

THE OUTCOMES OF AN INNOVATIVE HYBRID PRE-DENTAL ADMISSION
ENHANCEMENT PROGRAM AMONG UNDERREPRESENTED
MINORITY AND DISADVANTAGED STUDENTS

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by
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University of Missouri-Kansas City, 2014

ABSTRACT

This study examined the outcomes of a hybrid pre-dental admission enhancement program (AEP) with regard to the Dental Admissions Test (DAT) scores, admission rates, and satisfaction among underrepresented and/or disadvantaged students at the University of Missouri, School of Dentistry (UMKC SOD). Additionally, data from 48 students who completed the AEP from years 2011-2014 were evaluated regarding their experience participating in the AEP. The program's unique hybrid design provided both a residential and online experience. The onsite experience exposed students to critical skills training encompassing time management, essay writing, learning styles, study skills, test taking skills, test anxiety, reading skills, and mentoring with the dental school application process. Students were able to prepare a rough draft of the dental school application essay and receive faculty feedback. This enabled students to have a well-written essay for their application. Additionally, AEP students participated in hands-on lab exercises and shadowed dental students providing patient care in the clinic. Technology allowed students to access the academic content of the AEP including Math, Chemistry, Organic Chemistry and Biology, 24/7 in an asynchronous format. Students were also mentored by supplemental instructors (SI) from the International Center for Supplemental Instruction (ICSI) three times per week in live synchronous sessions through Blackboard Collaborate™ support.

Students were asked to complete a program evaluation, which posed questions in a 5-point Likert scale format ranging from 1 = strongly disagree to 5 = strongly agree, has yes/no questions and allows for student comments. Frequency statistics, Pearson correlations and a Regression Model were used for statistical analysis of the data. All tests were conducted at $p < 0.05$ or less with a group of 48 students. Students admitted to dental school are continually monitored throughout their dental education until graduation.

APPROVAL PAGE

The faculty listed below, appointed by the Dean of the School of Education, have examined a dissertation titled “The Outcomes of an Innovative Hybrid Pre-dental Admission Enhancement Program among Underrepresented Minority and Disadvantaged Students,” presented by Carrie L. Carter-Hanson, candidate for the Doctor of Education degree, and certify that in their opinion it is worthy of acceptance.

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CHAPTER 1

INTRODUCTION

Health professions has been severely lacking in diversity for many years, both in its educational institutions and in the workforce. This critical shortage in culturally diverse health care practitioners is troublesome most notably due to the impending change in the nation's demographics in the next twenty years (Meyers, 2007; Sullivan Commission, 2004; Sullivan, 2010). For example, 50 percent of our nation is expected to be comprised of African American Hispanic and other ethnic groups such as Asian and American Indian/Alaskan Native by the year 2050. Therefore, it will be crucial to educate a healthcare workforce able to meet the needs and demands of this demographic shift (Sullivan Commission, 2004; U.S. Department of Health & Human Services, 2012). A lack of racial and ethnic diversity in health professions also impacts oral health as evidenced by the demonstrated link between general and oral health (U.S. Department of Health & Human Services, 2012). The problem is further exacerbated by the lack of access to oral health care within low income and underserved populations (U.S. Department of Health & Human Services, 2012). Low numbers of African American, Hispanics and American Indians/Alaskan Natives, are considered to be underrepresented groups in dentistry. These people groups are often referred to in dental education as underrepresented minorities and the term URM is utilized interchangeably in the literature. The lack of representation further complicates the ability of people to seek care from a practitioner that is representative of one's culture (Saha, Taggart, Komaromy, & Bindman, 2000) creating a cyclical effect. Studies conducted in both medicine and dentistry demonstrate how low numbers of minority group practitioners impact patients' ability to access care (Saha et al., 2000; Smith, Ester, & Inglehart, 2006; Sullivan Commission, 2004; Sullivan, 2010).

Significance of the Problem

The problem begins with the lack of diversity in all healthcare professions. In 2004, the Sullivan Commission reviewed the current status of healthcare professions for diversity in the workforce. The report showed that while the African American, Hispanic, and American Indian populations were on the rise in our nation, there was still a lack of representation of these groups in medicine, nursing, and dentistry (Sullivan Commission, 2004). Despite years of trying to rectify and increase the number of culturally diverse students enrolled in various health profession schools, a general lack of diversity in all health care professions still exists today (Sullivan, 2010). The educational institution is the primary resource for change on this crucial issue as there is a critical link between a diverse health care workforce and improving our nation's access to care for the underserved (Sullivan, 2010; U.S. Department of Health & Human Services, 2012). This impending lack of diversity in the health professions is directly impacting racial and ethnic health disparities (Sullivan Commission, 2004). As a more recent report by Sullivan (2010) stated, "the benefits of a diverse health workforce to the health care and health status of minorities are compelling and indisputable" (Sullivan, 2010).

The lack of diversity in healthcare is further described in dentistry. Currently, African American, Hispanic and American Indian student populations reflect a markedly low enrollment in American dental schools as defined by the American Dental Education Association (American Dental Education Association, 2011). In 2003-2004, Weaver et al (2005) reported that the total percentage of African American, Hispanic, and American Indian dental students enrolled at the time was only 11.2 percent (Weaver, Ramanna, Haden, & Valachovic, 2005). Not much has changed since 2004. For example, in 2011 the total number of all URM students reported to be enrolled in U.S. Dental Schools was 705/5,302 enrollees (13.29%) compared to the number of

white enrollees of 2,958/5,302 (55.79%) (American Dental Education Association, 2011). This means that less than one in seven of all enrollees were from the combination of populations of African American, Hispanic, and American Indian.

The fact that low numbers of culturally diverse oral health care professionals are graduating from higher education institutions has a direct effect on access to care. Access to oral healthcare remains a national problem recognized by the Surgeon General and one that is being addressed by several states, local and governmental agencies (U.S. Department of Health & Human Services, 2012). As U. S. dental schools continue to graduate low numbers of diverse oral health care practitioners, the oral health care needs of ethnically diverse patients are directly impacted. This creates a barrier for underserved populations to receive quality oral health care services (Brown, Wagner, & Johns, 2000; Dolan, Atchison, & Huynh, 2005; Saha et al., 2000; Smith et al., 2006; Sullivan Commission, 2004).

A number of solutions have been recommended by national associations to remedy the lack of diversity in the healthcare workforce (ADEA, Sullivan Commission). Recommendations were formulated by the Sullivan Commission and include : (1) Increasing diversity in the health professions, citing the importance of this change at the educational level; (2) Exploring nontraditional paths for education and training of a health professional; and (3) Adhering to change within institutional leadership to support diversity (Sullivan Commission, 2004). Likewise, the American Dental Education Association's (ADEA) Commission reviewed the roles and responsibilities of the academic institution in educating a more diverse student population and set forth a landmark call for change "to improve the oral health care of all Americans" (Haden, et al. 2003).

As a result of these suggested calls for change and proposed initiatives, newly developed dental enrichment programs have been developed and implemented for the past several years across the country. Several programs were aimed solely at increasing enrollment of African American, Hispanic, and American Indian students into dental school. Some were designed as post-baccalaureate focusing on science course enrichment, while others promoted themselves as summer enrichment programs (Johnson, Woolfolk, May, & Inglehart, 2013; McClain, Jones, McClain, & Curd, 2013; Pendleton & Graham, 2010). The main purpose of these general enrichment programs was to increase the enrollment of African American, Hispanic, and American Indian students by developing their academic and professional skills. Traditional baccalaureate programs expose students to nine month or year-long training with faculty members and other students while also focusing on their academic and professional skills development. Enrichment programs are usually completed in a shorter time frame (Johnson et al., 2013; McClain et al., 2013).

Other programs are often referred to as “Pipeline” programs. The most noteworthy program has been the Robert Wood Johnson Foundation (RWJ) and the California Endowment (TCE) Pipeline program schools. The RWJ foundation awarded funds to 11 U.S. dental schools to implement what is known today as the RWJ Pipeline (See Table 1). Additionally, TCE funded 4 California dental schools to participate in the Pipeline program, for a total of 15 schools deemed the “Pipeline, Profession and Practice: Community Based Dental Education Program” (Andersen et al., 2005). The “Pipeline” is defined as a dental school program that incorporates recruitment efforts, curricular revisions, and extramural clinical rotations into their dental school program for the purpose of increasing the number of URM students into U.S. dental schools (Alexander & Mitchell, 2010; Carreon, Davidson, & Andersen, 2009; Gravely, McCann, Brooks,

Harman, & Schneiderman, 2004). The pipeline schools were developed out of a call to action from the American Dental Education Association (ADEA) Commission President's report on the roles and responsibilities of academic dental institutions (Haden et al., 2003). The U. S. dental schools who participated in the Pipeline program have shown an increase in the number of URM student admissions (Formicola et al., 2009; Formicola, D'Abreu, & Tedesco, 2010). The numbers of U. S. dental schools not participating were referred to as "Non-Pipeline" schools and numbered 37 at the time. The California dental schools operated under the same definition as the RWJ pipeline schools (Andersen, Davidson, et al., 2009).

The Pipeline schools were created in an effort to boost enrollment and change the core environment of the dental school rather than provide enhancement skills for individuals seeking to become competitive candidates for admission. These goals were met by incorporating curricular changes within the dental school, exposing students to a variety of culturally diverse rotations, as well as highlighting characteristics of the school that attracted URM students. After implementation of the Pipelines, the program was evaluated for a variety of outcomes. Both the structural and operational functions of the program were evaluated, rather than relying solely on the increase in the number of URM students over time. The overall impression from study authors (Bailit & Formicola, 2010), described the Pipeline program as being successful both in its ability to increase the diversity of the student body as well as impact the issues of access to oral health care through its educational initiatives (Andersen, Davidson, et al., 2009; Andersen et al., 2005; Bailit & Formicola, 2010; Formicola et al., 2009).

