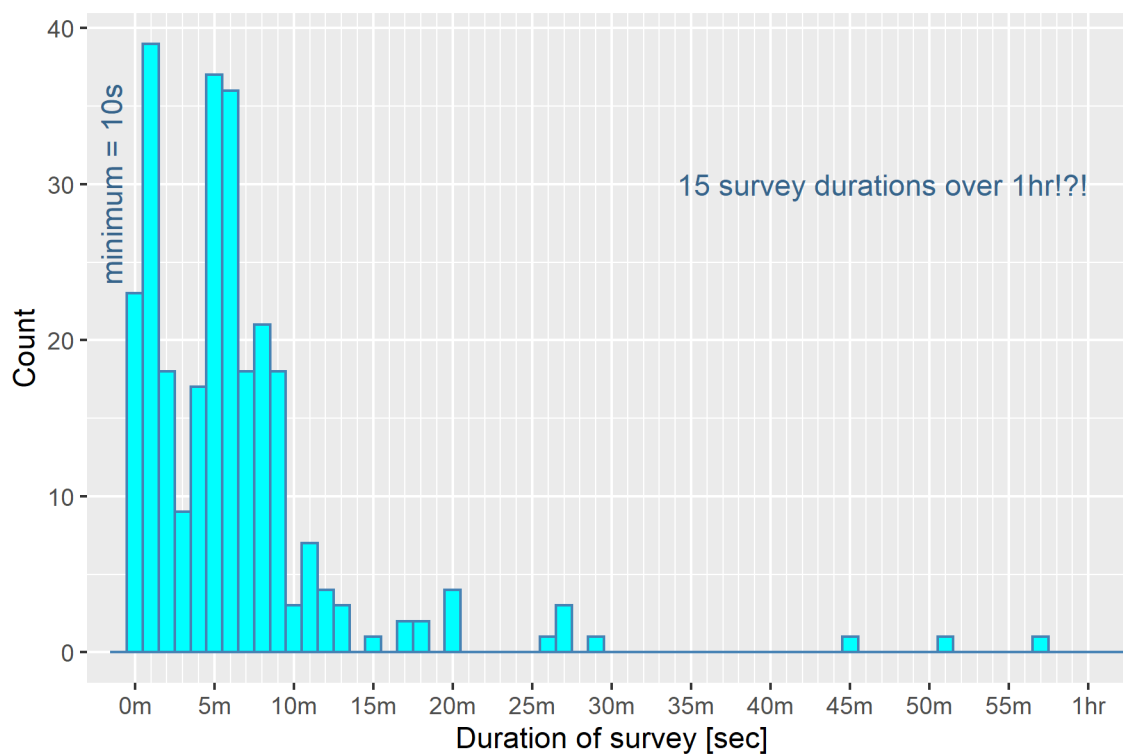
A summation of the aforementioned statistics does illustrate that both the majority of the non-mentored and the mentored groups do experience programmatic stress. It is also clear to state that both the academic and clinical courses attribute to the programmatic stress experienced by these groups. The next section will focus on the mentored students only to determine if mentoring does mediate stress while in this academic journey.

Survey Results - Mentored Students

This portion of the analysis segregated the mentored students into a group of their own. The survey population was reduced from 472 respondents to 285 participants (N=285) since those are the number of respondents who reported matriculating in programs which had formal mentoring programs. This section is to determine how programmatic stress and the overall mentoring experience were affected by having an assigned mentor or having a mentoring experience mediate the stress the students reported were associated with this program.

Figure 6

Duration of Survey



Demographics

From the reported demographics, it was determined that 33.7% (n = 96) respondents were from dental hygiene programs located in university settings while 34.4 % (n = 96) attended programs located in community college settings. Eighty-four (n = 84) of the respondents were in

baccalaureate degree programs and 100 (n = 100) were attending programs in institutions which awarded associate degrees. The students attending these programs are admitted in cohorts which range in size from less than 12 students to more than 25. It appears that the formal mentoring programs were integrated in the larger cohorts although 31.9% (n = 90) of the respondents from the mentored group did not answer this question.

Table 5

Age

<Recategorized>	N	% of 285	% excl. missing (n=194)
Less than 12	18	(6.3%)	(9.3%)
13-24	63	(22.1%)	(32.5%)
25+	113	(39.6%)	(58.2%)
<missing>	91	(31.9%)	
285			

The race/ethnicity responses were somewhat diverse, however, 50.2% (n = 143) reported to be white and 23.2% (n = 45) reported to be American Indian, Asian, African American, Hispanic or unknown. And of those reporting 96.4 % reported being female while only 3.6% reported being male. The majority, 53.1% (n = 103) of these respondents reported being 23 years of age or younger, while 29.4 % (n = 57) were 24-29, 11.3% (n = 22) were 30-34, 3.6% (n = 7) were 35-39 and 2.6% (n = 5) were 40 years of age or older.

Survey Results

In examining the statistical outcomes of the surveys which were strictly associated with the mentoring experiences held by first-year dental hygiene students in different cohorts across the United States, a variety of mentoring involvements was considered. The mentoring assignment, mentoring activities, association with both academic and clinical skill performance as well as the overall mentoring experience and how it affected programmatic stress, were all analyzed. Correlations between any of these categories were also revealed.

Mentor Assignment

Question. “Was your mentor assigned?” (n = 236) This question required a simple yes or no answer in which 91.1% (n = 215) of the respondents answered yes, 8.9% (n = 21) answered no and 17.2% (n = 49) did not answer. However, the majority of respondents were not able to choose their mentor, but rather accepted the assignment from someone else in the program. In most scenarios, these assignments are made prior to the beginning of the semester which would make it difficult since many first-year students are not yet personally acquainted with their faculty.

Active Mentoring

Question. “Did you meet with your mentor a prescribed number of times?” (n = 235) Again, with a simple yes or no response required for this question, 60.4% (n = 142) of the respondents answered yes, 39.6 % (n = 93) replied no, and 17.5% (n = 50) did not respond. The information requested from this question pairs well with the following question which addresses the availability of the student to be able to meet with their mentor, not only as required by the program, but also as the need arose.

Question. “Did you meet with your mentor as needed?” (n = 235) Another simple yes or no response required for this question where 78.3% (n = 184) responded yes, while 21.7 % (n = 51) responded no and 17.5% (n = 50) did not respond. Although the number of positive responses outnumbers the negative responses almost 3:1, this single outcome was concerning since the purpose of the mentoring relationship is to support the student in times of need.

