A Dissertation

entitled

Does Dental Hygiene Student Engagement While Enrolled in the Dental Hygiene Program Influence Academic Achievement?

by

Susan Leiken

Submitted to the Graduate Faculty as partial fulfillment of the

requirements for the Doctor of Philosophy Degree in Education

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An Abstract of

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Expansion of the scope of dental hygiene responsibilities reflected in state Dental Boards' Dental Hygiene Practice Acts have led U.S.-based dental hygiene programs to intensify their curricula while investigating ways to improve student success.

Using an original survey electronically distributed to 12,000 dental hygiene students by the American Dental Hygienists' Association (ADHA), this study investigated dental hygiene student engagement activities, both in the dental hygiene program and in student chapters of the ADHA, with student success measured by cumulative grade point average (GPA).

Four predictors were found to influence student success: the quality of faculty interactions; highest degree attained; race- Black or African American (a negative predictor); and, the quality of program director's interactions.

This study may encourage educators to focus on improved strategies for delivering dental hygiene education through strong leadership and revitalized policies and practices. Future research may review enhanced student engagement practices as they relate to student success.

Acknowledgments

"The achievement of your goal is assured the moment you commit yourself to it."

— Mack R. Douglas

I was motivated and determined to complete my dissertation journey and along the way, I welcomed the love, support, and encouragement from family, friends, and colleagues who energized me. My husband, Richard, offered humor and praise, accompanied by declarations of impatience, that surprisingly motivated me to completion. My daughter, Jessica, an attorney, assisted me with a complex legal assignment and also offered encouragement. With updates in the sports world, my son-in-law, Aaron Goldstein, a sports producer, helped me temporarily forget my worries. My daughter, Kimberly Leiken, PhD, with a doctorate in neuro-linguistics, lent a scholarly hand and a shoulder for venting. Although his presence is missed, my dad, George Mandel, encouraged me with memories of his favorite phrase, "Upward and onward." My mom, Millie, patiently accepted my persistence to finish my work over visiting her. My gratitude to the American Dental Hygienists' Association for the interest in my study, and for the first time in history, distributing a PhD candidate's survey to 12,000 dental hygiene students. I appreciated the hard work and time expended by Sue Bessner, ADHA Senior Manager of Research. My appreciation to Dr. Tom Short whose expertise navigated me through data analysis, and to my editor, Mr. Brent Chartier, for his keen humor, while facing the dauntless task of explicating my study. A special thank you to Dr. Robert Trebar, and to members of my committee: Dr. Ron Opp, Chair, for his direction and guidance; Dr. Sunday Griffith for her reassurances; and, Dr. David Meabon for his "Royal Order of the Zebras" counsel, and a special thanks to committee member and colleague, Dr. Denise Bowers, for her comfort and assurances along the way.

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Chapter 1

Introduction

Student success in college is often synonymous with, and represented by, the student's grade point average (GPA). Today, colleges are often questioned about their student success rates. To answer this question, many colleges, and programs within colleges, along with external audiences, rely on graduation rates (Gutierrez, 2009). Dental Hygiene Programs within community colleges and within four-year universities are also concerned with dental hygiene student success. Expansion of the scope of dental hygiene responsibilities reflected in state Dental Boards' Dental Hygiene Practice Acts have led dental hygiene programs across the country to intensify their curriculum with more robust and demanding dental health instruction. Therefore, maintaining the existing professional health career program grade evaluation breakdown, with 93 being the lowest A and 78 being the lowest C, is challenging for a student and requires a student to commit to the arduous task of being engaged in the educational process until completion of their dental hygiene program.

Utilizing Astin's Theory of Involvement, this study investigated the national trends of dental hygiene student engagement, both in the dental hygiene program, and in student chapters of the American Dental Hygienists' Association (ADHA). The study examined whether dental hygiene student involvement has an influence on student success, as measured by cumulative GPA.

Astin's Theory of Involvement defines involvement as the investment of physical and psychological energy in various objects, and an object can be the student experience in a student activity (Astin, 1984). Involvement has both quantitative and qualitative

features. Quantitative involvement refers to the amount of time devoted to the activity, and qualitative involvement refers to the seriousness with which the activity was approached (Astin, 1984). The amount of student learning and personal development associated with any educational program is directly proportional to the quality and quantity of student involvement in that program (the more a student puts into something, the more he or she gets out of it). The effectiveness of any educational policy or practice is directly related to the capacity of that policy or practice to increase student involvement (Astin, 1984).

It has been generally assumed that participation in extracurricular activities has a positive impact on the retention of students beyond the first year (Wang & Shiveley, 2009). Participation in clubs and organizations has long been identified as an important form of involvement that contributes to student learning across a variety of domains (Foubert & Grainger, 2006). In addition, research has strongly supported the assumption that student engagement is positively related to objective and subjective measures of gains in general abilities and critical thinking (Kuh, Hu, & Vesper, 2000).

Astin's longitudinal study also showed that students who join social fraternities or sororities, or who participate in extracurricular activities of almost any type, are less likely to drop out (Astin, 1975). According to Astin, his theory of involvement has advantages over traditional pedagogical approaches because it focuses on the motivation and behavior of the student. However, college students are adults, and no institution can or should take full responsibility for the learning or graduation of every student. Student effort is a major component of educational quality (Callan, 2012). Increasing the time faculty and administrators spend with the individual student discussing ways to motivate

the student, and to encourage student involvement in activities might produce positive results similar to the results that instructional tutoring has on students. Additionally, meeting and interacting with faculty also can be beneficial in engaging the student. Clubs and organizations allow students to establish a connection through interaction with peers and members of the faculty (D'Amico & Hawes, 2000). Therefore, all institutional policies and practices may be judged by the degree of involvement they foster in the student (Hutley, 2011). Wang and Shiveley (2009) conducted a study that compared two groups of students: those who participated in an extracurricular activity, and those who did not. The subjects who participated in an extracurricular activity had better GPAs than did those students who chose not to participate. These results also support the argument that student involvement increases academic achievement (Wang & Shiveley, 2009).

Research has shown that student involvement enhances the overall college experience and the development of transferable skills for undergraduate students. Participation in student organizations can lead to the development of social and leadership skills, higher retention rates, heightened self-confidence, improved satisfaction with college, and the ability to see courses and the curriculum as more relevant, leading to further success after college (Hawkins, 2010).

Additionally, post-graduate success has been linked to good practices in undergraduate education (Pascarella, Cruce, Umbach, Wolniak, Kuh, Carini, Hayek, Gonyea, & Zhao, 2006). The National Survey of Student Engagement (NSSE) is an annual survey of first-year and senior students designed to assess the extent to which students engage in empirically-derived good practices in undergraduate education, and what they gain from their experience (Kuh, 2001b). From an empirical standpoint, the

NSSE and similar surveys are solidly based (NSSE, 2012). Furthermore, various measures of the good practice dimensions are significantly and positively linked to desired aspects of cognitive and non-cognitive growth during college, and to career and personal benefits after college (Astin, 1993b; Chickering & Reisser, 1993; Kuh, Schuh, Whitt, & Associates, 1991; Pascarella & Terenzini, 1991). Examples of individual studies supporting the predictive validity of specific dimensions of good practices in under-graduate education would include the following: student-faculty contact (Anaya, 1999; Avalos, 1996; Kuh & Hu, 2001; Terenzini, Springer, Yaeger, Pascarella, & Nora, 1994); cooperation among students (Cabrera, Crissman, Bernal, Nora, Terenzini, & Pascarella, 2002; Johnson, Johnson, & Smith, 1998a, 1998b); active learning (Hake, 1998; Kuh, Pace, & Vesper, 1997; Lang, 1996); and, academic effort/time on task (Astin, 1993a; Hagedorn, Siadat, Nora, & Pascarella, 1997; Johnstone, Ashbaugh, & Warfield, 2002).

There is little, if any, research on dental hygiene student engagement in dental hygiene programs, or on student involvement in student chapters of the ADHA. Also, there is little if any research on whether dental hygiene student engagement has a positive influence on GPA. There is also little, if any, research on dental hygiene student-faculty contact, dental hygiene student-student interaction, dental hygiene student-academic effort and/or student-time on task data, and no reported studies that examine the influence of these variables on student success.

The intent of this study is to present results that provides dental hygiene educators and administrators with a better understanding of how dental hygiene student involvement in dental hygiene programs and in student chapters of the ADHA impacts

academic achievement, as measured by cumulative GPA. The data may result in future educational program policy changes that will enhance dental hygiene student engagement activities, leading to improved student success (GPA).

Statement of the Problem

In the last ten years, the majority of state dental hygiene practice acts have changed and expanded the scope of practice for dental hygienists. More than 40 states allow some type of local anesthesia administration by dental hygienists, in addition to adding a variety of increased responsibility attached to dental hygiene procedures. With each addition or change in a state's practice act, accredited dental hygiene educational programs in that state must update and revise educational curricula to reflect those changes. Consequently, educational programs have become more challenging and rigorous for the dental hygiene student. As an example, the dental hygiene student is required to possess a well-structured recognition of head and neck anatomy, as well as an understanding of how the chemical pharmacotherapy of anesthesia impacts the body and oral cavity.

The concern over student failure in a high-stakes health career program such as dental hygiene has led to investigating ways to improve retention rates. Furthermore, developing student awareness in the importance of involvement in his/her national professional organization after graduation by promoting student membership and participation while in school is a growing dental hygiene program initiative. It is believed that such student involvement is linked to improved student educational performance.

This study investigated the national trends of dental hygiene student engagement, both in the dental hygiene program and in student chapters of the ADHA. The study investigated dental hygiene student involvement and its association with student success, as measured by cumulative GPA.

Conceptual Framework

The conceptual framework centers on Astin's, *Student Involvement: A Developmental Theory for Higher Education* (1984). The most basic tenet of Astin's Theory of Involvement is that students learn more the more they are involved in both the academic and social aspects of the collegiate experience. An involved student is one who devotes considerable energy to academics, spends much time on campus, participates actively in student organizations and activities, and interacts often with faculty (Astin, 1984). For student growth to take place, students need to actively engage in their environment (Astin, 1984). Astin states that the intended end of institutional and pedagogical practices is to achieve maximum student involvement and learning; to accomplish this, instructors cannot focus solely on technique, but must also be aware of how motivated students are and how much time and energy they are devoting to the learning process (Astin, 1984). Using the national database from the ADHA, a survey was administered to all dental hygiene students in accredited dental hygiene programs to test Astin's theory of student involvement.

Research Questions

A national survey was administered to all dental hygiene students in accredited dental hygiene programs. The results examined student demographics and the extent of

student engagement in ADHA Student Chapters and addressed the following research questions:

1. What influence, if any, do student demographics (age, gender, race) have on student's cumulative grade point average?
2. What influence, if any, student-program director/administration have on student's cumulative grade point average?
3. What influence, if any, do student-faculty interactions have on student's cumulative grade point average?
4. What influence, if any, do student-student interactions have on student's cumulative grade point average?
5. What influence, if any, does participation by students in Student Chapters of the American Dental Hygienists' Association have on student's cumulative grade point average?

Significance of the Problem

This study provided needed data to stimulate interest in a national dental hygiene educational program drive to promote student commitment to Student Chapters of the ADHA. It is anticipated that increased student membership will translate into professional membership once graduation takes place. Additionally, the more engaged the student is in the dental hygiene student organization, and the more the student interacts with dental hygiene faculty, administration, and peers while enrolled in the dental hygiene program, the more the dental hygiene student is expected to become a better learner. Student success, as measured by cumulative GPA, is expected to improve with greater student involvement. Currently, there is a gap in the literature on the subject

of dental hygiene student membership in Student Chapters of ADHA and student involvement in the dental hygiene program environment. The possibility that one or both of these types of involvement have a potential for influencing student cumulative grade point average warranted further investigation.

Summary

Nationally, Dental Hygiene State Practice Acts have advanced dental hygiene procedures and have increased dental hygienists' responsibilities. Changes in these practice acts have led all dental hygiene programs to expand required scientific knowledge and pharmacotherapy instruction to their educational curricula. The result is a very rigorous dental hygiene program with growing concern over increased student failure rates. This study employed Astin's Theory of Involvement as its theoretical framework to determine what influence, if any, dental hygiene student engagement in curricular and extracurricular activities has on academic achievement (GPA range). A new survey was administered nationally to students identified from the ADHA student database.

This chapter discussed the concerns surrounding dental hygiene student success, identified gaps in the literature, and stated the research questions. The remaining chapters, beginning with Chapter Two, review the literature and discusses Astin's *Student Involvement: A Developmental Theory for Higher Education* and Astin's I-E-O model. This study's methodology is described in Chapter Three, and includes a description of the population, survey instrument, and the data collection and analysis procedures. Chapter Four focuses on the results of the research and addresses the finding for each research

question. Chapter Five summarizes the study and discusses the findings and conclusion, including practice and policy implications and recommendations for future research.

Chapter Two

Literature Review

Introduction

Many studies have examined student success in universities and colleges in an attempt to determine what motivates students to do well academically. The quality of education can be measured by student engagement, as the more engaged students are with the institution, the more likely they are to persist and complete their education (Astin, 1999; Kuh, 2009). Students are also more likely to have a deeper understanding of their learning and to graduate with the critical thinking skills required for their careers (Chickering & Gamson, 1987).

Although the literature explores a number of student development theories, this review emphasizes Astin's, *Student Involvement: A Developmental Theory for Higher Education* (1984). Astin's Theory of Involvement affirms that students learn more the more they are involved in both the academic and social aspects of the college experience. This view of student engagement served as the theoretical framework for examining the literature on student interactions with administration, faculty, peers, and student involvement in student organizations and their accompanying influences on cumulative GPA. Astin's theory established the parameters for studying various dental hygiene student engagement/interactions and their influences on the dental hygiene student's GPA.

Astin's Theory of Student Involvement

In order to discuss Astin's *Student Involvement: A Developmental Theory for Higher Education*, defining of the term *involvement* is in order. Astin's defines

involvement as the investment of physical and psychological energy that the student devotes to the academic experience (Astin, 1984).

For example, students who exert a significant amount of energy studying might spend a great deal of time in the library researching information, or meet with teacher assistants or schedule time in the tutoring center. Students who occupy their time in student activities might be involved in campus political functions, campaigning for leadership roles as student officers, participating in various student organizations, or participating in fraternity/sorority events. Other examples include students who regularly interact with faculty, participate in projects with peers and/or mentors, or attend conferences or educational programs with administrators/professors. In other words, students who are *involved* are engaged with campus life and are motivated to seek opportunities to participate in and become immersed in the college culture.

Astin clearly emphasizes student behavior when discussing involvement (1984). It is the student who makes the decision as to how to spend his/her time and with whom. The involved student is the student who makes the decision to *do* something. While motivation is an important aspect of advancing the student's actions, it is what the student does that is at the core of Astin's theory. Table 1 lists the research relevant to Astin's Theory of Student Involvement covered in this literature review.

The Theory of Student Involvement had its origin in a longitudinal study that looked at what influenced college student persistence (Astin, 1975). Positive factors encouraged student persistence by increasing student involvement, while negative factors discouraged student persistence, reducing student involvement and leading the student to drop out of college.

Table 1

Astin's Theory of Student Involvement

Author/Study/Year	Source/Relevance
Astin's Theory of Student Involvement/1984	Longitudinal and multi-institutional study of undergraduates enrolled in four-year degree colleges from the late 1960s and early 1970s that provided insight into student retention behavior.
Astin, I-E-O Model,1991	Cooperative Institutional Research Program (CIRP) data from longitudinal study of 500,000 entering a variety of 1,300 collegiate institutions with updated information on the study of college impact (Astin, p. 4).
Tinto's Model of Student Departure, 1993	A longitudinal, interactionalist model and the most widely utilized sociological framework for understanding the issues behind college student departure. Based on anthropological theories of social withdrawal, this model asserts that academic and social integration are crucial to a student's adaptation to college.
Pascarella's General Causal Model 1985	Analyzed 2,600 studies over 20 years to show the long-term effect attending college had on people's lives. The studies generally showed that those who attended college were: better informed; more involved in civic activities; better able to handle life's ambiguities; happier; healthier; richer; and, more likely to have their children get a college education.
Chickering & Gamson, 1987 Seven Principles For Good Practice In Undergraduate Education	These principles stem from 50 years of research as to how the way teachers teach and students learn, how students work and play with one another, and how students and faculty talk to each other.

While the theory focuses on the student expending energy to physically do something, Astin also accentuates the student's investment of psychological energy.

Astin asserts that the concept of involvement resembles the Freudian concept of *cathexis* or the process of investment of mental or emotional energy in a person, object, or idea (Astin, 1984).

The Theory of Student Involvement offers the following five claims (Astin, 1984):

1. Involvement is defined as the investment of physical and psychological energy in various objects, and an object can be defined as a broad general experience or a very finite action.
2. The degree of involvement varies from one student to the next. Further, a student's degree of involvement can vary from one object to another.
3. Involvement has both quantitative and qualitative features. How much time a student commits to a particular activity can be measured, as can the quality of the student's commitment.
4. The amount of student learning in an educational climate correlates with the quality and quantity of student involvement in that educational climate.
5. How much emphasis the educational policies place on student involvement is directly related to policy effectiveness.

In advancing his Theory of Student Involvement, Astin contends there should be a bridge mediating program policies or pedagogical theories with student outcomes. Therefore, Astin explains how his theory of student involvement can be used to connect three pedagogical theories to student development outcomes. The three pedagogical theories are identified as subject-matter theory, resource theory, and individualized (eclectic) theory.

Astin characterizes the subject-matter theory as the content theory, with professors advocating that student learning depends on "exposure to the right subject matter" (Astin, 1984, p.520). Faculty with expertise in a particular subject matter become the focus, and the student is relegated to a passive role of listening to the academician's words of wisdom. If the student is self-motivated and possesses strong auditory learning skills, the student will do well in this type of learning environment. However, the student who is academically struggling and has no interest in this field of study usually ends up with poor or failing results. Currently, there is serious consideration given to determining whether this type of classroom instruction should be continued, or if it impedes progress toward improved student outcomes and student retention.

The second pedagogical theory, the resource theory, is championed by administrators and policymakers due to its emphasis on institutional assets as the basis for student achievement. Therefore, state-of-the-art technology, laboratories, elaborate learning resource centers, and financial aid, as well as prominent, highly published professors and adequate, experienced advising and counseling personnel, are all deemed important and necessary if the student is to be successful and graduate.

There are concerns, however, over the resource theory's (second pedagogical theory) drawbacks. The concept of hiring "super-star professors" is considered flawed due to the time such faculty members devote to research endeavors outside of the classroom, instead of instruction and student interaction. Additionally, data are lacking as to student use of institutional facilities and whether or not a correlation with student success actually exists.

The third pedagogical theory, the individualized (eclectic) theory, emphasizes the custom-tailored approach to the college student experience. Curricula can be designed to be flexible and varied to meet the needs of the individual student, as no one course of study and no single institutional resource will address the student body's "wish list." Astin believes this theory is widely acknowledged by developmental and learning psychologists due to its focus on the individual student's requisites (Chickering & Associates, 1981). The student is not the only decision-maker in selecting his/her pathway to educational enlightenment. This theory stresses the importance of student advising, independent study, and self-paced instruction, along with competency-based evaluation models (Grant, Elbow, Ewens, Gamson, Kohli, Neumann, Olesen, & Riesnian, 1979).

There are also problems with this individualized (eclectic) theory, especially when trying to apply it to higher education's emphasis on cost control. The costs of higher education for the student to assume, and for the educational institution to provide, have escalated annually. Today, the burden of financing a college education rests on the student and/or the student's family. Therefore, options to reduce the financial burden through financial aid, loans, grants, and lowered tuition options all look very appealing for the college education consumer. At institutions where curricula are flexible, it is also not difficult to expect that lowering college tuition costs through accelerated educational programs may be a viable alternative to more costly tuition rates at high-end universities. Fast-tracking the student to complete college requirements earlier would also reduce college expenses. When looking at funding higher educational opportunities from this perspective, the time it takes to complete the process is of paramount importance,

especially when completion rates at some colleges are abysmally low. Fewer than half (45%) of students who enter community college with the goal of earning a degree or certificate met their goal six years later (Center for Community College Student Engagement [CCSE], 2010a).

Furthermore, the third pedagogical theory, the individualized (eclectic) theory, is not in harmony with today's view of the conventional student. Just as the concept of the traditional student has changed, so too has the concept of the traditional college experience. Instead of representing the wealth of intellectual possibilities and opportunities for self-exploration colleges once did, research suggests the vast array of choices in programs of study, courses, and majors may in fact be hurting students' chances for success and may inadvertently contribute to low completion rates. College completion is a complex process, with multiple junctures where students may make incorrect choices, get off track, and fail to finish a program or degree (Karp, 2013). Offering students multiple course and degree options, majors, and course delivery methods—though intellectually appealing—may overwhelm students, create barriers to their success, and contribute to their failure (Jenkins & Cho, 2012; Scott-Clayton, 2011; Zeidenberg, 2012).

Astin continues interpreting his Theory of Student Involvement by explaining how his theory can unite the elements of these three pedagogical theories (subject-matter theory, resource theory, and individualized [eclectic] theory) with positive student outcomes. As an example, if a particular subject matter (subject-matter theory) is identified, the student is still required to expend a sufficient amount of time and commitment to studying that particular curriculum in order to produce successful

learning results. It is not enough to present information to the student, place a facility in proximity to the student, or present a menu of electives for student selection. According to Astin's theory, the student has to decide to make an effort to become actively involved in his learning process, to routinely utilize the institution's facilities, or to incorporate electives that will satisfy credit towards his/her program of study.

Furthermore, the Theory of Student Involvement focuses on time as a crucial part of the development of the student. What the student decides to do with his/her time correlates with the specific goals the student decides to achieve. The student's time, therefore, becomes the quest everyone pursues. Administrators and faculty members compete with programs, policies, and regulations that impact student time, whether it is class time, semester sessions, mandatory attendance guidelines, office hours, college closings, or employment hours. Time schedules are not all that influence a student's time, but just the amount of time a student takes to navigate the campus from class building to student union to dormitory takes up a great deal of the student's daily regimen.

While a student's time is an important component of the Student Involvement Theory, where and with whom the student spends his/her time are also critical elements contributing to student retention and success. Studies have supported the belief that the student who lives in a student residential facility, works on campus (work-study), eats in a campus facility patronized by students, socializes in the student union, campus facilities, or sororities/fraternities, and interacts with fellow classmates, college peers, faculty, and administrators, will develop a strong identification and attachment to college life, leading to a more promising and successful college experience (Astin, 1984).

Based on the Cooperative Institutional Research Program (CIRP) study conducted by the Higher Education Research Institute at the University of California, Los Angeles, of more than 20,000 students, 25,000 faculty members, and 200 institutions, Astin's updated study (1993a) showed how academic programs, faculty, student peer groups, and other variables affect students' college experiences.

Astin's Theory of Student Involvement was selected as the conceptual framework for this study, although two other college impact models frequently employed are Tinto's Model of Student Departure and Pascarella's General Causal Model.

College impact models, a subsection of student development theories, emphasize understanding the environmental and sociological origins of change, and look specifically within the college context in regards to student development (Pascarella & Terenzini, 2005). All three represent an 'input-process-output' approach (Kazmi, 2010).

Alexander Astin's Input-Environment-Output (I-E-O) model underscores the need to have an understanding of students' qualities and characteristics upon their entry into an educational institution, the nature of the educational environments with which they come into contact, and their qualities and characteristics as they exit the institution, in order to be able to fully evaluate its effectiveness (Astin, 1991). Astin's I-E-O model was applied to this study as the Input variables and Environment variables were explored to determine the influences impacting the output variable (GPA).

Astin's Theory of Student Involvement's I-E-O model presents a fitting, conceptual model for examining the relationship between the college environment (E-student interactions and activities of engagement) and student success (O). The I-E-O model's core concepts are composed of three fundamental components. The first concept

centers upon a student's inputs (I), such as the student's attributes and abilities when s/he begins college. These inputs are, in a sense, the raw materials with which the institution has to deal (Astin, 1970) (Figure 1).

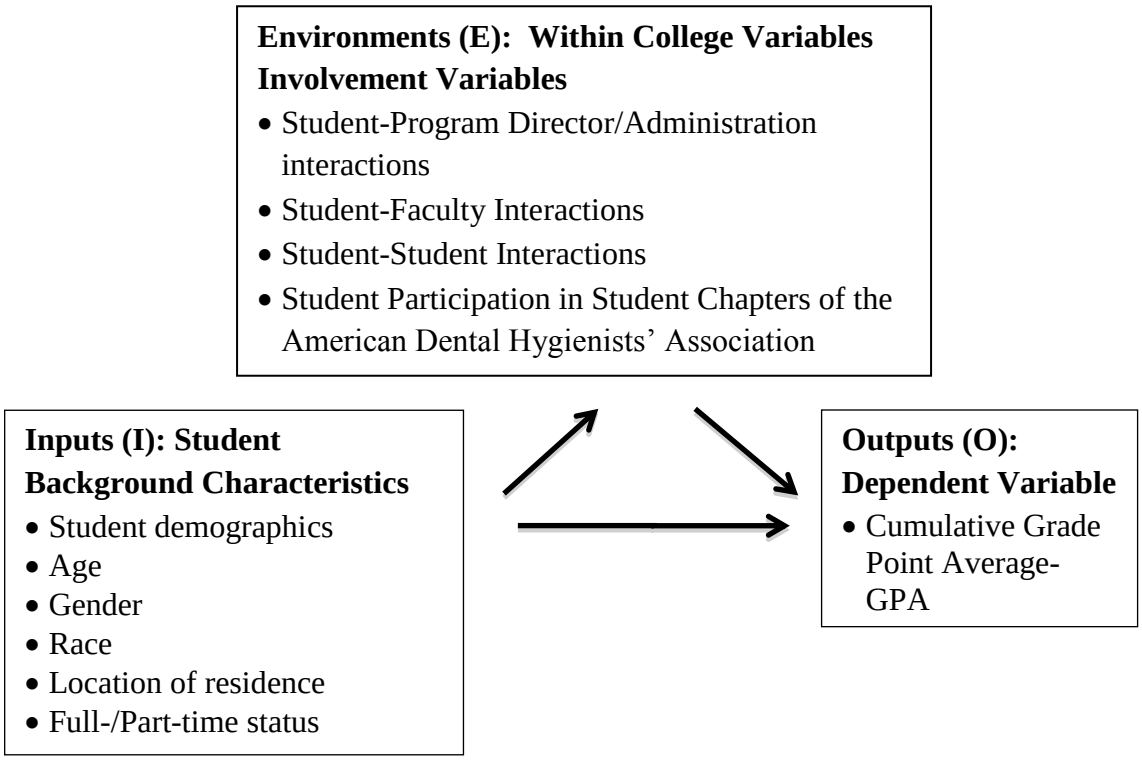

Figure 1. Astin's I-E-O model with variables.

The second is the student's environment (E), which accounts for all of the relationships, exchanges, and activities a student encounters during college. Thirdly, are the outcomes (O), which cover a student's recently acquired persona, knowledge, opinions, principles, and views that have become the newly-designed fabric surrounding the graduate's make-up as s/he leaves the college community.

Astin's I-E-O model emphasizes the student as the focal point when examining the nature of the educational environment and how fully the student has embraced the

institution's offerings. This model has been the guide for decades of research on the impact of the environment on undergraduate student development (Case, 2011).

Comparison of Theories

Tinto's Model of Student Departure focuses on institutional characteristics that are within the institution, and academic and social integration (Kazmi, 2010). Tinto's Model of Student Departure (1993) has been the most frequently used conceptual framework for examining predictors of attainment and persistence (Paulson, 2013).