In addition to providing seed monies for dental pipeline programs for 15 U. S. dental schools, in 2005, RWJ foundation partnered with the American Dental Education Association (ADEA) and the American Association of Medical Colleges (AAMC) to offer summer

enrichment programs aimed at increasing the enrollment of minority students. The program is currently known as the Summer Medical and Dental Enrichment Program (SMDEP) and aims to offer students a variety of academic and career experiences to enhance their dental or medical school application (Summer Medical & Dental Education Program, 2013).

Another noteworthy outcome of the Sullivan Commission, the Institute of Medicine, and the formulation of the Pipeline schools, was the realization that the dental school admission process was in need of reevaluation. A more holistic approach was suggested by many scholars of these culturally diverse initiatives (Sullivan Commission, 2004). For example, it is now recommended that dental schools include not only a comprehensive review of the student's standardized testing (GPA, DAT score) and experience/shadowing in the field of dentistry; but also take into account the student's interview, personal statement, leadership qualities, life experiences, and community service (Alexander & Mitchell, 2010; Andersen, Davidson, et al., 2009; Sullivan Commission, 2004). These admission characteristics are referred to as non-cognitive variables and have been shown to play a significant role in student success in addition to cognitive indicators (Buyse & Lievens, 2011; Norman, 2010; Smithers, Catano, & Cunningham, 2004). This is a critical reason for inclusion of non-cognitive variables in the admission review which could increase the admission selection of more URM students (Atchison et al., 2009).

The aforementioned enrichment or pipeline programs created to date have been traditional in style with pedagogy in lecture format combined with clinical shadowing and rotations to community clinics (Alexander & Mitchell, 2010; Carreon et al., 2009). In an effort to enhance access to enrichment programs, a hybrid summer admission enhancement program (AEP) was developed by several faculty at the UMKC School of Dentistry (UMKC SOD) with the goal of

meeting the needs of students with “just in time” teaching and learning prior to the dental school application process. The program was designed to provide both online and onsite academic and professional skills training needed to increase the URM and /or disadvantaged student’s acceptance to dental school.

Several unique features set the AEP apart from other pipeline programs. First, the program collaborates with UMKC’s International Center for Supplemental Instruction (ICSI), an academic assistance program that uses peer-assisted study session facilitated by students who have previously done well in a given content area and who agree to attend all class lectures, take notes, and act as model students. (Ardendale, 1997; University of Missouri-Kansas City, 2008). The AEP also incorporates the UMKC SOD DAT Online Preparatory Course created by UMKC faculty, as a rigorous study tool prior to students taking the DAT (ADEA Bulletin, 2011). Additionally, the AEP is uniquely different from other pipeline or enrichment programs because of its incorporation of online modules available to the students 24/7. The online modules are aimed at increasing the student’s academic skills and incorporate the use of supplemental instruction three times per week in a face to face asynchronous environment. Nationally recognized faculty conduct the online preparatory modules for biology, chemistry, organic chemistry and quantitative analysis (ADEA Bulletin, 2011). In alignment with recommendations on holistic admissions, the AEP also focuses on non-cognitive skills building such as help with the dental school personal essay and interview process.

Conceptual Frameworks

Several conceptual frameworks will inform this study including the works of Claude Steele and his theories of “stereotype threat” (Steele, 1997). Steele’s premise outlines how stereotypes influence ones’ ability to do well on standardized tests, as well as purporting how the

inequalities of educational access for minority groups impacts a person's identity with specific educational domains. For example, if African Americans have not had the role models, or exposure to the same educational experiences, (dentistry or other health care fields), this might diminish their ability to see themselves or identify that role as a possible career choice (Steele, 1997). This thought process also shapes one's intellectual identity and performance. Steele defines stereotype threat as "a situational threat, a threat in the air, and in general form, can affect the members of any group about whom a negative stereotype exists"(Steele, 1997). This can apply to any group such as the elderly, African Americans, Hispanics, skateboarders, gang members, and the like. For example, if there is a stereotype that women do not do as well in math as men, and a woman who identifies with this stereotype is taking a math test, the stereotype has the potential to directly influence her performance on the exam (Nussbaum & Steele, 2007; Steele, 1997). Students identify with specific domains. They assess their own ability to do well in certain areas such as a medical or dental profession based on whether or not others like them have been successful (Steele, 1997). Nussbaum also discusses the negative effects of stereotypes on academics which may lead to a lower level of achievement (Nussbaum & Steele, 2007). In order to help students be successful in the college environment, it is important then to uncover these biases and threats, be aware of programmatic situations in which they can occur, and to provide programs that are sensitive to cultural differences.

Researchers Astin and Tinto were pioneers in the understanding of college student behavior (Astin, 1984). Astin's theory of involvement and Tinto's theory of student departure both deal with the issues of college persistence (Milem & Berger, 1997). In his theory, Astin explains his definition of involvement to be "the physical and psychological energy the student devotes to the academic experience (Astin, 1984). A student who gives much attention to

studying, extracurricular campus activities, and interacts with faculty would be considered a highly involved student. An uninvolved student would then be the opposite. Astin gives five basic postulates to his theory: (1) Involvement as the student's investment of energy in college; (2) Involvement occurring in a continuum or varying degrees of involvement; (3) Involvement having both quantitative and qualitative features; (4) Involvement is directly proportional to the program the student is enrolled in; and (5) Any effectiveness of a program is related to its ability to increase student involvement (Astin, 1984). Astin maintained that the last two postulates would provide helpful insight to developing effective programs for students in order to increase persistence (Astin, 1984; Milem & Berger, 1997). The AEP is designed to assist students in their academic and professional skills as a goal of becoming competitive candidates in the dental school application pool. By studying the AEP program material, forging friendships with their pre-dental school peers, developing mentoring relationships with their faculty, as well as becoming involved in campus and professional associations, AEP students reflect the nature of Astin's theory of student involvement (Astin, 1984; Berger & Milem, 1999; Milem & Berger, 1997).

The impressive work of Tinto (1993) and his interactionalist model of student departure also inform this study. Tinto's theory supports the crucial role of student involvement as a positive outcome for student success (Milem & Berger, 1997; Tinto, 1993, 2003). Tinto states:

There appears to be an important link between learning and persistence that arises from the interplay of involvement and the quality of student effort. Involvement with one's peers and with the faculty, both inside and outside the classroom, is itself positively related to the quality of student effort and in turn to both learning and persistence (Milem & Berger, 1997; Tinto, 1993, 2003). In 1993, Tinto

emphasized the role of student behavior and perception as they integrate more knowledge and gain more social awareness in their college environment. He described the students' campus experience and interactions as important pieces to persistence (Tinto, 1993; Milem & Berger, 1997).

These aspects of Tinto's model regarding student involvement and their desire to integrate are the basic premise of the AEP. Our goal as faculty is to mentor the students in how to be successful candidates in a highly rigorous admission process and to utilize the tools given them in the program. This requires that they integrate with one another, faculty and become involved both inside and outside the classroom.

Purpose Statement

The purpose of this study is to examine the impact /outcomes of a hybrid pre-dental admission enhancement program (AEP) for underrepresented and/or disadvantaged students at the UMKC SOD. The study will be accomplished by assessing outcomes from a program survey, student DAT scores, admission rates, and student satisfaction feedback on the program's ability to prepare students for becoming competitive candidates in the admission process. Specific components of the online modules and the onsite features of the enhancement program will be evaluated using correlational and regression analysis. Ex post facto data from students who have completed the AEP from years 2011 to 2014 will be analyzed.

Operational Definitions

Health Care Disparity: A complex issue requiring a multifaceted problem solving approach. A thorough definition should be viewed as one that encompasses a person's environment, their health status, access to health care, utilization and quality of that

care, and health outcomes(Carter-Pokras & Baquet, 2002).

It is further defined as one in which a person has a difference in health seen as avoidable or unjust. Beyond race, health care disparities are related to socioeconomic factors, one's physical and cultural community environment, personal management of health, and ability to receive and pay for health care services. How people exist within their community, physical and cultural environment along with their society and policy circumstances have a large impact on how they are able to access health care (Guay, 2004; Meyers, 2007).

Oral Health Care Disparity: Differences that exist between two or more groups and highlights the need to remove these differences to improve the oral health care of those whose status is below the reference (Chattopadhyay, 2008).

Dental Practitioner Disparity: Not enough representation of minority dental practitioners to mirror the community and culture (American Dental Education Association, 2011; Sullivan Commission, 2004).

Underrepresented minority: The current definition of an underrepresented minority (URM) group in dentistry are those individuals represented of African American, Hispanic or American Indian/Alaskan Native ethnic group (American Dental Education Association, 2011).

Disadvantaged Person: One who comes from an environment that has inhibited the individual from obtaining the knowledge, skill, and abilities required to enroll in and graduate from a health professions school, or from a program providing education or training in an allied health profession; or, comes from a family with an annual income below a level based on low income thresholds according to family size published by the U.S. Bureau of Census, adjusted annually for changes in the Consumer Price Index, and adjusted by the Secretary, HHS, for use in health professions and nursing programs (U.S. Census Bureau, 2011). For example, students from this demographic can be white but not have had the advantages or exposure to college preparatory course work such as advanced placement or honors math and science courses (Green, 2006; Twigg, 2005; Wimberly & Noeth, 2005).