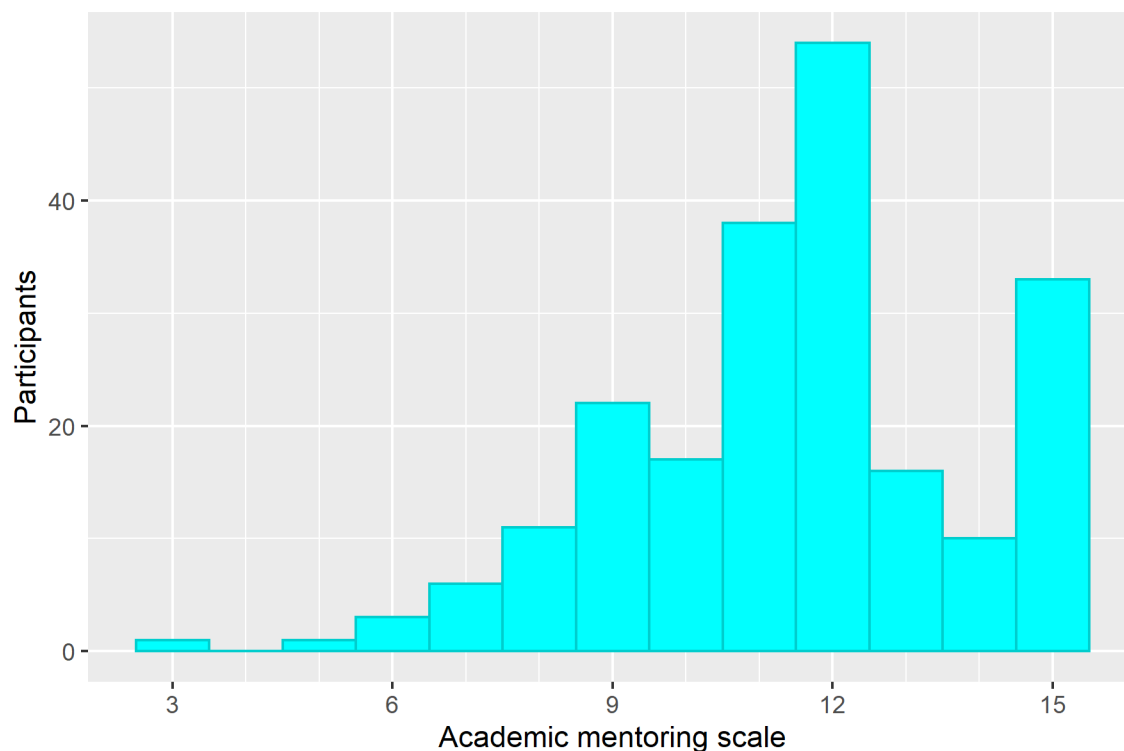
Academic Mentoring

Question. “I felt comfortable sharing my academic performance with my mentor.” Of the 211 respondents 45.2% (n = 165) either agreed or strongly agreed that they felt comfortable discussing their academic status with their mentors while 14.2% (n = 30) remained neutral when answering this question. Only 7.6% (n = 16) reported disagreeing or strongly disagreeing with the aforementioned statement.

Question. “My mentor did meet me on the same level of my knowledge and ability.” (n = 212) This question employed a 5 choice Likert scale response. Of the 212 respondents who completed the survey, 25.9 % (n = 55) strongly agreed, 44.3% (n = 94) agreed, and 22.2% (16.5) remained neutral. Only 5.2% (n = 11) disagreed and 2.4% (n = 5) strongly disagreed.

Question. “My mentor did supply me with guidance regarding my course subjects.” (n = 212) Again, 23.1% (n = 49) strongly agreed, 49.1% (n = 104) agreed, and 19.3% (n = 41) remained neutral. Only 6.6% (n = 14) disagreed and 1.9% (n = 4) strongly disagreed.

Question. “My mentor facilitated my learning regarding my course subjects.” (n = 212) Of the 212 respondents (n = 212) who answered the question, 23.6% (n = 50) strongly agreed, 39.2% (n = 83) agreed and 28.3% (n = 60) remained neutral. Only 8.0% (n = 17) disagreed and 0.9% (n = 2) strongly disagreed.

Figure 7*Academic mentoring scale*

mean \pm SD : 11.5 \pm 2.3

median : 12.0

The distribution is negatively skewed in this subset of mentored students; however, the skewness is considered tolerable. For academic mentoring we have a mean 11.48/4 Qs = 3.8 meaning that the respondents were closer to agreement with their answers.

Clinical Mentoring (IV) Scale

Question. “I felt comfortable sharing my clinical performance with my mentor.”

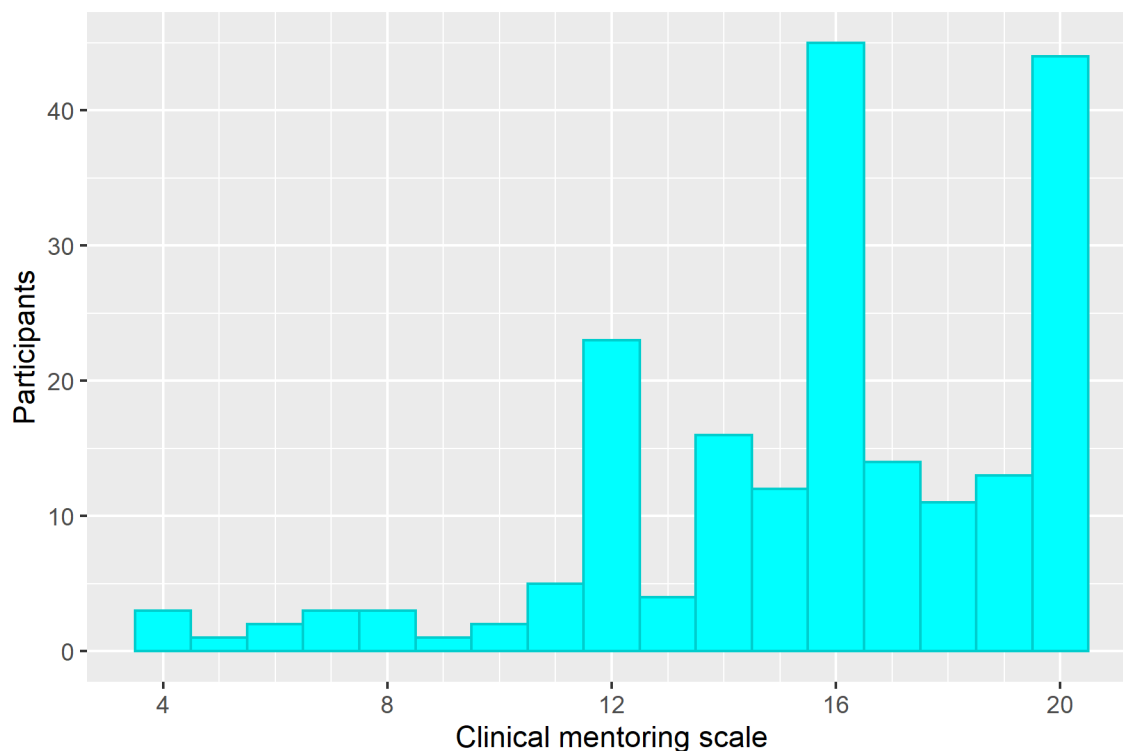
Sixty-seven, (32.8%) of the 204 respondents reported that they strongly agreed with the question, 50.5% (n = 103) agreed while 10.3% (n = 21) were neutral and 6.4 % (n = 13) disagreed or strongly disagreed.