Building upon Spady's research (1970, 1971), Tinto proposed a Model of Student Departure that was initially based on the sociological concept of suicide, as proposed by Durkheim in 1951 (Paulson, 2013). Tinto found Durkheim's work analogous to the departure of the student from higher education. He suggested that when college students are not sufficiently integrated, or if they maintain values that are sufficiently different from the college they attend, they are more likely to withdraw or dropout (Paulson, 2013). Tinto questions,

> What would it mean for institutions to take student success seriously? Among other things, it would mean that institutions would stop tinkering at the margins of institutional life and make enhancing student success the linchpin about which they organize their activities. They would move beyond the provision of add-on services and establish those educational conditions within the institution that promote the success of all, not just some students. To be serious about student success, institutions would recognize that the roots of attrition lie not only in their students and the situations they face, but also in the very character of the educational settings, now assumed to be natural to higher education, in which they

> ask students to learn....An extensive body of research identifies the character of the settings or conditions within institutions, and in turn the actions institutions can take that promote student success, in particular during the students' first year of college. Here the emphasis is on the conditions in which we place students, rather than on the attributes of students themselves (Tinto, 2002, p.1).

Pascarella recognized that the structural organization of the institution and the institutional environment also play a role in shaping the learning and cognitive development of students (Kazmi, 2010). He also explicitly integrated Astin's concept of involvement into his 'quality of student effort' variable. In Pascarella's General Causal Model, growth is defined as "a function of direct and indirect effects of five sets of variables" (Pascarella & Terenzini, 2005, p. 56).

The five sets of variables are: 1) students' background characteristics; 2) the institution's organization and structure; 3) the institutional environment; 4) interactions with agents of socialization; and, 5) the quality of student effort. Students' background characteristics and the institution's organization and structure interact to produce the institutional environment. Taken together, these three variables interact to influence student interactions with agents of socialization. Quality of effort, the last set of variables, is influenced by student characteristics, the institutional environment, and interactions with agents of socialization. Sets one, four, and five combine to produce a student's overall learning and cognitive development (Pascarella & Terenzini, 2005). This model uses sets one and two as its input variables, sets three, four, and five as its process variables, and learning and cognitive development as outcome variables.

While Tinto's Theory of Student Departure and Pascarella's General Causal Model have proven to be pivotal scholarly works in researching student development, Astin's Theory of Student Involvement emphasizes the individual student's decision-making process in shaping the approach to his/her educational experience. Astin built upon the concept of 'quality of effort' to purport his theory of student involvement (Astin, 1984). This theory was proposed to promote the belief that students must play an active role in the process of student development and learning (Astin, 1999). It is a theoretical construct that can be used as a tool to help understand a diverse set of findings leading to policy formulation and change (Richmond, 1986). Astin's I-E-O model looks at student dynamics and how they play a role in optimizing student outcomes. Therefore, Astin's Theory of Student Involvement and its accompanying I-E-O model became the conceptual framework for this study in determining how students' decisions about their interactions with institutional administrators, faculty, peers, and engagement in student organizations influence student success.

Student-Administration Interaction

An institutional administration encompasses a variety of personnel and resources, all designed to assist the student to successfully navigate the college journey while encountering positive social interactions, strengthening bonds with the university, and achieving individual educational goals. The administrative workforce and institutional resources and activities include, but are not limited to, deans, program directors, advisors, counselors, career managers, residential mentors, orientations, concerts, theatre productions, speaker's series, learning resource centers, student unions, sports and fitness facilities, recreational complexes, housing, medical/dental student clinics, technology

laboratories, and smart classrooms. Table 2 lists the research relevant to student-administration interaction covered in this literature review.

Table 2

Student-Administration Interaction

Author/Study/Year	Source /Relevance
Kuh, 2009 Report on The National Survey of Student Engagement (NSSE)	The NSSE, a 15-20 minute survey, has been completed by 1.5 million students at 1,200 colleges and universities in the last decade. By design, NSSE demonstrates that student engagement can be measured across large numbers of institutions and that engagement data can be used immediately by faculty and staff to improve the undergraduate experience. Results highlight the relevance of engagement as an indicator of student and institutional performance and underscore the role of institutions in inducing students to engage in educationally purposeful activities.
Cuseo, 2001 Report on Student Retention	Results from 25 years of advising surveys by American College Testing (ACT). Discussion pertaining to institutional improvement and its link to student-advisor interactions as demonstrated through academic advising. Academic advising is portrayed as one of the major academic and social domains of the college experience.
Bean, 1980	An Industrial Model of Student Attrition. Initial adaptation of Price's model to the student attrition process was modified by Bean. In an empirical study, the model was found to hold up much better for women than men. This model was evaluated at a major mid-western university, where the variables accounted for 12% of the variance in dropout for men and 21% for women. Bean expanded variables that influenced institutional commitment, which was operationalized by a measure of intent to stay at the institution. The more a student intended to stay, the less likely a student would drop out.

Noel & Levitz, 1995	Student Satisfaction Inventory (SSI) measures students' satisfaction in accordance with their college experiences. SSI results can be used to improve student retention, staff and organizational development, student success, marketing and recruiting, enrollment management, strategic planning and resource development, and institutional effectiveness.

When conducting a policy review process, institutions need to examine their policies and business practices to determine the best procedures to employ when addressing the needs of the student body and the best approaches to use when acknowledging institutional issues and concerns. Purposeful deliberations pertaining to institutional activities and operations that guide student behavior can serve as a catalyst for improvements to collectively serve students.

Institutional policy must address the core mission of the institution and those responsible for that mission. It must be located at the center—not the periphery—of institutional life and must commit the institution to place the assessment and promotion of student learning and success as its main concern (Tinto, 1998). In effect, institutions must hold themselves and their various departments' facilities, activities, and staff accountable for enhancing student success. The institutional culture and environment is crucial to student learning (Tinto, 1998).

Student engagement represents the time and effort students devote to activities that are empirically linked to desired outcomes of college and what institutions do to induce students to participate in these activities (Kuh, 2009). This is critical to higher education, as institutions are faced with increasing pressure to improve student outcomes, such as retention, persistence, and completion (Astin, 1999; Zepke & Leach, 2005). The

quality of education can be measured by student engagement, as the more students engage with the institution, the more likely they are to persist and complete their education (Astin 1999; Kuh, 2009). Students are also more likely to have a deeper understanding of their learning and graduate with the critical thinking skills necessary for their careers (Chickering & Gamson, 1987). "In these ways and more, student engagement can be used as an institutional alarm clock, waking students from their slumber" (Kazmi, 2010, p. 2).

Students perform better and are more satisfied at colleges that are committed to their success and cultivate positive working and social relationships among different groups on campus. Community college students also benefit from services targeted to assist them with academic and career planning, academic skill development, and other issues that may affect both learning and retention (CCCSE, 2008).

In his extensive work on campuses, Noel, a nationally recognized student-retention scholar and consultant, found that institutions that give extra attention to careful life planning and academic advising show improvement in retention rates (Cuseo, 2001).

There is a well-established, empirical relationship between students' level of satisfaction with the institution they attend and their rate of retention (Bean, 1980, 1983; Noel, Levitz & Saluri, 1985). Additionally, college satisfaction is a primary predictor of student persistence (Noel, & Levitz, 1995).

Data generated by the National Survey of Student Engagement (NSSE) from 469 institutions revealed that students who report the highest degree of satisfaction with the quality of their academic advisement were most likely to demonstrate the highest levels of engagement (Kuh, 2002). From the NSSE data, as high levels of student engagement

(involvement) are empirically associated with higher rates of student retention (Astin, 1993; Pascarella & Terenzini, 1991; Tinto, 1993), the strong relationship between student engagement and the quality of academic advising may be interpreted as providing additional evidence of an empirical link between academic advisement and student retention (Cuseo, 2001).

In Tinto's theory, students enter the institution with pre-existing traits, differing degrees of educational commitment, wavering interest in remaining at the same institution, and uncertainty in the depth of persistence towards college completion. Once in the institution, there are two main processes in place, those that lead to academic integration, and those that lead to social integration. Dependent upon student experiences with these processes, students revise their initial commitments and make their output decision: to persist or to depart (Tinto, 2002).

If an institution commits itself to achieving maximum student involvement, counselors and other student personnel workers must occupy a more important role in institutional operations. Because student personnel workers frequently operate on a one-to-one basis with students, they are in a unique position to monitor the involvement of their clients in the academic process and to work with each client in an attempt to increase involvement (Astin, 1999).

Institutional personnel workers are competing with a myriad of choices that detract the student from more helpful alternatives and vie for the student's time. Not all options a student faces are designed to stimulate involvement in the college experience. Enrolling in courses that represent the student's ultimate career path early in the freshman year, feeling comfortable in his/her residential accommodations, joining student

organizations, participating in various extracurricular activities, or socializing in peer groups may attract the student's attention with constructive results.

Furthermore, advisors and counselors may recommend self-monitoring of a student's time by journaling or keeping a daily record as an initial step to successful advising and mentoring. Reviewing with the student how much time is spent in socializing, studying, sleeping, working, and commuting may reveal problems with time management. From such a ledger, a counselor can identify the principal activities in which a student is involved and whether there are time conflicts to adjust, unwanted study habits to eliminate, or a need to incorporate academic tutoring.

Challenges that face administrators and associated personnel include integrating all opportunities afforded the student in a multidisciplinary approach that will encourage student development, engagement and participation, all with the aim of ensuring a successful college experience. In short, the theory of student involvement provides a unifying construct that can help to focus the energies of all institutional personnel on a common objective (Astin, 1999).

Student-Faculty Interaction

The more contact students have with their instructors, the more likely they are to learn effectively and to persist toward achievement of their educational goals. Personal interaction with faculty members strengthens students' connections to the college and helps them to focus on their academic progress. Working with an instructor on a project, or serving with faculty members on a college committee, lets students see first-hand how experts identify and solve practical problems. Through such interactions, faculty members become role models, mentors, and guides for continuous lifelong learning

(CCCSE, 2008). Table 3 lists the research relevant to student-faculty interaction covered in this literature review.

Table 3

Student-Faculty Interaction

Author/Study/Year	Source /Relevance
Feldman & Newcomb, 1969	Reviewed the integration of studies on the effects of the college experience on students over a 40-year period from the mid-1920s to the mid-1960s. Increased student-faculty interaction provides academic information and influences students decision making and problem solving skills and the pursuit of life goals.
Endo & Harpel, 1982	Over a four-year span, examined four aspects of student-faculty interaction, including frequency of formal meeting, quality of advising, frequency of informal interaction, and helpfulness. Results were significant for faculty influence over student-intellectual/personal/social satisfaction with the college experience.
Sanford, 1967	Examined the college experience at Vassar over several years. The author maintained that the primary aim of education is not so much the accumulation of knowledge provided by faculty or the development of specific skills, as it is the development of students as individuals.
Wilson, Gaff, Dienst, Wood, & Bavry, 1975	Longitudinal study concluded that student-faculty interaction has a positive influence on a range of personal, career, and educational outcomes.
Centra & Rock, 1971	The social and academic environments of 27 small, liberal arts' colleges were assessed through student perceptions and included five scales: the extent of faculty-student interaction; student activism; curriculum flexibility; academic challenge; and, the colleges' cultural facilities. Results suggest certain student-described college environmental features are related to academic achievement.

Gurin & Katz, 1966	Study included four public, four private schools, and two alternate schools. Questionnaires were administered to 4,000 students. Interviews were conducted with 600 students. Students believed faculty members were most likely to know career opportunities in their respective fields. Students value faculty's greater knowledge and expertise about occupational diversity found in a specific content area over counselors and advisors.

Frequent interaction with faculty is more strongly related to satisfaction with college than any other type of involvement or, indeed, any other student or institutional characteristic (Astin, 1984). Students who interact frequently with faculty members are more likely than other students to express satisfaction with all aspects of their institutional experience, including student friendships, variety of courses, intellectual environment, and even the administration of the institution. Thus, finding ways to encourage greater student involvement with faculty could be a highly productive activity on most college campuses (Astin, 1984).

The significance of faculty-student interaction for effective education has been widely acknowledged (Chickering, 1969; Gaff, 1973; Pascarella, 1980; Sanford, 1967). In addition, increased student-faculty interaction has been shown to have a broader impact on a student's general way of thinking, problem solving, and interest in various life goals (Endo & Harpel, 1982). Student-faculty communication is also important in influencing student's occupational decisions (Chickering 1969; Feldman & Newcomb, 1969; Wilson et al., 1975). Studies have shown that students who have regular, positive contact with faculty have increased educational aspirations (Grigg 1965; Gurin & Katz, 1966; Thislethwaite, 1960). Further, research has shown that an increase in meetings

with faculty and student-faculty dialogue influence intellectual and academic development (Astin & Panos, 1969; Bean, 1980; Centra & Rock, 1971; Chickering & McCormick, 1973; Newcomb, Brown, Kulik, Reimer, & Revelle, 1970; Pascarella & Terenzini, 1976, 1977, 1978, 1979; Spady 1971; Terenzini & Pascarella, 1977, 1978, 1989; Wilson et al., 1975).

Scholars have emphasized that even out-of-class contact between students and faculty significantly enhances the quality of the undergraduate experience (The Boyer Commission, 1998; Chickering & Gamson, 1987; Kuh et al., 1991). Empirical studies conducted over the past three decades document that out-of-class contact with faculty is associated with increases in students' quality of effort, persistence, academic achievement, intellectual and personal development, and evaluation of their college experience (Astin, 1993; Feldman & Newcomb, 1969; Kuh & Hu, 2001; Pascarella & Terenzini,1991; Tinto,1993).

Recognition of the potential benefits to students of less formal kinds of student-faculty contact outside the classroom has led many institutions to undertake initiatives intended to promote such interaction, such as creating various forms of living-learning communities (Gabelnick, MacGregor, Matthews, & Smith, 1990; Golde & Pribbenow, 2000; Shapiro & Levine, 1999). Interestingly, studies found a strong association between the faculty's own values and beliefs and the extent of the engagement in out-of-class student interactions (Einarson & Clarkberg, 2004).

Chickering and Gamson (1987) outlined guidelines to help students, faculty, and administrators create high quality learning environments. One of the essential principles that emerged from the study was the need to increase the level of contact between

students and faculty. Extensive research has documented that this student-faculty relationship is crucial in the creation of positive teaching and learning environments inside and outside the traditional classroom (Cotton & Wilson, 2006; Cox & Orehovec, 2007; Halawah, 2006; Kuh & Hu, 2001; Pascarella & Terenzini, 1976, 1978,1979; Ullah &Wilson, 2007; Umbach & Porter, 2002; Umbach & Wawrzynski, 2005).

Studies that have taken student characteristics into account have yielded additional evidence that academic and non-academic student-faculty interactions enhance academic performance as measured by college grades (Anaya, 1992, 1999; Astin, 1993). Moreover, these interactions appear to facilitate academic achievement as measured by student reported gains and performance on standardized tests and grades (Anaya, 1999).

A variety of faculty interactions can be assessed, including student-faculty emails, faculty discussions outside the classroom, participation in student-faculty projects/community events, joint meetings with career management experts, conferences, discussing grades and student ideas, and receiving prompt feedback (written, oral, electronic) on student performance.

One predominant theme in the student engagement literature is the importance and benefits of student-faculty interactions (Astin, 1987, 1999). As cited in Astin's longitudinal study of student retention, frequent interaction with faculty is more strongly related to satisfaction with college than any other type of involvement or, indeed, any other student or institutional characteristic (Astin, 1993). Furthermore, the literature demonstrates that a student's college experience is greatly enhanced by positive student-faculty interactions, which impact student approval with other aspects of college life.

Chickering and Gamson's seven principles of good practice in undergraduate education list practices that encourage contact between students and faculty members as principle number one (Chickering & Gamson, 1987). Faculty certainly can influence a student's ability to assume "good practices," such as: developing reciprocity and cooperation among students; active learning techniques; giving prompt feedback; emphasizing time on task; communicating high expectations; and, respecting diverse talents and ways of learning (Chickering & Gamson, 1987). In motivating student achievement through these very important educational ideals—activity, cooperation, diversity, expectation, interaction and responsibility—faculty significantly impact the student's ability to succeed (Chickering & Gamson, 1987).

Faculty interaction may matter in more ways than one. Research shows that positive faculty opinions about various programs influence the likelihood that students will participate in them (Kazmi, 2010). According to Kuh (2009), in institutions where professors said that learning communities were only somewhat important, only three percent of first-year students participated in them. At institutions where instructors said learning communities were very important, the participation level among first-year students was 55% (Kuh, 2009).

Faculty opinions and mentoring play an important role in guiding the student through the college maze where a student's time, according to Astin (1999), is a finite resource. With that in mind, it is not difficult to concede that students will listen and act according to what faculty members say and what events they deem worthwhile. Since a student considers his/her time valuable, any decision to participate in an activity is evaluated on whether it is considered worthwhile. When faculty members place

emphasis on these activities as being important, it likely sends the message to students that the activity will be worthwhile, which increases the likelihood of student participation (Kazmi, 2010). The literature overwhelmingly demonstrates the importance and benefits of student-faculty interaction and, by extension, its impact on student engagement.

According to many research studies on student development, fostering quality student-faculty interactions have resulted in the development of a multitude of positive student attributes, such as self-esteem, self-respect, confidence in judgment, improved overall college satisfaction, successful student outcomes, and higher levels of academic achievement and intellectual and personal development.

Student-Peer Interactions

Considerable research suggests a student's commitment of time and energy to academic work can be strongly influenced by student peers. The classroom is often the first and perhaps only place students meet and interact with other students. Involvement can easily be promoted and encouraged in a comfortable classroom setting to initiate student-peer interaction. Learning is central to the college experience and the root source of student success (Tinto, 1998). Involvement in classroom learning, especially with other students, leads to greater quality of effort, enhanced learning, and in turn, heightened student success (Tinto, 1997). Even among students who persist, students who are more involved in learning, especially with other students, learn more and show greater levels of intellectual development (Endo & Harpel, 1982). It is for these reasons that so much of the literature on institutional retention and student learning and development speaks to the importance of building educational communities that involve

all, not just some, students (Tinto, 1993). Table 4 lists the research relevant to student-peer interaction covered in this literature review.

Table 4

Student-Peer Interaction

Author/Study/Year	Source /Relevance
CCCSE, 2008	National survey of 2 million students at community and technical colleges concluded that learning, persistence, and attainment in college was consistently associated with students being actively engaged with faculty, staff, and other students.
Meyers & Jones, 1993	Studied classroom experiences, concluding that student-centered instructional methods, such as informal, small groups of students, cooperative student projects, simulations, and case studies with student-student interaction increased motivation to learn, greater retention of knowledge, deeper understanding, and more positive attitudes toward the subject being taught.
Johnson et al., 1998	Review covered more than 600 studies conducted over nine decades, comparing the effectiveness of cooperative learning efforts. The studies involved students from different age-groups, subject areas, and settings and found that the more a student works in a cooperative learning group, the more s/he learns, the better s/he understands, and the better the student feels about him/herself, the class, and his/her classmates.
Picciano, 2002	This study used a descriptive analysis of interaction, presence, and performance data collected among 125 part-time students in a graduate course in education administration at New York's Hunter College. Results support the strong relationship between students' perception of interaction and perceived learning.

Students learn more when they are actively involved in their education and have opportunities to think about and apply this learning in the different settings. Through collaboration with other students to solve problems or to master challenging content, students develop skills that prepare them to deal with the situations and problems they will encounter in the workplace, community, and in their personal lives (CCCSE, 2008). Contributing to class discussions, working with other students on projects during class, tutoring other students, participating with classmates in a community-based project as a regular course requirement, discussing course issues with peers outside of class, all enrich the educational process, leading to enhanced student success (CCCSE, 2008). A positive association with student achievement was found in studies focusing on active student participation involving students interacting with classmates, such as cooperative learning, debates, role-playing, problem-based learning, and case studies (Meyers & Jones, 1993).

A common element for learning in a typical classroom environment is the social and communicative interactions between students and between students and the teacher. The ability to ask a question, to share an opinion with a fellow student, or to disagree with the point of view in a reading assignment are all fundamental learning activities (Picciano, 2002). In examinations of interaction, the concept of *presence*—a sense of being in a place and belonging to a group—also has received research attention. A student's physical presence in a face-to-face course assumes s/he has a sense of belonging to the class or group of students enrolled in the course. He or she listens to the discussion and may choose to raise a hand to comment or to answer or ask a question. Furthermore, this same student may develop a relationship with other students in the class and discuss

topics related to the class during break, at a water fountain, or in the cafeteria (Picciano, 2002).

Meta-analyses of experimental and quasi-experimental research have indicated that cooperative learning experiences provide a distinct advantage over individual learning experiences in fostering growth in both knowledge acquisition and problem-solving skills (Johnson et al., 1998a, 1998b; Qin, Johnson, & Johnson, 1995). Evidence also suggests involvement in cooperative class projects has a positive net effect on growth in leadership abilities and job-related skills (Astin, 1993).

One interesting finding reported by Astin is the effect of student peer groups and its influence on volunteer participation in community or service learning projects. Student engagement in volunteer and community service work operates through peer networking (Astin, 1996). One promising way to encourage greater student participation in volunteer activities and service learning is to maximize the amount of interaction that occurs among students. Specific forms of student-student interactions that have positive effects on volunteer participation include participation in religious activities, involvement in campus activism, and socializing with members of different ethnic groups. Each of these activities constitutes student-student interaction (Astin, 1996).

From Engstrom and Tinto's study (2008), academically underprepared students who participate in learning communities were significantly more engaged in classroom activities related to faculty and peers, as well as activities outside of class, than their underprepared counterparts. These students were encouraged to take ownership of their learning and to see themselves and their peers as potential sources of knowledge (Engstrom & Tinto, 2008). They reported intellectual, emotional, and developmental

gains, and were more likely to persist in college compared to their counterparts (Engstrom & Tinto, 2008). The results indicate it is not enough for institutions to simply have a learning community in place; the learning community itself requires that faculty and staff change the way they perceive learning and teaching. Staff and faculty must work together to develop safe environments for students to connect not only to each other, but to faculty and support staff/services as well. For learning communities to be successful, institutions must take ownership in creating environmental conditions that are conducive to success. They must believe that any student can be successful, if the right conditions exist, and show students that they care about their success (Tinto, 2008).

Student-Organization Involvement

College students have the opportunities to become involved in a multitude of campus activities, ranging from political groups, environmental activist events, animal protection organizations, to leadership programs, gender-identity societies, and multi-faith communities. All are capable of influencing the student's motives and goals. Furthermore, student participation in collegiate organizations contributes to meaningful learning and personal development (Case, 2011).

In addition to academic involvement, social involvement has been found to contribute to student intellectual development (Terenzini & Pascarella, 1994). Participating in campus clubs and organizations is one way for students to become purposefully involved in their educational experience (Case, 2011). As students participate in these groups, they can expect to experience gains in a variety of areas including: cognitive skills (Gellin, 2003); self-confidence and interpersonal skills (Huang & Chang, 2004); a variety of developmental skills (Cooper, Healy, & Simpson, 1994);

and, higher order thinking and problem-solving skills (Beilke, 1990). Additionally, participants are likely to experience growth in practical skills as they apply classroom knowledge to real-life contexts through involvement in campus clubs (Bare & Hoggatt, 1986; Winston, Bledsoe, Goldstein, Wisbey, Street, Brown, Goyen, & Rounds, 1997). Table 5 lists the research relevant to student-organization involvement covered in this literature review.

Table 5

Student-Organization Involvement

Author/Study/Year	Source /Relevance
Case, 2011	Study included 1,545 students at faith-based liberal arts' institutions who completed the 2002 CIRP and the 2006 College Senior survey. Results indicated involvement in clubs, groups, career goals, student-faculty interaction, and community and public service satisfaction were significant predictors of college success.
Huang & Chang, 2004	Participants were 627, third-year college students in Taiwan. Results showed the correlation between academic and co-curricular involvement is positive and linear. To maximize cognitive and affective growth, students should be involved in both academic and co-curricular activities as much as possible.
Winston et al., 1997	Using Weisbord's model of organizational diagnosis, researchers developed the Student Organization Environment Scale to measure student perceptions of the psychosocial environment of college student organizations. Research demonstrated the effects of leadership development for college students. Many of the researchers found that it is good for students to have an opportunity to develop their leadership skills.
Hawkins, 2010	Study examined the GPA of undergrads enrolled at Purdue in 2009 to examine the relationship between student involvement and GPA. Results indicated student organization members had significantly higher GPAs than the general student population.

Engaging in extracurricular activities helps students to develop skills needed to succeed in the college environment (Kuh, Kinzie, Buckley, Bridges, & Hayek, 2006). Kuh cites academic performance as being one of the factors positively impacted by student activity (Hawkins, 2010). Additionally, student organizations provide an outlet for students to explore interests outside of the classroom, allowing students to further develop their talents (Astin, 1993).

A variety of student entry characteristics will likely have implications for many college outcomes, including the choice to participate in campus clubs and organizations (Case, 2011). Research has consistently found associations between living on campus and student involvement, as on-campus residence affords convenient access, more time for interaction, and peer influence (Gellin, 2003; Pascarella & Terenzini, 2005). At one faith-based institution, the research found direct evidence that living on campus is the strongest predictor for involvement in campus co-curricular activities (Hoffman, 2002). Past research findings that associated high school involvement with self-efficacy beliefs about future involvement in college and the research highlighting the merits of involvement in high school and college provide support for previous high school involvement in predicting collegiate involvement (Fredricks & Eccles, 2006; Peters & Brown, 1991; Reeves, 2008). Additionally, Astin (1993) claimed that pretests typically receive the greatest weight for predicting posttest outcome measures of the same variable. The 2008 NSSE found first-generation college students to be among the pockets of disengagement (Marklein, 2008). Involvement in clubs and organizations is an effective

means of increasing student success among first-generation college students (Cushman, 2007; Inkelas, Daver, Vogt, & Leonard, 2007; Pascarella & Terenzini, 2005), but this group is less likely to be involved, unless an intervention is enacted (Cress & Sax, 1998; Lundberg, Schreiner, Hovaguimian, & Miller, 2007; Pike, Kuh, & Gonyea, 2003). Many institutions support ethnic groups through programs that promote identity development and a sense of belonging (Laden, 1999; Schultz, Colton, & Colton, 2001). Previous research has revealed that ethnic groups hold positive perceptions of clubs and organizations, but participation lags (Rooney, 1984; Wang, Sedlacek, & Westbrook, 1992). African-American students at historically Black institutions have been found to devote more time to organizations than White students attending predominantly White institutions (Watson & Kuh, 1996). Although the findings on ethnically diverse student involvement are uneven, many studies affirm these students are likely to be involved in campus clubs and organizations (Lundberg et al., 2007; Pascarella & Terenzini, 2005; Pike et al., 2003; Watson & Kuh, 1996).

Students who work on campus are likely to participate in clubs and organizations because they have access to increased knowledge of campus opportunities (Astin, 1993b; Hernandez, Hogan, Hathaway, & Lovell, 1999; Hoover, 2004). High levels of student engagement found in the Pike, Kuh, and Massa-McKinley's (2008) study also affirm the likelihood of on-campus student workers being involved in campus groups.

Sense of community, student-faculty interaction, and peer interaction likely contribute in positive ways to the decision to participate in clubs and organizations (DeNeui, 2003). Research found that students with higher participation levels in campus organizations and activities had a higher sense of community than students with lower

levels (DeNeui, 2003). A person's level of choice to belong to a group has been found to positively correlate with a sense of community (Obst & White, 2007). This finding corresponds to voluntarily participating in campus clubs and groups.

The quantity of research on the desirable outcomes associated with student-faculty interaction (Astin, 1993b; Pascarella & Terenzini, 2005) and the initiative of institutions to encourage this type of interaction (Kuh & Hu, 2001) provide support for associations between student-faculty interaction and participation in clubs and groups. These findings, coupled with high levels of encouragement from faculty for students to participate in co-curricular activities (CCCSE, 2008), suggest a strong association between student-faculty interaction and involvement in campus clubs and organizations. Peer interaction has been documented as a powerful influence on how students spend their time (Astin, 1993a; Hu & Kuh, 2002; Pascarella & Terenzini, 2005). Students are more likely to be involved in clubs and organizations if their dominant peer group is involved (Astin, 1993). Many students participate in clubs and organizations for social reasons and to meet people with similar interests (McCannon & Bennett, 1996; Strauss, 2005). High student-to-student contact associated with participation in clubs and organizations makes satisfaction with peer interaction a likely predictor for involvement in college campus clubs and groups.