Research Questions

1. Is there a significant difference between the pre/post DAT scores among students attending a pre-dental summer enhancement program (AEP)?
2. What percentage of students gain admission to dental school after attending a pre-dental summer enhancement program AEP?
3. What program characteristics best predict student satisfaction among students attending a pre-dental summer enhancement program (AEP)?

Limitations/Delimitations

This study has limitations as well as delimitations. A delimitation of the study is its small sample size. The study included pre-dental students enrolled in the AEP from the UMKC SOD. Therefore, results cannot be generalized to other university or college populations. A Limitation of the study is that there was no control group with which to make group comparisons. The study only assessed data solely from those students who completed the program.

Since there is limited research on hybrid pre-dental enrichment programs, outcomes from this study can aid in developing a hybrid program model for the dental education community (Alexander & Mitchell, 2010; Carreon et al., 2009). Information can be gained and shared on developing similar programs in other dental schools across the country who desires to increase the diversity of their dental school enrollment using the model outlined in this study.

CHAPTER 2

REVIEW OF THE LITERATURE

Lack of Diversity in Health Professions

Although the United States is a nation of diversity, minorities are still vastly underrepresented in the health professions workforce today. Especially pronounced are the lack of African Americans, Hispanics and American Indians in medical, dental, nursing, and pharmacy careers. In 2007, these groups made up only 8.7% of physicians, 6.9% of dentists, 9.9% of pharmacists, and 6.2% of registered nurses (Sullivan, 2010). In another study, the authors noted how the lack of minorities enrolled in health professions education is becoming a public health crisis (Baldwin, Woods, & Simmons, 2006). In the recent Surgeon General's 2020 Health People report (U.S. Department of Health & Human Services, 2012), a reoccurring objective was that of addressing access to health care. It is important to recognize how the lack of diversity in all health professions impacts access to care for underserved individuals. Training a more diverse health profession workforce will directly impact the care that underserved areas receive (Cohen, Gabriel, & Terrell, 2002). The recent Sullivan report outlines how critical training health care workers to become more interdisciplinary in their approach is necessary to effectively care for a diverse community of health care needs (Sullivan, 2010).

Lack of Diversity in Dentistry

Diversity or lack thereof in the health care workforce is an overarching issue. The literature suggests patients' often select an oral health care provider based on cultural diversity (Saha et al., 2000; Sullivan Commission, 2004; Veal, Perry, Stavisky, & Herbert, 2004). Another way of stating this is that patients often seek treatment by those who look like themselves. However, there is a lack of culturally diverse oral healthcare providers in the workforce to meet

the needs of ethnically diverse patients (Brown et al., 2000; Saha et al., 2000; Sullivan Commission, 2004; Veal et al., 2004). African American, Hispanic and American Indian student populations are still despairingly underrepresented in American dental schools today (American Dental Education Association, 2011; Sinkford, Valachovic, & Harrison, 2004). For example, Weaver et al reported that in 2003-2004, little had changed in terms of numbers of URM dental school enrollees and in fact, some had declined. More currently, the total number of all URM students reported to be enrolled in U.S. Dental Schools was 705/5,302 enrollees (13.29%) compared to the number of white enrollees of 2,958/5,302 (55.79%) (American Dental Education Association, 2011). This is a critical issue because the composition of our nation with regard to ethnicity/race is rapidly changing from a white majority to a projected fifty percent culturally diverse nation by the year 2050 (Sullivan Commission, 2004; U.S. Census Bureau, 2011).

Other important reasons for supporting the admission and education of a more diverse dental school climate are also found in the literature. In a 2002 study by Cohen, Gabriel and Terrell, the authors describe several important reasons why it is essential to the nation to address practitioner disparity. Advancing cultural competence, increasing access to quality health care for all populations, providing a more diverse platform for research endeavors, and creating health care management positions for minorities are all critical aspects of the disparity issue among health care workers (Cohen et al., 2002; Haden et al., 2003). Additional studies also recognize the vast enrichment a diverse cultural student body brings to the learning environment for all learners (Alexander & Mitchell, 2010). In these studies, the emphasis on graduating more culturally diverse oral health care practitioners is a crucial piece in addressing access to oral health care and meeting the needs of the underserved community (Alexander & Mitchell, 2010;

Cohen et al., 2002; Haden et al., 2003; Novak, Whitehead, Close, & Kaplan, 2004; Smith et al., 2006).

Lack of Access to Oral Healthcare

Access to oral health care remains problematic and ties directly into statements and definitions of healthcare disparities. Meyers, (2007) described it as a complex issue needing a multifaceted problem solving approach. Meyers defines a health care disparity as one in which a person has a difference in health seen as losing, avoidable or unjust. The issues are related to socioeconomic factors, one's physical and cultural community environment, personal management of health, and their ability to get and pay for health care. How people exist within their community, physical and cultural environment along with their society and policy circumstances have a large impact on how they are able to access health care (Meyers, 2007). Carter-Pokras and Baquet (2002) in attempting to define health disparity, identifies that conceptually both inequality and inequity involve ethical judgment and notes that current dictionary definitions of disparity include these ethical components in their definitions (Carter-Pokras & Baquet, 2002). With the degree of debate that has gone into defining health disparity it is understandable why health care disparities have been described as being complex and requiring a multifaceted problem-solving approach.

Similar to health disparities in general, Chattopadhyay (2008) discussed how health disparities have been observed in oral health and divisions of access continue to exist by gender, race, ethnicity, income, education, disability, geographic location, and sexual orientation. The issue of racial/ethnicity is complicated by the fact that many racial and ethnic minorities live in areas where there are oral health care provider shortages thereby decreasing their ability to access culturally competent, affordable, quality oral health care (Chattopadhyay, 2008). The author

goes on to state that “disparity is the difference between any two or more groups” (Chattopadhyay, 2008). Chattopadhyay further outlines the existence of health disparities among various ethnic groups as defined by the National Institute of Dental and Craniofacial Research (NIDCR) such as African Americans, Hispanic, Puerto Rican, Cuban, Central or South American, or other Spanish Culture; American Indian, Alaskan Native, and Asian or Pacific Islanders; in addition to low income, special needs, AIDS/HIV populations, elderly, and homebound or institutionalized populations. The literature has also revealed that people who cannot adequately access oral health care are more likely to have general health problems as a result (U.S. Department of Health & Human Services, 2012).

It has been documented that poor oral health affects a person’s overall health. The Surgeon General described oral health care needs and recognized disparities in the recent report entitled “Healthy People 2020” which details objectives for improving the nation’s health. The objectives described are three fold (U. S. Department of Health & Human Services, 2012). They are (1) to increase the awareness of the connection of overall health and oral health; (2) to implement effective prevention plans; and (3) to reduce access disparities for both preventive and dental treatment services. Also integrated within this plan are objectives specifically aimed at addressing the oral health care needs of our nation. The relationship between general health and oral health is highlighted in the report. The report discussed the importance of maintaining proper oral health so that people can speak, eat, smile, taste, chew, swallow and show emotion. These oral health abilities are crucial to a person’s overall quality of life. Additionally, the report points out that disparities still exist in access to oral health care, and describes access in terms of four areas including (1) health care coverage, (2) service, (3) timeliness, and (4) workforce (U.S. Department of Health & Human Services, 2012).

The term “access to care” refers to a person’s ability to seek and receive health care services. As reported there are many pockets of the U.S. population that are underserved in their ability to acquire health care services, more specifically, oral health care services. As a chief policy advisor for the American Dental Association (ADA), Dr. Guay (2004) describes access to oral health care and gives both old and new definitions to the problem. Previously access to oral health care was described solely on the patient’s ability to seek and receive services. This definition was based only on external factors of work force and the patient’s ability to pay for services rendered (Guay, 2004). The latest working definitions are multifaceted and include not only seeking and receiving oral health care services but considers the availability of the service (Chattopadhyay, 2008; Cooper, Hill, & Powe, 2002; Guay, 2004; U.S. Department of Health & Human Services, 2012). In conjunction with the Surgeon General’s 2000 report which identified and concluded oral health as critical to overall health, the evidence for the need to address access to oral health care issues is definitive (Guay, 2004; Haden et al., 2003).

The Surgeon General in “Healthy People 2020, draws attention to the fact that dentistry has gained great success in the area of dental disease over the past several decades, but in spite of these gains, great disparities still exist in the U. S. (U.S. Department of Health & Human Services, 2012). These disparities are evident among those who live below the poverty guidelines and exemplified by people with increased dental decay and untreated teeth compared to those with higher income levels (Guay, 2004; Meyers, 2007; U.S. Department of Health & Human Services, 2012). Population groups such as the poor, working poor, inner city poor, rural area residents, immobile, culturally isolated, unemployed, uninsured, special needs, Native Americans and Alaska Natives are more likely to have difficulty gaining access to oral health care services (Guay, 2004). The Meyers (2007) study builds upon and correlates many of the

above mentioned groups by adding that populations are not able to receive access to oral health care when they have difficulty with (1) individual socioeconomic circumstances, (2) physical and cultural community environment, (3) personal management of health, and (4) health care financing and delivery. He ascertains the most influential factor affecting a person's ability to seek and receive oral health care is how a person exists within, influences and is influenced by their community and organizations. In addition, their physical and cultural environment as well as society and policy circumstances also play a role (Meyers, 2007). Because economics influences the community, more unemployed people live in poverty stricken neighborhoods, which have an increased prevalence of access to oral health care issues. The problem is exacerbated by one thing and in turn is compounded by another (Guay, 2004; Meyers, 2007; U.S. Department of Health & Human Services, 2012).