Question. “I did feel as though I could ask for guidance regarding treating patients from my mentor.” (n = 203) Of the 203 respondents that answered the question, 38.4% (n = 156) both strongly agreed and agreed, 15.3% (31) were neutral, 4.4% (9) disagreed and 3.4% (7) strongly disagreed.

Question. “My mentor did share his/her own professional experiences with me.” (n = 204) Of the 204 respondents 36.8% (n = 75) strongly agreed, 36.3% (n = 74) agreed, 14.7% (n = 30) were neutral, 8.8% (n = 18) disagreed, and 3.4% (n = 7) strongly disagreed.

Question. “My mentor did supply me with guidance regarding my clinical deficiencies.” Regarding the 203 respondents, 30% (n = 61) strongly agreed, 46.3 (n = 94) agreed, 13.3 % (n = 27) were neutral, 5.9% (n = 12) disagreed, and 4.4% (n = 9) strongly disagreed.

Question. “My mentor facilitated my learning in clinical skills.” (n = 204) Of the 204 respondents, 29.9% (n = 61) strongly agreed, 40.2% (n = 82) agreed, 18.6% (n = 38) remained neutral, 6.9% (n = 14) disagreed and 4.4% (n = 9) strongly disagreed.

Figure 8*Clinical Mentoring Scale*

mean \pm SD : 15.7 ± 3.7

median : 16.0

The distribution is negatively skewed in this subset of mentored students; however, the skewness is considered tolerable. For clinical mentoring we have mean 15.71 /5 Qs = 3.9 meaning that the majority of respondents were in agreement of the question.

Programmatic Stress

Question. “The first semester of this program was challenging for me academically.”

(n = 199) Of the 199 respondents, 23.6% (n = 47) strongly agreed, 43.2% (n = 85) agreed, 19.6% (n = 39) remained neutral, 11.1% (n = 22) disagreed and (n = 5) 2.5% strongly disagreed.

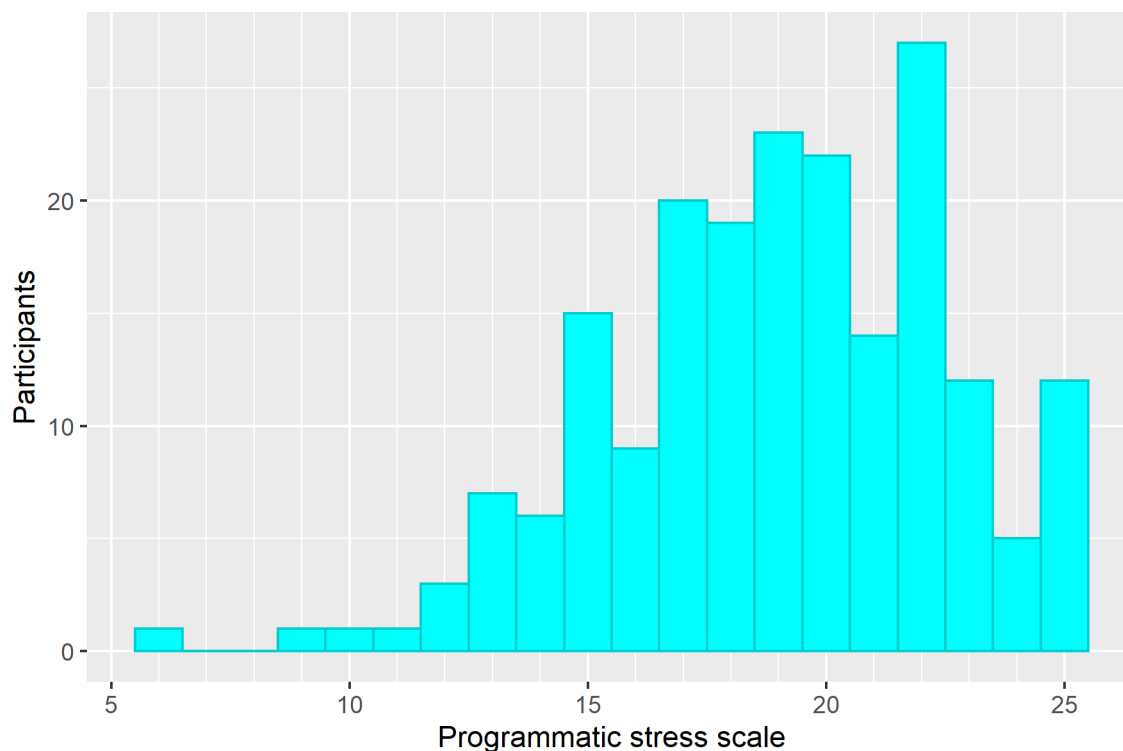
Question. “Developing clinical skills was more difficult than I anticipated.” (n = 199)

Of the 199 respondents, 23.6% (n = 47) strongly agreed, 35.2% (n = 70) agreed, 25.1% (n = 50) remained neutral, 14.1% (n = 28) disagreed, and 2.0% strongly disagreed.

Question. “Financial stress was considerable since the program schedule was not conducive to employment.” (n = 199) Of the 199 respondents, 33.2% (n = 66) strongly agreed, 29.6% (n = 59) agreed, 20.1% (n = 40) remained neutral, 14.1% (n = 28) disagreed, and 3% (n = 6) strongly disagreed.

Question. “I find this program to be more difficult than I originally thought.” (n = 198) Of the 198 respondents, 28.3% (n = 56) strongly agreed, 41.4% (n = 82) agreed, 19.7% (n = 39) remained neutral and 1% (n = 2) disagreed.

Question. “I find this program to be more time consuming than I originally thought.” (n = 199) Of the 199 respondents, 38.7% (n = 77) strongly agreed, 32.2% (n = 64) agreed, 19.6 (n = 39) remained neutral, 8.0% (n = 16) disagreed, and 1.5% (n = 3) strongly disagreed.

Figure 9*Programmatic Stress Scale*

mean \pm SD : 19.0 \pm 3.5

median : 19.0

The programmatic stress score is the sum of 5 Qs so mean $18.98/5$ Q = 3.8, so again averaging between agree and neutral, but closer to agree.