The research supports the importance of student organizational involvement in enhancing and enriching the student's college experience. The many advantages cited that lead to a robust college life include social and leadership skills, enhanced decision-making capabilities, determined direction in pursuing career opportunities, heightened self-confidence, stronger relationships with faculty, mature viewpoint of the relevancy of

curricula, and improved educational aspirations, academic achievement and post-college success.

Critical Analyses

The importance of student engagement within higher education has been researched for decades and is a recognized educational strategy for student success, championed by educators, administrators, advisors, and institutional stakeholders. However, over time, there has been an escalation of concern over students' lack of interest, motivation, and over the ease in which a student's level of commitment can descend to failing grades and the lure of dropping out.

There currently exists a shift in institutional attention from student enrollment to student completion. The importance of engaging all students in their education continues to resonate strongly with families, students, educators, administrators and researchers. The different opportunities for promoting student engagement through student interactions with administrators, faculty, peers, and through participation within college organizations has been discussed. The results demonstrate a significant relationship between student engagement and student success. It has been emphasized that engagement is relevant for predicting and preventing school dropout, as well as facilitating positive educational student outcomes. This argument becomes exceptionally critical when completion rates are linked to all aspects of school funding resources.

The literature, however, in examining how the engagement construct has been researched and who is being studied, requires a closer look. A careful and close scrutiny of the previous research on student involvement reveals that the majority of students involved in the studies included undergraduates between ages of 18 and 20, enrolled full-

time in four-year institutions with campuses, dormitories, and college community settings. The reality is that the more than 65,000 students nationally enrolled in allied health programs, including dental hygiene students, do not possess this same profile and, therefore, the question of whether dental hygiene student engagement activities have any influence over student success becomes noteworthy (Association of Allied Health Professional Institutional Report, 2010).

Today's student is diverse, with multi-layered features, ranging from the adult-learner, single parent, part-time, to special needs. Furthermore, there is little if any research on student engagement as it relates to the student in health career programs. Little or no research has been found on dental hygiene student engagement and whether or not student engagement influences dental hygiene student success (GPA).

No study, including a longitudinal effort, has examined the dental hygiene student's involvement and interactions while enrolled in a dental hygiene program, and whether those interactions have had any impact on cumulative GPA. It is therefore necessary to draw attention to the composition and structure of an accredited dental hygiene program to determine factors that may or may not obstruct the opportunity for dental hygiene student engagement activities to influence student success.

This study examined dental hygiene student engagement activities through student-interactions with administrators, faculty, peers, and through student participation in student chapters of the ADHA and their influences on dental hygiene student success.

Accredited Dental Hygiene Programs

The research that led to Astin's *Student Involvement: A Developmental Theory for Higher Education* concentrated on student engagement and student involvement activities

of undergraduate students in four-year university settings. There is little or no research on student engagement practices of students enrolled in health career educational programs in four-year universities and/or community colleges. In particular, there is little or no research on dental hygiene student engagement. It is important to appreciate the rigidity of accredited dental hygiene programs' curricula mandated by the American Dental Association's Commission on Dental Accreditation. The subsequent prescribed course of study and inflexible student schedules present challenges in cultivating other types of student engagement opportunities.

Entry-level dental hygiene programs prepare students to be competent in the clinical practice of dental hygiene (www.adha.org). Dental hygienists are licensed oral health professionals who prevent and treat oral diseases in order to foster a healthy oral environment and promote the patient's overall health. Dental hygienists are graduates of accredited dental hygiene educational programs in colleges and universities, and must successfully complete the written/online National Board Dental Hygiene Examination and a clinical board examination in order to secure a state license and practice (www.adha.org).

Admission to dental hygiene programs is a highly competitive process. In 2006, programs reported 25% of students applying for admission to associate's degree programs were admitted, while 33% of students applying to baccalaureate programs were admitted. The majority of dental hygiene programs (93%) have limited enrollment. Admission requirements and prerequisites vary from institution to institution, but generally the majority include up to 40-credit hours of prerequisite college courses in chemistry, English, speech, psychology, and sociology. Additionally, 72% of dental

hygiene programs use college science GPA as admissions criteria, and 72% include overall college GPA as admissions criteria (www.adha.org).

The entry-level dental hygiene curricula for all accredited dental hygiene programs require an average of 2,910 clock hours of curriculum. This includes 684 clock hours of supervised clinical dental hygiene instruction general education courses, including English, speech, psychology, and sociology. Basic science courses include general chemistry, anatomy, physiology, biochemistry, microbiology, pathology, nutrition, and pharmacology. Dental science courses include dental anatomy, head and neck anatomy, oral embryology and histology, oral pathology, radiography, periodontology, pain control, and dental materials. Dental hygiene science courses include oral health education/preventive counseling, patient management, clinical dental hygiene, community dental health, medical and dental emergencies, and supervised instruction in pre-clinical and clinical practice. Fifty-four percent of all programs use extended clinical facilities beyond their campus, and 80% require students to perform a clinical rotation in a community or public-health setting (ADHA, 2006).

Both associate's and baccalaureate degrees are considered entry-level to the profession, and both prepare graduates for the clinical practice of dental hygiene in a private dental office or public clinic. Associate's degree programs offer an average of 2,860 total clock hours of instruction, while baccalaureate programs offer an average of 3,073 total clock hours of instruction.

Dental hygiene programs awarding associate's degrees offer about the same average number of didactic and laboratory clock hours devoted to patient care as programs that award baccalaureate degrees. General education, social science, and

biomedical science courses included in the curriculum should be equivalent to those offered in four-year colleges and universities (www.ada.org).

Baccalaureate programs, on average, offer more clinical clock hours devoted to patient care than do associate's degree programs (607 versus 535). On average, baccalaureate programs provide notably more clock hours of instruction in written communication, chemistry, oral health education/preventive counseling, and patient management.

The average estimated total cost of tuition and fees for an associate's degree is $36,463 and $48,617 for a baccalaureate degree.

There are 287 associate's degree dental hygiene programs offering either an Associate of Applied Science Degree, Associate in Science Degree, or Associate in Arts Degree nationally. Fifty-three dental hygiene programs offer a Bachelor of Science degree in Dental Hygiene (ADHA, 2006). Based on the Commission on Dental Accreditation's 2012-2013 Survey of Allied Health Accredited Dental Hygiene Programs, 83% of institutions offering dental hygiene education are public institutions while 5.4% are private, non-profit. The survey results also find that 29.8% of faculty members in accredited dental hygiene programs are full-time, while 70.2% of faculty are employed as part-time or adjunct faculty (www.ada.org).

Less than half (47%) of all dental hygiene programs offer elective courses, and 12% offer specialization tracks. Due to program lengths, baccalaureate programs and master's level degree programs are more likely than associate's degree programs to offer both elective courses and specialization tracks. The difference in the extent of time to complete a dental hygiene program (baccalaureate/four-year versus an associate's degree

/two year) bears consideration when discussing engagement opportunities afforded to students enrolled in either type of program.

Membership in student chapters of the ADHA varies from dental hygiene program to dental hygiene program, ranging from mandatory membership of all students to no requirement. The purpose of the constitution and bylaws of each chapter may also vary, but should define how a student chapter is instituted and governed. ADHA does not require student chapters to create and submit a student constitution and bylaws; however, there are many colleges and universities that require a constitution and/or bylaws for student organization status. It should not be a complicated document, but should contain all necessary information for proper functioning of the student chapter. However the document is prepared, it must be distributed to all members of the student chapter for review before being adopted. The original copy of the bylaws should be retained for the dental hygiene program's files.

Forming committees will depend upon the specific goals and needs of each particular chapter. Committees may include membership, component/constituent outreach, community dental health, program development, legislation, fundraising, continuing education, hospitality/social, table clinics, research poster sessions, and event planning (www.ada.org).

Conclusion

This chapter presented an overview of Astin's *Student Involvement: A Developmental Theory for Higher Education*. Although the research identified many highly acclaimed student development theories and models, Astin's Student Involvement Theory served as the theoretical framework for this study.

Furthermore this chapter explored the different types of student engagement: student-administration interaction; student-faculty interaction; student-peer interaction; and student-organization involvement as the primary areas of student investment that this study examined.

It is worthwhile to note that this chapter also provided a description of accredited dental hygiene programs and their rigorous educational requirements. It is important to draw attention to the different learning environments between undergraduate students in a four-year university and that of dental hygiene students. The rigid structure of the dental hygiene curriculum may present challenges for promoting dental hygiene student engagement opportunities.

Acknowledging the intensity of an accredited dental hygiene program's curriculum, that must keep pace with current technological procedures, and with increased dental hygiene responsibilities, is an ongoing effort for dental hygiene educators across the country.

Additionally, there is growing concern over an increase in dental hygiene student academic challenges and the possibility for consequential negative impacts on student outcomes. There has been little or no research on promoting dental hygiene student success through student engagement opportunities. This dissertation filled a gap in the dental hygiene student engagement literature by conducting a national study of involvement variables that impact dental hygiene student success as measured by the cumulative GPA.

Chapter Three discusses research design and methodology. The survey instrument is described, along with a discussion of the target populations, the data collection process, and data analysis procedures.

Chapter 3

Methodology

Introduction

Chapter three describes the methods used to examine the influence of dental hygiene student engagement interactions (independent variables), have on dental hygiene student success, as measured by cumulative grade point average (GPA, dependent variable) while the student is enrolled in a dental hygiene program. The purpose of this study was to discover if there are options for dental hygiene educators to incorporate enhanced educational strategies that will strengthen dental hygiene student progress as the student navigates through an ever-changing and challenging dental hygiene curriculum. This chapter also provides information pertaining to the research design, the theoretical framework, the data analysis model/research questions, the survey instrument used for data collection, population, the data analysis procedures assumptions, and limitations. Chapter three concludes with a summary.

Research Design

The research design for this study was a quantitative non-experimental research design. This study adapted the (I-E-O) model with student demographics as inputs (I), two-year and four-year dental hygiene student-interactions as environments (E), and cumulative grade point average (GPA) as the output (O). The goal for this procedure was to control and adjust for student input variable effects, to determine whether dental hygiene program interactions (E-variables) have any influence on the student's GPA. Non-experimental quantitative research designs are suitable for testing the degree to which variables relate, and for making predictions (Johnson, 2001).

Theoretical Framework

The theoretical framework employed for this study was Alexander W. Astin's, *Student Involvement: A Developmental Theory for Higher Education* (Astin, 1985). Alexander Astin's 1985 Theory of Student Involvement's fundamental principle focuses on the correlation between academic performance and student involvement. This theory has many applications in the world of higher education, and is one of the strongest pieces of evidence for co-curricular student involvement (Astin, 1985). Researchers have continued to study this correlation with similar results. Student involvement in co-curricular activities, such as student organizations, leadership positions, and activity in campus residence halls has a positive correlation with retention and academics (Kuh and Pike, 2005). Because of the positive aspects of academic and co-curricular involvement, universities have been encouraging students to become involved.

This study also focused on the correlation between dental hygiene student engagement and student success. This study's survey questions were designed to determine if dental hygiene students' co-curricular activities are predictors of student success.

Astin's theory explains how desirable outcomes for institutions of higher education are viewed in relation to how students evolve and develop as a result of being immersed in their coursework, as well as being engaged in campus life (Astin, 1985). The appeal of Astin's theory is its link to a student's psychological determination. The student cannot be forced to be involved. The student must determine his/her own need to *invest* time and energy in activities, events, classes, and organizations, and clubs for positive outcomes to transpire. Institutions realize there are factors that can motivate a

student, or discourage a student from becoming involved in any number of institutional offerings.

Alexander Astin's Input-Environment-Output model underscores the need to have an understanding of students' qualities and characteristics upon their entry into an educational institution, the nature of the educational environments with which they come into contact, and their qualities and characteristics as they exit the institution, in order to be able to fully evaluate their effectiveness (Astin, 1991). This model was applied to this study, as the input and environment variables are explored to determine if they have any influences on the output variable (GPA).

Survey Instrument

The survey instrument was an originally prepared 40-item questionnaire. The survey was designed to address the research questions, with topical headings to compartmentalize sections for respondent-comprehension. The first section, Demographics, included 14-questions pertaining to the student's age, gender, race, institutional and enrollment-related information, two- or four-year Dental Hygiene program, first-year/freshman or second-year/senior, and range of GPA. The second section—Student Interactions with Dental Hygiene Program Director/Administration—is a six-question portion with items pertaining to time spent with the Dental Hygiene Program Director by meeting outside of class discussing academic issues, discussing career options, working in conjunction on a committee research project, attending a dental hygiene meeting together, or by frequenting an institutional facility for a non-dental hygiene related activity.

The third section—Student Interactions with Dental Hygiene Faculty—is a seven-question portion, with items pertaining to students contributing to course discussions, meeting faculty to review course content, exams, or to discuss career options, and working with faculty on committees, research, or emailing faculty or receiving prompt feedback.

The fourth section—Student Interactions with Dental Hygiene Classmates—is a five-question portion with items pertaining to students participating in class, meeting classmates outside of class, collaborating with classmates on dental hygiene course projects, and by attending dental hygiene events with classmates.

The fifth and last section—Student Activity/Participation in Student Chapter of ADHA—is an 8-question portion with items pertaining to student participation in the student chapter of the ADHA, student involvement in dental hygiene-related activities, such as Table Clinics, and community/service learning events.

Validity and Reliability

Each item developed for the 40-item questionnaire was reviewed by the personnel from the Research Department of the ADHA. The goal of the ADHA Research Department is to broaden the association's involvement in a variety of oral health research initiatives. In addition, the research personnel support internal association-related endeavors that rely on research or statistical expertise.

Both inside and outside of the research arena, it is important for practitioners to make decisions that are firmly grounded in knowledge obtained from research and clinical experiences. To help advance the Dental Hygiene Profession, the National

Dental Hygiene Research Agenda (NDHRA) identifies the following priority research areas:

- Health Promotion/Disease Prevention
- Health Services Research
- Professional Education and Development
- Clinical Dental Hygiene Care
- Occupational Health and Safety

As part of the professional dental hygiene community, ADHA is committed to using the NDHRA to guide research, enhance patient-centered care, improve the quality of services and foster other professional efforts. The ADHA is also focused on acquiring data that supports the educational goals of the profession and the public, and private policies that keep it moving forward.

The National Dental Hygiene Research Agenda (under current revision) defines the area of Professional Education and Development by examining studies that are concerned with educational methods, curricula, students and faculty; recruitment and retention of students and faculty; and, promoting graduate education and career path options. The agenda includes the following:

1. Evaluate the extent to which current dental hygiene curricula prepare dental hygienists to meet the increasingly complex oral health needs of the public
2. Investigate how other health professions have established the master's and doctoral levels of education as their entry level into practice
3. Identify the factors that affect recruitment and retention of faculty
4. Assess how educators are socializing students to research

5. Investigate the extent to which new research findings are incorporated into the dental hygiene curriculum
6. Validate and test measures that evaluate student critical thinking and decision-making skills
7. Investigate curriculum models for training and certification of competency in specialty areas (e.g., anesthesiology, developmentally disabled, forensics, geriatrics, hospital dental hygiene, oncology, pediatrics, periodontology, and public health)
8. Critically appraise current methods of evaluating clinical competency (dental hygiene graduation competencies, standardized national board testing, clinical board examinations)
9. Validate measures that assess continued clinical competency

The survey was piloted and reviewed for content, grammar, and comprehension by an additional panel of dental hygiene program directors and educators with a total of more than 100 years of experience in the dental hygiene educational field. Additionally a panel of students piloted the survey for comprehension, and time of completion.

Data Analysis Framework

Astin's Theory of Student Involvement's I-E-O model presents a fitting, conceptual model for examining the relationship between the college environment (E-student interactions and activities of engagement) and student success (O), and served as the data analysis framework for this study. The I-E-O model's core concepts are composed of three fundamental components. The first concept centers on a student's inputs (I), such as the student's existing attributes and abilities when the student begins

his/her college experience. These inputs are, in a sense, the raw materials with which the institution has to deal (Astin, 1970).

The second is the student's environment (E), which accounts for all of the relationships, exchanges, and happenings a student encounters during college. Thirdly, are the outcomes (O), which cover a student's recently acquired persona, opinions, principles, and views that have become the newly-designed fabric surrounding the graduate's make-up as he/she leaves the college community.

Astin's I-E-O model emphasizes the student as the focal point, when examining the nature of the educational environment and how fully the student has embraced the institution's offerings. This model has been the guide for decades of research on the impact of the college environment on undergraduate student development (Case, 2011).

The model is particularly useful in examining the impact of the college environment on student development by matching its I-E-O design with statistical analysis methods, such as temporally-sequenced blocked multiple regressions, the data analysis methodology that was used in this study. According to Astin, step-wise, linear, multiple regression analysis is perhaps the most flexible and versatile method, particularly if the regression is carried out in separate stages dictated by the logic of the college impact process (Astin, 1970). The college impact (E) was measured over the time period that the dental hygiene student had been enrolled in the dental hygiene program, senior/second-year student, or freshman/first-year student. These time periods allowed for the model to measure the effects of the college environment (student interactions, and student participation in student dental hygiene organization) on a selected student outcome-student success, as measured by the cumulative grade point

average (GPA). This model was applied to this study as the input and environment variables were explored to ascertain the amount of influence on the output variable (GPA).

To expedite the data analysis process, the predictor (input and environment) variables were organized into six blocks—one block of input variables and six blocks of environmental variables. The sections below identify by block, each of the predictor variables to be used in this study, and indicate how each variable was measured.

Outcome variable. The outcome or dependent variable of this study was student success, as measured by the cumulative grade point average (GPA), and was determined from the eleventh question on the survey of demographics. The GPA was defined in this study as students' self-reporting from a drop-down menu of a seven-point scale, ranging from 3.6-4.00 to below 2.50.

Input variables. This study's input variables were organized into Block 1 (see Tables 7). Block 1 represented student demographics, including gender, age, citizenship, and race (see Table 6).

Most models that examine aspects of student success include the input variables--student background characteristics, including demographics and pre-college academic status, and other experiences (Kuh et al., 2007). Many studies have looked at the causes and consequences of student success in college, and how these factors interact with gender, race and ethnicity, and first-generation status (Allen, 1999; Gaither, 2005; Person & Christensen, 1996).

Table 6

Student Background Characteristics

Variable	Relationship	References
Demographics: Gender, age, race, citizenship, location of residence	Student Success	• Kuh et al., 2007 • Allen, 1999 • Gaither, 2005 • Person & Christensen, 1996 • Gloria, Robinson Kurpius, Hamilton, & Willson, 1999 • Rendon, Jalomo, & Nora, 2000

Race and ethnicity, along with family income, are especially important because the nature of the undergraduate experience of historically underserved students can differ markedly from that of majority White students in Predominantly White Institutions (PWIs) (Allen, 1999; Gloria et al, 1999; Rendon et al., 2000).

Block 1 and respective survey measures are summarized in Table 7.

College environmental variables. The college environmental variables encompass institutional or between-college characteristics of the student's environment that are the constant for all students at a particular college, but can differ from one college to another, such as a private or public institution (Astin, 1991). Additionally, college environmental variables include dental hygiene program enrollment and student academic status, and three different types of student interactions, which are measured by two surveys—freshmen-student or senior-student—and are represented by Blocks 2

through 5. The last block, block 6, represents student-participation in the Student Chapter of the ADHA and student engagement activities.

Table 7

Block 1 Variables: Student Input Characteristics

Variables	Survey Measures/Response
1. Gender	1=Male 2= female
2. Age	6-point scale, ranging from 19 and younger to 40 and older
3. Citizenship	1=US
	2=Canada
	3=other
4. Ethnicity–Hispanic or Latino	Dichotomous variable
	1=Yes
	2=No
5. Race	Six variables

Block 2 represents between-college characteristics, dental hygiene program enrollment, fulltime/part-time status, highest degree attained in non-dental hygiene discipline, hours of course load, and freshman versus senior student status, and student academic status as measured by the cumulative grade point average.

Studies have looked at the student enrollment status as it relates to student success. Developed by the Higher Education Research Institute (HERI) in 1992, the College Senior Survey (CSS) is administered annually through the Cooperative Institutional Research Program (CIRP) at the University of California, Los Angeles. The

CSS, which is typically administered to college seniors as an exit survey, offers valuable feedback on students' academic and campus life experiences. Information from the CSS can be used for student assessment activities, accreditation and self-study reports, campus planning, research, and policy analysis. Data from the CIRP Freshman Survey and the 2009 CIRP College Senior Survey of the same student cohort are used to examine the relationship between factors in the college environment (predictor environmental variables, such as student enrollment) and student success (see Table 8). With regard to students' academic status, the vast majority of the students in the sample (95.4%) were full-time undergraduates when they completed the survey, and 86.0% reported an overall college grade point average of a "B" or better (CIRP, 2009).

Table 8

College Environmental Variable: Student Enrollment

Variable	Relationship	Reference
Student Enrollment	Student Success	• Cooperative Institutional Research Program (CIRP), 2009

Block 2 and respective survey measures are summarized in Table 9.

Block 3 represents Student-Program Director/administration interactions via meetings/conferences, attending meetings together, collaborative initiatives, and socializing at non-dental hygiene event. In addition, block 3 represents the assessment of the quality of student-program director/administration interactions.

Table 9

Block 2 Variables: Institutional Characteristics, Dental Hygiene Program Enrollment, and Student Academic Status

Variables	Survey Measures/Response
1. Institutional characteristics- Private Public	1=Private 2=Public
2. Enrollment in two-year or four-year or degree completion dental hygiene program	Dichotomous variable 1= Yes 2= No
3. Is your dental Hygiene program semester-based or quarter-based	Dichotomous variable 1=Yes 2=No
4. Highest degree in a non-dental hygiene discipline	4 point scale ranging from associate's degree to Non-applicable
5. Enrolled part-time or full-time	Dichotomous variable 1=Yes 2=No
6. Course-load in hours	Fill-in
7. Enrolled in the dental hygiene program as a first year/freshman or second year/senior	Dichotomous variable 1=Yes 2=No
8. Which school do you attend	Drop down menu
9. Overall College GPA	Seven point scale, ranging from 3.6-4.00 to below 2.50

Students perform better and are more satisfied at colleges that are committed to their success. Community college students also benefit from administrative services targeted to assist them with academic and career planning, and academic skill

development (Community College Survey of Student Engagement [CCSSE], 2008). Survey items from the CCSSE Institutional Report questioned the respondent on the following: administrative support to help student succeed; institutional fostering of diversity initiatives; administrative support of student's personal life challenges; and, administrative interest in student's career counseling and guidance.

Table 10

Student-Administration Support Variable

Variable	Relationship	Reference
Student-Administration Support	Student Success	• Community College Survey of Student Engagement [CCSSE], 2008

Block 3 and respective survey measures are summarized in Table 11.

Table 11

Block 3 Variables: Student-Program Director/Administration Interactions

Variables	Survey Measures/Response
1. Meeting outside of class to discuss academic issues	Five-point scale ranging from weekly to never
2. Meeting outside of class to discuss career plans	Five-point scale ranging from weekly to never
3. Collaborative initiatives other than coursework	Five-point scale ranging from weekly to never
4. Attending dental hygiene conference together	Five-point scale ranging from weekly to never
5. Attending a non-dental hygiene event on campus together	Five-point scale ranging from weekly to never
6. Self-report of quality of interactions with Program Director/Administration	Five-point scale ranging from excellent to poor

Block 4 represents student-faculty interactions via classroom discussions, and meetings/conferences to discuss course-related issues, meetings/conferences to discuss non-course-related issues such as career plans, and collaborative initiative. Block 4 also represents student-faculty interactions, as characterized by prompt feedback, emailing, and assessment of quality of faculty interactions.

The Center for Community College Student Engagement (CCCSE) administers, in addition to its own survey, an additional two surveys that all complement each other: *Community College Faculty Survey of Student Engagement* (CCFSSE), and the *Survey of Entering Student Engagement* (SENSE). All are tools that assess student engagement and how engaged students are with college faculty and staff, with other students, and with their studies (CCSSE, 2010).

Survey items from the 2008 Center for Community College Student Engagement Institutional Report questioned the respondent on the following: using email to communicate with an instructor; discussing grades and/or assignments with an instructor; talking about career plans with an instructor; discussing ideas from classwork with instructor outside of class; receiving prompt feedback from instructor; and, working with instructor on activities other than coursework.

There have been a myriad of studies over the years that have demonstrated the importance of strong student-faculty connections and student success. Faculty and staff must use effective educational practices throughout the institution to help students, and to create a culture that fosters student success (Allen, 1999; Chickering & Gamson, 1987; Chickering & Reisser, 1993; Dayton, Gonzalez-Vasquez, Martinez, & Plum, 2004; Education Commission of the States, 1995; Kuh, Douglas, Lund, & Ramin-Gyurnek,

1994; Kuh, Kinzie, Schuh, Whitt, & Associates, 1991; Outcalt & Skewes-Cox, 2002; Pascarella & Terenzini, 2005; Watson, Terrell, Wright, Bonner, Cuyjet, Gold, Rudy, & Person, 2002).

Table 12 lists references related to the student-faculty interaction variable, while Table 13 summarizes the survey measures included in Block 4.

Table 12

Student-Faculty Interaction Variables

Variable	Relationship	References
Student-Faculty Interaction	Student Success	• Community College Survey of Student Engagement [CCSSE], 2008, 2010 • Community College Faculty Survey of Student Engagement (CCFSSE), 2010 • Survey of Entering Student Engagement (SENSE), 2010 • Allen, 1999 • Chickering & Gamson, 1987 • Chickering & Reisser, 1993 • Dayton, Gonzalez-Vasquez, Martinez, & Plum, 2004 • Education Commission of the States, 1995 • Kuh, Douglas, Lund, & Ramin-Gyurnek, 1994 • Kuh, Kinzie, Schuh, Whitt, & Associates, 1991 • Outcalt & Skewes-Cox, 2002 • Pascarella & Terenzini, 2005 • Watson, Terrell, Wright, Bonner, Cuyjet, Gold, Rudy, & Person, 2002

Table 13

Block 4 Variables: Student-Faculty Interactions

Variables	Survey Measures/Response
1. Contributing to course discussions	Five-point scale ranging from weekly to never
2. Meeting outside of class to discuss course-related issues	Five-point scale ranging from weekly to never
3. Meeting outside of class to discuss career plans	Five-point scale ranging from weekly to never
4. Collaborative initiatives other than coursework	Five-point scale ranging from weekly to Never
5. Emailing to communicate with faculty	Five-point scale ranging from weekly to never
6. Receiving prompt feedback on student performance	Five-point scale ranging from weekly to never
7. Self-report of quality of interactions with faculty	Five-point scale ranging from excellent to poor

Block 5 represents student-student interactions via classroom discussions, meetings/conferences to discuss course-related issues, collaborative initiatives, and attending dental hygiene-related events together.

Students learn more when they are actively involved in their education and have opportunities to think about and apply what they are learning in different settings with their classmates. Through collaboration with others to solve problems or master challenging content, students develop valuable skills that prepare them to deal with the kinds of situations and problems they will encounter in the workplace, community and in their personal lives (CCSSE, 2008).

Survey items from the 2008 CCSSE Institutional Report questioned the respondent on the following: asking questions in class or contributing to class discussions; presentation to class; working with other students on projects during class; working with classmates outside of class to prepare for class assignments; tutored or taught other students; participated with classmates in a community-based project; and, discussed ideas from classroom topics with classmates outside of class.

Table 14 identifies references related to the student-student interaction variable, while Table 15 summarizes the survey measures included in Block 5.

Table 14

Student-Student Interaction Variable

Variable	Relationship	Reference
Student-Student interactions	Student Success	• Community College Survey of Student Engagement [CCSSE], 2008

Block 6 represents student-participation in the Student Chapter of the ADHA and student engagement activities, such as presentation of a Table Clinic and volunteering for a service-learning event.

Findings from the 2009 Administration of the College Senior Survey (CSS) National Aggregates examined student success with students' leisure activities, including participating in campus organizations, clubs, volunteering, community service learning activities, working, exercising, and partying. In an average week, many students spend significant time socializing with friends, exercising/playing sports, surfing the internet,

watching TV, participating in student clubs/groups, and accessing online social networks (CSS, 2009).