Not being able to seek care from a practitioner that is representative of one's culture has also been cited in the literature as a significant factor and barrier to access to care. In a study on why patients choose a physician, the authors found correlations between ability to choose and choosing a practitioner from their own race (Saha et al., 2000). Twenty-five percent of Blacks and Hispanics chose their physician due to ethnicity. The most unique finding was that while Blacks and Hispanics only represented about five percent of the practicing physicians, they treated and cared for about 25 % of black and 23 % of the Hispanic patients in this study. It is important to recognize how these research findings can impact access to the oral health care needs of patients.

In a more current study regarding alumni and student practice trends, researchers found African American practitioners treated significantly more URM patients than their White alumni counter parts (39.3% vs 10.2%; $p \leq .001$)(Smith et al., 2006). Similarly, another research study

documenting the practice trends of Texas dentists, the authors reported black dentists to treat a higher percentage of both black and economically disadvantaged patients (Solomon, 2001). These research findings bring important awareness regarding the lack of diverse health care professionals in the workforce. Therefore, if more URM students graduate from U. S. dental schools, it can be said that access to oral health care will be positively impacted.

Dental Education Strategies

In an effort to combat the aforementioned health care workforce disparities and access to oral health care issues experienced by minority and underserved populations, the American Dental Education Association (ADEA) Commission President put forth a landmark call to action (Haden et al., 2003) for American dental schools to respond. In his report Haden stated the “academic dental institutions are the fundamental underpinnings of the nation’s oral health” (Haden et al., 2003). Additionally, the President appointed the Commission to report on the “Roles and responsibilities of the academic dental institutions in improving the oral health status of all Americans”. One of the main goals was to improve the diversity of the workforce (Haden et al., 2003).

Developing and implementing various types of pipeline programs in U.S. dental schools (Haden et al., 2003; Sullivan Commission, 2004), along with revisiting the dental school admission process, selection, and criteria within these programs (Sandow, Jones, Peek, Courts, & Watson, 2002), have been among the favored programmatic themes. Academic institutions must continue to meet the needs of students and ultimately the community the academic institution serves (Sandow et al., 2002).

Pipeline & Enrichment Programs

Pipeline programs have been a strategy adopted by dental education for the purpose of preparing URM to be competitive in the dental admissions process, ultimately resulting in increased numbers of URM oral health care providers. In their study, Cooper, Hill, and Powe (2002) discuss the impact and significance of training diverse health care workforce leaders who are willing to practice in underserved areas. They describes how educating a more culturally diverse health care workforce can help to meet the needs of those with limited access to oral health care (Cooper et al., 2002). Concomitantly, a major study by the Institute of Medicine along with the Sullivan Commission, recommends educating a more diverse oral health care workforce (Sullivan Commission, 2004). In their report the Commission details why this is critically important and how pipeline programs are beneficial. They state:

A number of strategies to broaden the health professions pipeline were identified including, efforts to provide extra support for disadvantaged and minority students through strategies such as mentoring, counseling, and training in test-taking and interviewing skills, and efforts to include more students from two year colleges and allied health professions seeking second careers (Sullivan Commission, 2004, p.7, 4.7).

Traditional pipeline programs which have centered on impacting students in the primary and secondary school setting have had limited success. This model uses faculty and health care professions students to mentor individuals desiring a career in medicine, nursing, pharmacy or dentistry. Most racial and ethnic minority students still receive a lower standard of education, score lower on standardized tests, and are not as likely to graduate from high school compared to white students(Sullivan Commission, 2004). Approximately 12.58 percent of African American

students and 9.48 percent of Hispanic students graduate with a four year degree compared to 19.19 percent of white students (Sullivan Commission, 2004).

Other more current pipeline or enrichment programs have demonstrated success and have focused on the strengths of these individuals and the importance of a diverse educational climate (Johnson et al., 2013; McClain et al., 2013; Pendleton & Graham, 2010). For example, in the study by Johnson, 2013, the authors explored whether the enrichment program for pre-dental students would help them perform better on their DAT after their completion of the program. The authors also evaluated whether the disadvantages the students had when entering the enrichment program actually helped them improve. Economic, educational, and social disadvantages were the three types considered. It was hypothesized by the authors that the more disadvantages the student had upon admission to the enrichment program, the more they would benefit from the program and potentially increase their DAT score (Johnson et al., 2013). It was found that the enrichment program training led to significant DAT improvement for the students. Additionally, the longer the training, the better the improvement (Johnson et al., 2013).

The University of Nevada, Las Vegas implemented a program to increase the diversity of their dental school through a pre-dental education program known as the Dental Prospects Club (McClain et al., 2013). The program focuses on the initiatives of outreach, recruitment and retention through club members and faculty advisors. The unique characteristic about this program is that it was started by a group of minority students from low to middle income status who were also nontraditional, first generation, disadvantaged, or had marginal DAT scores, GPA's and/or science grades. Most of the students needed to work many hours to support their immediate families. They faced severe hardships. They turned to dental faculty for support and formed the Dental Prospects Club. These students had many other qualities such as hard work

ethics and determination that is normally discounted in traditional admission criteria, making them ideal candidates for dental school. Each school year, the students come to a Dental Prospects Club meeting and pay a small fee. They are not required to disclose any of their academic information, however, once admitted, they must meet with faculty for review of their areas of weaknesses and develop strategies for overcoming them through weekly meetings. A variety of items are assessed such as preparing for the DAT, interview skills building, and other admission processes. The students are also paired with dental students for mentoring. Additionally, the students complete two dental assisting courses and participate in outreach clinics. The UNLV program has demonstrated success with its Dental Prospects Program and demonstrates how mentoring with faculty and other dental students can be an important aspect of a pre-dental enrichment program is (McClain et al., 2013).

The University of Chicago derived a different way of going about increasing the diversity of their student body (Pendleton & Graham, 2010). The dental school has raised the bar for a culturally sensitive environment through a series of steps in strategic planning, employment of diverse faculty members, the establishment of a mentoring and counseling program for URM students, and the implementation of a school-wide diversity committee. This ultimately led to increasing cultural competence for all faculty, students, and staff (Pendleton & Graham, 2010). To establish this supportive diverse dental school culture, the changes were implemented over a 10 year period of time. The administrators of the school took time to review the environment as a whole and the mission statement, to make sure the dental school's mission was in line with the university's mission. Secondly, a multi-campus university diversity task force has been implemented and has representation from the dental school. There is also a Chancellors committee to assist with diversity issues and the Center for Diversity. A unique characteristic of

this program is the URM Faculty Recruitment and Mentoring Programs. Seed monies for salaries to hire and mentor URM faculty help to secure more diverse dental school faculty members. The program has not been without its difficulties. It is hard to change the culture within, so developing a strategic plan, securing an advisory committee and making students feel welcome through mentoring, counseling, and student organizations have proven invaluable to the sustainability of the program (Pendleton & Graham, 2010).

Robert Wood Johnson /California Endowment Pipeline Programs

The largest response to this call to action has been the Robert Wood Johnson (RWJ) and the California Endowment (TCE) Pipeline programs. In an effort to increase the number of URM students in U.S. dental schools, in 2001, a six-year grant funded by the RWJ Foundation was given to 11 U.S. dental schools to implement a dental pipeline program. The W.K. Kellogg Foundation gave financial aid funds to students recruited into the Pipeline program. In the next year, four additional schools were funded by TCE. The major aim of the Pipeline program was to assure that the nation would have a diverse population of well-educated dental practitioners to meet the oral health care needs of all Americans (Alexander & Mitchell, 2010; Andersen, Friedman, et al., 2009; Bailit & Formicola, 2010; Haden et al., 2003; Steele, 1997). A national competition was held to select the 15 participating schools (See Table 1). Three objectives were to be met by the end of the final year including: (1) increasing the time senior students and residents spent in community clinics and treating underserved populations; (2) provide both didactic and clinical courses which would prepare students for community experiences; and (3) increase recruitment of URM and low-income students (Bailit & Formicola, 2010; Steele, 1997). This was a crucial opportunity to demonstrate the success of a pipeline program and the

relevancy to non-participating schools. At the time, the 15 schools represented about a third of the total dental school population (See Table 1 below).

Table 1: University Dental Schools Participating in the Pipeline Program

Dental School	Type of Pipeline: Robert Wood Johnson (RWJ) The California Endowment (TCE)
Boston University	RWJ
Howard University	RWJ
Loma Linda University	TCE
Meharry Medical College	RWJ
Temple University	RWJ
The Ohio State University	RWJ
University of North Carolina at Chapel Hill	RWJ
University of California, Los Angeles	TCE
University of California, San Francisco	TCE
University of Connecticut Health Center	RWJ
University of Illinois at Chicago	RWJ
University of Southern California	TCE
University of the Pacific	TCE
University of Washington	RWJ
West Virginia University	RWJ

Admission Processes

One of the barriers to admission for URM or disadvantaged students has been low scores on the Dental Admission Test (DAT). Dental schools have long used cognitive assessment tools such as the student GPA, science GPA, and the DAT as the hallmark of selecting a successful candidate. However, research demonstrates that these statistics alone do not predict student success in dental school (Curtis, Lind, Plesh, & Finzen, 2007). Studies regarding prediction of academic success in dental school have demonstrated the science GPA (sGPA) and the DAT academic average (AA) score to be good predictors of student success on national boards parts I and II (Ranney, Wilson, & Bennett, 2005; Sandow et al., 2002). However, the overall GPA and

other traditional admission criteria are not accurate in predicting first or fourth year performance in dental school (Curtis et al., 2007).