Mentoring Experience (Dependent Variable)

Question. "I felt respected by my mentor." (n = 195) Where n = 195, 30.8% (n = 60) strongly agreed, 48.2% (n = 94) agreed, 14.9% (n = 29) remained neutral, 2.1% (n = 4) disagreed, and 4.1% (n = 8) strongly agreed.

Question. "I felt increased stress when meeting with my mentor." (n = 195)
Of the 195 respondents, 6.7% (n = 13) strongly agreed, 9.7% (n = 19) agreed, 23.6% (n = 46) remained neutral, 42.1% (n = 82) disagreed, and 17.9% (n = 35) strongly disagreed.

Question. “My mentor gave me guidance.” (n = 195) Of the 195 respondents, 25.6% (n = 50) strongly agreed, 53.3% (n = 104) agreed, 11.3% (n = 22) remained neutral, 4.6% (n = 9) disagreed, and 5.1% (n = 10) strongly disagreed.

Question. “My mentor provided me with perspective.” (n = 195) Of the 195 respondents, 26.7% (n = 52) strongly agreed, 47.7% (n = 93) agreed, 16.9% (n = 33) remained neutral, 4.6% (n = 9) disagreed, and 4.1% (n = 8) strongly disagreed.

Question. “My mentor assisted me in finding alternative solutions to my problems.” (n = 195) Of the 195 respondents who replied, 20.0% (n = 39) strongly agreed, 46.2% (n = 90) agreed, 22.6% (n = 44) remained neutral, 5.1 % (n = 10) disagreed, and 6.2 % (n = 12) strongly disagreed.

Question. “My mentor did stimulate me to think critically.” (n = 194) Of the 194 students who replied, 24.7% (n = 48) strongly agreed, 46.4% (n = 90) agreed, 17.0 remained neutral, 8.2% (n = 16) disagreed, and 3.6% (n = 7) strongly disagreed.

Question. “My faculty mentor relationship did facilitate my professional growth.” (n = 195) Of the 195 respondents who answered, 23.6% (n = 46) strongly agreed, 46.2% (n = 90) agreed, 18.5% (n = 36) remained neutral, 7.7% (n = 15) disagreed and 4.1% (n = 8) strongly disagreed.

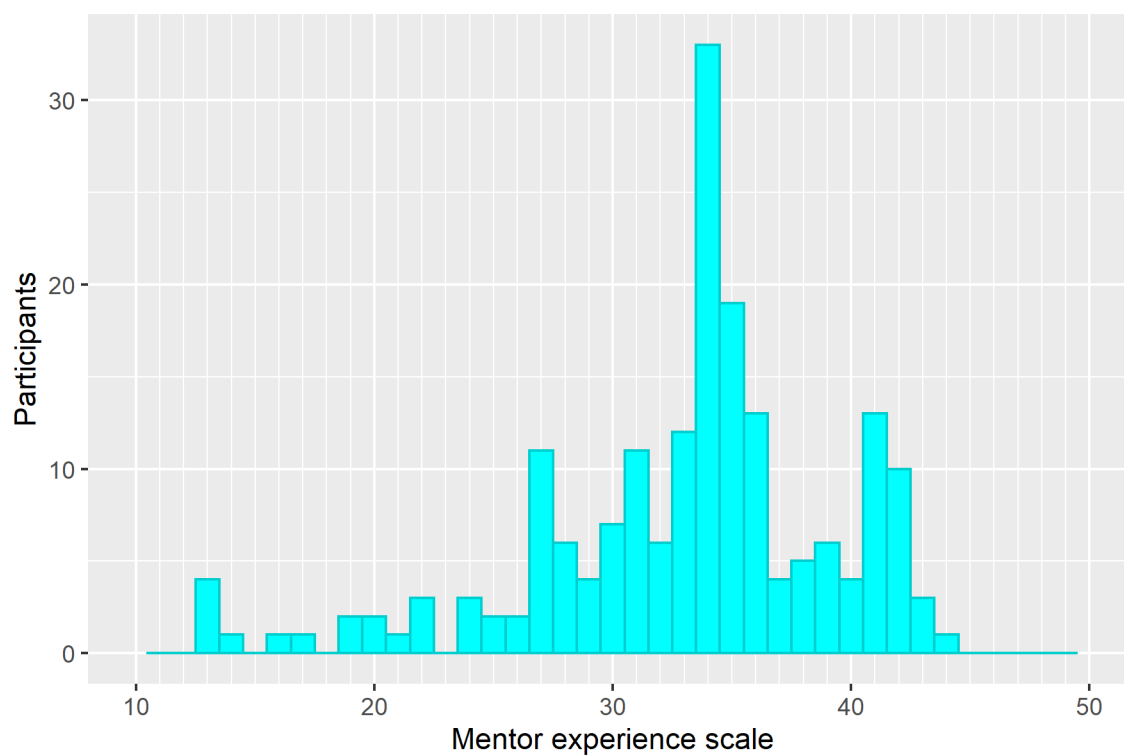
Question. “My mentorship relationship did facilitate my personal development.” (n = 191) Of the 191 respondents who answered, 22.0% (n = 42) strongly agreed, 47.1% (n = 90) agreed, 18.3% (n = 35) remained neutral, 7.9% (n = 15) disagreed and 4.7% (n = 9) strongly disagreed.

Question. “The mentorship relationship did increase my self-confidence in any or all aspects of the program.” (n = 194) Of the 194 respondents who replied, 22.2% (n = 43) strongly

agreed, 43.3% (n = 84) agreed, 21.1 % (n = 41) remained neutral, 9.3% (n = 18) disagreed, and 4.1% (n = 8) strongly disagreed.

Figure 10

Mentor Experience Scale



mean \pm SD : 33.0 \pm 6.4

median : 34.0

The Mentor Experience score is the sum of 9 Qs so mean is $33.01/9 Q = 3.7$ and again is has a tolerable negative skew, so respondents were averaging between agree and neutral, but closer to agree.

This portion of the study illustrated that although this mentored group agreed that mentoring was beneficial in all categories when reducing stress, overall, the mentoring experience did not prove to be statistically significant. When analyzing the regression analyses that were run on the effects of mentoring, it was determined that the respondents found that

having a mentoring opportunity to aid in both academic and clinical performance, also improved the overall mentoring experience.

Multivariable Models

This regression uses a generalized linear model analysis and was used to determine if certain dental hygiene student variables can influence overall programmatic stress. (The GLM was used so that both continuous and categorical independent variables may be mixed in the linear model.) This Minimal model was reached using a backward-forward stepwise procedure beginning with the full model where all independent variables were entered into the model. In the backward step portion of the procedure, for each independent variable currently in the linear model, the residual deviance was calculated with the variable in and out of the model. If the p-value for the chi-square statistic was < 0.05 , then the variable is omitted from the model, otherwise it was retained. In the forward step process, the independent variables which are not in the model (excluding the one that were just removed) have the residual deviance calculated with the variable in and then out of the model. If the p-value for the chi-square statistic is < 0.1 , then the variable is readmitted to the model. If there are several variables that could be readmitted, then the one with the smallest increase in the Akaike's information criteria is readmitted. This then becomes the base model for the next step. It cycles backward, then forward until there is nothing to omit or readmit. From one step to the next the models are hierarchical.