Table 15

Block 5 Variables: Student-Student Interactions

Variables	Survey Measures/Response
1. Participating in classroom discussions	Five-point scale ranging from weekly to never
2. Meeting outside of class to discuss course-related issues	Five-point scale ranging from weekly to never
3. Collaborative dental hygiene course-related initiatives	Five-point scale ranging from weekly to never
4. Participating in a group dental hygiene assignment at a facility outside of the dental hygiene program	Five-point scale ranging from weekly to never
5. Attending a dental hygiene conference/meeting/course together	Five-point scale ranging from weekly to never

Table 16 identifies references related to student engagement activities, while Table 17 summarizes the survey measures included in Block 6.

Table 16

Student Engagement Activities Variable

Variable	Relationship	Reference
Student engagement activities	Student Success	• Administration of the College Senior Survey (CSS): National Aggregates, 2009

Table 17

Block 6 Variables: Student Engagement Activities and Participation in the ADHA Student Chapter

Variables	Survey Measures/Response
1. Presentation of a Table Clinic	Dichotomous variable 1=Yes 2=No
2. Volunteer to participate in a Community/Service Learning event	Dichotomous variable 1=Yes 2=No
3. Does Dental Hygiene Program have a Student Chapter ADHA?	Dichotomous variable 1=Yes 2=No
If yes, respond to following questions: 4. Attend meetings	Dichotomous variable 1=Yes 2=No
5. Assume a leadership role	Dichotomous variable 1=Yes 2=No
6. How many hours a week does student commit to Student Chapter ADHA?	Five-point scale ranging from one hour a day to do not commit any time

Data Analysis Model

Astin's (1993) Input-Environment-Outcomes (I-E-O) model provided the data analysis-framework that guided this study. The I-E-O model features the student's attributes and characteristics upon their entry into an educational institution, the nature of the educational environments with which they come into contact, and their qualities and personalities as they exit the institution in order to fully evaluate the student's satisfaction with his/her college experience.

The purpose of regression analysis is to examine the effects of one or more independent variables on a single dependent variable. Regression arrives at an equation to predict performance based on each of the inputs.

Regression analysis was used to investigate if any correlations exist between the independent variables (dental hygiene student engagement interactions) and the dependent variable (dental hygiene student success, as measured by cumulative grade point average-GPA), thereby addressing each of the following research questions:

1. What influence, if any, do student demographics (age, gender, and race) have on student's cumulative grade point average?
2. What influence, if any, do student-program director/administration interactions have on student's cumulative grade point average?
3. What influence, if any, do student-faculty interactions have on student's cumulative grade point average?
4. What influence, if any, do student-student interactions have on student's cumulative grade point?
5. What influence, if any, does participation by students in Student Chapters of the American Dental Hygienists' Association have on student's cumulative grade point average?

Population

The population consisted of 12,000 dental hygiene students enrolled in the 334-accredited dental hygiene programs in the United States. Six-thousand first-year/freshman dental hygiene students and 6,000 second-year/senior dental hygiene students enrolled in either a two-year or four-year program comprised the population

surveyed. Recent studies have examined e-mail survey response rates and have noted a considerable decline, which may, in part, be due to issue salience or information overload (Sheehan, 2001). Therefore, the decision to improve response rates, and generate as much pertinent information as possible, prompted the researcher and the American Dental Hygienists' Association (ADHA) to survey all dental hygiene students enrolled in accredited dental hygiene programs in the U.S. The ADHA electronically distributed the survey on behalf of the researcher to the dental hygiene students, through the use of a designated survey software program. The responses were directed to the researcher for analysis.

Data Analysis Procedures

A step-wise multiple regression using blocks with variables to be determined from the survey was used. Stepwise methodology was used in order to determine the variables in each block that are significant predictors of GPA. Astin's I-E-O Model was also used as the conceptual framework and data management tool to determine the blocks for this regression analysis.

The Statistical Product and Service Solutions (SPSS) statistical software package (Statistics GradPack 21.0, 2012) was used to support quantitative data analysis. SPSS can perform multiple regression analysis, which shows the influence of two or more variables on a designated dependent variable. In multiple regression analysis, any number of variables can be used as predictors. The advantage for stepwise multiple regression for this study is that the analysis shows the influence of the input variable on the environment and dependent variable, as well as the influence of the environmental variables on the dependent variable.

Following the data collection process, the methodology used to analyze the results was multiple regression analysis using blocks with variables from the surveys. Regression analysis controls for the influence of the input variables, thereby allowing the researcher to make less biased causal inferences about the influence, if any, of the environmental variables (E). Regression arrives at an equation to predict performance based on each of the inputs, and the results provide the best combination of predictors of the dependent variable. The most adaptable method for implementing the I-E-O model is blocked stepwise regression analysis (Astin & Sax, 1998).

Applying temporal sequencing, with the ability to block variables in a stepwise fashion, results in a new regression model (Astin & Denison, 2009). The predictor variables were entered in to the regression model in a step-wise fashion in accordance with the I-E-O model. The regression procedure ceased to add new variables when the p value associated with the inclusion of an additional variable increases above the .05 significance.

Assumptions

The first assumption is that the students regarded the information from the survey as important. The role of the current student in today's educational environment, find them often confronted with many requests to complete college questionnaires, and an additional request may burden the student. If the questionnaire is not attached to a grading mechanism, the student may not want to spend the time responding.

The second assumption is that the student would take the time to respond and to respond accurately. In haste to complete another task, the student may not take the time to read the questions and may just respond to be finished, not necessarily to be accurate.

The third assumption is that the students would not discuss the survey, nor have fellow classmates complete the questionnaire for them. The responses must represent the individual student and not a cohort from one program to another.

Limitations

The first limitation pertains to the survey representing a specific time in the student's educational tenure. The student's interactions and participation in student activities may change, although the time frame is limited between two- to four-years.

The second limitation is that this study is a quantitative study and the respondents did not have a chance to qualify their response with any verbal face-to-face discussions. This inability to provide additional information to the responses may have limited a more accurate insight into the students' interactions.

A third limitation pertains to the use of self-reported data (student self-reporting of their GPAs). The validity and credibility of self-reports have been examined extensively (Baird, 1976; Berdie, 1971; Pace, 1985; Pike, 1995; Pohlmann & Beggs, 1974; Turner & Martin, 1984).

Student self-reports are subject to the halo effect, the possibility that students may slightly inflate certain aspects of their behavior or performance, such as grades (Kuh, 2001). According to Pike (1999), this halo effect appears to be relatively constant across different types of students and schools. Kuh (2001) clarifies by explaining that while the absolute value of what students report may differ somewhat from their actual performance, the effect is consistent across schools and students, so that the halo effect does not appear as an advantage or disadvantage for one institution or student group compared with another.

Summary

This chapter reviewed the methodology of the study. The focus of this research was to investigate the national trends of dental hygiene student interactions in the dental hygiene program, and student engagement in student chapters of the ADHA. The study determined whether dental hygiene student interactions and student involvement have an influence on student success, as measured by cumulative grade point average (GPA). An overview of the methodology used to examine the research questions was also included in this chapter. The theoretical framework was discussed, including how the I-E-O model was employed as the Data Analysis Model. The research design, survey instrument and the population were also described. Finally, assumptions and limitations were also identified**.** Chapter Four discusses in detail the analysis of the data.

Chapter 4

Results

Introduction

Previous research has examined the influence of undergraduate student engagement on student academic success and on the successful outcome of the college experience (Astin, 1984). Research has found that the correlation between academic and co-curricular involvement and student success is positive and significant (D'Amico & Hawes, 2000; Huang & Chang, 2004). However, little or no research has examined the relationship between dental hygiene student engagement while enrolled in a dental hygiene program and dental hygiene student success, as measured by cumulative grade point average (GPA). This study intended to fill the gap in the dental hygiene student engagement literature by conducting a national student engagement survey among 12,000 freshman and senior dental hygiene students enrolled in accredited dental hygiene programs in the U.S. The results may prompt dental hygiene program directors and educators to focus on improved strategies and processes for delivering dental hygiene education through strong leadership and revitalized policies and practices. This concept is discussed further in Chapter Five.

Data Analysis Process

As discussed in Chapter Three, Astin's I-E-O model has been the guide for decades of research on the impact of the college environment on undergraduate student development by matching its I-E-O design with statistical analysis methods, such as temporally-sequenced blocked multiple regression, the data analysis methodology used in this study. To expedite the data analysis process, the predictor (input and environment)

variables were organized into six blocks—one block of input variables (demographics) and five blocks of college environmental variables (institutional or between-college characteristics, enrollment, academic status, student interactions, and student activity and participation in the student chapter of the American Dental Hygienists' Association [ADHA].

Using the research design and the original survey developed for this study and described in Chapter Three, the six blocks of predictor variable data were examined for their possible influence on the cumulative GPA (the dependent variable). Before describing the results of the data analysis, a summary of descriptive statistics that characterize the population profile is presented.

Characteristics of the Population

The population was comprised of 12,000 freshmen and senior dental hygiene students enrolled in any of the 334-accredited dental hygiene programs in the U.S. Among students who received the survey, 2,806 started it and 2,649 students completed it, for a response rate of 22% and a completion rate of 94%. Only completed surveys were included in the final analyses. The average time to complete the survey was 428.47 seconds, or approximately 7.14 minutes.

Appendix A shows the full set of characteristics of the population. Students in the population were predominately female (97.4%). Respondents ranged in age from under 19 (2.7% of respondents) to more than 40 years of age (4.8%). The majority of respondents (42%) fell in the 20-23 age range, followed by 24-29 year olds (32.2%), and 30-34 year olds (11.8%).

Race was delineated into six options: American Indian/Alaskan Native (1.9% of respondents); Black/African American (3.1%); White (80%); Asian (6.6%); Native Hawaiian/Pacific Islander (0.7%); and, "chose not to respond" (5.1%). The majority of respondents (96.4%) were U S. citizens, followed by Canadian citizens (0.2 %), and those who identified "Other" (3.3%). In terms of ethnicity, the Hispanic or Latino population comprised 11.3%, with the majority of respondents (88.7%) identifying as neither Hispanic nor Latino.

The dependent variable, cumulative GPA, was reported in 7 ranges from below 2.5 to 4.0. The majority of the respondents (29%) reported their GPA ranged from 3.5 to 3.75. An almost equal number of respondents (26.9%) reported their GPA ranged from 3.76 to 4.00, and a lesser number (20.6%) reported their GPA ranged from 3.26 to 3.49. Ninety-three percent of respondents reported a GPA of 3.00 or higher (Table 1). For statistical analysis, labels for the GPA ranges were converted to a midpoint GPA within each interval, and will be referred to as *GPA proxy* going forward. These values are displayed in Table 18.

The population of dental hygiene students responding to this survey appears to be academically strong and consistent with the level of qualified applicants applying for admission to dental hygiene programs (standard deviation of GPA proxy values is 0.31607, indicating a very small amount of GPA variation around the mean). It is possible that the consistency among scores is due to the fact that 70% of dental hygiene programs use college science GPA as part of the criteria in admissions procedures, and 70% of dental hygiene programs include overall college GPA as admission criteria. In 2011-12, associate dental hygiene programs reported a mean of 81 applicants with 31

admissions (38% admitted), while baccalaureate programs reported a mean of 76 applicants with 28 admissions (36% admitted) (www.adha.org). Because the majority of dental hygiene programs (99%) have a maximum enrollment cap, GPA is used to make admission selections.

Table 18

Respondents' GPA Ranges

	Frequency	Valid Percent
3.76- 4.00	712	26.9
3.50-3.75	773	29.2
3.26-3.49	577	21.8
3.00-3.25	419	15.8
2.75-2.99	133	5.0
2.50-2.74	31	1.2
Below 2.50	4	.2
Total	2,649	100.0
Missing	157	
Total	2,806	

Respondents predominately (82%) attend public schools, 13.2% of respondents attend private schools, and 4.2% were unsure if their school was private or public. Eighty percent of respondents attend a two-year dental hygiene program, while 15.4% attend a

four-year dental hygiene program and 4.5% attend a degree completion dental hygiene program (see Appendix A).

Thirty-eight percent of the population already had an associate's degree in a non-dental hygiene discipline, and 20.4% had a bachelor's degree in a non-dental hygiene discipline. Only 1% of the population had a master's degree in a non-dental hygiene discipline. Thirty-nine percent of respondents responded "Not Applicable," perhaps indicating that they had not earned any degree.

The respondents reporting their status as being first-year students totaled 41.3% while 40.6% reported their status as second-year students, 7.7% were third-year students, and 10.3% of respondents were fourth-year students (see Appendix A).

More than a third (37.1%) of respondents reported never meeting with the dental hygiene program director over academic issues. Additionally, more than one-third of respondents met with the dental hygiene program director weekly, (13.3%) every two weeks (5.7%), or monthly (17.6%), to discuss academic issues, while 25% of respondents met at least once a semester with the dental hygiene program director to discuss academic issues (see Appendix A).

The majority (62.7%) of respondents reported they never met outside of class to discuss career plans with the dental hygiene program director. Very few (16.3%) students met weekly, every two weeks, or monthly with the dental hygiene program director to discuss career plans. Under a quarter (21%) of respondents reported meeting outside of class once an academic term with the dental hygiene program director to discuss career plans (see Appendix A).

Almost half of the students (44.4%) never worked with the dental hygiene program director on non-course work activities, such as committees, student organizations, or research projects. Few students (15.7%) worked either weekly or every two weeks with the dental hygiene program director on non-course work activities. Roughly one-in-five (21.6%) students collaborated with the dental hygiene program director on non-course work activities on a monthly basis. Finally, few students (16.4%) worked with the dental hygiene program director on non-course work activities only once an academic term. One-third (33.15%) of respondents never attended a meeting or conference with the dental hygiene program director. Very few (4.7%) of the students attended weekly or every two weeks a meeting or conference with the dental hygiene program director. Roughly one-in-five (21.1%) respondents attended a monthly meeting or conference with the dental hygiene program director. Finally, the remaining respondents (40.5%) attended a meeting or conference with the dental hygiene program director only once an academic term (see Appendix A).

Students who self-reported excellent interactions with the dental hygiene program director totaled 39.7%. Almost a third (32.7%) of respondents self-reported their interactions with the dental hygiene program director as being good. The students who self-reported their interactions with the dental hygiene program director as being satisfactory totaled 15.8%. Few students (7.7%) reported their interactions with the dental hygiene program director as being fair. Finally, only 4.2% of the respondents reported their interactions with the dental hygiene program director as being poor (see Appendix A).

Only 6.1 % of respondents reported never meeting with faculty. The majority (76.1%) of students responded that they met with faculty weekly. Only 5.1% met with faculty every two weeks, with 8.4% of the respondents reported meeting with faculty monthly. Few (3.8%) students reported meeting with the faculty once during an academic term. One-fourth (25.5%) of respondents never met outside of class with a faculty member to review for exams or to clarify course-related issues. However, more than a third (34.7%) of respondents met with faculty either weekly (23.1%) or every two weeks (11.6%). Twenty-two percent of the respondents met with faculty on a monthly basis, and 14.6% of respondents met with faculty once an academic term (see Appendix A).

The majority (56.2%) never met with faculty to discuss career plans. The respondents meeting with faculty to discuss career plans weekly totaled (8%), and every two weeks (3.1%). The students meeting with faculty monthly to discuss career plans totaled (11.7%). Students meeting with faculty to discuss career plans only once an academic term totaled (21%) (see Appendix A).

Over one-third (36.7%) of respondents never collaborated with faculty on non-course activities, such as committee-work, research projects, etc. The students collaborating with faculty on a weekly basis totaled 13.4%, while those reporting collaboration activities every two weeks totaled 7.4%. Student-faculty collaboration efforts occurring monthly totaled 25.2%. The students reporting they collaborated with faculty only once an academic term totaled 17.2%. Only 3% of respondents reported they never received emails from faculty (see Appendix A).

The majority (63.2%) of respondents received emails from faculty on a weekly basis. Almost an equal number (14.6%) of students received emails every two weeks as those who received emails monthly (15.1%). Very few (4.1%) respondents received emails only once an academic term (see Appendix A).

Very few (4%) respondents reported never receiving prompt feedback on student performance from faculty. The majority (71.3%) received prompt feedback on student performance on a weekly basis. An almost equal number (9%) of students reported receiving prompt feedback every two weeks as those reporting receiving prompt feedback every month (9.9%). Only 5.8% reported receiving prompt feedback once an academic term (see Appendix A).

Almost half (48.2%) of respondents reported their interactions with the faculty were excellent. Those reporting that their interactions with the faculty were good totaled 34.9% while 11.1% described their interactions as satisfactory and 4.1% reported their interactions as fair. Very few (1.7%) reported their interactions with faculty were poor (see Appendix A).

Only 1.1% of the respondents reported never participating in classroom discussions, while the majority (94.5%) of students reported participating in classroom discussions on a weekly basis. Very few (4.5%) students responded that they participated in classroom discussions every two weeks (2.2%), once a month (2.0%), or only once an academic term (.3%) (see Appendix A).

Only 6.3% of the respondents never met with classmates outside of class to review course content. The majority (71.1%) met with classmates every week, and 10.1% met with classmates every two weeks, while almost as many (9.5%) met with

classmates once a month. Very few (3%) met with classmates only once an academic term (see Appendix A).

Very few (4.0%) students reported never collaborating with classmates on a course project. The majority (60.9%) reported collaborating with classmates on a course project on a weekly basis. Students collaborating with classmates on a course project every two weeks totaled 10.8% and monthly, 16.9%. A few (7.3%) respondents collaborated with classmates on a project once an academic term (see Appendix A).

Students reported never participating in a group dental assignment totaled 14.2%. Many of the respondents (41.5%) reported participating in a group dental assignment on a weekly basis. Students participating in a group dental assignment every two weeks totaled 9.0% and monthly, 18.7%. The respondents reporting participating in a group dental assignment only once an academic term totaled 16.6% (see Appendix A).

Respondents who reported they never attended a dental hygiene conference with classmates totaled 15.5%. An almost equal number (15.2%) reported attending a dental hygiene conference with classmates on a weekly basis. Only 2.8% of respondents attended a conference with classmates every two weeks. The students who attended a conference with classmates once a month totaled 21.4%, and 45.2% of respondents attended a conference with classmates once an academic term (see Appendix A).

The majority (72.3%) of the students presented a Table Clinic at dental hygiene conference (not a course requirement), while 27.7% of respondents did not (see Appendix A).

The majority (80.4%) of dental hygiene programs have a student chapter of the ADHA, while almost twenty percent (19.6%) of dental hygiene programs do not have a student chapter of the ADHA (see Appendix A).

Among dental hygiene programs with a student chapter, only 3.0% of their students attend weekly meetings, while slightly less than the majority (47.3%) attend monthly meetings. Almost one-in-seven (14.8%) student respondents attend meetings once an academic term, and 9.1% attend less than once an academic term. Over a quarter of the respondents (25.9%) never attend meetings of the student chapter ADHA (see Appendix A).

The majority (78.3%) of respondents do not have leadership roles in the student chapter ADHA, while 21.7% do (see Appendix A).

Only 1.0% of respondents reported they commit up to 5 hours a week to student chapter ADHA activities, while students who commit 1-3 hours totaled 17.2%, students who commit less than an hour a week totaled 31.3%, and those students who commit no time to student chapter ADHA activities totaled 22.0%. More than a quarter (28.5%) of students reported being challenged by course loads and could not commit time to their student chapter of the ADHA (see Appendix A).

The survey was distributed electronically by the ADHA through QuestionPro Survey. QuestionPro Survey is a provider of online survey software that allows users to generate a variety of reliable statistical facts with accompanying survey analysis data pertinent for research initiatives. Prior to the survey being sent, an email was sent to the 334 dental hygiene program directors, informing them that a survey of student engagement would soon be forwarded to both freshman and senior dental hygiene

students. Pre-notification emails and letters have been found to increase survey response rates (Baruch & Holtom, 2008). The email briefly described the study and asked program directors to encourage student participation. The biannual meeting of the Ohio Council of Dental Hygiene Directors coincided with this email being sent. The chair ended the meeting with an announcement of the survey, and asked program directors in attendance to encourage student participation.[1] The ADHA included an introduction to the survey, a brief description of the survey, and the researcher's dissertation efforts. An incentive and an opportunity to pique student interest can improve response rates (Baruch & Holtom, 2008). Students were informed that the first 500 survey respondents had the option to enter a raffle for one of three $100 gift cards.

Review of the Research Questions

Chapter Four discusses the statistical analysis conducted to identify what influence, if any, dental hygiene student engagement/interactions (independent variables) may have on dental hygiene student success, as measured by cumulative GPA (dependent variable) while enrolled in a dental hygiene program, and addresses the study's following research questions:

1. What influence, if any, do student demographics (age, gender, race) have on student's cumulative grade point average?
2. What influence, if any, do student-program director/administration interactions have on student's cumulative grade point average?
3. What influence, if any, do student-faculty interactions have on student's cumulative grade point average?

[1] The researcher did not solicit this announcement.

4. What influence, if any, do student-student interactions have on student's cumulative grade point average?
5. What influence, if any, does participation by students in Student Chapters of the American Dental Hygienists' Association have on student's cumulative grade point average?

Statistical Analysis Process

Incomplete surveys were not included in the final analysis. For several variables in this survey, a dummy variable was introduced to represent the presence or absence of a value or condition. They are used to represent categorical variables with more than two levels. Some predictor variables do not require dummy variables, including categorical predictor variables that only have two levels. Categorical variables with no dummy variables include the following:

- Gender - Categorical, with 1 = Female and 2 = Male
- Ethnicity Are you Hispanic or Latino Categorical, 0 = No, 1 = Yes
- Are you currently enrolled in your dental hygiene-Categorical, with 1 = Full Time and 2 = Part Time
- Presentation of a Table Clinic-Categorical-1 = Yes and 2 = No
- Volunteer to participate in a Community/Service Learning event –Categorical-1 = Yes and 2 = No
- Does your dental hygiene program have a Student Chapter ADHA-Categorical-0=low/absence to 1=high/presence
- Do you have a leadership role in the Student Chapter? Categorical-1=yes and 2=No

Categorical variables with a total of 14 dummy variables include the following:

- Race – American Indian or Alaska Native
- Race – Black or African American

- Race – White
- Race – Asian
- Race – Native Hawaiian or Other Pacific Islander
- Race – Choose not to respond

  (Categorical, represented in six dummy variables)
- What is your citizenship-(Categorical, represented in two dummy variables for US or Canadian, vs Other)
- Two Year or Four Year Program-(Categorical- represented in three dummy variables for Two-Year, Four-Year, and Degree Completion.)
- Public or Private-(Categorical, represented in three dummy variables for Private, Public, or Unsure)

The remaining thirty-one predictor variables were continuous variables.

Testing for Multicollinearity

The term *multicollinearity* refers to a condition in which two or more predictor variables are highly correlated. It demonstrates whether independent variables are associated with each other, and can be used as a diagnostic test to determine if the results from the regression model are believable. In multiple regression analysis, multicollinearity between predictors makes it difficult to assess the individual importance of a predictor. If two predictors are highly correlated and each accounts for similar variance in the criterion, the regression model cannot distinguish which of the two variables is more important.

The bivariate correlations among the 45 potential predictor variables in this analysis were examined. Two conditions resulted in both being equal to r = -0.806. One of them was between the indicator variables for *Public* and *Private* (but not *Unsure)*. The other was between the indicator variables for *two-year* and *four-year* program (but not

degree completion program). These correlations are not that close to -0.9 (or 0.9) and therefore do not indicate the presence of collinearity.

The Variance Inflation Factor (VIF) and tolerance scores also provide an index that measures how much the variance (the square of the estimate's standard deviation) of an estimated regression coefficient is increased because of collinearity. The VIF and tolerance scores were reviewed for multicollinearity. In the final block regression model for this data, the largest VIF was found to be 1.524 and the smallest tolerance was 0.656. These values indicate that multicollinearity is not a substantive concern.

Testing for Linearity

Prior to beginning the regression analysis, the data were prepared by examining the 45-predictor variables for how they vary when correlated with the dependent variable, GPA. The bivariate correlations were used to screen predictor variables included in the block regression analysis.

A two-tailed Pearson *r* correlation coefficient to determine whether the correlation was positive or negative was calculated for each predictor. The results assessed the strength of the linear association with GPA. Twelve of the 45 predictors were found to have a significant ($p < .05$) bivariate correlation with the criterion variable and were included in the initial regression model. The Pearson *r* correlations between each of the 45 variables and the GPA are shown in Appendix B.

There were eight predictor variables with a Pearson *r* correlation significant at the .01 level. There were four predictor variables with a Pearson *r* correlation significant at the .05 level, for a total of 12 predictor variables with significant bivariate correlations with GPA proxy out of 45 potential predictor variables. Only those 12 predictor

variables with a significant bivariate correlation with the dependent variable were included in the blocked regression analysis.

Regression Analysis

The survey data were analyzed using causal analytical modeling via blocked regression analysis (CAMBRA), a form of stepwise linear multiple regression in which predictor variables were entered by temporally-sequenced blocks aligned with the research questions previously identified. As discussed in Chapter Three, stepwise regression is used to identify the most statistically significant set of predictor variables that were most effective in predicting student success, as measured by GPA. Entered in the block sequence, variables were added to the regression equation one at a time. In order to be considered by the CAMBRA process, the predictor variable's p-value had to be less than .05. The predictor variables remain in the regression process until they exceeded the p-value removal of .10. Consecutive regression series were performed until the addition of any variable no longer contained anything more to contribute to the process.

The Statistical Product and Service Solutions (SPSS) statistical software package (Statistics GradPack 21.0, 2012) was used to support quantitative data analysis.

Results of Analysis by Block

A total of 4 (out of 12 offered to the analysis) predictors remained in the final regression model. Of these, 3 predictors were found to be statistically significant (P-value < 0.05) predictors of the criterion variable among the 1,722 students in the final sample. Table 19 presents the predictors included in the final model, sorted by block, according to their entry sequence, from Block 1 through Block 6. The first column

(Block/Step with Predictor Variable Entering) shows the step number in the regression, which included four steps. The first column also indicates the block of variables associated with each step, and identifies the name of the variable that entered at each step. The second column (Zero *r*) displays the Pearson *r* correlation between each predictor variable and the criterion variable. The third column (Step β) indicates the standardized beta coefficient of the predictor variable when it first entered the regression equation. The fourth column (Final Step β) shows the standardized beta coefficient for each predictor variable at the final step of regression model. The standardized beta coefficient (β) indicates the relative strength of the unique contribution that each predictor in the regression model makes to explain the variance in the criterion variable, when controlling for the variance explained by all other variables in the model. The fourth column also identifies the four variables that were significant (p-value < 0.05) predictors of the criterion variable. The fifth column (*F*) denotes the *F*-value. When paired with a p-value, the *F*-value tests the null hypothesis (that the predictor variables in the model have no significant relationship with the criterion variable).

The blocked regression analysis produced a final model, with an R^2 value, (coefficient of determination) 0.017, or 1.7%. The final set of predictor variables accounts for 1.7% of the variability in the criterion variable, GPA proxy. The Adjusted R^2 is a penalized version of the original R^2, adjusting for the number of predictor variables in the model. The adjusted R^2 for the final model is 0.015 or 1.5%. (*p-value < 0.05 indicates that individual predictors in the final model, that are statistically significant at the 0.05 level (but not at the 0.01 level), are identified with an asterisk. **p-value < 0.01 with two asterisks indicates statistical significance at the 0.01 level.)

Table 19

Predictor Variables of Students' GPA Proxy-Final Regression Model

Block/Step with Predictor Variable Entering	Zero *r*	Step β	Final Step β	*F*
Block 1 Race - Black or African American	0.079**	0.062**	-0.061*	6.800**
Block 2 Highest Degree	0.051**	0.064**	0.063**	7.034**
Block 3 Describe the quality of your interactions with the Director	0.081**	0.068**	0.017	7.746**
Block 4 Describe the quality of your interactions with Faculty	0.119**	0.087**	0.087**	7.859**
Block 5 No significant predictors entered the model.				
Block 6 No significant predictors entered the model.				