There has been a recent movement in dental education to incorporate other valuable indicators in the admission process which can reflect a student's ability to do well in a rigorous dental school curriculum. Items such as leadership, work ethic, life experiences, interview skills and the student's personal desire to become a dental professional can all add to the holistic view of the candidate (Price & Grant-Mills, 2010). In their review of the Pipeline schools, Price and Grant (2010) discussed non-cognitive variables that should be included and reviewed in the admission process to gain a more diverse student body. These variables include leadership, ability to sustain academic achievement with multiple priorities, volunteerism, communication, social background, and disadvantaged status. The authors encouraged dental schools to incorporate these attributes into the admission process. Other authors have suggested steps and strategies for including non-cognitive factors in the admission process and increasing the diversity of the dental school classes (Lopez, Self, & Karnitz, 2009).

The ADEA Admissions Committee developed a workshop designed to challenge dental school administrators to review and revise their current admissions policies towards a more "holistic" approach (Wells, Brunson, Sinkford, & Valachovic, 2011). The workshop developed out of a response to the Pipeline, Profession, & Practice: Community Based Dental Education program which reviewed the admission process of the 15 Pipeline schools funded by the RWJ and TCE (Wells et al., 2011). In their workshop, the authors present information regarding the value of diversity in the student body along with steps for achieving a holistic admissions practice. Key elements such as student experience and attributes in addition to their GPA and DAT are reviewed. The authors conclude that changes in URM enrollment after attending the

workshop vary depending on the types of changes implemented, however, more significant changes have been noted in schools where participation of the dean has occurred (Wells et al., 2011).

Likewise, some dental schools are just beginning to adjust their admission process to reflect a more holistic approach. East Carolina University (ECU) has based its admission process on the school's mission to educate dentists from rural, disadvantaged and URM populations in order to meet the drastic oral health care needs of the state (Wilson, Sedlacek, & Lowery, 2014). In meeting this goal, the admissions committee integrates non-cognitive variable scores to be evaluated along with traditional cognitive measures. Each applicant completes the required ADEA's Associated American Dental Schools Application Service (AADSAS) forms. These documents and an ECU supplemental application are submitted for a holistic review of the non-cognitive variables. Students who meet the initial criteria based on the above factors are invited for an interview (Wilson et al., 2014). The program has been successful in that more admission offers were given to URM students whose non-cognitive variable scores received higher desirability. Reviewing various innovative and holistic admission strategies is imperative if the dental education institution desires to align its mission with current educational practices and meeting the oral health care needs of a diverse society (Price & Grant-Mills, 2010).

Development of the Admission Enhancement Program

In the summer of 2011, in an effort to cultivate a culture of diversity in the dental school classes at the UMKC School of Dentistry, the Admission Enhancement Program (AEP) was developed by several faculty members. Initial funds for the program came from the Missouri Legislator entitled "Caring for Missourians" in order to increase the number of health care professionals in the Missouri workforce. The AEP is a 10 week program and is offered each

summer. The purpose of the program is to provide students the opportunity to enhance their application for entrance into dental school. The program gives students the opportunity to enhance their Dental Admission Test (DAT) scores, and advance their professional development through academic skills training and enhanced knowledge of the dental profession (Table 2).

The AEP is uniquely different from other pipeline or enrichment programs in several ways. First it offers its content both online and onsite in a hybrid format. The online portion provides four modules covering biology, chemistry, organic chemistry, and quantitative analysis which are available to the students 24/7. Complimenting a residential (onsite) experience to the online offering has been demonstrated in the literature to be an important aspect in enhancing the online content (Andersen, Friedman, et al., 2009). Students come to campus twice during the program. The first residential experience is during the first week of the program, providing an avenue to meet the faculty along with other academic and professional skills training. The other residential experience takes place during the last week as a three day “wrap up” session. This week includes professional panels and the mock interview.

Secondly, the AEP works collaboratively with faculty and staff from UMKC’s main campus International Center for Supplemental Instruction (ICSI) program. The inception of ICSI program began at UMKC and is now utilized internationally by many colleges and universities (Ardendale, 1997). This collaboration has proved to be invaluable for both the AEP and the ICSI. With the first entering AEP class, ICSI embarked on its first online implementation. This unique venture allows students to meet with their supplemental instructor (SI) in a synchronous online environment three times per week to review any problems and review course material. Third, students are able to use the UMKC School of Dentistry DAT Online Preparatory Course (Andersen, Friedman, et al., 2009) to refine their academic skills and

prepare for the DAT. This CE preparatory course was developed and designed exclusively by UMKC SOD. The modules are taught by UMKC faculty who are experts in their respective fields of biology, chemistry, organic chemistry and math. These same faculty members also write questions for the DAT so are they are well versed in what is critical material to study in those specific areas. Students can study from the comfort of their own home and hone their study skills to weak areas (ADEA Bulletin, 2011).

Conceptual Framework

Several conceptual frameworks inform this study. First, the work of Claude Steele and his theory regarding stereotype threat is important to explore. In his research, Steele purposes that to be successful in school one must identify with school and all of its subdomains (Steele, 1997). Sometimes these subdomains can be frustrating when they become negative such as with economic disadvantage or gender roles. When felt as a negative stereotype, this further creates what is then deemed a threat. People who feel these threats may feel judged in their actions. When under the influence of a domain which has a negative stereotype threat, it has been demonstrated that students of color or different ethnical or racial background other than white, score lower on standardized tests (Steele, 1997; Steele & Aronson, 1995).

In 2005, Steele and Aronson embarked on research regarding ethnicity and taking standardized tests that might differ between white and black students. Students were asked to answer questions about their gender and ethnicity prior to taking the exam which could pose a threat to their performance on the exam (Steele & Aronson, 1995). High stakes exams reviewed were the SAT, the Law School Admissions Test (LSAT), Medical College Admission Test (MCAT), the Dental Admission Test (DAT), and the Graduate Record Examination (GRE). Most of the research conducted revealed that white men score highest on these exams compared

to women and those of diverse ethnic backgrounds (Steele & Aronson, 1995). Again, the problem with standardized testing is known here as stereotype threat and is defined by Steele as a social-psychological threat that happens when a person is in a situation or doing something for which a negative stereotype about one's group applies (Steele, 1997). This threatens the person negatively and makes them feel judged or treated with conformity to that negative stereotype. Steele states, "Those who identify with the domain to which the stereotype is relevant, this predicament can be self-threatening" (Steele, 1997).

Aronson (2004) has also demonstrated how poor achievement outcomes of certain cultural groups such as African Americans, Hispanics, and women are due to stereotype threat and the responses it evokes. Stereotype threat can be powerful when the person identifying with it and the particular domain they are in elicits a negative response (Aronson, 2004). Additionally, other studies have shown that when students arrive at college with equal GPA's and SAT scores, similar college preparation, and economic backgrounds, there were still significant achievement gaps between white and African American students (Massey, Charles, Lundy, & Fischer, 2003). The "gap" was related to the stereotype threat, and not to their cognitive ability. Because the literature has demonstrated this difference in various cultural groups for students taking standardized tests such as the DAT, the AEP would aid in removing the threat, giving students the tools to be more successful on the DAT and become more competitive candidates in the admission pool. During their time in the AEP, students go through training for test taking skills and test anxiety. Additionally, they form relationships and mentors with ethnically diverse faculty who are dentists and see that they too can achieve this goal of doing well on the DAT.

Secondly, with regard to Astin's student involvement theory (Astin, 1984) and Tinto's departure model (Tinto, 1987), both researchers discuss the role of involvement on the student's

ability to persist and graduate. Astin focuses on the factors of involvement that lead to a student's departure from college. Quite simply stated, "Involvement is the amount of physical and psychological energy the student devotes to the academic experience (Astin, 1984)". In a study by Milem and Berger (1997), researchers found that by utilizing an integrated model from both Astin and Tinto, measures of academic and social integration could help explain college students who persist to graduation. The authors found that the levels of background experiences students came to college with had an impact on the students' level of commitment to the institution. Additionally, students with higher levels of academic achievement were more likely to become involved in campus clubs and activities compared to those who had lower scholastic achievement at enrollment. The study also demonstrated that early involvement (the first six to seven weeks) was significantly related to persistence. Even more significant was the evidence of early involvement with faculty and its impact on persistence. This is particularly important when assessing the faculty as a role model for students (Milem & Berger, 1997). In the case of the AEP, students receive feedback from and form relationships with the AEP faculty. They view them as mentors, and the possibilities of what they can someday achieve as dentists themselves. The involvement with faculty for mentorship, encouragement, and direction are key issues from Astin's conceptual framework that inform the AEP program in at its core.

Lastly, Astin also developed the Input-Environment-Outcome (I-E-O) Model which is very helpful in explaining some of the key concepts and impacts of the AEP. In his textbook, *"What Matters in College: Four Critical Years Revisited"*, Astin (1993) describes his I-E-O model for how college impacts students. The most important question is not how college affects students, but the difference or change that occurs in the individual as a result of attending college. Astin describes two important changes that researchers in higher education should observe when

assessing the student. They are: (1) the change that results from the impact of college itself, and (2) the change that occurs as a result from other influences outside of college such as maturation (Astin, 1993).

Astin (1993) and Schuh, Jones, & Harper (2010) both describe the I-E-O model. Inputs (I) are the characteristics students bring with them when they enroll in college such as the student’s abilities, skills, family background, educational history, values and desires.

Environments (E) can be described as the various programs or characteristics of the college life such as faculty, peers, educational environment, policies, engagement in activities, and student employment. Outcomes (O) are characteristics of the student that are measureable after being exposed to college (Astin, 1993; Schuh, Jones, & Harper, 2010). Astin (1993) goes on to describe how the model is useful in providing educators with knowledge regarding the impact of college on students and to further be able to develop desired outcomes for educational programs (Astin, 1993). In the I-E-O model, a variety of outcome measures can be assessed when evaluating the impact of college on students. Astin (1993) created the “taxonomy of student outcomes” to better understand these outcomes and is based on the type of data (Psychological or Behavioral), and the type of outcome (Affective or non-cognitive, and Cognitive). This can be explained in the table below (Astin, 1993).