Table 6

*Programmatic Stress Scale - Multivariable Model
(Full Model)*

Coefficient	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	9.571	7.415	1.291	0.20
Assigned: No	-1.175	1.025	-1.147	0.25
Active: No	3.455	1.106	3.124	0.0021
Acad. Performance scale	-0.191	0.159	-1.200	0.23
Clin. Performance scale	0.162	0.104	1.555	0.12
Setting: University or four-year college: dental school	-2.691	0.887	-3.033	0.0028
Setting: University or four-year college: separate dental department	0.959	1.050	0.914	0.36
Setting: Other university or four-year college setting	1.078	2.693	0.400	0.69
Setting: Community college	1.859	1.010	1.840	0.068
Setting: Technical college or institute	2.816	1.390	2.026	0.044
Setting: Other	-0.469	3.492	-0.134	0.89
Award: Certificate	4.647	2.771	1.677	0.096
Award: Associate degree	2.523	2.236	1.129	0.26
Award: Baccalaureate degree	6.599	2.630	2.509	0.013
Award: Baccalaureate degree in dental hygiene	5.534	2.401	2.305	0.022
Award: Other	4.088	4.407	0.928	0.36
Prereq: Yes - general education only	0.751	2.595	0.289	0.77
Prereq: No	-0.251	2.130	-0.118	0.91
#students: 13-24	1.067	0.994	1.073	0.29
#students: 25+	0.750	0.993	0.756	0.45
Prior educ: High school diploma	2.498	6.867	0.364	0.72

Coefficient	Estimate	Std. Error	t value	Pr(> t)
Prior educ: Less than one year of college	9.780	7.227	1.353	0.18
Prior educ: One year of college (without degree)	3.617	6.848	0.528	0.60
Prior educ: Two years of college (without degree)	3.531	6.662	0.530	0.60
Prior educ: Associate degree	3.618	6.741	0.537	0.59
Prior educ: Three years of college (without degree)	3.446	6.884	0.501	0.62
Prior educ: Four years of college without degree	4.041	6.865	0.589	0.56
Prior educ: Baccalaureate degree	3.575	6.807	0.525	0.60
Prior educ: Other	6.225	6.816	0.913	0.36
Race: Not white	0.185	0.684	0.270	0.79
Gender: Woman	-0.081	1.428	-0.057	0.95
Age: 24-29	-0.935	0.688	-1.360	0.18
Age: 30+	0.169	0.807	0.210	0.83

Table 7

*Programmatic Stress Scale - Multivariable Model
(Minimal Model)*

Coefficient	Estimate	Std. Error	p-value
(Intercept)	15.979	6.314	0.012
Assigned: No	-1.179	0.989	<0.0001
Active: No	3.542	1.029	<0.0001
Acad performance scale	-0.201	0.152	<0.0001
Clin performance scale	0.160	0.100	<0.0001
Setting: University or four-year college: dental school	-2.566	0.846	
Setting: University or four-year college: separate dental department	0.980	1.012	
Setting: Other university or four-year college setting	1.054	2.629	<0.0001
Setting: Community college	1.897	0.960	
Setting: Technical college or institute	2.748	1.331	
Setting: Other	-0.613	3.421	
Award: Baccalaureate degree	0.987	1.208	
Award: Associate degree	-3.027	0.918	
Award: Certificate	-1.002	1.581	<0.0001
Award: Diploma	-5.650	2.331	
Award: Other	-1.588	3.625	
#students: 13-24	1.084	0.964	
#students: 25+	0.873	0.937	0.0010
Prior educ: High school diploma	2.260	6.187	
Prior educ: Less than one year of college	8.882	6.604	<0.0001
Prior educ: One year of college (without degree)	2.768	6.192	

Coefficient	Estimate	Std. Error	p-value
Prior educ: Two years of college (without degree)	2.735	6.001	
Prior educ: Associate degree	2.701	6.087	
Prior educ: Three years of college (without degree)	2.556	6.224	
Prior educ: Four years of college without degree	3.127	6.153	
Prior educ: Baccalaureate degree	2.666	6.111	
Prior educ: Other	5.275	6.149	
Age: 24-29	-0.843	0.653	<0.0001
Age: 30+	0.242	0.750	

Programmatic Stress (Dependent Variable)

When considering the minimal multivariable model regarding programmatic stress, the following factors were exhibited:

- Having an assigned mentor seemed to increase stress programmatic stress.
- Having an active mentoring experience when necessary was statistically significant in decreasing programmatic stress.
- Clinical performance was associated with programmatic stress.
- Neither the school setting nor the type of degree earned were influential factors in programmatic stress.
- The prior education completed nor the age of the students seemed to influence programmatic stress.

Table 8

*Mentoring Experience Scale - Multivariable Model
(Full Model)*

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	8.923	8.322	1.072	0.29
Assigned: No	0.544	1.188	0.458	0.65
Active: No	-3.069	1.324	-2.318	0.022
Acad.Mentoring scale	0.548	0.189	2.897	0.0043
Clin.Mentoring scale	0.979	0.125	7.825	< 0.0001
Setting: University or four-year college: dental school	-0.063	1.054	-0.060	0.95
Setting: University or four-year college: separate dental department	-1.143	1.239	-0.923	0.36
Setting: Other university or four-year college setting	2.161	3.167	0.682	0.50
Setting: Community college	0.760	1.202	0.633	0.53
Setting: Technical college or institute	0.370	1.666	0.222	0.82
Setting: Other	-2.528	4.101	-0.616	0.54
Award: Certificate	-3.202	1.923	-1.665	0.098
Award: Associate degree	-1.137	1.128	-1.008	0.32
Award: Baccalaureate degree	-1.378	1.622	-0.850	0.40
Award: Baccalaureate degree in dental hygiene	-12.723	2.822	-4.509	< 0.0001
Award: Other	2.064	4.356	0.474	0.64
Prereq: Yes - general education only	1.119	3.074	0.364	0.72
Prereq: No	-3.247	2.521	-1.288	0.20
#students: 13-24	0.901	1.196	0.754	0.45
#students: 25+	1.524	1.208	1.262	0.21
Prior educ: High school diploma	1.099	8.068	0.136	0.89