Note. N = 1,772; R^2 = 0.017; Adjusted R^2 = 0.015; *p-value < 0.05; **p-value < 0.01

The four predictors were sorted in the final regression model, in decreasing order from the strongest Final Step β to the weakest (Table 20). The description of the quality of faculty interactions emerged as the strongest predictor of student success (GPA), followed by highest degree attained: followed by race- Black or African American (negative), and ending with description of the quality of program director's interactions.

Table 20

Predictor Variables

Rank	Predictor Variable	Variable Block	Final Step β
1	Describe the quality of your interactions with Faculty	4	0.087**
2	Highest Degree	2	0.063**
3	Race - Black or African American	1	-0.061*
4	Describe the quality of your interactions with the Director	3	0.017

Note: N = 1,772; R^2 = 0.017; Adjusted R^2 = 0.015; *p-value < 0.05; **p-value < 0.01

Block 1. Research question one was, *What influence, if any, do student demographics (age, gender, race) have on student's cumulative grade point average?* Student population demographics were included in Block 1. The majority of respondents were in the range of 20-23 years old, with 77% of respondents falling under the age of thirty. Students in the population were predominately White (80%). The majority of respondents (96.4%) were US citizens, and 88.7% of the respondents were not Hispanic or Latino. The majority of respondents (29%) reported their GPA ranged from 3.5 to 3.75. Ninety-three percent of respondents reported a GPA of 3.00 or higher.

Black or African American was found to be a significant negative predictor of students' GPA (β= -0.061*, $p < .05$), and the only factor emerging as statistically significant in Block 1. This finding indicates that, controlling for other variables, students of Black/African American race tend to have lower GPAs than do students from other racial/ethnic groups.

Block 2. This block included such institutional characteristics as: attending private or public institutions; two-year, four-year, or dental hygiene degree completion program; highest degree attained; full-time or part-time; current course load; and, student status/first, second, third, fourth year.

The variable *highest degree in a non-dental hygiene discipline* was the only statistically significant predictor of GPA proxy among Block 2 variables. Holding a higher degree (β= 0.063**, $p < .001$) was found to be a significant predictor of student success. This finding shows that, controlling for other variables, dental hygiene students who, upon entering the dental hygiene program, already possess a degree from a higher education institution, are more likely to have higher GPA scores than those students who do not.

Block 3. Research question two was, *What influence, if any, do student-program director/administration interactions have on student's cumulative grade point average?* Dental hygiene student interactions with the program director/administration were included in Block 3. This block included interacting with the dental hygiene program director by: meeting outside of class to discuss academic issues; meeting outside of class to discuss career plans; collaborating over initiatives other than coursework; attending a dental hygiene meeting or conference; attending a non-dental hygiene event; and, self-reporting of quality of interactions with dental hygiene program director.

The one statistically significant Block 3 predictor was *self-report of quality of interactions with program director* (β= 0.017). In one of the early incarnations of the multiple regression model, this predictor variable was statistically significant with a p value<.05 and was found to be a significant predictor of GPA proxy. However, with a

more complete model, including a larger number of potential predictor variables, it was no longer statistically significant, but remains in the model as one of four predictor variables. This result indicates the higher that students rated the quality of their interactions with their dental hygiene program director, the higher their GPA tended to be.

Block 4. Research question three was *What influence, if any, do student-faculty interactions have on student's cumulative grade point average?* Dental hygiene student-faculty interactions included in Block 4 were: contributing to course discussions; meeting outside of class to review for exam or clarify course related issues; meeting outside of class to discuss career plans; working with faculty on activity other than coursework; emailing with faculty; receiving prompt feedback on student performance; and, describing quality of interactions with faculty.

The one statistically significant predictor variable among the Block 4 predictors was *describe the quality of your interactions with faculty* (0.087** p-value < 0.01). This result indicates the higher that students rated the quality of their interactions with faculty, the higher their GPA tended to be.

Block 5. Research question four was *What influence, if any, do student-student interactions have on student's cumulative grade point average?* Dental Hygiene student-classmate interactions included in Block 5 were: participating in class discussion; meeting outside of class to review course content; collaborating on dental hygiene course-related issues, participating in a group dental hygiene assignment; and, attending together a dental hygiene conference. No significant predictors from Block 5 entered the model.

Block 6. Research question five was, *What influence, if any, does participation by students in Student Chapters of the American Dental Hygienists' Association have on students' cumulative grade point average?* Block 6 includes dental hygiene student activity and dental hygiene student involvement in student chapters of the ADHA by: presenting a table clinic at a dental hygiene conference; volunteering to promote dental health at a community site for a non-course assignment; does your dental hygiene program have a student chapter ADHA?; attending student chapter ADHA meetings; having a leadership role in a student chapter of the ADHA; and, committing time to student chapter activities. No significant predictors from Block 6 entered the model.

Relative contributions of the variable blocks. The contributions to the R^2 value from predictors within each block were accumulated, which allowed the construction of Table 4, depicting incremental contributions to R^2 by variable block. The amount of total variance in the criterion variable explained by the final regression model was 1.7%. Based on an analysis of the R^2 change attributed to each block of variables in the final model, Table 21 shows a summary of the relative contribution of each block toward the total explanation of variance in the criterion variable. Block 1 accounted for .04% of the variance of the criterion. Block 2 accounted for .04%, and Block 3 accounted for .05%. Block 4 accounted for .04%. Both Blocks 5 and 6 did not contribute toward the total explanation of variance in the criterion.

Table 21

Contributions to R^2 by Variable Block

Variable Block Added	Cumulative R^2	R^2 Change
Block 1	0.004	0.004**
Block 2	0.008	0.004**
Block 3	0.013	0.005**
Block 4	0.017	0.004**
Block 5	NA	NA
Block 6	NA	NA

Note: N = 1,800; R^2 = 0.017; Adjusted R^2 = 0.015; Indicates significance of *F* Change: *p-value < 0.05; **p-value < 0.01

Indirect effects. Variables were added to the regression equation one at a time as they entered the block sequence. The predictor variables remained in the regression process until they exceeded the p-value removal of .10. At one stage of the consecutive regression series, one predictor variable, (*description of program director's interactions as excellent*) was a significant predictor ($p < .05$ in the previous stages of the regression model). It became a non-significant predictor in the succeeding model. This indicates that, the influence of the predictor variable on the criterion variable was mediated by another predictor variable (the mediator). The reduction in the influence of the first predictor (the mediated variable) on the criterion resulting from the entry into the model of the mediator variable is known as an indirect effect (Astin, 1993).

Table 22 identifies the one non-significant variable whose influence on the criterion appears to have been mediated by another predictor variable. The table indicates

the corresponding mediator variable as *descriptions of faculty interactions*. No other mediating relationships among the variables that appeared in the final blocked regression model were detected.

Table 22

Indirect Effects – Mediated and Mediator Variables

Mediated Variable	Step β before mediation	Step β after mediation	Mediating Variable	Model Step at which the Indirect Effect Occurred
Describe the quality of your interactions with the Director	0.068**	0.017	Describe the quality of your interactions with Faculty	4

Note: N = 1,772; R^2 = 0.017; Adjusted R^2 = 0.015; *p-value < 0.05; **p-value < 0.01

Summary

This chapter provided descriptive statistics and results of the stepwise multiple regression analysis based on data from the original survey designed for this national study. The survey was electronically distributed by the ADHA to 12,000 dental hygiene students enrolled in accredited dental hygiene programs in the U.S. The purpose of this study was to investigate the national trends of dental hygiene student interactions in the dental hygiene program, and student engagement in student chapters of the ADHA. The study determined whether dental hygiene student interactions and student involvement have an influence on student success, as measured by cumulative GPA.

A total of 4 (out of 12 offered to the analysis) predictors remained in the final regression model. Two predictor variables had positive statistically significant

associations. A students' characteristics, Black or African American student, was statistically significant as a negative predictor. Self-reporting of program director interactions ($\beta = 0.017$) had a p-value < .05 initially in the early incarnations of the multiple regression model. However, with a more complete model, it was no longer statistically significant, but remains in the model as one of the four predictor variables. The description of the quality of faculty interactions emerged as the strongest predictor of student success (GPA), followed by highest degree attained: followed by race- Black or African American (negative), and ending with description of the quality of program director's interactions.

Chapter Five elaborates on these findings, their implications for policy and practice, and suggested recommendations, in addition to considerations for future research.

Chapter 5

Discussion, Recommendations, and Conclusions

Introduction

Chapter Four presented the results of this study's regression analysis so as to respond to the study's research questions. Chapter Five, the final chapter of this study, continues the interpretation and review of these outcomes, considers the consequences for theory, policy and practice changes, presents the study's limitations, and offers recommendations for future research.

Purpose and Overview of the Study

The purpose of this national study was to present results that provide dental hygiene educators and administrators with a better understanding of how dental hygiene student involvement in dental hygiene programs and in student chapters of the American Dental Hygienists' Association (ADHA) impact academic achievement, as measured by cumulative grade point average (GPA). The research started with the belief that the more engaged a student is in the dental hygiene student organization, and the more the student interacts with dental hygiene faculty, administration, and peers while enrolled in a dental hygiene program, the better the student's outcome (GPA).

The conceptual framework of this study centered on Astin's *Student Involvement: A Developmental Theory for Higher Education*. The basic tenet of Astin's Theory of Involvement is that the more involved students are in the academic and social aspects of the college experience, the more they learn. An involved student is one who devotes considerable energy to academics, spends much time on campus, participates actively in student organizations and activities, and interacts often with faculty (Astin, 1984). For

student growth to take place, students need to actively engage in their environment (Astin, 1984).

The literature review demonstrated a gap in research on the subject of dental hygiene student membership in student chapters of the ADHA and student involvement in the dental hygiene program environment. The possibility that one or both types of involvement may influence student cumulative GPA required further investigation and supported this study's completion. The data generated from this study may result in future educational program policy changes, enhancing dental hygiene student engagement activities and leading to improved student success (GPA).

Using data collected from an original survey designed for this study, the regression analysis found that of 45 potential predictor variables examined, 12 predictors were found to have a significant ($p < .05$) bivariate correlation with the criterion variable, and were included in the initial regression model. A total of 4 (out of 12 offered to the analysis) predictors remained in the final regression model. Two predictor variables had statistically significant, positive associations ($p < .01$). The predictor variable *student race – Black or African American* was statistically significant ($p < .05$) as a negative predictor. *Self-reporting of program director interactions* ($\beta = 0.017$) had a p-value < .05 initially in the early incarnations of the multiple regression model. However, with a more complete model, it was no longer statistically significant, but remains in the model as one of four predictor variables. The description of the quality of faculty interactions emerged as the strongest predictor of student success (GPA), followed by highest degree attained, followed by race – Black or African American (negative), and ending with the description of the quality of program director's interactions.

The amount of total variance in the criterion variable explained by the final regression model was 1.7%. Blocks 1, 2, and 4 accounted for .04% of the variance of the criterion each. Block 3 accounted for .05%. Blocks 5 and 6 did not contribute toward the total explanation of variance in the criterion.

Discussion of the Results

Block 1. The majority of the respondents fell in the range of 20-23 years old with 77% of respondents falling under the age of 30. By gender, students in the population were predominately female, 97.4%, with the remaining 2.6% male. Students in the population were predominately White (80%). The majority of the respondents (96.4%) were US citizens, and 88.7% of respondents were not Hispanic or Latino. The majority of the respondents (29%) reported their GPA ranged from 3.5 to 3.75. Ninety-three percent of respondents reported a GPA of 3.00 or higher.

The interpretation of the results indicate the Black or African American student was found to be a significant negative predictor of students' GPA (β= -0.061*, $p < .05$), and the only factor emerging as statistically significant in Block 1. This is consistent with previous literature demonstrating Black students having lower GPAs than White students (Demo & Parker, 1987). Possible causes for lower GPAs, lower retention rates, and lower numbers of degree attainment are varied, and equivocate between individual student deficiencies and institutional failings. One factor that has been suggested as a significant cause for concern is that students are underprepared for college. Additionally, institutional limitations include reduced financial assistance, counseling support, and academic advising.

Block 2. This study's respondents predominately attend public schools (82%) while 13.2% attend private schools and 4.2% were unsure whether their school was private or public. The predictor variable *highest degree in a non-dental hygiene discipline* was the only statistically significant predictor of GPA proxy among Block 2 variables. Holding a higher education degree ($\beta = 0.063^{**}$, $p < .001$) was found to be a significant predictor.

This finding suggests that a student who has had previous success in achieving an associate's, bachelor's, or master's degree in a non-dental hygiene discipline would be successful academically in completing a dental hygiene program. The rigors and challenges facing students in a dental hygiene program were discussed in Chapter Two, and students who have proven capable enough to fulfill college requirements in the past appear to possess the drive and skills required to achieve academic success once enrolled in a dental hygiene program.

Block 3. Dental hygiene students' interactions with their dental hygiene program director included: meeting outside of class to discuss academic issues; meeting outside of class to discuss career plans; collaborating over initiatives other than coursework; attending a dental hygiene meeting or conference; attending a non-dental hygiene event; and, students' self-reporting of the quality of interactions with the dental hygiene program director.

The one statistically significant Block 3 predictor was *self-report of quality of interactions with program director* ($\beta = 0.017$). In one of the early incarnations of the multiple regression model, this predictor variable was statistically significant with a p value<.05 and was found to be a significant predictor of GPA proxy. However, with a

more complete model, including a larger number of potential predictor variables, it was no longer statistically significant, but remains in the model as one of four predictor variables. This result indicates the higher that students rated the quality of their interactions with their dental hygiene program director, the higher their GPA tended to be.

The results invite analysis as to how dental hygiene program directors and administrators establish quality interactions with students and the types of activities that promote a comfortable exchange between students and administrators. The college environment provides ample opportunities for both students and directors to discuss dental hygiene and non-dental hygiene subjects in a non-threatening environment. Meetings held in a student union can provide a neutral location to discuss such topics as campus culture, campus-entertainment, and community involvement. This exchange between students and administrators now becomes a dialogue between adults, eliminating the stress over a grade-related requirement. It may also present students and administrators in a different, positive light, changing either party's perception of the other.

A dental hygiene program director serving as advisor to the ADHA student chapter may be another way an administrator may interact with students without judgment or evaluation. Spending time with students in a consulting capacity might also encourage student organization involvement and strengthen student resolve to succeed in the dental hygiene program.

Respondents who self-reported excellent interactions with their dental hygiene program director reported higher GPAs than students who reported poor interactions.

Student success can be enhanced by the dental hygiene program director being a positive role model and by being approachable to students when collaborative efforts present themselves.

Block 4. Dental hygiene students interact with faculty by: contributing to course discussions; meeting outside of class to review for exams or to clarify course-related issues; meeting outside of class to discuss career plans; working with faculty on activities other than coursework; emailing with faculty; receiving prompt feedback on student performance; and, students' self-report of the quality of their interactions with faculty. The one statistically significant predictor variable among the Block 4 predictors was *describe the quality of your interactions with faculty* (0.087** P-value < 0.01). This result indicates the higher students rated the quality of their interactions with their dental hygiene faculty, the higher their GPA.

Block 4—dental hygiene student interactions with their dental hygiene faculty—accounted for .04% toward the total explanation of variance in the criterion. The description of the quality of faculty interactions emerged as the strongest predictor of student success (GPA).

These results are consistent with Astin's research from more than 30 years ago, that frequent interaction with faculty is more strongly related to satisfaction with college than any other type of student involvement or institutional characteristic (1984). Students who interact frequently with faculty members are more likely than other students to express satisfaction with their institutional experience, including student friendships, variety of courses, intellectual environment, and the institution's administration. Finding ways to encourage greater student involvement with faculty could be a highly productive

activity on most college campuses (Astin, 1984). It is no surprise that respondents who self-reported excellent interactions with their dental hygiene faculty reported higher GPAs than did those students who reported poor interactions.

Block 5. Dental hygiene student interactions with peers/classmates include: participating in class discussion; meeting outside of class to review course content; collaborating on dental hygiene course-related issues; participating in a group dental hygiene assignment; and, attending a dental hygiene conference together. No significant predictors from Block 5 entered the model.

Stepwise block regression was used to identify the most statistically significant set of predictor variables contributing to student success as measured by GPA. To be considered by the CAMBRA process, the predictor variable's p-value had to be less than .05. When examining the bivariate correlations for this study's data, 12 of the 45 predictors were found to have significant bivariate correlations with the criterion variable. As such, these 12 predictors were included in the initial regression model. None of the variables pertaining to dental hygiene student interactions with peers/classmates had significant bivariate correlations with the criterion variable, so no predictors entered the model.

However, research studies demonstrate that a positive association between student achievement and student participation in activities such as interacting with classmates, cooperative learning, debates, role-playing, problem-based learning and case-studies (Meyers & Jones, 1993). Participation in a group dental hygiene assignment can occur within the classroom setting or outside of the dental hygiene facility. Personal growth

and development occur when students are involved in opportunities that provide stimulation, challenge, exposure to diversity, and collegial contact.

Block 6. Dental hygiene student involvement in student organizations included: presenting a table clinic at a dental hygiene conference; volunteering to promote dental health at a community site for a non-course assignment; having a student chapter of the ADHA; attending student chapter meetings; having a leadership role in the student chapter; and, committing time to student chapter activities. No significant predictors from Block 6 entered the model.

When examining the bivariate correlations for this study's data, 12 of the 45 predictors were found to have significant bivariate correlations with the criterion variable and, therefore, those 12 predictors were included in the initial regression model. Two variables—*does your dental hygiene program have a student chapter* (correlation significant at the .05 level) and *do you have a leadership role in the student chapter* (correlation significant at the .05 level)—have significant bivariate correlations with the criterion variable. As such, these predictor variables were 2 of the 12 predictors included in the initial regression model.

The CAMBRA process allows for predictor variables to enter the model based on the order of the blocks. Previous blocks that are already in the model impact the effect of subsequent variables entering into the model. The dental hygiene student activity and involvement in student organizations (*does your dental hygiene program have a student chapter* and *do you have a leadership role in the student chapter)* are from the last block to be entered (Block 6). None of these variables added anything significant to the explanation of the variance in the criterion variable. However, research supports the

importance of student organizational involvement in enhancing and enriching a student's college experience and personal skills. From the literature, the many advantages of a robust college life include improved social and leadership skills, enhanced decision-making capabilities, improved direction in pursuing career opportunities, heightened self-confidence, stronger relationships with faculty, a more mature viewpoint of the relevancy of curricula, and improved educational aspirations, academic achievement, and post-college success (Hawkins, 2010).

The more involved students are, the more likely they are to benefit intellectually and personally. Miller and Jones went even further, asserting that extracurricular programs should be viewed as essential components of higher education, since they provide such strong benefits, rather than being considered merely supplemental (Fitch, 1991). Although none of the co-curricular involvements included in this study were found to be significant predictors, further research on the influence of the other types of co-curricular variables appear warranted based on previous research.

Implications for Theory

Astin's *Student Involvement: A Developmental Theory for Higher Education* was the theoretical framework validating this study (Astin, 1984). The concept of student involvement has diverse meanings. This study focused on the process of student interactions with dental hygiene program personnel and classmates, in addition to exploring the types and amount of student activity in the student chapters of ADHA while enrolled in a dental hygiene program. However, the nature of the dental hygiene program experience, including the rigorous schedules and demands placed upon a dental hygiene

student's time as s/he navigates through an accredited dental hygiene educational program, merits discussion.

The dental hygiene student is enrolled in the dental hygiene phase of his/her education for a brief two years. There may be additional coursework if the student is enrolled in a Bachelor's-level dental hygiene program however, within the dental hygiene program, there are a standardized set of courses each semester/quarter, requiring successful completion of all courses in that timeframe in order to proceed to the next semester/quarter. Additionally, the institution where the dental hygiene program resides requires non-dental hygiene course completion, leaving the student little free time for individual, non-academic interests.

As previously noted, the Theory of Student Involvement focuses on time as a crucial part of the student's development. What a student decides to do with his/her time correlates with specific goals a student decides to pursue. As students only have limited time and energy to give to each demand placed on their lives, it is important to determine when involvement in school, organizations, and socializing with classmates can be too demanding and negatively impact other areas of their lives. If there is disequilibrium and a disproportionate amount of time given to one activity, other areas of a student's life may suffer (Upcraft et al., 1984).

These results have considerable implications as to how higher education administrators should encourage involvement and support for dental hygiene students. As time is a student's most valuable resource (Astin, 1999), this may explain why it is difficult to involve dental hygiene students, who have an extremely limited amount of time outside the dental hygiene program, compared to the demands of other students.

This study's results indicate the dental hygiene student has made a concerted effort to spend time interacting with dental hygiene administration and faculty.

There are some important insights from this study than can contribute to clarifying the concept and meaning of dental hygiene student involvement. Firstly, there is the dental hygiene student's involvement with his/her faculty and program administrator. More than one-third (36.6%) of respondents met with the dental hygiene program director weekly, every two weeks, or monthly to discuss academic issues. The majority (76.1%) of students responded that they met with faculty weekly.

Secondly, this study's results show that dental hygiene students are engaged in the dental hygiene program and continue to interact with their classmates, faculty, and administrators, as well as attend student chapter meetings. Most (80.4%) dental hygiene programs have an ADHA student chapter. Among dental hygiene programs with a student chapter, slightly less than the majority of students (47.3%) attend monthly meetings while almost one-quarter (21.7%) of respondents is active in leadership roles in the student chapter ADHA.

Thirdly, student involvement can be impacted by the dental hygiene educational program's cohort structure. Typically, a cohort consists of a group of students who enter a program of studies together and complete a series of common learning experiences over a one- to two-year period. Dental hygiene classes consist of freshman, second-year, third-year, or senior cohorts with close access to dental hygiene administrators and faculty. The opportunity to become part of a network of classmates, closely available to instructors for course assistance, emotional support, and ongoing interaction contributes to program persistence. Being part of a strong support group with access to faculty

supervision can serve as a vital support system for students. Faculty members realize how crucial it is to motivate students to persevere in reaching the next educational tier. This collective experience affords a level of trust and comfort with others and a vehicle for asserting one's self (Watt & Rodmell, 1988).

Implications for Policy, Practice, and Future Recommendations

Based on the findings of this study, dental hygiene student success as measured by cumulative GPA is associated primarily with students already possessing a higher education degree upon entering the dental hygiene program and student interactions with their dental hygiene program director and faculty. Being a Black or African American had a negative impact on a dental hygiene student's GPA. This was identified as the study's negative predictor variable.

The Black or African American student and challenges for student success. The academic underperformance of Black students has long troubled people concerned with educational inequities (Good et al., 2003). Each year, statistics from statewide and national tests reaffirm the disturbing pattern of underachievement. For example, compared to White and Asian students, Black students receive lower grades and have higher dropout rates at practically every level of schooling (Good et al., 2003).

Recommendations for early and continuing interventions may improve opportunities for student success. Introducing a mentoring system for all dental hygiene students can be beneficial. Scheduling meetings, email communications, or telephone conversation with the faculty-mentor, as often as needed, would be helpful for the student-at-risk. Mentors can provide useful advice for the students regarding study skills, adjustment problems, trepidation over acquiring new technical skills (instrumentation),

and reticence over interactions with new and different classmates. Mentors can provide a comfortable outlet for students to voice their own doubts and, in turn, mentors can coach students and suggest practical ways in which students can overcome self-doubt and barriers to achievement. Faculty and staff must employ educational practices and resources from throughout the institution to help compensate for shortcomings in students' academic preparation and to create a culture that fosters student success (Allen, 1999; Fleming, 1984). All students, including dental hygiene students, attending institutions that employ a comprehensive system of complementary initiatives based on effective educational practices, are more likely to perform better academically, to be more satisfied, and to persist and graduate (Kuh et al., 2005; Kuh et al., 2007). Initiatives for dental hygiene students might include first week-orientation, small group-learning projects, intrusive advising, early warning systems, redundant safety nets, supplemental instruction, and peer tutoring (Forest, 1985, Kuh et al., 2005; Kuh et al., 2007; Wang & Grimes, 2001). However, simply offering such programs and practices does not guarantee student success. Institutional programs and practices must be of high quality, customized to meet the needs of students they are intended to reach, and be firmly rooted in a student success-oriented campus culture (Kuh et al., 2005).

Students already possessing a higher education degree upon entering the dental hygiene program. The literature has shown that students who have already attained a higher education degree tend to exhibit more desirable approaches to learning. In addition, in terms of both their persistence and attainment, the subsequent academic performance of the degreed, mature student on their degree courses was competitive (Richardson, 1995).

One recommendation for effective dental hygiene admission policy is to obtain applicants' transcript information and identify students who have already graduated with a degree in a non-dental hygiene discipline. Achieving a degree may be weighted more favorably when reviewing application information.

Student interactions with the dental hygiene program director. This study confirmed that student interactions with the dental hygiene administrator/program director have a positive impact on student success. Creating ways to establish excellent interactions between students and the dental hygiene program administrator/program direction would have to include student-collaboration with the program director. One type of interaction may include work with the program director on initiatives other than coursework. The chance to have a more intimate, one-on-one experience that is non-threatening and does not include an evaluation is important to the student who can envision being the program director's colleague post-graduation. Additionally, the opportunity to work with the program director during an academic term, beginning in the first semester/quarter of the freshman year, and then experiencing a new opportunity each semester/quarter thereafter could prove beneficial and nonthreatening to the student. Developing a rapport with students, beginning with their initial introduction into the program, could be particularly advantageous should a student experience unexpected academic difficulties or personal issues that impact his/her ability to persist.

Furthermore, program directors who organize a career program with the senior class to meet firms that provide dental hygiene staffing and human resource services to dental practices can prompt discussions that lead to portfolio preparation, reference letters, and career management prospects. These possibilities affirm for the dental

hygiene student future success through program completion and graduation. It is not only important for students to envision their success and academic achievements as they enter the last phase of their educational tenure, but to be aware of their scholastic success along their educational journey. Coordinating this event also connects the administrator/program director and student through a common interest.

In addition, scheduling a meet-and-greet session in the dental hygiene program classrooms, where the program director, institutional tutorial staff, and counselors/advisors represent a panel of advocates who provide students with contact information can be informative as well as reassuring for the at-risk student. Sometimes, finding the right person to reach within the institution is a burden for the student. Having this information can be useful in keeping the student focused on coursework and program completion.

Moreover, the program director can coordinate an event for students that involves institutional personnel, such as student affairs' professionals, who encourage students to realize the positive influence student involvement can have on student success. Whitt (1994) found that such encouragement provides essential support to persuade students to become involved. Often, these supportive individuals demonstrated their belief in a student's capabilities and potential, which encouraged self-confidence and involvement. Student affairs personnel can assist students by providing information and resources to help them feel more compatible with their educational institution. These opportunities begin with student's first visits to campus. Students often benefit most from one-on-one counseling, which allows them to explore options and discuss their individual concerns related to the academic and social expectations of college life (Upcraft et al., 1984).

Concerns may include academics, time constraints, finances, personal needs, and family support (Edwards & Person, 1997). Providing effective, individual attention and care helps students feel welcome and supported. In addition, respondents reported that quality interactions with their program directors, stem from directors who are approachable, respectful, and knowledgeable.

The administrator/program director can ensure the dental hygiene program's culture is welcoming to students. From dental hygiene faculty to program support staff, everyone associated with the dental hygiene program must believe the student can learn and can overcome educational challenges. Providing a positive learning environment by giving students some control over learning processes helps to develop this confidence and commitment to learning.

Student interactions with dental hygiene faculty. This study showed that dental hygiene students who have quality interactions with dental hygiene faculty can result in student academic success. These interactions can take place either inside or outside the classroom. Having routine contact through classroom activities, dental hygiene-related events, or simply by meeting with faculty can enhance the importance of student-faculty connections. Discussions that provide pertinent information in a timely manner will contribute to student awareness and confidence and afford opportunities for students to make sound decisions pertaining to their education. Faculty can design the classroom time to be effective and convenient for student engagement activities, as well as for meaningful educational exercises.