Table 2: Classification of Student Outcomes by Type of Outcome and Data

	OUTCOME	
DATA	Affective (Non-cognitive)	Cognitive
Psychological	Drive for success, attitudes, beliefs, values, achievement, & college satisfaction	Problem solving, critical thinking, aptitude & academic achievement,
Behavioral	Friendships, personal habits and hobbies, activities, mental health, interpersonal relationships	Achievements related to cognitive development such as work, education, responsibility, awards, income, recognition

Astin's (1993) I-E-O model informs the AEP in a number of ways. First, Inputs (I) can be seen in the admission and selection process into the AEP. The committee is able to review many of the inputs that the student has prior to being admitted into the AEP such as family background, aspirations to achieve, values, problem solving ability, academic achievement and the like. Secondly, after being accepted, the AEP provides the student with numerous tools, resources, academic programs, faculty, other students, mentors and activities, in which they can participate, engage and study in order to achieve their goals. In this way, the environment (E) of the AEP can serve to expose the student to a variety of experiences. Lastly, with regard to outcome (O), the AEP is able to measure characteristics of the student after exposure to the program such as their admission to dental school and their achievement on the DAT. Additionally, the outcomes survey measures student perception of satisfaction and how well prepared they are academically. Astin's I-E-O model will be most helpful in assessing whether or not the environmental experiences the students were exposed to in the AEP aided in growth and change (Astin, 1993).

Summary of the Literature

The literature reviewed for this study has centered on a holistic view of health care disparities in general and how these health care disparities impact that of oral health care. It is clear by the research presented that oral health care disparities still exist within pockets of the U.S. population, in underserved and underrepresented areas of the country (Meyers, 2007; U.S. Department of Health & Human Services, 2012). Access to oral health care is then impacted by these health care disparities making it difficult for many people to receive oral health care (Cooper et al., 2002; Guay, 2004). Concomitantly, along with the problem of access to oral health care there also exists a lack of URM student in U.S. dental schools specifically in the

Hispanic, American Indian and African American population. Additionally, these populations are expected to rise in the next several years (U.S. Census Bureau, 2011). In 2011, only 13.29% of the total number of all students enrolled in U.S. dental schools were reported to be URM compared to 55.79% reported as white students (American Dental Education Association, 2011). It is critical, therefore, that we address this issue and continue the vigilance of increasing the number of URM students in dental schools (Haden et al., 2003).

In an effort to address this problem, the ADEA formed a group of experts and developed roles and responsibilities for academic dental institutions (Haden et al., 2003). The RWJF and TCE together funded 15 schools to develop pipeline programs aimed at increasing the number of URM students in U.S. dental schools (Formicola et al., 2009). Curricular changes led to many positive outcomes. Schools were able to increase the number of URM students in their dental school classes, and students had increased exposure to progressive, well-rounded, culturally competent curriculum (Andersen et al., 2007; Formicola et al., 2010; Gravely et al., 2004). While these studies have reviewed the impact of increasing enrollment of URM students in U.S. dental schools (Andersen et al., 2007; Andersen, Friedman, et al., 2009), they have not evaluated other critical measures. For example, previous programs have not evaluated the impact of the program for its ability to help the student become a more competitive candidate in the admission pool, the assessment of admission rates, how the program helped the student in their essay writing skills, interview process, or with their overall academics and DAT preparation. Additionally, none of the aforementioned programs in the literature included an online/hybrid format. Online education offers many advantages for students in an enrichment program. Many programs discussed were also year-round or yearlong, rather than summer enhancement, which are more financially burdening. A summer enhancement program would allow a more “just in

time” financial friendly opportunity for students to take advantage of these challenges without further financial burden (Alexander & Mitchell, 2010; Nivet, 2010). Therefore, the purpose of this current study is to examine the impact /outcomes of a hybrid pre-dental admission enhancement program (AEP) with regard to DAT scores, admission rates and satisfaction among underrepresented minority and/or disadvantaged students in at the UMKC School of Dentistry.

Several conceptual frameworks inform this study. The work of Claude Steele and his theory of stereotype threat (Steele) in taking high stakes exams such as the (DAT) are reviewed (Steele & Aronson, 1995). Additionally, the study reviews concepts of Astin and Tinto. Astin’s student involvement theory, Tinto’s student persistence, and Astin’s I-E-O model are examples of how students come to college with a history of characteristics and are then molded by the college environment(Astin, 1984, 1993; Milem & Berger, 1997; Tinto, 1993, 2003). The outcomes of the college environment and that of their time in the AEP can help us to understand how interactions, engagement, and involvement can shape the student.

CHAPTER 3

METHODOLOGY

Introduction

The purpose of the Admission Enhancement Program (AEP) is to expand the pool of culturally diverse candidates to the UMKC School of Dentistry by strengthening their foundational knowledge, academic skills, and interactions with individuals across the dental profession. The AEP is a summer program which is 10 weeks in length and consists of both online and residential components. The online portion includes access to four modules for Biology, Chemistry, Organic Chemistry and Quantitative Reasoning. The modules are designed to help strengthen the students' foundational knowledge in these particular areas prior to taking the Dental Admission Test (DAT). Students have access to the modules 24/7 through technology and have two weeks to review and complete each module. Online technology allows students to review these materials from their own home base. Three days per week, students meet synchronously (live) online with their classmates and a Supplemental Instructor (SI) at a pre-set time to go over class materials, problems and assignments. This feature gives students an opportunity to ask questions and work through any material they might be struggling with (Ardendale, 1997; Rath, Peterfreund, Xenos, Bayliss, & Carnal, 2007; University of Missouri-Kansas City, 2008). After completion of the four academic modules, students register for the UMKC School of Dentistry DAT Preparatory Course (ADEA Bulletin, 2011) to further develop their review skills and prepare them to perform competitively on the DAT. The residential experience commences during the first and last weeks of the program. During the onsite/residential experience students reside in campus housing. This residential experience

helps students in developing valuable relationships with each other as classmates in the AEP cohort.

Research Questions

The following research questions were addressed in this study. (1) Is there a significant difference between the pre/post DAT scores among students attending a pre-dental summer admission enhancement program (AEP)? (2) What percentage of students gain admission to dental school after attending the AEP? (3) What program characteristics best predict student satisfaction among students attending a pre-dental summer admission enhancement program (AEP)?

Program Design & Description

Phase I: Residential experience.

The residential experience transpired during the first and last weeks of the AEP. It allowed students to form connections with their fellow classmates while also helping to develop mentoring relationships with faculty. This component is a unique and critical aspect to the AEP's approach and has been demonstrated in other studies to aid in dental school success (Andersen, Friedman, et al., 2009). The first week of the residential experience, information was provided to students through collaboration between the UMKC School of Dentistry and the Atterbury Success Center (See Table 3 below). Faculty developed curriculum that addressed academic skills training including test taking, reading and writing skills, as well as critical thinking and time management skills. Prior to arrival, students write a rough draft of their essay for the dental admission application. Upon arrival to their first week, students receive faculty feedback on their essay and are given the opportunity to refine their essay through revisions according to that feedback. This is a critical piece of the onsite experience and crucial to the admission process.

The last week of the residential experience focuses on professional skills training and development. Another significant component of the onsite experience is the

Table 3: Onsite and Online AEP Design

Program Item	Weeks	M – F
<p>Onsite week: On-site Workshops at the UMKC School of Dentistry, presented in conjunction with the UMKC Atterbury Success Center designed to enhance:</p> <ul style="list-style-type: none"> ▶ Study Skills ▶ Test Taking Skills ▶ Reading Skills ▶ Writing Skills ▶ Critical Thinking Skills ▶ Time Management Skills <p>On-site and online mentoring in the UMKC School of Dentistry application process:</p> <ul style="list-style-type: none"> ▶ Practice Interview Sessions ▶ Essay Writing Workshops ▶ Counseling for Financial Aid ▶ Guidance through actual application process 	1	
<p>Online Modules – Dental Knowledge Enhancement:</p> <ul style="list-style-type: none"> • Online Course (8 weeks) taken from students’ home location <ul style="list-style-type: none"> ▶ Instructors who are experienced in teaching these courses at the university undergraduate level and in a national online DAT preparation course. ▶ Access to course material 24/7. ▶ Self-directed with structured dates and timelines for completion. ▶ Interaction with tutors, instructors, and with other students. 	2 - 9	SI Leader Instruction
Quantitative Analysis Module	2 & 3	M/W/F
Chemistry Module	4 & 5	M/W/F
Organic Chemistry Module	6 & 7	M/W/F
Biology Module	8 & 9	M/W/F
<p>Final On-site Week - Career Exploration – Participative Seminars on-site at the UMKC School of Dentistry on careers in dental research, dental public health, and dental education.</p> <ul style="list-style-type: none"> • Clinical Experience – Shadowing/Hands-On experience with UMKC School of Dentistry faculty, alumni, and student mentors in a public health clinic, the dental school clinic, and the dental school pre-clinical lab. 	10	W/TH/F
Enroll in UMKC-SOD online national DAT preparation course		

students' participation in mock interviews with dental school faculty. This opportunity prepares the student for the real dental school admission interview process. Additionally, students learn about alternative dental careers through panel discussions on academia, research and public health dentistry. Specific lab days are also held to give the students the opportunity to experience real life practice as a dentist. For example, they shadow dental students on the clinic floor treating patients as well as participate in a "hands-on" lab experience with suturing and placing restorations on manikin teeth. All of these experiences enable students to see a glimpse of what the dental school climate might be like and to envision themselves as a practicing dentist in the future.