	Estimate	Std. Error	t value	Pr(> t)
Prior educ: Less than one year of college	11.531	8.483	1.359	0.18
Prior educ: One year of college (without degree)	2.657	8.030	0.331	0.74
Prior educ: Two years of college (without degree)	2.837	7.825	0.363	0.72
Prior educ: Associate degree	2.560	7.915	0.323	0.75
Prior educ: Three years of college (without degree)	2.412	8.085	0.298	0.77
Prior educ: Four years of college without degree	2.714	8.070	0.336	0.74
Prior educ: Baccalaureate degree	3.677	8.000	0.460	0.65
Prior educ: Other	2.329	8.004	0.291	0.77
Race: Not white	-0.516	0.837	-0.617	0.54
Gender: Woman	-0.847	1.687	-0.502	0.62
Age: 24-29	0.488	0.824	0.593	0.55
Age: 30+	0.057	0.950	0.060	0.95

Table 9

*Mentoring Experience Scale - Multivariable Model
(Minimal Model)*

Coefficient	Estimate	Std. Error	p-value
(Intercept)	8.378	8.216	0.31
Active: No	-2.930	1.286	< 0.0001
Acad. Performance scale	0.556	0.188	< 0.0001
Clin. Performance scale	0.987	0.124	< 0.0001
Setting: University or four-year college: dental school	-0.086	1.050	
Setting: University or four-year college: separate dental department	-1.214	1.226	
Setting: Other university or four-year college setting	2.056	3.150	< 0.0001
Setting: Community college	0.724	1.196	
Setting: Technical college or institute	0.430	1.656	
Setting: Other	-2.563	4.090	
Award: Baccalaureate degree	-1.411	1.616	
Award: Associate degree	-1.125	1.125	
Award: Certificate	-3.215	1.918	< 0.0001
Award: Diploma	-12.734	2.814	
Award: Other	2.451	4.262	
Prereq: Yes - general education only	1.111	3.066	
Prereq: No	-3.109	2.496	< 0.0001
#students: 13-24	0.909	1.192	
#students: 25+	1.503	1.204	< 0.0001
Prior educ: High school diploma	1.404	8.019	
Prior educ: Less than one year of college	11.845	8.433	< 0.0001
Prior educ: One year of college (without degree)	3.026	7.968	

Coefficient	Estimate	Std. Error	p-value
Prior educ: Two years of college (without degree)	3.187	7.768	
Prior educ: Associate degree	2.968	7.844	
Prior educ: Three years of college (without degree)	2.895	7.995	
Prior educ: Four years of college without degree	3.050	8.015	
Prior educ: Baccalaureate degree	4.067	7.934	
Prior educ: Other	2.653	7.952	
Race: Not white	-0.567	0.827	0.0068
Age: 24-29	0.481	0.821	
Age: 30+	0.089	0.945	0.032

Note change: Gender: Woman was removed: p-value = 0.054

Mentoring Experience (Dependent Variable)

Regarding the mentoring experience from the minimal multivariable model, the following factors were exhibited:

- Having an active mentoring experience when necessary was statistically significant in increasing the mentoring experience.
- Being able to include academic and clinical performance in the mentoring process improved the overall mentoring experience.
- The school setting, the type of degree earned, size of the cohort or age of the student or previous prerequisites taken did not seem to influence the mentoring experience.

Summary

It is evident that parts of the mentoring experience play a role in mediating stress in dental hygiene programs. The reported demographics did not seem to have any effect on the amount of programmatic stress experienced or the effectiveness of the mentoring experience. Having an assigned mentor did increase stress, assuming that having the freedom to personally choose a mentor could possibly have been a more positive option. Having an active mentoring experience when necessary was statistically significant in reducing programmatic stress. And being able to include both academic and clinical performance seemed to improve the overall mentoring experience.

CHAPTER FIVE: DISCUSSION

Regarding mentored students in dental hygiene programs, the findings in this study did reveal that having an assigned or appointed mentor did increase programmatic stress and clinical performance was also associated with programmatic stress. Having an active mentoring experience when necessary greatly increased the mentoring experience as well as decreased programmatic stress. Being able to include the academic and clinical performance in the mentoring process also improved the overall mentoring experience. This is valuable information for both the program and the student as including an effective mentoring experience could increase student retention.

Admittance into dental hygiene professional academic programs is a highly competitive process, as only one third of total applicants will be admitted (ADA, 2014). Learning in the health science industry requires the ability to perform well in both academic and clinical courses simultaneously, possibly initiating student stress. This is a new concept to most students who have only been enrolled in an academic program without a clinical component. The three most frequently cited factors linked to student stress in professional programs are competition, heavy workload and finances (Murphy et al., 2009). If students are not academically or clinically competent, they may require remediation, be asked to repeat a semester, or even drop out of the program all together (Wood et al., 2014). If students choose to remain in the program and are required to repeat a course or even a semester, this can add to their financial stress.

When a dental hygiene student is not successful, it is almost impossible to find another student to fill the seat in a cohort since the curriculum is delivered in a lock-step fashion. Not

only is this a financial issue for the unsuccessful student, but for the institution as well due to lower tuition revenue. Therefore, increasing the students' opportunity for success is beneficial to all stakeholders involved. Faculty-student mentoring does show some promise in reducing student stress which aids in overall student success.

In examining possible interventions to reduce student stress leading to attrition, particularly for first-year students, faculty-student mentor relationships have been employed in a multitude of professional education programs (Hamshire et al., 2012). However, these relationships have not been documented regarding the perceived effectiveness among first-year dental hygiene students when enrolled in these professional programs. The purpose of this study was to examine the effectiveness of faculty-student mentoring programs in mediating stress for first-year dental hygiene students.

In considering all of the findings in this study, it was important to determine what the students perceived as stress, if their reported stress was only due to factors in the program or was affected by some additional stresses outside of the program. And after these stresses were identified, were any of them correlated, and lastly if a faculty-student relationship would reduce any of the reported stresses. Also, if the reported stresses were related to the program, did the students believe they were affecting their academic or clinical performance.

One of the first questions asked was, "Was your mentor assigned?" The findings indicated that having an assigned mentor seemed to increase stress. This could be due to the fact that the student did not feel comfortable with the faculty member to whom they were assigned. or they may have been assigned to the mentor prior to the beginning of the semester before even being introduced to the mentor. Findings by D'Abate, indicated that faculty regard their role to include teaching, sharing information, providing feedback and academic goal-setting, whereas

roles such as introducing, affirming and befriending may be better provided by peer-mentors (2009). This faculty-student mentoring participation can add to the already heavy faculty workload which is experienced by full-time faculty, particularly in baccalaureate dental hygiene programs (Freudenthal & Bowen, 2010). Therefore, depending on the professional role that faculty members hold, the student may find the faculty member to be more intimidating than helpful. Even mentors who are course directors of more challenging courses could seem more threatening when discussing student stresses, particularly if the student is mostly stressed about performance in the mentor's course. Therefore, to reduce stress regarding the faculty-student mentor relationship, it is perceived that student selection may provide a more calming relationship than having a mentor assigned.