Studies have shown that students engage when they act as their own learning agents, striving to achieve goals meaningful to them (CCCSE, 2010). Students take

ownership of their education when they are engaged in their education. Fostering a classroom environment that emphasizes the health career goals a dental hygiene student deems important is one way faculty can encourage student engagement in the classroom setting. Again, the element of time determines how flexible the student's schedule is to even allow additional interactions outside of the classroom. Expanding the use of the classroom for student-faculty interaction is a practical solution for enhancing student-faculty engagement.

Faculty contact appears to be a key element of student success. If the faculty is perceived to be approachable, well prepared, and sensitive to student needs, students are committed to work harder, get more out of the session, and are more willing to contribute to classroom discussion. In addition, respondents reported that quality interactions with their faculty can be attributed to faculty being interested in the student, and interested in assisting the student to be the best clinician. Furthermore, respondents added faculty, who are available, take time with students, work hard, and are excited about their profession, are considered excellent faculty members.

With patient care as a focal point, dental hygiene faculty could create educational experiences for students that are challenging and enriching and that extend their academic abilities. Offering real patient care case studies are challenging and thought-provoking for the student and can reinforce the student's enthusiasm for his/her future career choice. Introducing the new concept of flipped classrooms where course content covering patient-care is transformed into active clinical learning incorporates teaching with technology.

When classroom discussions cover dental hygiene career activities, faculty may enhance these discussions with guest presentations from practicing dental hygienists. These dental hygienists can represent an array of employment options, from the traditional dental office setting, to the public health dental hygienist, the military, or the dental hygienist administrator working for the government. Further, community dental hygienists who are officers and active members from within the local dental hygiene component or the executive director and/or members from the state dental board can also be invited to meet and speak to students.

Going out together for dinner, followed by attending a local dental hygiene component meeting can be a way to connect both existing members (the dental hygiene faculty and program director) with future members (the dental hygiene class). A professional faculty role model can inspire student interest in the educational process and, ultimately, the student's career choice.

All of these best practices have a way of strengthening the student's interest in succeeding in the dental hygiene program in order to graduate and become a professional dental hygienist.

While outside of class, students who meet with their faculty to review for exams or to clarify course-related issues also benefit from additional faculty interactions. Scholars have emphasized that even out-of-class contact between students and faculty significantly enhances the quality of the undergraduate experience (The Boyer Commission, 1998; Chickering & Gamson, 1987; Kuh et al., 1991). Meeting once an academic term might also indicate a need to just check-in with faculty and not to schedule frequent visits an at-risk student might require.

Students stay connected and become organized and informed through regular communication with faculty. Receiving routine feedback on clinical performance or classroom assignments can provide direction, guidance, and alleviate student concern, or encourage student appointments, leading to faculty meetings that are a proven, positive predictor of student success. A variety of faculty interactions can be assessed, from student-faculty emails to faculty discussions outside of class, that lead to improved student performance (Anaya, 1992, 1999; Astin, 1993).

While in class, students can find a myriad of opportunities to discuss dental hygiene-related subjects and can begin to know their instructor as a future colleague. Discussing opinions of dental hygiene legislation, new dental devices, or the addition of a new dental hygiene responsibility to the state dental practice act can not only lead to interesting classroom conversations, but can reveal the instructor's personality in a light other than that of an evaluator. Strengthening the connections between student and instructor appears to encourage student interest and improve student outcomes. Studies have shown that students who have positive and regular contact with faculty members have an increase in student educational aspirations (Grigg 1965; Gurin & Katz, 1966; Thislethwaite, 1960).

Dental hygiene student interactions with peers. While this study did not statistically show that student-student interactions are associated with academic success, it is worthwhile to note that interacting with peers can provide numerous benefits for the student, as well as the cohort overall. For the class as a whole, participating in either a structured (e.g., in the classroom setting) and unstructured (e.g., meeting outside of program hours) group dental hygiene assignment may be an efficient way to introduce

the students to each other. Peers increase students' feelings of acceptance and allow them to share common experiences and address similar concerns. Matching new students with peer mentors or second-year dental hygiene students may create peer connections and support for discussing concerns and orientation to the dental hygiene program. These partnerships give new students a link to the program through students within the same educational population. Learning that is active and that involves peer relationships can also encourage student social skills as well as initiate lasting friendships and the potential for future collegial exchanges.

Within the class, the students can actively participate in projects with their classmates. Such activities may involve the entire class or smaller groups. Some interesting conversations can take the form of debates (i.e., pro-fluoride vs. anti-fluoride, the use and frequency of digital radiographic examinations). While these contemporary issues may prove interesting, the preparation of working with classmates in class or in a student's apartment, or becoming familiar with another classmate while becoming familiar with course content, can be a bonding moment that evolves into a lasting friendship.

Participation in a group dental hygiene assignment within the classroom may require smaller groups of students working together. A quieter discussion with fewer students may be appealing for classmates who do not know each other well and may encourage student-friendly conversations that may be less awkward when occurring in a larger class setting. Easing into becoming an acquaintance that leads to a friendship can occur with very little effort. Students who see each other to complete an assignment can

also provide an opportunity to share helpful study habits, clarify coursework, and create a bond over the challenges of studying. This can lead to improved student outcomes.

Participation in a group dental hygiene assignment outside of class requires more time, but allows for students to see each other in different settings, such as coffee houses, cafes, student union, libraries, or a student's personal living area. Working with classmates allows students to be at ease with other classmates, while completing coursework in a positive setting and with a shared motivation to succeed.

Students may be assigned a requirement to attend a dental hygiene- related conference, meeting, or off-campus course with other students. This can be viewed as a way to experience future professional commitments together. Personal growth and development occur when students are involved in opportunities that provide stimulation, challenge, exposure to diversity, and collegial contact.

Scheduling a dental-hygiene related event that promotes interest in future dental hygiene legislation or that introduces new dental hygiene devices or treatments can bring students together with company representatives, legislators, future colleagues, and dental hygiene organization leaders. This experience reminds students that, together with their classmates, they are the future of the dental hygiene profession. Strong peer ties can forge a link between students, boost moral when academic challenges are perceived as overwhelming, and encourage an optimistic look toward the future.

Student-organization involvement. While the four predictor variables did not include student interaction in student organization activity, this study did show that, statistically, 2 variables—*does your dental hygiene program have a student chapter* and *do you have a leadership role in the student chapter*—have significant bivariate

correlations with the criterion variable and were 2 of the 12 predictors included in the initial regression model.

The ADHA offers students membership in student chapters if they are currently enrolled in an accredited dental hygiene program or pursuing a complementary baccalaureate or graduate degree from an accredited college or institution of higher education. Student membership fees are at a reduced rate from post-graduate/professional membership fees. ADHA student chapters provide an outlet for students to explore various dental hygiene-related interests with some events occurring outside the classroom. Undergraduate involvement allows students to participate while experimenting in organizational legislation, leadership, and professional development, and encourages self-acknowledgement of emerging talents.

This study showed that students are involved in their institution's respective ADHA student chapter. The majority (80.4%) of dental hygiene programs have an ADHA student chapter. Almost one-half (47.3%) of students attend monthly ADHA student chapter meetings. Almost a fourth (21.7%) have leadership roles.

Possible suggestions to enhance student-organization involvement can range from mandatory student membership to scheduling student chapter activities within the classroom setting. As a member of the student chapter ADHA, the student has access to association publications, including *Access*, which contains a student-focused column, and *Strive*, which publishes student research papers and articles of interest.

Additional ideas for enhancing student involvement in the student chapter might include offering students the chance to publish research papers or submit articles of concern and interest to *Strive*. The article could be incorporated as a course requirement

or extra credit, without adding extra time to an already full program agenda. Being creative within a course and scheduling a time to Skype with another class of dental hygiene students across the county, or using ADHA's Facebook page as a way to discuss national dental hygiene issues, presents a possibility for students to connect with other students as they expand local and nationwide networking of fellow students and dental hygienists.

The ADHA's Annual Session is the only national meeting to offer dental hygiene students their own program track. Again, dental hygiene educators can design a class activity that provides time for students to submit an application to become a student representative from their respective district. Student delegates represent colleagues and attend the ADHA's Annual Session at no cost.

The ADHA's Annual Session covers the latest trends, technologies, theories, and techniques, including the opportunity to attend the public viewing of the table clinic and research poster presentations. Undergraduate students from across the nation are able to present table clinics and original research poster sessions on useful and timely information pertinent to the dental hygiene practice. Engaging in interactive activities with fellow dental hygiene students at the annual session may inspire further passion for the profession. A certain amount of excitement can be contagious and, upon the delegate-student's return, providing class time to share his/her experiences with both first-year and senior classmates can present a chance to spread a new awareness of the dental hygiene profession on a national level. Perhaps the new interest will lead to a more determined effort to be academically successful in order to graduate and to become active in the dental hygiene profession's national organization.

Another opportunity to connect with the professional organization is to take advantage of the ADHA's online study courses and discounts on student guides for the National Dental Hygiene Board Exam. Again, dental hygiene educators can look to resourceful opportunities to assist students in being successful by having the program purchase online study courses and by assigning students to design review classes for senior students.

Because the dental hygiene program requires the student to commit the majority of time to coursework and patient care in the program's clinic, it would be advantageous for dental hygiene educators to provide time within the classroom for student chapter activities. More than a quarter (28.5%) of students reported being challenged by course loads and could not commit time to their student chapter of the ADHA.

Within the program's schedule, students could be given the time to apply to the ADHA to be a part of the Student Advisory Board. One of four students is selected to represent student issues, challenges, and viewpoints on the ADHA's Committee on Student Relations. Students can become empowered when their opinions are heard by involved and influential ADHA members. Students who take the initiative to change and improve their profession may find a sense of improved self-esteem, which may foster renewed appreciation for the dental hygiene field. Enabling students to become active early on in their professional endeavors, to become officers or chairpersons of committees, may lead students to become active professionals. Engagement requires the student to participate, to be proactive, and to make choices that dictate his/her use of time, ultimately leading not only to academic achievement, but to success as an active citizen.

Even if every variable could be considered, students remain individuals and, therefore, retain a myriad of diverse preferences, capabilities, and aspirations. While participation in activities may vary from student to student, the important point is that students become more serious about future membership and become more involved as they matriculate into the profession of dental hygiene.

Future Research

The survey results revealed a dental hygiene student age profile of adult students (22.9%) over the ages of 29 (22.9%) and who are between the age of 23 and 40 (55.1%). The engagement activities of an adult student with personal commitments as well as employment goals may prove to be more challenging. It may prove to be an interesting research effort to concentrate on age-related factors that impact a dental hygiene student's ability to become fully engaged in the dental hygiene program.

Faculty members and student affairs staff could work together to utilize the current body of knowledge and continue to ask questions worth researching to assist adult students and encourage their involvement. This will include incorporating new information as it comes along, especially as technology continues to progress at its current, rapid pace. The exploration of understanding dental hygiene adult students' needs and the advancement of ways to maximize their involvement opportunities and experiences presents a new frontier for research ideas.

Additional research could also center on student engagement practices among dental hygiene students enrolled in distance learning courses. The future of higher education includes more and more distance learning opportunities as traditional dental hygiene courses convert to distance education. How do dental hygiene educators engage

students who are not physically present in a classroom setting? How do dental hygiene students bond with classmates in the absence of direct, face-to-face communication and interaction? Although distance learning provides the educational content of a course, how do dental hygiene program directors cultivate an atmosphere of trust and encouragement when the student and the educator are separated by time and distance?

A longitudinal study might shed light on dental hygiene student engagement practices while enrolled in a dental hygiene program and their influence in advanced degree attainment. Did the dental hygiene student experience a positive educational tenure with strong faculty role models who encouraged graduate education? Another longitudinal study in engagement practices might center on the influence of student engagement while enrolled in the dental hygiene program and future community service addressing the access to dental care crisis targeting our populations.

From the perspective of both a dental hygiene educator and community dental hygienist, it would be valuable to learn engagement practices that lead to enthusiastic, dedicated dental hygiene graduates with a strong sense of commitment to their profession and to the public they treat.

Furthermore, future research studies might look at the differences in dental hygiene student engagement activities and student success, taking place in a two-year community college dental hygiene program versus dental hygiene student engagement activities and student success, taking place in a four-year university dental hygiene program. Likewise, future research might also examine the differences in dental hygiene student engagement activities and student success, taking place in a dental hygiene program with open enrollment, versus dental hygiene student engagement activities and

student success, taking place in a dental hygiene program with selective admissions criteria.

Limitations

Although every study contains some limitations (Astin, 1991), this national study examined both freshman and senior dental hygiene students' engagement practices while enrolled in accredited dental hygiene programs across the country. The robust response from more than 2,500 students provided insight into dental hygiene student interactions with administration, faculty, peers, and student participation in student chapters of the ADHA.

Using multiple regression analysis, the researcher was afforded the opportunity to determine statistical significance and not causation between predictor variables and the dependent variable, GPA. Further research including qualitative data may impart more detail into the responses from the students' perspective.

Contributions to the Literature

This dissertation made a significant contribution to the dental hygiene literature as the first study to address dental hygiene student engagement and its influence on student success, as measured by cumulative GPA. Since there is little, if any, research on dental hygiene student engagement, this study fills the gap by surveying 12,000 dental hygiene students across the country. This study adds a significant contribution to the research compiled on dental hygiene education. Currently, there is a dearth of peer-review studies and publications focused on the dental hygiene student and dental hygiene education. Much of the published information has centered on the efficacy of oral health products, devices, and patient treatment modalities. While these reports are useful, it is important

to look at how the student evolves into a professional licensed dental hygienist who will use these products and contribute to the health and well-being of another human being.

This study has advanced Astin's Theory of Student Involvement by defining dental hygiene student engagement and its influence on dental hygiene student success (GPA). By delineating the different types of dental hygiene student engagement activities and interactions, this study can assist dental hygiene educators and administrators in designing a dental hygiene program that emphasizes student interactions and engagement activities throughout their dental hygiene curriculum. By examining their own dental hygiene programs, administrators, program directors, and faculty can develop specific initiatives to enhance student involvement, leading to greater student satisfaction, and improved student outcomes.

In today's economy and with increased institutional accountability, higher education is faced with significant budgetary cuts, stricter spending allotments, and fewer resources to provide anticipated quality instruction. Furthermore, state and federal mandates expect increased student completion rates and have stipulated that future funding will be disbursed, using institutional benchmarks, including the number of students graduating, as one of the determining factors.

Given the gravity of the challenges facing college education, this national study can be referenced for the variables that best predict student success. This data may result in future educational program policy changes that will enhance dental hygiene student engagement activities, leading to improved student success (GPA). Increased educational funding can be anticipated to those universities and community colleges across the country with successful dental hygiene programs.

Conclusion

Administrators and educators have recognized that student success is linked with academic success (GPA), student retention, and student completion and, therefore, effective measures to enhance student success are a priority at institutions of higher learning. As dental hygiene administrators and educators become more aware of their programs' graduation rates and student outcomes, a concerted effort to improve dental hygiene educational efforts in retaining and in supporting the qualified dental hygiene student is being promoted.

The purpose of this national study was to present results that provide dental hygiene educators and administrators with a better understanding of how dental hygiene student involvement in dental hygiene programs and in student chapters of the ADHA impact academic achievement, as measured by cumulative GPA. This study investigated the national trends of dental hygiene student engagement, both in the dental hygiene program and in student chapters of the ADHA. The study was to determine if dental hygiene student involvement has an influence on student success, as measured by cumulative GPA. Furthermore, the more engaged the student is in the dental hygiene program, and the more the student interacts with dental hygiene faculty and administrators while enrolled in the dental hygiene program, the more the dental hygiene student is expected to become a better learner. Student success, as measured by GPA, is expected to improve with greater student involvement.

A total of 4 (out of 12 offered to the analysis) predictors remained in the final regression model. Two predictor variables had positive statistically significant associations. A students' characteristics, Black or African American student, was

statistically significant as a negative predictor. Self-reporting of program director interactions ($\beta = 0.017$) had a P-value < .05 initially in the early incarnations of the multiple regression model. However, with a more complete model, it was no longer statistically significant, but remains in the model as one of the four predictor variables. The description of the quality of faculty interactions emerged as the strongest predictor of student success (GPA), followed by highest degree attained, race- Black or African American (negative), and ending with description of the quality of program director's interactions.

A crucial finding resulting from this study is that student involvement is an important ingredient to add to the rigorous dental hygiene curriculum mandated by accredited dental hygiene programs. Even amidst the rigidity and inflexibility inherent in a dental hygiene program, the dental hygiene student found the time to interact with both dental hygiene administration and dental hygiene faculty. For decades, Astin has promulgated his theory that the student who is involved and has embraced the college experience will be successful and will most likely achieve his/her educational goals. For the first time, the involvement theory has been applied to the dental hygiene student and is a useful instrument for investigating factors that reinforce the dental hygiene student experience and dental hygiene student academic success as measured by cumulative GPA.

Future researchers are urged to employ both the I-E-O model and Astin's Theory of Student Involvement when entering into research involving dental hygiene students. Referencing the original national survey prepared for this study, future researchers can design similar surveys to conduct additional studies of dental hygiene students. Future

research could analyze the impact of involvement on satisfaction with the dental hygiene program experience, the program's career services, and employment expectations upon graduation.

Furthermore, the future researcher is encouraged to expand the scope of studies to include the influence of student involvement in other health-related fields, such as nursing students, dental and medical students, and allied health career students. It would be enlightening to examine if the academic success of other health career students, who not only have to assume demanding didactic information, but are also required to become proficient in health-related technical skills, are impacted by student engagement activities.

From a practical perspective, the future researcher can investigate how these findings can be relevant to the administration of the dental hygiene program. If dental hygiene student interactions with program administrators and dental hygiene faculty contribute to student success, then on an institutional level, resources can be authorized toward developing programs and policy regulations that center on student engagement and outcome-focused strategies.

The majority of dental hygiene programs (334) in the U.S. are accredited by the American Dental Association's Commission on Dental Accreditation (CODA). Additionally, in order for the dental hygienist to practice, state Dental Hygiene Practice Acts mandate the successful completion of several dental hygiene board examinations in order to be a licensed dental hygienist, and only licensed dental hygienists can practice in the U.S. It would be advantageous for the prospective dental hygiene student to be attentive to dental hygiene programs where dental hygiene student success has been

documented. With the high cost of tuition (between $37,000 and $50,000, www.ada.org), today's students are more conscious of their college expenses, earning potential, and school loans. For the dental hygiene student to feel confident that s/he is making a sound investment in his/her future, the student wants to know that s/he can be successful throughout the dental hygiene program, and ultimately succeed when completing all of the required dental hygiene board examinations. Findings from this dissertation can provide dental hygiene programs options for meaningful strategies to address student concerns. The data may result in future educational program policy changes that will enhance dental hygiene student engagement activities, leading to improved student success (GPA).

References

Allen, D. (1999). Desire to finish college: An empirical link between motivation and persistence. *Research in Higher Education, 40*, 461-485.

American Dental Hygienists' Association. (2006). Re: Dental Hygiene educational facts (electronic informational source) Retrieved from (http://www.adha.org/resources-docs/72611_Dental_Hygiene_Education_Fact_Sheet.pdf).

American Dental Hygienists' Association. (2011). Re: Dental Hygiene educational facts (electronic informational source) Retrieved from (http://www.adha.org/resources-docs/72611_Dental_Hygiene_Education_Fact_Sheet.pdf).

American Dental Hygienists' Association. (2006). Re: Dental Hygiene career facts (electronic informational source) Retrieved from (http://www.ada.org/sections/educationAndCareers/pdfs/dh.pdf).

Anaya, G. (1992). Accuracy of Self-Reported Test Scores *College and University*, *75*(2).

Anaya, G. (1999). *Within-college, curricular and co-curricular correlates of performance on The MCAT* (Medical College Admission Test). Paper presented at the annual meeting of the American Educational Research Association, Montreal, Canada.

Association of Allied Health Professional Institutional Reports.(2010). Association of Schools of Allied Health Professions. Washington DC. Retrieved from: http://www.cdrewu.edu/assets/pdfs/FacultyManualFebruary2011/UploadFolder/ASAHP%20Institutional%20Profile%20Survey%20Report%202009-10.pdf

Astin, A. W. (1970). *The methodology of research on college impact*. American Council on Education, Washington, D.C.; National Inst. of Mental Health (DHEW) Bethesda, Md.; National Science Foundation, Washington, D.C. (Portions of this paper were presented at the annual meeting of the American Educational Research Association, Minneapolis, Minn. 67pages).

Astin, A. W. (1975). *Preventing students from dropping out*. San Francisco: Jossey-Bass.

Astin, A. W. (1984). Student involvement: A developmental theory for higher education. *Journal of College Student Personnel, 2.*

Astin, A. W. (1985). *Achieving educational excellence: A critical assessment of priorities and practices in higher education*. San Francisco: Jossey-Bass.

Astin, A. W. (1991). *Assessment for excellence*: *The philosophy and practice of assessment and evaluation in higher education*. New York, NY: American Council on Education/Macmillan.

Astin, A. W. (1993a). *What matters in college:* Four critical years revisited. San Francisco, CA: Jossey-Bass.

Astin, A. W. (1993b). *Assessment for excellence: The philosophy and practice of assessment and evaluation in higher education.* Phoenix, AZ: Educational Measurement (American Council on Education/Oryx Press Series on Higher Education).

Astin, A. W. (1996). Involvement in learning revisited: Lessons we have learned. *Journal of College Student Development, 37,* 123-134.

Astin, A. W. (1999). Student involvement: A developmental theory for higher education. *Journal of College Student Development, 40* (5), 518.

Astin, A. W., Creager, J., Panos, R. (1966). *A program of longitudinal research on the higher educational system.* American Council on Education (ACE), Washington, D.C. Research Reports *1*(1)1-44.

Astin, A. W., & Denison, N. (2009). Multi-campus studies of college impact: Whichstatistical method is appropriate? *Research in Higher Education, 50,* 354-367. doi: 10.1007/s11162-009-9121-3

Astin, A. W., & Panos, R. (1969). *The educational and vocational development of college students.* Washington, D.C.: American Council on Education.

Astin, A. W., & Sax, L. J. (1998). How undergraduates are affected by service participation. *Journal of College Student Development, 39,* 251-263.

Avalos, J. (1996). *The effects of time-to-degree completion, stopping out, transferring,and reasons for leaving college on students' long-term retention, educational aspirations, occupational prestige and income.* Unpublished doctoral dissertation, University of California at Los Angeles.

Baird, L.L. (1976). Using self-reports to predict student performance. New York: The College Board.

Bare, S., & Hoggatt, J. (1986). Integrating student organizations into the curriculum. *Business Education Forum (Yearbook Issue*), 59-62.

Baruch, Y., & Holtom, B. C. (2008). Survey response rate levels and trends in organizational research. *Human Relations, 61*(8), 1139-1160. doi:10.1177/0018726708094863

Bean, J.P. (1980). Dropouts and turnover: The synthesis of a causal model of student attrition. *Research in Higher Education, 12,* 155-187.

Bean, J. P. (1983). The application of a model of turnover in work organizations to the student attrition process. *Review of Higher Education, 6,* 129-148.

Beilke, M. M. (1990). Expected and unexpected benefits derived from student organizations. *Business Education Forum,* 24-25.

Berdie, R. F. (1971). Self-claimed and tested knowledge. Educational and Psychological

Measurement.31, 629-636

Cabrera, A., Crissman, J., Bernal, E., Nora, A., Terenzini, P., & Pascarella, E. (2002). Collaborative learning: Its impact on college students' development and diversity. *Journal of College Student Development, 43(1),* 20-34.

Callan, P. (2012). Student commitment is a major determinant of quality. *Chronicle of Higher Education.* March 12, 2012. Retrieved from EBSCO host.http://chronicle.com/article/Do-College-Completion-Rates/131029/

Case, K. (2011). A gendered perspective on student involvement in collegiate clubs and organizations in Christian higher education. *Christian Higher Education, (10)*166-195. doi: 10.1080/15363759.2011.576208

Center for Community College Student Engagement (2008). *The Heart of Student Success: Teaching, Learning, and College Completion* (CCCSE Findings). Austin, TX: The University of Texas at Austin, Community College Leadership Program.

Center for Community College Student Engagement (2010a). *The Heart of Student Success: Teaching, Learning, and College Completion* (CCCSE Findings). Austin, TX: The University of Texas at Austin, Community College Leadership Program.

Center for Community College Student Engagement (2010b). *The Heart of Student Success: Teaching, Learning, and College Completion (Community College Faculty Survey of Student Engagement -CCFSSE)* Austin, TX: The University of Texas at Austin, Community College Leadership Program

Center for Community College Student Engagement (2010c). *The Heart of Student Success: Teaching, Learning, and College Completion* (Survey of Entering Student Engagement SENSE). Austin, TX: The University of Texas at Austin, Community College Leadership Program

Centra, J. & D. Rock (1971). College environments and student achievement. *American Educational Research Journal, 8* (4): 623-34.

Chickering, A. W. (1969). Education and identity. San Francisco, CA: Jossey-Bass.

Chickering, A. W., & Associates. (1981). *The modern American college*. San Francisco, CA: Jossey-Bass.

Chickering, A. W., & Gamson, Z. F. (1987). Seven principles for good practice in undergraduate education. *American Association for Higher Education Bulletin,* 3-7.

Chickering, A. W. & McCormick, J. (1973). Personality development and the college experience. *Researching Higher Education, 1,* 43-70.

Chickering, A. W., & Reisser, L. (1993). *Education and identity* (2nd ed.). San Francisco, CA: Jossey-Bass.

Cooperative Institutional Research Programs. (2009). College Senior Survey (CSS): Findings from the 2009 national aggregates. *Higher Education Research Institute (HERI) at the University of California, Los Angeles.* Retrieved from *http://heri.ucla.edu/PDFs/pubs/Reports/2009_CSS_Report.pdf.*

Cooper, D. L., Healy, M. A., & Simpson, J. (1994). Student development through involvement: Specific changes over time. *Journal of College Student Development, 35*, 98-102.

Cotten, S. R., & Wilson, B. (2006). Student–faculty interactions: Dynamics and determinants. *Higher Education*, *51*(4), 487-519.

Cox, B. E., & Orehovec, E. (2007). Faculty-student interaction outside the classroom: A typology from a residential college. *Review of Higher Education, 30*(4), 343-362.

Cress, C., & Sax, L. (1998). Campus climate issues to consider for the next decade. *New Directions for Institutional Research (98),* 65-80. doi:10.1002/ir.9805

Cushman, K. (2007). Facing the culture shock of college: First-generation college students talk about identity, class, and what helps them succeed. *Educational Leadership, 64*(7), 44-47. Retrieved from http://www.ascd.org/Publications/EducationalLeadership/digitalel.aspx.

Cuseo, J. (2001) Academic advisement and student retention empirical connections & systemic interventions. *Manuscript Kentucky Postsecondary Education Data Portal (Council on Postsecondary Education)* Re: student retention (electronic informational source) Retrieved fromhttp://cpe.ky.gov/NR/rdonlyres/6781576F-67A6-4DF0-B2D3-2E71AE0D5D97/0/CuseoAcademicAdvisementandStudentRetentionEmpiraclConnectionsandSystemicInterventions.pdf.

D'Amico, M. F., Hawes, J. M. (2000). The role of professional fraternities and other student groups in student development Re: student development (electronic informational source) Retrieved from http://scholar.googleusercontent.com/scholar?q=cache:0fqnJYJ8cf4J:scholar.google.com/+d%E2%80%99Amico+%26+Hawes,+student+involvemet&hl=en&assdt=0,36

Dayton, B., Gonzalez-Vasquez, N., Martinez, C. R., & Plum, C. (2004). Hispanic-serving institutions through the eyes of students and administrators. In A. Ortiz (Ed.), Addressing the unique needs of Latino American students. *New Directions for Student Services, 105* 29-39. San Francisco, CA: Jossey Bass.

DeNeui, D. L. (2003). Investigating first-year college students' psychological sense of community on campus. *College Student Journal, 37*(2), 224-234. Retrieved from http://www.projectinnovation.biz/csj.html

Education Commission of the States (ECS). (1995). Making quality count in undergraduate education. Denver, CO: ECS Distribution Center.