Essay reviews

As indicated above, one of the unique pieces of the students' time on campus was developing their personal essay statement to be submitted with their dental school application. Prior to their first onsite residential experience (week one), students developed and submitted a rough draft of their essay and posted it on the AEP blackboard site. Faculty members were then assigned a student essay to review and given a rubric to follow for evaluation (See Appendix A). Students received feedback on their essay prior to the workshop on essay writing from the success center faculty. Faculty reviewed the essays utilizing a rubric with five areas including, introduction; main points; organization and structure; and style, sentence flow and dictation. These areas are evaluated on a four-point scale from poor (1) to excellent (4) (See Appendix A) . The aim of the essay workshop was to further review and refine student essays according to faculty feedback and to develop a complete and thorough essay to be submitted with their dental application.

Mock interviews

During the second onsite residential experience (week ten), students were able to experience how a dental school interview is conducted through a “mock interview”. Faculty interviewed students asking questions similar to those in the dental school interview process. This gave students the ability to practice and refine their interviewing skills and to receive valuable feedback from faculty on ways to improve. Faculty rate students using an interview evaluation rubric which reflects the areas of critical thinking and coping skills; dental orientation; personal attributes; and commitment to community (See Appendix B).

Phase II: Online Experience.

The online experience is one of the most unique pieces of the AEP and includes the four academic modules as well as the UMKC School of Dentistry DAT Preparatory Course. This part of the AEP takes place during weeks two through nine. The online components allow students to study from their own home, give them access to materials 24/7 and asynchronous assistance three days per week from the supplemental instructor (SI).

Supplemental instruction

Collaboration with the UMKC International Center for Supplemental Instruction (ICSI) is one of the unique components of the AEP pre-dental program. Supplemental Instruction (SI) is crucial for students during the online module portion of the program. By definition, SI is an academic assistance program utilizing peer-led group study to mentor students and help them succeed in traditionally difficult coursework. SI leaders have previously completed these courses with competency, thereby enabling them to lead and conduct group sessions that include study strategies and collaborative learning in a nonthreatening environment (University of Missouri-Kansas City, 2008). To be most effective, it is recommended that SI sessions be held three times

per week. SI was developed in 1973 by Dr. Deanna Martin from the University of Missouri-Kansas City, as a response to high failure rates among minorities in medical school. The results of SI were so innovative and effective that by 1981, the U.S. Department of Education recognized SI as an “Exemplary Education Program”, a distinction held by very few post-secondary programs (Ardendale, 1997; University of Missouri-Kansas City, 2008). Today, SI is known internationally and a little over 1,800 U.S. Institutions and 27 countries have implemented SI on their campuses (University of Missouri-Kansas City, 2008). Because SI has been successful in its efforts to help students increase their chances of doing well in difficult course material, the pre-dental enhancement program sought to incorporate SI leaders in the core coursework for the online modules. During the inaugural year of the AEP, 2001, was the first time SI endeavored to conduct sessions in the virtual world.

Online modules

Weeks two through nine comprised the online portion of the program. After the residential/onsite portion of the program, students returned to their homes to review the course materials and assignments for each individual module. Each module is able to be accessed 24/7 and two weeks were given to complete each of the four modules: Biology, Chemistry, Organic Chemistry, and Math. Students were required to meet three times per week with their supplemental instructor (SI) leader and classmates at a prescribed time via Blackboard Collaborate[®], a synchronous two way audio-video technology utilized to meet with online users in real time. SI leaders utilize tablet technology to enhance the learning of material. Tablet technology enables the SI leader to physically demonstrate problems to students and work through those problems in a step by step fashion. Each module is designed for mastery of material for the purpose of enhancing their foundational knowledge and academic skills in each

category prior to taking the DAT. After completion of the four core academic modules, students access the UMKC Online CE DAT Preparatory program as a study tool prior to taking the DAT in August or September of their admission year (Community, 2012). This material is also available to them 24/7.

Study Participants (Sample)

The study population represents students from the African American, Hispanic, and American Indian ethnic/racial population in addition to any disadvantaged students from underserved areas of the state of Missouri or nearby states. These students could be white as well as be from a racially diverse culture. The study sample consisted of a set of 48 students who were representative of these ethnic/racial populations or lived in a rural/underserved area. All students completed the UMKC pre-dental admission enhancement program (AEP) since its inaugural year in 2011 to 2014. The target population was African American, Hispanic, or American Indian and/or disadvantaged students who were working towards their pre-requisite course work for admission to dental school. Criteria for admission to the AEP program included: a minimum GPA of 2.5, completion of at least 90 hours of undergraduate coursework, and must be from either a URM or disadvantaged group.

The term URM in dentistry and for this study was defined as being from an African American, Hispanic or American Indian group (Sullivan Commission, 2004). For this study the term disadvantaged was defined as being from an environment that has inhibited the individual from obtaining the knowledge, skill, and abilities required to enroll in and graduate from a health professions school, or from a program providing education or training in an allied health profession; or, comes from a family with an annual income below a level based on low income thresholds according to family size published by the U.S. Bureau of Census, adjusted annually

for changes in the Consumer Price Index, and adjusted by the Secretary, HHS, for use in health professions and nursing programs (U.S. Census Bureau, 2011; U.S. Department of Health & Human Services, 2009). Researchers agree that when using the term disadvantaged to describe students this implies that these students have not had access to or completed the more challenging college preparatory coursework. Rather, they often take lower level math, science, and reading courses (Green, 2006; Twigg, 2005; Wimberly & Noeth, 2005). Based on this definition, the highest priority for acceptance into the AEP was given to students from either of these two backgrounds, underrepresented or disadvantaged. Each year, approximately 40 students applied to the AEP and 12 students were chosen based on the stated criteria.

AEP Outcome Assessment Instrument.

Surveys have been utilized in dental education as an accepted data collection tool to evaluate the impact and effectiveness of programs for many years. For example, Carreon, Davidson, and Andersen (2009) used survey data from African American, Hispanic and American Indian students by employing the Multi-cultural Assessment Questionnaire and the Health Beliefs Attitude Survey. This research was a compilation study for evaluating the framework of the dental pipeline program. Both of these surveys used Likert type scales in their questions (Carreon et al., 2009). Survey data was also used to assess changes made in dental education as a result of the implementation of the 15 pipeline dental schools. The study by Andersen, et al (2005), assessed the “Effectiveness of Pipeline, Profession, and Practice: Community Based Dental Education Program” (Andersen et al., 2005).

At the completion of the pre-dental admission enhancement program, students were sent a link to Survey Monkey™ to complete an anonymous program evaluation survey. The survey consisted of a 49 item program evaluation instrument which uses 5-point Likert scale, yes/no, and

short answer format questions allowing students to rate each and every aspect of the program, both onsite and online (Appendix D). The AEP program evaluation survey was originally adapted from Roberts (2005) course evaluation for online education (Roberts, Irani, Telg, & Lundy, 2005). Roberts instrument was used in a study conducted at the UMKC School of dentistry with a pharmacology course evaluating student satisfaction (Gadbury-Amyot & Brockman, 2011; Roberts et al., 2005). The instrument has been further utilized in other dental course evaluation studies such as the “Development and Implementation of Online National Board Dental Examination Review Courses” (Gadbury-Amyot, Austin, & Overman, 2013; Gadbury-Amyot, Singh, & Overman, 2013) and “Using Tablet Technology and Instructional Videos to Enhance Preclinical Dental Laboratory Learning” (Gadbury-Amyot, Purk, Williams, & Van Ness, 2014). All of these research studies utilized a post-course evaluation to assess course design, organization, content effectiveness, and student use. These published course evaluations assessed the impact of the courses by utilizing five point Likert scale questions ranging from 5=strongly agree to 1=strongly disagree, yes/ no questions, and including a place for students to write in comments about their overall perception of the course.

The AEP outcome survey was divided into several sections (Appendix D). Section I of the AEP instrument contains 8 questions regarding how the program impacted the students’ future and helped them personally. Section II includes 10 questions which address the degree of difficulty and enjoyment of the program. The next section (III) includes 13 questions regarding feedback about the quality of instruction for the onsite experience; the math, chemistry, organic chemistry, and biology modules; the DAT Online Prep course; the SI leader instruction for each module; as well as the presentations for academic skills and professional training and mentoring in the application for dental school. Section IV consists of 8 questions that directly relate to the

online and technical aspects of the AEP such as posting to the discussion board, interactions and facilitations from each online course instructor, direct email, module assignments, and technical assistance.

To gain a better understanding of the student perception and how well prepared they felt for taking the DAT, Section V addressed 6 questions on this topic. Students were asked to rate how well the math, chemistry, organic chemistry, and biology modules, the DAT CE Prep course, and Test taking strategies presentation, prepared them for taking the DAT using a 5 point Likert scale of 5 = Strongly agree and 1 = Strongly disagree. Lastly, section VI contains 12 open ended questions which allows students to provide feedback about the AEP. There are also open-ended questions pertaining to how students found out about the AEP, qualities to be successful in completing the AEP, two positive and two negative aspects of the AEP, if they thought they met the expectations of the program, if their opinion of the program changed over time, how they received help when they needed it, what changes they might suggest, and how the blackboard interface and modules impacted the program. The last part of the evaluation asks students to provide census data (questions 46-49).

A cover letter is included in the program evaluation (See Appendix C). All students were told about confidentiality, intent of the program evaluation, benefits of the research study and anonymity. Completion of the program evaluation was evidence of the students consent to participate in the study. The program evaluation contains no identifying information to link the participant to the survey.