Next, it was determined that programmatic stress was a factor in overall stress, however stresses that occurred outside of the program were not considered to be significant in their program journey. In the mentored group, both academic performance and clinical performance were moderately correlated with one another as well as moderately correlated with programmatic stress. In the non-mentored group, academic and clinical performance were not correlated with one another, but both were correlated with programmatic stress. Therefore, in either group, academic and clinical performance together add to programmatic stress. This is not surprising since the program is mostly comprised of these two factors. Early in the program, academic and clinical courses also overlap in content and the clinical courses actually have more of an academic approach to them. The clinical courses introduced during the first semester are more theoretically driven, both instructing and physically developing the correct instrumentation skills. The clinical portions of a dental hygiene program are competency based, employing a unique component that measures a learner's ability to perform professional tasks similar to real-life

work situations (Wood et al., 2014). Therefore, students may excel in the academic courses but struggle in the clinical courses or excel in the clinical courses and be highly challenged in the academic courses. This may explain why the academic and clinical courses were just moderately correlated by the mentored group and not at all by the non-mentored group. However, it is apparent that both groups recognized these variables as being a factor in the stress experienced in the program.

Since stress is a feeling of emotional or physical tension, overall academic and clinical performance may trigger this stress. Achievement emotions may also enter into the outcomes of performance in these courses since stress associated with both the academic and clinical courses was identified. Positive and negative emotional states consume attentional resources by focusing the attention on the object of the emotion and this consumption of neurological resources results in fewer neurological resources being available to aid in task completion, negatively impacting the achievement (Meinhardt & Pekrun, 2003). Therefore, if a student is experiencing stress regarding clinical or academic activities or exams, the stress associated with the elements related to the outcome may consume his/her neurological resources necessary to aid in the task completion. Achievement emotions are tied directly to the achievement activities and outcomes. The students' outcome emotions most often times receive more attention in the literature and may be described as joy when a goal is met, or frustration and shame when reaching the goal is unsuccessful (Pekrun et al., 2007). If stresses can be reduced in these situations so that the task at hand may receive the bulk of the neurological resources, then the students' performance may be more successful.

Active mentoring, occurring when needed, seemed to decrease stress which implies that mentoring does play a role in reducing programmatic stress. It was reported that both the

mentored and the non-mentored groups expressed experiencing stress in academic and/or clinical performance. It was also determined that academic and clinical performance were associated with programmatic stress. And finally, when both academic and clinical performance were included in the active mentoring process, the mentoring experience was reported to be more positive. Without having a defined mentor protocol, it is difficult to predict what discussions took place in each mentor session. Since, according to Bowen, et al., Freudenthal et al., and Navickis et al., these dental hygiene programs are considered rigid and do not allow much latitude for poor performance in either clinical or academic environments, it is understood why the discussion of academic and clinical performance would enhance the mentoring experience (2006, 2010). It is also understood why meeting with one's mentor on demand was important as well. According to the transformational learning theory, the mentor may listen and share any previous challenges they experienced in their program journey, creating a relationship of trust. This valuable relationship may foster a rapport of care and encouragement built from these relationships which may help students overcome a fear or stress that affects their overall performance in the educational environment. Poor performance on any academic or clinical exam or even confusion regarding new content being delivered may require an unplanned mentor meeting. Faculty members serving as mentors in the program largely comprise the academic and/or clinical instructors in the program who have a strong sense of the education being presented. Therefore, it is understood that if students met with their faculty mentor at times when they are most stressed, program performance may be improved. This would, in turn, increase the student retention rate of these highly competitive programs.

Limitations

Definition

The first question asked in this survey was “Do you have a faculty-student mentoring program in your dental hygiene educational program?” One of the limitations of this study was the lack of a definition of a faculty-student mentoring program in the actual survey. An explanation should have been provided such as Sambunjak’s, et al. stating that a faculty mentor would be paired with a student and would participate in regularly scheduled mentor meetings with defined criteria (2006). Without a definition as a guide, the student’s perception of that definition had an effect on the part of the survey they were able to complete as well as their total survey responses.

Researcher

A second limitation of this study is that the researcher is a dental hygiene program director in one of the US, CODA accredited dental hygiene programs. The researcher has taught in two different dental hygiene programs during the previous thirteen years and has participated in a multitude of different types of mentor meetings. Therefore, many of the questions in this survey were written based on the previous program and mentoring experiences she observed. However, when designing the survey, conversations with additional dental hygiene program directors across the United States occurred as well.

Mentor Pairings

Limitations in data collection may be due to faculty-student pairings in programs who employ formal mentoring programs. Each faculty-student mentor pairing is unique. The dynamics between each pair may cause variability in the results due to their unique relationship. For example, some mentor pairs may involve self-selection, while others may be a result of assigned pairings. The survey did include a question regarding if the mentor was assigned.

Timing and Distribution of Survey

Limitations regarding the number of surveys completed was also affected by the compliance of the request for the program directors to forward the survey to first-year students. After the survey was launched, eighteen schools stated they would not allow their students to participate unless an additional IRB was completed through their school, with no guarantees of approval. One school stated it was closing and did not have a first-year class. This survey was launched in April of 2021, and some schools were not in session due to the lingering effects of the COVID-19 virus. This virus greatly affected dental education programs since they all involve patient care and were responsible to provide a certain level of personal protective equipment (PPE) to their staff and students to create a safe environment for patient care to occur. Some schools reported having difficulty acquiring these necessities at that time. Therefore, since a few schools were not in session, it is difficult to ascertain the level of communication that was occurring between those program directors and their students.

Survey Design

The survey instrument contained close-ended questions which limited responses to only what was provided on the survey. There was no opportunity to clarify their answer. Participants could also mistake the intent of the question.

Implications and Future Research

The implications of this research, although not all statistically significant, had a primary focus of exploring, identifying and mediating stresses experienced by first-year dental hygiene students. This research project revealed that the dental hygiene students surveyed did experience some type of stress related to an academic or clinical component of the dental hygiene program. However, due to the small number of surveys returned, and because not all areas of this research

were statistically significant, it is not possible to draw new solutions for every CODA approved dental hygiene program.

Considering these findings, it is recommended for institutions to continue evaluating the effects of the stress produced in these professional programs for newly matriculated students. It may be further necessary to divide the groups based on the types of institutions they are attending. Although all of the students in dental hygiene programs experience similar curriculum, the school settings are much different. It is also certainly not suggested to ignore the needs of the second-year students, however adjusting to the new components of a professional academic program can be quite difficult for some individuals. Since the students reported the reduction of stress occurring if being able to meet with their mentor when necessary, it would be important to create a schedule which would allow for these meetings to occur when programmatic stress becomes elevated. Reducing student stress levels associated with programmatic stress has the potential of increasing student success.