Edwards, R., & Person, D. R. (1997). Retaining the adult student: The role of admission counselors. *Journal of College Admission, 154*, 18-21.

Einarson, M. K., & Clarkberg, M. E. (2004). *Understanding faculty out-of-class interaction with undergraduate students at a research university*. Paper presented at the Association for the Study of Higher Education.

Endo, J., & Harpel, R. (1982). The effect of student-faculty interaction on students' educational outcomes. *Research in Higher Education, 16* 115-135.

Engstrom, C., & Tinto, V. (2008). Access without support is not opportunity. *Change, 40* (1), 46.

Faculty Survey of Student Engagement. (2008). Retrieved from http://nsse.iub.edu/pdf/2008InstitutionalReport/FSSE08%20Reports%20(Bac-Diverse%20-%20TS).pdf

Feldman, K. & Newcomb, T. (1969). *The Impact of College on Students.* San Francisco, CA: Jossey-Bass.

Foubert, J. D., and Grainger, L. U. (2006). Effects of involvement in clubs and organizations on the psychosocial development of first-year and senior college students. (Student Affairs Administrators in Higher Education) *NASPA Journal, 43*, 166-182.

Fredricks, J. A., & Eccles, J. S. (2006). Extracurricular involvement and adolescent adjustment: Impact of duration, number of activities, and breadth of participation. *Applied Developmental Science, 10*(3), 132-146. doi:10.1207/s1532480xads10033.

Gabelnick, F., J. MacGregor, R. S. Matthews, and B. L. Smith. 1990. Learning communities: Creating connections among students, faculty, and disciplines. *New Directions for Teaching and Learning 41*(Spring). San Francisco, CA: Jossey-Bass.

Gaff, J. (1973). Making a difference: The impacts of faculty. *The Journal of Higher Education, (44)* 8.

Gaither, J. (2005). Minority retention: What works? *New Directions for Institutional Research, 125*, San Francisco, CA: Jossey Bass.

Gellin, A. (2003). The effect of undergraduate student involvement on critical thinking: A meta-analysis of the literature 1991–2000. *Journal of College Student Development, 44*, 746-762.

Gloria, A. M., Robinson-Kurpius, S. E., Hamilton D. K., & Willson, M. S. (1999). African American student persistence at a predominately white university: Influences of social support, university comfort, and self-beliefs. *Journal of College Student Development, 40* (3), 267-268.

Golde, C. M., & Pribbenow, D. A. (2000). Understanding faculty involvement in residential learning communities. *Journal of College Student Development, 41* (1), 27-40. doi: 10.1080/10668920903153261

Grant, G., Elbow, P., Ewens, T., Gamson, Z., Kohli, W., Neumann, W., Olesen, V., & Riesnian, D. (1979). *On competence*. San Francisco, CA: Jossey-Bass.

Grigg, C. (1965). Recruitment to graduate study: college seniors' plans for postgraduate-education and their implementation the year after commencement. Atlanta, GA: Southern Regional Education Board.

Gurin, P., and Katz, D. (1966). Motivation and aspiration in the negro college. *Ann Arbor, Michigan: University of Michigan Survey Research Center, Institute for Social Research.*

Gutierrez A. (2009). Practical model for the community college. *Community College Journal of Research and Practice, 33*: 958-961. doi: 10.1080/10668920903153261

Hagedorn, L., Siadat, M., Nora, A., & Pascarella, E. (1997). Factors leading to gains inmathematics during the first year of college. *Journal of Women and Minorities in Science and Engineering, 3*(3), 185-202.

Hake, R. (1998). Interactive-engagement versus traditional methods: A six-thousand student survey of mechanics test data for introductory physics courses. *American Journal of Physics, 66*(1), 64-74.

Halawah, I. (2006). The effect of motivation, family environment, and student characteristics on academic achievement [electronic version]. *Journal of Instructional Psychology*, 1-10.

Hawkins, A. (2010). Relationship between undergraduate student activity and academic performance. *Purdue University College of Technology.* Retrieved from http://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=1013&context=techdirproj.

Hernandez, K., Hogan, S., Hathaway, C., & Lovell, C. D. (1999). Analysis of the literature on the impact of student involvement on student development and learning: More questions than answers? (Student Affairs Administrators in Higher Education) *NASPA Journal 36*(3), 184-197. Retrieved from http://www.naspa.org/pubs/journals/naspajournal.cfm

Hoffman, J. L. (2002). The impact of student co-curricular involvement on student success: Racial and religious differences. *Journal of College Student Development,43,* 712-737.

Hoover, E. (2004). Students study less than expected, survey finds. *Chronicle of Higher Education, 51*(14), A1–A31. Retrieved from http://chronicle.com/section/Home/5

Hu, S., & Kuh, G. D. (2002). Being (dis)engaged in educationally purposeful activities: The influences of student and institutional characteristics. Research in Higher Education, 43, 555-575. Retrieved fromhttp://www.airweb.org/?page=89

Huang, Y., & Chang, S. (2004). Academic and co-curricular involvement: Their relationship and best combinations for student growth. *Journal of College Student Development, 45*, 391-406.

Hutley, K. (2011). Alexander Astin's Theory of Involvement: A Summary *Center for the Advancement of Teaching.* Educational Administration and Foundations) Illinois State University. Retrieved from http://sotl.illinoisstate.edu/conf/astin.shtml.

Inkelas, K. K., Daver, Z. E., Vogt, K. E., & Leonard, J. B. (2007). Living-learning programs and first-generation college students' academic and social transition to college. *Research in Higher Education, 48,* 404–434. doi:10.1007/s11162–006-9031-9036.

Jenkins, D., & Cho, S. W. (2012). *Get with the program: Accelerating community college students' entry into and completion of programs of study* (CCRC Working Paper No. 32) New York, NY: Columbia University, Teachers College, Community College Research Center.

Johnson, B. (2011). Assessing legitimation in mixed research: a new framework. *Quality & Quantity 45(6,* 1253-1271. Netherlands: Springer.

Johnson, D. W., Johnson, R. & Smith, K. A. (1998a). *Active Learning: Cooperation in the college classroom* (2nd Edition). Edina, MN: Interaction Book Company.

Johnson, D., Johnson, R., & Smith, K. (1998b). Cooperative learning returns to college. *Change, 30*(4), 26–35.

Johnstone, K., Ashbaugh, H., & Warfield, T. (2002). Effects of repeated practice and contextual-writing experiences on college students' writing skills. *Journal of Educational Psychology, 94*(2), 305–315.

Karp, M. M. (2013). *Entering a program: Helping students make academic and career decisions* (CCRC Working Paper No. 59). New York, NY: Columbia University, Teachers College, Community College Research Center.

Kazmi, A. (2010). Sleepwalking through undergrad: Using student engagement as an institutional alarm clock. *College Quarterly (13) Win.* 1-15.

Kuh, G. D. (2001a). Assessing what really matters to student learning: Inside the National Survey of Student Engagement. *Change, 33*(*3*), 10-17, 66.

Kuh, G. D. (2001b). The national survey of student engagement: Conceptual framework

and overview of psychometric properties. Indiana University Center for Postsecondary Research and Planning. Bloomington, IN electronic source retrieved from http://nsse.indiana.edu/2004_annual_report/pdf/2004_Conceptual_Framework.pdf

Kuh, G. D. (2002) Student engagement in the first year of college. Plenary address delivered at the Annual Conference on The First-Year Experience, Orlando FL

Kuh, G. D., Kinzie, J., Buckley, J., Bridges, B., & Hayek, J. C. (2007). Piecing together the student success puzzle: Research, propositions, and recommendations. ASHE Higher Education Report, 32(5). San Francisco, CA: Jossey-Bass.

Kuh, G. D. (2008). High-impact educational practices: What they are, who has access to them, and why they matter. Washington, D.C.: Association of American Colleges and Universities.

Kuh, G. D. (2009). What student affairs professionals need to know about student engagement. *Journal of College Student Development*, *50* (6), 683.

Kuh, G. D., Douglas, K. B., Lund, J. P., & Ramin-Gyurnek, J. (1994). Student learning outside the classroom: Transcending artificial boundaries. *(ASHE-ERIC Higher Education Report No. 8*). Washington, DC: The George Washington University, Graduate School of Education and Human Development.

Kuh, G. D., & Hu, S. (2001). The effects of student-faculty interaction in the 1990s. *Review of Higher Education, 24*(3), 309-332.

Kuh, G. D., Hu, S., and Vesper, N. (2000). They shall be known by what they do: an activities-based typology of college students. *Journal of College Student Development, 41*, 228-244.

Kuh, G. D., Kinzie, J., Buckley, J., Bridges, B., & Hayek, J. C. (2006). *What matters to student success: A review of the literature*. Bloomington, IN: Indiana University Center for Postsecondary Research.

Kuh, G. D., Kinzie, J., Schuh, J. H., Whitt, E. J., & Associates (2005). Student success in college: Creating conditions that matter. San Francisco, CA: Jossey-Bass.

Kuh, G. D., Pace, C., & Vesper, N. (1997). The development of process indicators to estimate student gains associated with good practices in undergraduate education. *Research in Higher Education, 38*(4), 435-454.

Kuh, G. D., Pike, G. R. (2005). First and second-generation college students: A comparison of their engagement and intellectual development. *Journal of Higher Education 76(3),* 276-300. doi: 10.1353/jhe.2005.0021

Kuh, G. D., Schuh, J. H., Whitt, E. J. & Associates. (1991*). Involving colleges: Successful approaches to fostering student learning and development outside the classroom*. San Francisco, CA: Jossey-Bass.

Laden, B. V. (1999). Socializing and mentoring college students of color: The Puente Project as an exemplary celebratory socialization model. *Peabody Journal of Education,74* (2), 55-74.

Lang, M. (1996). *Effects of class participation on student achievements and motivation*. Unpublished honors thesis, University of Western Ontario, London, Ontario.

Lundberg, C. A., Schreiner, L. A., Hovaguimian, K., & Miller, S. S. (2007).First-generation status and student race/ethnicity as distinct predictors of student involvement and learning. (Student Affairs Administrators in Higher Education) *NASPA Journal 44*(1), 57-83. Retrieved from http://www.naspa.org/pubs/journals/naspajournal.cfm

Marklein, M. B. (2008). National Survey of Student Engagement: Assessing the undergraduate experience. *USA Today*. Retrieved from http://www.usatoday.com

McCannon, M., & Bennett, P. (1996). Choosing to participate or not: A study of college students' involvement in student organizations. *College Student Journal, 30*, 312-315. Retrieved from http://www.projectinnovation.biz/csj.html

Meyers, C., & Jones, T. B. (1993). *Promoting active learning: Strategies for the classroom.* San Francisco, CA: Jossey-Bass.

National Survey of Student Engagement, (2008). *Promoting engagement for all students: The imperative to look within.* Bloomington, IN: Indiana University, Center for Postsecondary Research.

National Survey of Student Engagement (2012) *Using Student Engagement Data for Institutional Improvement Institutional Report 2012*. Re: NSSE Survey Instruments (electronic informational source) Retrieved from http://nsse.iub.edu/pdf/conference_presentations/2006/TENNAIR%20NSSE%20CCSSE%20session.pdf

Newcomb, T. M., Brown, D. R., Kulik, J. A., Reimer, D. J. & Revelle, W. (1971). The University of Michigan's Residential College. In Dressel, P. L. (Ed.), *The New Colleges: Towards an Appraisal.* Iowa City, IA: American College Testing Program.

Noel, L. & Levitz, R. (1995). New strategies for difficult times. *Recruitment & Retentionin Higher Education, 9(7)*, pp. 4-7.

Noel, L., & Levitz, R., & Saluri, D. (1985). *Increasing student retention: New challenges and potential*. San Francisco, CA: Jossey-Bass.

Obst, P. L., & White, K. M. (2007). Choosing to belong: The influence of choice on social identification and psychological sense of community. *Journal of Community Psychology, 35*(1), 77-90. doi: 10.1002/jcop.20135

Outcalt, C. L., & Skewes-Cox, T. E. (2002). Involvement, interaction, and satisfaction: The human environment at HBCUs. *The Review of Higher Education, 25* (3), 331-347.

Pace, C.R. (1985). The credibility of student self-reports. Los Angeles: University of California. The Center for the Study of Evaluation, Graduate School of Education.

Pace, C. (1990). *College Student Experiences Questionnaire* (3rd ed.). Los Angeles, CA: University of California, Center for the Study of Evaluation, Graduate School of Education.

Pascarella, E. T. (1980). Student-faculty informal contact and college outcomes. *Review of Educational Research, 50,* 545-595.

Pascarella, E. T., & Terenzini, P. T. (1976). Informal interaction with faculty and freshman ratings of academic and non-academic experience of college. *Journal of Educational Research, 70,* 35-41.

Pascarella, E. T., & Terenzini, P. T. (1977). Patterns of student-faculty informal interaction beyond the classroom and voluntary freshman attrition. *The Journal of Higher Education, 48* (5), 540-552.

Pascarella, E. T., & Terenzini, P. T. (1978). Student-faculty informal relationships and freshman year educational outcomes. *Journal of Educational Research, 71,* 183-189.

Pascarella, E. T., & Terenzini, P. T. (1979). Interaction effects in Spady's and Tinto's conceptual models of college dropout. *Sociology of Education, 52,* 197-210.

Pascarella, E. T, & Terenzini, P. T. (1991). *How college affects students: Findings and insights from twenty years of research*. San Francisco, CA: Jossey-Bass.

Pascarella, E. T., & Terenzini, P. T. (2005). *How college affects students: A third decade of Research* (Volume 2). San Francisco, CA: Jossey-Bass.

Pascarella, E., T. Cruce, T., Umbach, P., Wolniak, G., Kuh, G., Carini, R., Hayek, J., Gonyea, R., & Zhao, C-M. (2006). Institutional selectivity and good practices in undergraduate education: How strong is the link? *The Journal of Higher Education. 77(2)* 251-285. Retrieved from http://cpr.iub.edu/uploads/pascarealla%20%282005%29%20institutional%20selectivity%20and %20good%20practices.pdf

Paulson, M. B., (2013). *Higher education handbook of theory and research* (Volume 28). New York, NY: Springer.

Person, D. R., & Christensen, M. C. (1996, Fall). Understanding Black student culture and Black student retention. *National Association of Student Personnel Administrators (NASPA) Journal, 34(1),* 47-56.

Peters, C. L., & Brown, R. D. (1991). The relationship of high school involvement, high school population size and gender to college students' self-efficacy beliefs. *College Student Journal, 25,* 473-481. Retrieved from http://www.projectinnovation.biz/csj.htm

Picciano, A.G. (2002) Beyond student perceptions: issues of interaction, presence, and performance in an online course. *Journal of Asynchronous Learning Networks (6)*1, 21-40.

Pike, G. R. (1999). The constant error of the halo in educational outcomes research. Research in Higher Education, 40, 61-86.

Pike, G. R., Kuh, G. D., & Gonyea, R. M. (2003). The relationship be-tween institutional mission and students' involvement in educational outcomes. *Research in Higher Education, 44*(2), 241-261. Retrieved fromhttp://www.airweb.org/?page=89

Pike, G. R., Kuh, G. D., & Massa-McKinley, R. (2008). First-year students' employment, engagement, and academic achievement: Untangling the relation-ship between work and grades. (Student Affairs Administrators in Higher Education) *NASPA Journal, 45*, 560-582. Retrieved from http://www.naspa.org/pubs/journals/naspajournal.cfm

Pohlmann, J. T., & Beggs, D. L. (1974). A study of the validity of self-reported measures of academic growth. Journal of Educational Measurement. 11, 115-119.

Qin, Z., Johnson, D. W., Johnson, R. T.,(1995). Cooperative versus competitive efforts and problems solving. *Review of Educational Research, 65,* 129-143.

Reeves, D. B. (2008, September). The extracurricular advantage. *Educational Leadership,66* (1), 86-97. Retrieved from http://www.ascd.org/publications/educationalleadership.aspx

Rendon, L. I., Jalomo, R. E., & Nora, A. (2000). Theoretical consideration in the study of minority student retention in higher education. In J. M. Braxton (Ed.), Rethinking the departure puzzle: New theory and research on college student retention (pp. 127-156). Nashville, TN: Vanderbilt University Press.

Richmond, J. (1986). The importance of student involvement: A dialogue with Alexander Astin. *Journal of Counseling and Development 65(2)* 92-96. Retrieved from http://onlinelibrary.wiley.com/doi/10.1002/j.1556-6676.1986.tb01240.x

Rooney, G. D. (1984). Minority student involvement in minority student organizations: An exploratory study. *Journal of College Student Personnel, 26*, 450-456. (ERIC Document Reproduction Service No. EJ323261).

Sanford, N. (1967). *Where colleges fail: A study of the student as a person*. San Francisco, CA: Jossey-Bass.

Schultz, E. L., Colton, G. M., & Colton, C. (2001). The Adventor Program: Advisement and mentoring for students of color in higher education. *Journal of Humanistic Counseling, Education and Development 40* (2), 208-218. Retrieved from http://www.counseling.org/Publications/Journals.aspx

Scott - Clayton, J. (2011). *The shapeless river: Does a lack of structure inhibit students' progress at community colleges?*(CCRC Working Paper No. 25, Assessment of Evidence Series). New York, NY: Columbia University, Teachers College, Community College Research Center

Shapiro, N. S., and J. J. Levine. (1999).*Creating learning communities: A practical guide to winning support, organizing for change, and implementing programs*. San Francisco, CA: Jossey-Bass.

Sheehan, K. B. (2001). E-mail survey response rates: A review. *Journal of Computer-Mediated Communication, 6* (2), 0. doi: 10.1111/j.1083-6101.2001.tb00117.x

Spady, W. (1970). Dropouts from higher education: An interdisciplinary review and synthesis. *Interchange 1*(1) 38-62.

Spady, W. (1971). Dropouts from higher education: Towards an empirical model. *Interchange 21*(2) 64-85.

Strauss, V. (2005). New generation of teens fueling growth in clubs; "Play-date" kids seek bonding, structure. *The Washington Post, A10*. Retrieved from http://www.washingtonpost.com

Terenzini, P. T. (1989). Assessment with open eyes: Pitfalls in studying student outcomes. *Journal of Higher Education 60*, 644-664.

Terenzini, P., & Pascarella, E. (1977).Voluntary freshman attrition and patterns of social and academic integration in a university: a test of a conceptual model. Research in Higher Education, 6, 25-44.

Terenzini, P., & Pascarella, E. (1978).The relation of students' precollege characteristics and freshman year experience to voluntary attrition. *Research in Higher Education. 9*, 347-366.

Terenzini, P. T., & Pascarella, E. T. (1994). Living with myths: Undergraduate education in America. *Change, 26* (1), 28-32. Retrieved from http://www.changemag.org

Terenzini, P. T., Springer, L., Yaeger, P., Pascarella, E., & Nora, A. (1994). The multiple influences on students' critical thinking skills. Paper presented at the annual meeting of the Association for the Study of Higher Education, Orlando, FL.

The Boyer Commission on Educating Undergraduates in the Research University (1998). *Reinventing undergraduate education: a blueprint for America's research universities*. Stoneybrook, NY: Carnegie Foundation for the Advancement of Teaching. Retrieved from http://www.niu.edu/engagedlearning/research/pdfs/Boyer_Report.pdf.

Thistlethwaite, D. L. (1960). College press and changes in study plans of talented students. *Journal of Educational Psychology, 51*, 222-234.

Tinto, V. (1993). *Leaving college*: *Rethinking the causes and cures of student attrition (2nd Ed.)*. Chicago, IL: University of Chicago Press.

Tinto, V. (1997). Classrooms as communities: Exploring the educational character of student persistence. *Journal of Higher Education, 68*, 599-623.

Tinto, V. (1998). College as communities: Taking the research on student persistence seriously. *Review of Higher Education, 21* 167-178.

Tinto, V. (2002). Enhancing student persistence: Connecting the dots. Paper presented at the University of Wisconsin, Madison.

Tinto, V. (2005). Taking student success seriously: Rethinking the first year of college. Retrieved from http://www.niu.edu/engagedlearning/research/pdfs/Boyer_Report.pdf.

Turner, C.F., & Martin, E. (Eds.) (1984). Surveying subjective phenomena *1* New York: Russell Sage Foundation.

Ullah, H., & Wilson, M. A. (2007). Students' academic success and its association to student involvement with learning and relationships with faculty and peers. *College Student Journal, 41*(4), 1192-1202.

Umbach, P., & Porter, S. (2002). How do academic departments impact student satisfaction? *Research in Higher Education*, 43(2), 209-234.

Umbach, P., & Wawrzynski, M. (2005). Faculty do matter: The role of college faculty in student learning and engagement. *Research in Higher Education,46*, 153-184.

Upcraft, M. L., Finney, J. E., & Garland, P. (1984). Orientation: A context. *New Directions for Student Services, 25*, 5-25.

Wang, J., & Shiveley, J. (2009). The impact of extracurricular activity on student academic performance. *Office of Institutional Research Report.* California State University, Sacramento. Retrieved from http://www.csus.edu/oir/Assessment/Nonacademic%20Program%20Assessment/Student%20Activities/Student%20Activity%20Report%202009.pdf

Wang, Y. Y., Sedlacek, W. E., & Westbrook, F. D. (1992). Asian Americans and student organizations: Attitudes and perceptions. *Journal of College Student Development, 33*, 214-221.

Watson, L. E., & Kuh, G. D. (1996). The influence of dominant race environments on student involvement, perceptions, and educational gains: A look at historically Black and predominantly White liberal arts institutions. *Journal of College Student Development, 37*, 415-424.Watson, L., Terrell, M. C., Wright, D. J., Bonner, F. Cuyjet, M. Gold, J., Rudy, D. & Person, D. R. (2002). *How minority students experience college: Implications for planning and policy.* Sterling, VA: Stylus.

Watt, A. & Rodmell, S. (1988). Community involvement on health promotion: Progress or panacea? *Health Promotion, 2*(4), 359-367.

Wilson, R. C., Gaff, J. G., Dienst, R., Wood, L., & Bavry, J. (1975). *College professors and theirimpact on students*. New York, NY: Wiley Interscience.

Winston, R. B., Bledsoe, T., Goldstein, A. R., Wisbey, M. E., Street, J. L., Brown, S. R., Goyen, K. D., & Rounds, L. E. (1997). Describing the climate of student organizations: The student organization environment scales. *Journal of College Student Development, 38,* 417-428.

Zeidenberg, M. (2012). Valuable learning or "spinning their wheels"? Understanding excess credits earned by community college associate degree completers (CCRC Working Paper No. 44). New York, NY: Columbia University, Teachers College, Community College Research Center.

Zepke, N., & Leach, L. (2005). Integration and adaptation: Approaches to the student retention and achievement puzzle. *Active Learning in Higher Education: The Journal of the Institute for Learning and Teaching, 6 (1),* 46-59.

Appendix A

Full Characteristics of the Survey Population

Characteristic	*N*	% of Survey Population
Gender		
Female	2689	97.4
Male	73	2.6
Missing	44	
Age		
19 and under	76	2.7
20-23	1164	42.0
24-29	893	32.2
30-34	327	11.8
35-39	175	6.3
40 and over	134	4.8
Race		
American Indian/Alaskan Native	54	1.9
Back or African American	88	3.1
White	560	20
Asian	184	6.6
Native Hawaiian or Other Pacific Islander	19	.7
Chose Not to Response	144	5.1
Citizenship		
US	2605	96.4
Canadian	6	.2
Other	90	3.3
Ethnicity		
Hispanic	303	11.3
Not Hispanic	2382	88.7
GPA Range		
3.76-4.00 (3.88 Proxy)	712	26.9
3.50-3.75 (3.63 Proxy)	773	29.2
3.26-3.49 (3.38 Proxy)	577	21.8
3.00-3.25 (3.13 Proxy)	419	15.8
2.75-2.99 (2.87 Proxy)	133	5.0
2.50-2.74 (2.62 Proxy)	31	1.2
Below 2.50 (2.37 Proxy)	4	.2
Institution		
Private	380	13.8
Public	2261	82.0
Unsure	116	4.2

Highest Degree		
Associate's	1025	38.0
Bachelor's	550	20.4
Master's	28	1.0
Not Applicable	1096	40.6
Program Length		
Semester-based	2462	87.7
Quarter-based	295	10.5
Program Duration		
Two-Year Dental Hygiene	2204	80.0
Four-Year Dental Hygiene	423	15.4
Degree Completion Dental Hygiene	127	4.6
Enrollment Schedule		
Full-Time	2570	93.0
Part-Time	194	7.0
Course load		
1	3	.1
2	10	.4
3	23	.8
4	30	1.1
5	23	.8
6	89	3.2
7	50	1.8
8	104	3.7
9	94	3.3
10	145	5.2
11	113	4
12	395	14.1
13	207	7.4
14	222	7.9
15	245	8.7
16	247	8.8
17	111	4
18	549	19.6
0	146	5.2
Current Year in Program		
First	1136	41.3
Second	1117	40.6
Third	213	7.7
Fourth	284	10.3
Academic Meetings with Program Director		
Never	936	37.1
Weekly	336	13.3
Every 2 weeks	145	5.7
Monthly	444	17.6
Once an academic term	664	26.3

Career Plan Meetings with Program Director		
Never	1574	62.7
Weekly	120	4.8
Every 2 weeks	40	1.6
Monthly	249	9.9
Once an academic term	528	21.0
Non-Course collaborations with Program Dir.		
Never	1111	44.4
Weekly	274	11.0
Every 2 weeks	165	6.6
Monthly	541	21.6
Once an academic term	411	16.4
Attend Dental Hygiene Conference/Meeting		
Never	821	33.1
Weekly	71	2.9
Every 2 weeks	61	2.5
Monthly	524	21.1
Once an academic term	1004	40.5
Non-Dental Hygiene event attendance		
Never	1549	61.7
Weekly	53	2.1
Every 2 weeks	49	2.0
Monthly	267	10.6
Once an academic term	591	23.6
Interaction with Program Director		
Excellent	1004	39.7
Good	823	32.6
Satisfactory	398	15.8
Fair	195	7.7
Poor	106	4.2
Course Discussion Contributions		
Never	152	6.1
Weekly	1909	76.1
Every 2 weeks	144	5.7
Monthly	210	8.4
Once an academic term	95	3.8
Faculty Coursework Meetings		
Never	715	28.7
Weekly	575	23.1
Every 2 weeks	288	11.6
Monthly	551	22.1
Once an academic term	364	14.6

Faculty Career Planning Meeting		
Never	1382	56.2
Weekly	196	8.0
Every 2 weeks	76	3.1
Monthly	288	11.7
Once an academic term	516	21.0
Non-Coursework Faculty Collaborations		
Never	915	36.7
Weekly	334	13.4
Every 2 weeks	185	7.4
Monthly	629	25.2
Once an academic term	429	17.2
Faculty Email Communications		
Never	73	3.0
Weekly	1528	63.2
Every 2 weeks	354	14.6
Monthly	366	15.1
Once an academic term	98	4.1
Prompt Faculty Feedback		
Never	99	4.0
Weekly	1786	71.3
Every 2 weeks	226	9.0
Monthly	248	9.9
Once an academic term	145	5.8
Quality of Faculty Interactions		
Excellent	1217	48.2
Good	881	34.9
Satisfactory	279	11.1
Fair	103	4.1
Poor	44	1.7
Student-Peer Coursework Discussion		
Never	26	1.1
Weekly	2332	94.5
Every 2 Weeks	55	2.2
Monthly	49	2.0
Once an Academic term	7	.3
Classmate Meetings about coursework		
Never	156	6.3
Weekly	1751	71.1
Every 2 Weeks	248	10.1
Monthly	235	9.5
Once an Academic term	73	3.0
Coursework Collaborations with		

Classmates		
Never	99	4.0
Weekly	1489	60.9
Every 2 Weeks	265	10.8
Monthly	413	16.9
Once an Academic term	179	7.3
Group Dental Hygiene Assignment		
Never	348	14.2
Weekly	1015	41.5
Every 2 Weeks	221	9.0
Monthly	458	18.7
Once an Academic term	405	16.6
Attend DH Conference w/ classmates		
Never	380	15.5
Weekly	373	15.2
Every 2 Weeks	68	2.8
Monthly	527	21.4
Once an Academic term	1110	45.2
Presentation of a Table Clinic		
Yes	679	72.3
No	1776	27.7
Community Service Learning Event		
Yes	1605	65.4
No	849	34.6
Student ADHA Chapter		
Yes	1970	80.4
No	480	19.6
ADHA Student Chapter Meeting Attendance		
Weekly	55	3.0
Monthly	871	47.3
Once an Academic Term	272	14.8
Rarely	168	9.1
Never	477	25.9
ADHA Student Chapter Leadership Role		
Yes	402	21.7
No	1447	78.3
Commitment to ADHA Student Chapter		
5 hours	19	1.0
1-3 hours	316	17.2
Less than 1 hour	575	31.3
No Time to Organization Activities	405	22.00

Limited hours due to coursework	524	28.5

Appendix B

Pearson r Correlations Between Predictor Variables (45) and the Criterion Variable

Note. * indicates the correlation is significant at the 0.05 level. ** indicates the correlation is significant at the 0.01 level

Block 1 – Student Input Characteristics - Demographics

Student Input Characteristics -- Demographics		GPA Proxy
Gender	Pearson Correlation	-.050**
	Sig. (2-tailed)	.010
	N	2642
Age Range	Pearson Correlation	.021
	Sig. (2-tailed)	.287
	N	2648
Race - American Indian or Alaska Native	Pearson Correlation	.007
	Sig. (2-tailed)	.713
	N	2649
Race - Black or African American	Pearson Correlation	-.079**
	Sig. (2-tailed)	.000
	N	2649
Race – White	Pearson Correlation	.072**
	Sig. (2-tailed)	.000
	N	2649
Race – Asian	Pearson Correlation	.009
	Sig. (2-tailed)	.629
	N	2649
Race - Native Hawaiian or Other Pacific Islander	Pearson Correlation	-.002
	Sig. (2-tailed)	.921
	N	2649
Race - Choose not to respond	Pearson Correlation	-.041*
	Sig. (2-tailed)	.033

	N	2649
	Pearson Correlation	.002
Citizenship1	Sig. (2-tailed)	.911
	N	2649
	Pearson Correlation	.043*
Citizenship2	Sig. (2-tailed)	.027
	N	2649
	Pearson Correlation	-.016
Ethnicity - Hispanic or Latino	Sig. (2-tailed)	.402
	N	2632

Block 2 – Institutional Characteristics – Program Type and Student Education

Institutional Characteristics/ Program Type and Student Education		GPA Proxy
PublicPrivate1	Pearson Correlation	-.027
	Sig. (2-tailed)	.158
	N	2649
PublicPrivate2	Pearson Correlation	.026
	Sig. (2-tailed)	.182
	N	2649
PublicPrivate3	Pearson Correlation	-.010
	Sig. (2-tailed)	.606
	N	2649
TwoFour1	Pearson Correlation	.013
	Sig. (2-tailed)	.509
	N	2649
TwoFour2	Pearson Correlation	-.036
	Sig. (2-tailed)	.061
	N	2649
TwoFour3	Pearson Correlation	.019
	Sig. (2-tailed)	.321
	N	2649
Highest Degree	Pearson Correlation	.051**
	Sig. (2-tailed)	.009
	N	2644
Are you currently enrolled in your dental hygiene - Fulltime Student	Pearson Correlation	-.001
	Sig. (2-tailed)	.951
	N	2644
What year student are you - First year	Pearson Correlation	.001
	Sig. (2-tailed)	.967
	N	2633
What is your current course load in the dental - 1	Pearson Correlation	.029
	Sig. (2-tailed)	.136
	N	2616

Block 3 – Program Director/Administration Interaction

Program Director/Administration Interaction		GPA Proxy
Meet outside of class to discuss academic issues	Pearson Correlation Sig. (2-tailed) N	-.017 .387 2483
Meet outside of class to discuss career plans	Pearson Correlation Sig. (2-tailed) N	.002 .920 2468
Work with him/her on activities other than coursework	Pearson Correlation Sig. (2-tailed) N	-.003 .891 2461
Attend a dental hygiene meeting or conference together	Pearson Correlation Sig. (2-tailed) N	.001 .945 2440
Frequent a non-dental hygiene activity	Pearson Correlation Sig. (2-tailed) N	-.002 .915 2469
Describe the quality of your interactions with – Excellent	Pearson Correlation Sig. (2-tailed) N	.081** .000 2482

Block 4 – Student-Faculty Interactions

Student-Faculty Interactions		GPA Proxy
Contributing to course discussions	Pearson Correlation	.059**
	Sig. (2-tailed)	.003
	N	2467
Meeting outside of class to review for an exam or other	Pearson Correlation	-.010
	Sig. (2-tailed)	.605
	N	2450
Meeting outside of class to discuss career plans	Pearson Correlation	.001
	Sig. (2-tailed)	.961
	N	2417
Working for faculty on activity other than course	Pearson Correlation	.029
	Sig. (2-tailed)	.155
	N	2450
Emailing with an instructor	Pearson Correlation	.039
	Sig. (2-tailed)	.057
	N	2379
Receiving prompt feedback written/oral/electronic	Pearson Correlation	.065**
	Sig. (2-tailed)	.001
	N	2463
Describe the quality of your interactions with – Excellent	Pearson Correlation	.119**
	Sig. (2-tailed)	.000
	N	2480

Block 5 – Student-Student Interactions

Student-Student Interactions		GPA Proxy
Participating in classroom discussions	Pearson Correlation	.027
	Sig. (2-tailed)	.183
	N	2427
Meeting outside of class to review course content	Pearson Correlation	.012
	Sig. (2-tailed)	.554
	N	2421
Collaborative dental hygiene course-related issues	Pearson Correlation	-.010
	Sig. (2-tailed)	.610
	N	2404
Participating in a group dental hygiene assignment	Pearson Correlation	.001
	Sig. (2-tailed)	.962
	N	2406
Attending together a dental hygiene conference	Pearson Correlation	-.016
	Sig. (2-tailed)	.442
	N	2417

Block 6 – Student Activity and Participation in Student Chapter ADHA

Student Activity and Participation and in Student Chapter ADHA		GPA Proxy
In your current year have you ever presented no – Yes	Pearson Correlation	-.025
	Sig. (2-tailed)	.227
	N	2411
Have you volunteered not a course assignment to – Yes	Pearson Correlation	.010
	Sig. (2-tailed)	.609
	N	2410
Does your dental hygiene program have a Student Chapter ADHA – Yes	Pearson Correlation	.048*
	Sig. (2-tailed)	.019
	N	2406
Do you have a leadership role in the Student Chapter – Yes	Pearson Correlation	.049*
	Sig. (2-tailed)	.036
	N	1813
Do you attend chapter meetings - Yes weekly	Pearson Correlation	.034
	Sig. (2-tailed)	.148
	N	1809
Time Spent	Pearson Correlation	.029
	Sig. (2-tailed)	.222
	N	1804

Appendix C

Letter to Dental Hygiene Program Directors

Dear Dental Hygiene Program Director,

As a fellow Dental Hygiene Program Director (Lorain County Community College Dental Hygiene Program in Ohio), I am writing you requesting that you assist your students in providing time (possibly scheduling a time for them) to complete a brief survey. A robust response rate generates sufficient data that may reveal facts and uncover trends about our students. Furthermore, this supporting evidence may enables us to reach conclusions that might impact our educational efforts on a national level.

The survey is being distributed as a joint effort stemming from both my research as an integral part of my PhD dissertation (graduate student at the University of Toledo in Ohio) and from the American Dental Hygienists' Association (ADHA). The ADHA is the preferred source for all Dental Hygiene data and information in the US. It is anticipated that the information gathered from this survey will contribute to the quality of our educational programs.

Being a dental hygiene educator, I know you are interested in examining dental hygiene student success and in determining what motivates students to do well. Through my research, I am looking at a well-known student development theory, Alexander W. Astin's, *Student Involvement: A Developmental Theory for Higher Education*.

There is little or no research on student engagement (involvement) practices of students enrolled in health career educational programs including dental hygiene. Therefore I am interested in surveying dental hygiene students, both freshman and senior students' engagement practices while they are currently enrolled in a dental hygiene program

It would be of considerable import for us as Program Directors and educators to learn that dental hygiene students can be successful academically with an increase in their dental hygiene program interactions. The results may prompt us to focus on improved strategies and processes for delivering dental hygiene education through strong leadership, and revitalized policies and practices.

Thank you for encouraging your students to complete the survey that will be sent to them in the next few days.

Appendix D

The Survey Instrument

Thank you for participating in this important research study. As a token of our appreciation, the first 500 responses to the survey will be entered into a raffle to win one of three $100 Amazon Gift Cards. If you would like to be included in the raffle, please include your contact information at the end of the survey. If you have any questions regarding the survey please contact sleiken@lorainccc.edu. Please submit your completed survey by: March 10, 2015.

Demographics

1. Your gender is:

	Female		Male

2. Your age range:

	19 and under		30 - 34
	20 - 23		35 - 39
	24 – 29		40 and over

3. Are you currently enrolled in a...?

	TWO YEAR Dental Hygiene Program		A DEGREE COMPLETION Dental Hygiene Program
	FOUR YEAR Dental Hygiene Program		

4. Is your dental hygiene program....?

	Semester based		Quarter based

5. What year student are you?

	First year		Third year
	Second year		Fourth year

6a. Which school do you attend (Alpha List A -L)**?**

	Allegany College of Maryland		El Paso Community College
	Amarillo College		Erie Community College
	Asheville-Buncombe Technical Community College		Eugenio Maria De Hostos Community College
	Athens Technical College		Farmingdale State College of New

			York
	Atlanta Technical College		Fayetteville Technical Community College
	Austin Community College		Ferris State University
	Baker College of Auburn Hills		Flint Hills Technical College
	Baker College of Port Huron		Florence Darlington Technical College
	Baltimore City Community College		Florida SouthWestern State College
	Baylor College of Dentistry		Florida State College at Jacksonville
	Bellingham Technical College		Foothill College
	Bergen Community College		Forsyth Technical Community College
	Big Sandy Community & Technical College		Fortis College
	Blinn College		Fortis College-Landover
	Bluegrass Community and Technical College		Fortis College-Phoenix
	Briarcliffe College		Fortis College-Salt Lake City
	BridgeValley Community & Technical College		Fortis Institute-Birmingham
	Bristol Community College		Fortis Institute-Erie
	Broward College		Fortis Institute-Scranton
	Burlington County College		Fox Valley Technical College
	Cabrillo College		Fresno City College
	Camden County College		Georgia Highlands College
	Cape Cod Community College		Georgia Perimeter College
	Cape Fear Community College		Georgia Regents University
	Carl Sandburg College		Goodwin College
	Carrington College California		Grand Rapids Community College
	Carrington College California - San Jose Campus		Great Falls College Montana State University
	Carrington College Mesa		Greenville Technical College
	Carrington College of Boise		Guilford Technical Community College
	Catawba Valley Community College		Gulf Coast State College
	Central Carolina Community College		Hagerstown Community College
	Central Community College		Halifax Community College
	Central Georgia Technical College-South Campus		Harcum College
	Central Georgia Technical College-North		Harrisburg Area Community College
	Central Piedmont Community College		Hawkeye Community College
	Century College		HCC Coleman College for Health Sciences
	Cerritos College		Henderson Community College
	Chabot College		Herzing University
	Chattanooga State Community College		Hillsborough Community College

	Chippewa Valley Technical College		Hiwassee College
	Clark College		Horry Georgetown Technical College
	Clayton State University		Howard College
	Coastal Bend College		Howard Community College
	Coastal Carolina Community College		Howard University
	College of DuPage		Hudson Valley Community College
	College of Lake County		Idaho State University
	College of Southern Idaho		Illinois Central College
	College of Southern Nevada		Indian River State College
	Collin College		Indiana University Northwest
	Colorado Northwestern Community College		Indiana University School of Dentistry
	Columbia Basin College		Indiana University South Bend
	Columbus State Community College		Indiana University-Purdue University Fort Wayne
	Columbus Technical College		Iowa Central Community College
	Community College of Denver		Iowa Western Community College
	Community College of Philadelphia		Ivy Tech Community College
	Community College of Rhode Island		Ivy Tech Community College - Anderson Campus
	Concorde Career College - Garden Grove		James A. Rhodes State College
	Concorde Career College - San Bernardino		John A. Logan College
	Concorde Career College-Aurora		Johnson County Community College
	Concorde Career College-Dallas		Kalamazoo Valley Community College
	Concorde Career College-Memphis		Kellogg Community College
	Concorde Career College-Missouri		Kennedy King College
	Concorde Career College-San Antonio		Kirkwood Community College
	Concorde Career College-San Diego		Lake Land College
	Cuyahoga Community College		Lake Superior College
	Cypress College		Lake Washington Institute of Technology
	Darton State College		Lakeland Community College
	Daytona State College		Lamar Institute of Technology
	Del Mar College		Lane Community College
	Delaware Technical and Community College		Lanier Technical College
	Delta College		Lansing Community College
	Des Moines Area Community College		Laramie County Community College
	Diablo Valley College		Lewis and Clark Community College
	Dixie State University		Lincoln College of New England
	Dona Ana Community College		Loma Linda University
	East Tennessee State University		Lone Star College Kingwood
	Eastern Florida State College		Lorain County Community College

	Eastern International College		Louisiana State University
	Eastern New Mexico University – Roswell		Luzerne County Community College
	Eastern Washington University		

6b. Which school do you attend (Alpha List M - Z)**?**

	Madison Area Technical College		Southeastern Technical College
	Manhattan Area Technical College		Southern Illinois University
	Manor College		Southern University at Shreveport
	MCPHS University		Southwestern College
	Meridian Community College		Springfield Technical Community College
	Mesa Community College		St. Cloud Technical and Community College
	Miami Dade College		St. Louis Community College-Forest Park
	Middlesex Community College		St. Petersburg College
	Middlesex County College		Stark State College
	Midlands Technical College		State College of Florida, Manatee - Sarasota
	Midwestern State University		State Fair Community College
	Milwaukee Area Technical College		SUNY at Canton
	Minnesota State Comm. and Tech. College-Moorhead		SUNY Broome
	Minnesota State University-Mankato		Taft College
	Mississippi Delta Community College		Tallahassee Community College
	Missouri College		Tarrant County College
	Missouri Southern State University		Temple College
	Mohave Community College		Tennessee State University
	Monroe Community College		Texas State Technical College
	Montgomery County Community College		Texas Womans University
	Moreno Valley College		The Community College of Baltimore County
	Mott Community College		The University of North Carolina
	Mount Ida College		Thomas Nelson Community College
	Mount Wachusett Community College		Trident Technical College
	Mt. Hood Community College		Truckee Meadows Community College
	New York City College of Technology		Tulsa Community College
	New York University		Tunxis Community College
	NHTI, Concords Community College		Tyler Junior College
	Nicolet Area Technical College		UH Maui College
	Normandale Community College		University of Alaska Anchorage
	North Central Missouri		University of Alaska Fairbanks

	College/Hillyard Technical Center		
	North Dakota State College of Sciences		University of Arkansas - Fort Smith
	Northampton Community College		University of Arkansas For Medical Sciences
	Northcentral Technical College		University of Bridgeport
	Northeast Mississippi Community College		University of Cincinnati
	Northeast Texas Community College		University of Detroit Mercy
	Northeast Wisconsin Technical College		University of Hawaii at Manoa
	Northern Arizona University		University of Louisiana at Monroe
	Northern Virginia Community College		University of Louisville
	Northern Wyoming Community College District		University of Maine at Augusta-Bangor Campus
	Oakland Community College		University of Maryland
	Ohio State University		University of Michigan
	Old Dominion University		University of Minnesota
	Orange County Community College		University of Mississippi Medical Center
	Oregon Institute of Technology		University of Missouri-Kansas City
	Owens Community College		University of Nebraska Medical Center
	Oxnard College		University of New England
	Ozarks Technical Community College		University of New Haven
	Pacific University		University of New Mexico
	Palm Beach State College		University of Oklahoma Health Sciences Center
	Parkland College		University of Pittsburgh
	Pasadena City College		University of South Dakota
	Pasco-Hernando State College		University of Southern California
	Pearl River Community College		University of Southern Indiana
	Pennsylvania College of Technology		University of Tennessee Health Science Center, Memphis
	Pensacola State College		University of Texas Health Science Center at Houston
	Phoenix College		University of Texas Health Science Center at San Antonio
	Pierce College Fort Steilacoom		University of the Pacific
	Pima County Community College		Utah College of Dental Hygiene, a division of Careers Unlimited, LLC
	Pima Medical Institute		Utah Valley University
	Pima Medical Institute-Houston		Valencia College
	Pima Medical Institute-Seattle		Vermont Technical College
	Portland Community College		Virginia Commonwealth University
	Prairie State College		Virginia Western Community College

	Pueblo Community College		Wake Technical Community College
	Quinsigamond Community College		Wallace State College
	Remington College – Nashville		Waukesha County Technical College
	Rio Salado College		Wayne Community College
	Roane State Community College		Wayne County Community College District
	Rochester Community & Technical College		Weber State University
	Rock Valley College		West Coast University
	Rose State College		West Georgia Technical College
	Rutgers University		West Liberty University
	Sacramento City College		West Los Angeles College
	Salt Lake Community College, Jordan Campus		West Virginia University
	San Joaquin Valley College		Western Kentucky University
	San Juan College		Westmoreland County Community College
	Sanford-Brown College-Dallas		Wharton County Jr. College
	Sanford-Brown Institute-Fort Lauderdale		Wichita State University
	Sanford-Brown Institute-Jacksonville		William Rainey Harper College
	Santa Fe College		Wiregrass Georgia Technical College
	Santa Rosa Junior College		Wytheville Community College
	Savannah Technical College		Yakima Valley Community College
	Seattle Central Community College		York Technical College
	Shasta College		Youngstown State University
	Shawnee State University		
	Shoreline Community College		
	Sinclair Community College		
	South Florida State College		

7. Is the school you attend...?

	Private		Unsure
	Public		

8. Are you currently enrolled in your dental hygiene program as a...?

	Full-time student		Part-time student

9. What is your highest degree in a non-dental hygiene discipline?

	Associate's Degree		Master's Degree
	Bachelor's Degree		Not applicable

10. What is your current course load in the dental hygiene program (in hours)?

	1		10
	2		11
	3		12
	4		13
	5		14
	6		15
	7		16
	8		17
	9		18

11. At this dental hygiene program in what range is your overall college grade point average?

	3.76 - 4.00		2.75 - 2.99
	3.50 - 3.75		2.50 - 2.74
	3.26 - 3.49		Below 2.5
	3.00 - 3.25		

12. What is your citizenship?

	U.S.		Other
	Canadian		

13. Ethnicity: Are you Hispanic or Latino?

	Yes		No

14. Race: (Select all that apply)

	American Indian or Alaska Native		Asian
	Black or African American		Native Hawaiian or Other Pacific Islander
	White		Choose not to respond

Program Director/Administration Interactions

15. Thinking about your current year in your dental hygiene program, please indicate how often you and your dental hygiene program director:

	Never	Weekly	Every Two Weeks	Monthly	Once an Academic Term
Meet outside of class to discuss academic issues	❑	❑	❑	❑	❑
Meet outside of class to discuss career plans	❑	❑	❑	❑	❑
Work with him/her on activity(ies) other than coursework (committees, student organizations, research project, etc.)	❑	❑	❑	❑	❑
Attend a dental hygiene meeting or conference together	❑	❑	❑	❑	❑
Frequent a non-dental hygiene activity such as attending a campus function	❑	❑	❑	❑	❑

16a. Describe the quality of your interactions with your dental hygiene program director:

	Excellent		Fair
	Good		Poor
	Satisfactory		

16b. Comments are optional if response to Q16a needs additional clarification:

Faculty Interactions

17. Thinking about your current year in your dental hygiene program, please indicate how often you and any dental hygiene faculty member have interacted by:

	Never	Weekly	Every Two Weeks	Monthly	Once an Academic Term
Contributing to course discussions	❑	❑	❑	❑	❑
Meeting outside of class to review for an exam or clarify course content	❑	❑	❑	❑	❑
Meeting outside of class to discuss career plans	❑	❑	❑	❑	❑
Working for faculty on activity other than coursework (i.e., committees, student organization, research project, etc.)	❑	❑	❑	❑	❑
Emailing with an instructor	❑	❑	❑	❑	❑
Receiving prompt feedback (written/oral/-electronic) on your performance	❑	❑	❑	❑	❑

18a. Describe the quality of your interactions with your dental hygiene faculty:

	Excellent		Fair
	Good		Poor
	Satisfactory		

18b. Comments are optional if response to Q18a needs additional clarification:

Peer Interactions

19. Thinking about your current year in your dental hygiene program, please indicate how often you and dental hygiene classmates have interacted by:

	Never	Weekly	Every Two Weeks	Monthly	Once an Academic Term
Participating in classroom discussions	❑	❑	❑	❑	❑
Meeting outside of class to review course content or study for a dental hygiene course examination	❑	❑	❑	❑	❑
Collaborating on a course project or dental hygiene presentation in the dental hygiene classroom	❑	❑	❑	❑	❑
Participating in a group dental hygiene assignment at a facility outside of the dental hygiene program	❑	❑	❑	❑	❑
Attending together a dental hygiene conference, meeting, or dental hygiene educational course off campus	❑	❑	❑	❑	❑

Activity Management

20. In your current year, have you ever presented (not a course assignment) a Table Clinic or Poster at a dental hygiene meeting or conference?

	Yes		No

21. Have you volunteered (not a course assignment) to present or participate in a Community Site/Service Learning event to promote health and /or dental health, and/or dental hygiene profession information?

	Yes		No

Student Chapter Engagement

22a. Does your dental hygiene program have a Student Chapter American Dental Hygienists' Association?

	Yes		No

22b. If YES, how often does it meet?

	Weekly		Less than once an academic term
	Monthly		Unsure
	Once an academic term		

23. Are you currently a member of the Student Chapter American Dental Hygienists' Association?

	Yes		Unsure
	No		

24. Do you have a leadership role in the Student Chapter American Dental Hygienists' Association?

	Yes		No

25. Do you attend the chapter meetings of your Student Chapter American Dental Hygienists' Association?

	Yes, weekly		Yes, rarely
	Yes, monthly		No, I do not attend chapter meetings
	Once an academic term		

26. Overall, how many hours per week do you commit to Student Chapter American Dental Hygienists' Association activities?

	5 hours		I do not commit any time to organization activities
	1 - 3 hours		Limited to the number of hours I can commit due to course loads
	Less than an hour		

Additional comments on any survey questions:

If you would like to be included in the raffle for 1 of 3 $100 Amazon Gift Cards, please include your contact information below. Remember, you must be one of the first 500 submitted and complete responses to be included in the raffle.

First Name

Last Name

Email Address

Appendix E

Institutional Review Board Consent

THE UNIVERSITY OF TOLEDO 1872

IRB # 200495
ICF Version Date: 01/14/15

ADULT RESEARCH-INFORMED CONSENT INFORMATION

Principal Investigator- Dr. Ronald Opp (faculty) Phone: 419.530.2695 Health and Human Services Bldg. Room 1300A ronald.opp@utoledo.edu

Student Investigator- Susan Leiken, 440-366-7168 sleiken@lorainccc.edu

The PhD dissertation, titled, "*Does Dental Hygiene Student Engagement While Enrolled in the Dental Hygiene Program Influence Academic Achievement?"* includes an electronic survey of 12,000 dental hygiene students. The 26-item survey has been reviewed and approved by the dissertation committee, the American Dental Hygienists' Association (ADHA), and a panel of dental hygiene educators, and dental hygiene students.

The survey will be distributed by the American Dental Hygienists' Association using their QuestionPro.com and their student email data base. The doctoral student will not have access to this email database. The dental hygiene students responding to this email will be notified that the email is being sent by the American Dental Hygienists' Association. The responses will be collected and sent to the doctoral student. The ADHA will also house the data on their server.

The purpose of the survey is to collect data pertaining to dental hygiene student engagement activities and dental hygiene student interactions while the dental hygiene student is enrolled in the dental hygiene program. Utilizing Alexander W. Astin's, *Student Involvement: A Developmental Theory for Higher Education*, this study will investigate the national trends of dental hygiene student engagement, both in the dental hygiene program, and in student chapters of the American Dental Hygienists' Association (ADHA). The study will determine whether dental hygiene student involvement has an influence on student success, as measured by cumulative grade point average (GPA). The most basic tenet of Astin's Theory of Involvement is that students learn more the more they are involved in both the academic and social aspects of the collegiate experience.

There are minimal risks to participation in this study. Confidentially will be maintained; the doctoral student will not have access to student email information. Student participation is purely voluntary and involves no penalties. Refusal to participate in this study will not affect your relationship with the ADHA or the University of Toledo. All data collected is confidential and retained in a password-protected and secure database.

There are potential benefits for the dental hygiene student, dental hygiene educator, and for the dental hygiene program director/administrator. Sufficient data may reveal facts and uncover trends about dental hygiene students leading to increased student completion rates and improved student outcomes. Furthermore, supporting evidence may enable dental hygiene educators to reach conclusions that may impact their educational efforts on a national level. It would be of considerable import for Program Directors and educators to learn that dental hygiene students can be successful academically with an increase in their dental hygiene program interactions. The results may encourage improved strategies and processes for delivering dental hygiene education through strong leadership, and revitalized policies and practices.

Before you decide to accept this invitation to take part in this study, you may ask any questions that you might have. If you have any questions at any time before, during or after your participation you should contact a member of the research team: Principal Investigator- Dr. Ronald Opp (faculty) Phone: 419.530.2695, ronald.opp@utoledo.edu or Student Investigator- Susan Leiken, 440.366.7168 sleiken@lorainccc.edu.

If you have questions beyond those answered by the research team or your rights as a research subject the Chairperson of the SBE Institutional Review Board may be contacted through the Office of Research on the main campus at the University of Toledo at 419.530.2844.

This Adult Research Informed Consent document has been reviewed and approved by the University of Toledo Social, Behavioral and Educational IRB for the period of time specified in the box below.

Approved Number of Subjects: 12,000

University of Toledo IRB Approved
Approval Date: 01/14/15
Expiration Date: 01/13/16

THE UNIVERSITY OF TOLEDO
1872

The University of Toledo
Department for Human Research Protections
Social, Behavioral & Educational Institutional Review Board
Office of Research, Rm. 2300, University Hall
2801 West Bancroft Street, Mail Stop 944
Toledo, Ohio 43606-3390
Phone: 419-530-2844 Fax: 419-530-2841
(FWA00010686)

To: Ronald Opp, Ph.D. and Susan Leiken
Department of School Psychology, Higher Education & Counselor Education

From: Walter Edinger, PhD., Chair
Kamala London Newton, Ph.D., Vice Chair
Mirella Pardee, Chair Designee
Patricia Case, Ph.D., Chair Designee

Signed: _____ **Date:** 1-15-15

Subject: IRB #200495
Protocol Title: ***Does Dental Hygiene Student Engagement While Enrolled in the Dental Hygiene Program Influence Academic Achievement?***

On 01/14/15, the Protocol listed below was reviewed and approved by the Chair and Chair Designee of the University of Toledo (UT) **Social Behavioral & Educational** Institutional Review Board (IRB) via the expedited process. The Chair and Chair Designee noted that you have been granted a waiver of written consent. This action will be reported to the committee at its next scheduled meeting.

Items Reviewed:
- IRB Application Requesting Expedited Review
- Current IRB Approved Information Sheet(s) (version date 01/14/15)
- Current IRB Approved Online Survey(s) (version date 01/14/15)

This protocol approval is in effect until the expiration date listed below, unless the IRB notifies you otherwise.

Only the most recent IRB approved Consent/Assent form(s) listed above may be used when enrolling participants into this research.

Approval Date: 01/14/15 Expiration Date: 01/13/16

Number of Subjects Approved: 12,000

Please read the following attachment detailing Principal Investigator responsibilities.