And finally, since the survey results reported that the mentoring experience was improved when academic and clinical performance were included, it may be recommended to create specific mentor meeting criteria that addresses each one of these components when meeting with the students. If these components were part of the meeting criteria, the student would be assured that these important elements would be reviewed during each meeting. That would provide assistance in refining the faculty-student mentor programs further.

However, there is still considerably more to be learned. It is recommended that if this research were duplicated, the definition of faculty-student mentoring be included at the beginning of the survey prior to the first question. In addition to utilizing the same survey, some open-ended questions may be added, possibly creating a mixed methods study. By adding the

qualitative feature, a more complete understanding of the mentor relationships would be revealed.

Changing the distribution time of the survey to immediately following the first semester of the program may also yield a larger sample size. This survey was distributed at a time when many programs were still operating electronically, possibly decreasing the student's desire to complete an electronic survey. Generalized conclusions may be made more easily if the sample size was larger.

Conclusion

The rigorous academic schedule of dental hygiene programs coupled with the significant financial responsibility associated with these programs, can exacerbate student stress. This stress can affect overall performance, leading to program attrition, which is an important topic for all stakeholders. The purpose of this study was to determine if the contribution of employing faculty-student mentoring with first-year dental hygiene students in US dental hygiene programs, had an effect on student performance and support in the initial weeks of matriculation. It was anticipated that the findings would aid program directors in determining whether the use of faculty-student mentorship programs should be incorporated in the student schedule and formal faculty training should be developed. The results of this study did indicate that parts of the mentoring process were effective in reducing student stress which could add to the body of knowledge as a way to aid in student persistence by providing pathways of stress reduction for students in the areas of clinical instruction, academics and stress associated with the program. Therefore, recommendations for faculty-student mentoring to be included in dental hygiene programs is evidenced in this study.

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Appendix A – Quantitative Instrument

Mentor Survey Revised

Yes/No

General Questions

1. Do you have a faculty-student mentoring program in your dental hygiene educational program?

YES/NO

2. Was your mentor assigned?
3. Did you have the same mentor for the entire semester?
4. Were you involved in the selection process of choosing a mentor?
5. Was your mentor a faculty member who was one of your current instructors?
6. Was your mentor also thought of as a peer?
7. Did your mentor fit into another type of category such as advisor, counselor, etc.?
8. Did you meet with your mentor a prescribed number of times?
9. Did you meet with your mentor as needed?

Likert scale Questions

Academic

1. I found the academic portion of the program more difficult than what I expected.
2. The semester was comprised of more hours than I have ever taken in a semester prior to entering the program.
3. I was concerned about passing one or more classes.
4. I felt comfortable sharing my academic performance with my mentor.
5. My mentor did meet me on the same level of my knowledge and ability.
6. My mentor did supply me with guidance regarding my course subjects.
7. My mentor facilitated my learning regarding my course subjects.

Clinical

1. I found my clinical instruction to be more difficult than what I expected.
2. I felt comfortable sharing my clinical performance with my mentor.
3. Learning instrumentation techniques was a challenge for me.
4. Our class worked on student partners in our pre-clinic instruction.
5. I was apprehensive about seeing my first “real” patient.
6. I did feel as though I could ask for guidance regarding treating patients from my mentor.
7. My mentor did share his/her own professional experiences with me.
8. My mentor did supply me with guidance regarding my clinical deficiencies.
9. My mentor facilitated my learning in clinical skills.

Programmatic Stress

1. The first semester of this program was challenging for me academically.
2. Developing clinical skills was more difficult than I anticipated.
3. Financial stress was considerable since the program schedule was not conducive to employment.
4. I find this program to be more difficult than I originally thought.
5. I find this program to be more time consuming than I originally thought.

Non-programmatic stress

1. I experience stress outside of this program, such as family responsibilities, employment etc.?
2. I have children.
3. I do not live within 15 miles of my program location.
4. I live close to my family.
5. My mentor provided me with emotional support.

Final Category

1. I felt respected by my mentor.
2. I shared my own program experiences of being a student with my mentor.
3. My program was so structured that I found it difficult to find time to meet with my mentor.
4. I felt increased stress when meeting with my mentor.
5. I considered dropping out of this program.
6. My mentor was interested in my needs.
7. My mentor gave me guidance.
8. My mentor provided me with perspective.
9. My mentor assisted me in finding alternative solutions to my problems.
10. My mentor did stimulate me to think critically.
11. My mentor was a role model.
12. My faculty mentorship relationship did facilitate my professional growth.
13. My mentorship relationship did facilitate my personal development.
14. The mentorship relationship did increase my self-confidence in any or all aspects of the program.
15. I did not benefit from meeting with my mentor.

Demo

1. Which of the following educational settings best describes where your dental hygiene education program is administered?
 - a. University or four-year college: school of health sciences
 - b. University or four-year college: dental school
 - c. University or four-year college: separate dental department
 - d. Other university or four-year college setting
 - e. Community college

- f. Technical college or institute
 - g. Vocational school or career college
 - h. Other
2. Indicate the type of award granted at the completion of the entry-level accredited dental hygiene education program
- a. Diploma
 - b. Certificate
 - c. Associate degree
 - d. Baccalaureate degree
 - e. Baccalaureate degree in dental hygiene
 - f. Other
3. Does the program require any college courses as prerequisites prior to entering the program?
- a. Yes – general education and science
 - b. Yes – general education only
 - c. Yes- science only
 - d. No
4. How many students are in your class or cohort?
- a. Less than 12
 - b. 25 – 50
 - c. 51 -75
 - d. 76 – 100
 - e. More than 100
 - f. I don't have a cohort
5. What type of term is your program?
- A. Quarter
 - B. Semester
 - C. Trimester
 - D. Module/Term
 - E. Other
6. What is your highest level of completed education prior to entering the program?
- a. GED
 - b. High school diploma
 - c. Less than one year of college
 - d. One year of college (without degree)
 - e. Two years of college (without degree)
 - f. Associate degree
 - g. Three years of college (without degree)
 - h. Four years of college without degree
 - i. Baccalaureate degree
 - j. Other

7. What is your legal citizenship?
 - a. U.S.
 - b. Canadian
 - c. Other
 - d. Unknown citizenship

8. What is your race/ethnicity?
 - a. American Indian
 - b. Asian/Asian American
 - c. Black or African American
 - d. Hispanic/Latino
 - e. Native Hawaiian or Pacific Islander
 - f. Unknown
 - g. White

9. What was your gender at birth?
 - a. Male
 - b. Female
 - c. Other

10. Please identify your age in one of the following categories:
 - a. 23 and under
 - b. 24-29
 - c. 30-34
 - d. 35-39
 - e. 40 and over

11. Number of assigned mentors:
 - a. 0
 - b. 1
 - c. 2-5
 - d. > 5
 - e. < 5