Instrument Evaluation Validity and Reliability.

Validity and reliability of the AEP program instrument has been established since it was adapted from an already existing course evaluation published in the literature and measures the

current research questions. Validity is demonstrated by showing that the instrument measures what it is intended to measure. Content validity has been established through a comprehensive review of the literature and the use of content experts. These experts were faculty from UMKC School of Dentistry and other published works of research in online education (Gadbury-Amyot & Brockman, 2011; Roberts et al., 2005). The program instrument evaluation's ability to answer the research questions is referred to as face validity. In other words the instrument was designed to review all components of the AEP and to answer the three research questions. Appropriate wording and language level is also an important consideration (Gravetter, 2013).

Dental Admission Test (DAT).

For the purposes of this study, the Dental Admission Test (DAT) scores were collected both as pre and post-test scores. Scores were collected when students were accepted into the AEP (pre) and after students completed the AEP and re-took the DAT(post). The DAT is a standardized scale exam students must complete when they desire to apply to dental school as part of the application process. It has been required as part of the application process by U.S. dental schools since 1951. The scale has four individual examinations and an overall Academic Average (AA). The four individual exams are (1) Sciences, (2) Quantitative Reasoning, (3) Reading Comprehension, and (4) Perceptual Ability. There are also three subscales under Sciences. These include Biology, Chemistry and Organic Chemistry. Separate scores are provided for these subscales. The Academic Average consists of an arithmetic mean of quantitative reasoning, reading comprehension, biology, chemistry, and organic chemistry. An article which reviewed the use of the DAT in admissions, suggested its internal reliability for the exam's four parts to be good with Kuder-Richardson coefficients ranging from .85 to .92 (Ranney et al., 2005). The predictive validity is determined by comparing scores on the DAT to

performance in dental school and scores on the National Board Dental Examination (NBDE).

The predictive validity of the DAT is .19 to .55 (Ranney et al., 2005). In other words, the higher the DAT score upon entrance to dental school, the better predictor of students' success in dental school and on the NBDE. However, there is some range restriction, because one is only looking at those who were admitted to dental school instead of the entire applicant pool. As students move through their dental curriculum the DAT becomes lower in its predictability. This is due in large part to the design of the dental curriculum. In later years, the education becomes more practical rather than theory driven (Ranney et al., 2005). While the DAT is a good predictor of success in dental school, it is not the only criterion that should be used in the selection and admission process.

Grade Point Average (GPA).

The student grade point average (GPA) and the Science GPA (sGPA) both served as criteria for selection into the pre-dental admission enhancement program and as variables for correlational analysis. The University of Missouri-Kansas City School of Dentistry figures the GPA as follows: A = 4 points, B = 3 points, C = 2 points, and D = 1 point. The sGPA is figured in the same manner. Grade point average and science grade point average has been demonstrated to show success in dental school.

Dental School Admission.

Admission to dental school was measured by evaluating the number of students who complete the AEP with the number of those AEP students who were offered admission to any U.S. dental school. This resulted in a percentage of students offered admission to dental school of those who took part in the AEP.

Data Collection and Analysis

This study was an ex post facto, quantitative design. Data was collected retrospectively from students who completed the AEP from years 2011 through 2014 and began after acceptance of the project by the doctoral committee and the UMKC Institutional Review Board. As indicated previously, once students completed the AEP, they were sent a link to Survey Monkey™ to complete the program evaluation. Additionally, students were directed to send their post DAT scores to the Director of the AEP for entry into the data base only. The cumulative GPA and science GPA were collected as part of the AEP admission process. As the dental school admission moved forward each year, the Director of the UMKC School of Dentistry, Office of Student Programs, notified the Director of the AEP of the admission results. Admission results were then tracked and entered into the data base.

Statistical Methods/Analytical Plan

Research design

This study followed a quantitative ex post facto research study design. The purpose of the study was to examine the impact /outcomes of a hybrid pre-dental admission enhancement program with regard to satisfaction, admission rates, and dental admission test scores among underrepresented minority and/or disadvantaged students who completed the UMKC SOD Admission Enhancement Program from years 2011 through 2014.

Program variables

Several outcomes were assessed in this study including student perceptions (satisfaction) of the Admission Enhancement Program, evaluation of student achievement on the dental admission test (pre-post DAT scores), and the numbers of students who applied to and are admitted to dental school (percentage of students admitted to dental school). The dependent

variables were the DAT scores, admission rates, and program satisfaction of the students. The independent variable was the admissions enhancement program (AEP) which included the online modules (biology, chemistry, organic chemistry, math and the online DAT prep course) along with other components of the program including the mock interview, essay review, test taking and test anxiety skills training (Creswell, 2013; Gravetter, 2013). The program outcome survey assessed several variables which can be seen in the following matrix table.

Table 4: Variable Matrix Table

Statistical Procedure	Variables	Rationale
Pearson Correlations	All forced-choice questions/variables (n=37)	Exploratory tool; identify significant relationships for regression model
Coding of Open Ended Responses	n=11 questions in section 6 of the AEP outcome survey (34-44)	Identify themes regarding reported categories
t-Test (within)	Grouping variables: admissions status; Dependent variables: Sci GPA; Post-DAT; program satisfaction,	Test for significant differences in dependent variables between categorical variables
t-Test (between)	Grouping variables: All forced-choice questions/variables (n=37)	Test for significance before and after treatment.
Chi-square	EX: Categorical variables: Admissions Status X Ethnicity/ age, satisfaction, doing well on modules DAT score X Ethnicity, age, satisfaction, doing well on modules,	Non-parametric test used with categorical data or classifications. Ex: Admission to dental school, Not admitted to dental school
Bivariate Correlation & Regression	Questions by Themes 1. Future Career (variables 1-5) 2. Personal Development (variables 6-8) 3. Academic Rigor (variables 9-15) 4. Program Satisfaction (variables 16-18) 5. Quality of Instruction (variables 19-30)	Method of analysis used to evaluate the degree of relationship between two quantitative variables. These will then be used to predict the scores dv& iv
Regression	DV: Post DAT score IVs: identified by exploratory Pearson Correlations; TBD	Identify proportion of explained variance attributable to each significant predictor.

Questions numbers 1-5 of the survey address how the program impacted the student's future. Personal impact of the program is evaluated in questions numbers 6 – 8, while difficulty of the program is evaluated in questions 9-15. Satisfaction questions while a theme of the outcome survey are specifically asked in questions 16-18. There are 13 questions which ask the students evaluate the quality of instruction on all aspects of the AEP including the onsite experience; the math, chemistry, organic chemistry, and biology online modules; the online CE DAT prep course; and the quality of instruction for each of the supplemental instruction leaders of the online modules. Additionally, management of the academic skills training information as well as the alternative careers exploration panels for dental research, education and public health are also evaluated in this section along with the mentoring in the application for dental school. This includes help with the essay writing and interview process. Section four of the program survey covers technical aspects of the AEP (questions 19 – 26). Section five addresses preparation for the DAT and asks students to rate how various aspects of the program and material prepared them for the DAT (questions 28 – 33) including the math, chemistry, organic chemistry, biology module, CE DAT prep webinar, and the test taking strategies. Qualitative or open-ended questions are presented in section six (questions 34 – 45). Lastly, census data including age, gender, race, and ethnicity is covered in the last section (questions 46-49) (See Table 5 below).

Table 5: Summary of Survey Questions

Question Type	Question Numbers	Question Format
Impact on Future	Section 1 (1-5)	Likert
Personal Impact	Section 1 (6-8)	Likert
Program Difficulty	Section 1 (9-15)	Likert
Program Satisfaction	Section 2 (16-18)	Yes/No
Quality of Instruction	Section 3 (13 Items Evaluated)	Likert
Technical Aspects	Section 4 (19-26)	Likert
DAT Preparation	Section 5 (28-33)	Likert
Open-ended Questions	Section 6 (34-45)	Open Ended
Census Data	Section 7 (46-49)	One Choice Selection/MC

Variables which were similar to one another in the AEP outcomes survey were looked at for strong relationships using the bivariate correlation method of analysis. This helped identify constructs for the regression model. All of the variables were explored for initial linear relationships using the Pearson Correlation. The Pearson Correlation (bivariate analysis) was used to measure the degree of and direction of relationship between the independent and dependent variables (Gravetter, 2013). Further relationships were then be examined by the Regression analysis. A Regression analysis uses correlations to make predictions about an unknown variable. Further, the regression analysis helped identify the proportion of explained variance (how much variance) will be attributed to each significant predictor. In this study, the dependent variable in the regression model was the post DAT scores.

Descriptive statistics

Descriptive statistics were also used to describe the population including age, gender and ethnicity. These are questions 46 through 49 on the AEP outcome survey. Means and standard deviations are used to describe the participants in terms of cumulative GPA and Science GPA. Outcomes regarding the range of DAT pre-post scores, number of students admitted to dental school and program satisfaction are also reported. Program satisfaction questions are addressed in questions 16, 17, and 18. Descriptive statistics were used to organize the data and make it more manageable. The data then tell a story of the participants. An average score (mean) is used to give a single descriptive value for the entire set of scores (Gravetter, 2013).

Correlational and regression analysis

An initial analysis was conducted using Pearson Correlations (Bivariate Correlations) as an exploratory tool to investigate general relationships between all program survey items. Significant pairs were then investigated further using within group T-Tests and Analysis of

Variance (ANOVA) where appropriate. Pearson Correlation is the most common correlation test and measures the degree of linear relationship between two variables. The T-Test was utilized to determine if there is a significant difference between two mean populations. For example, this study analyzed two groups of DAT scores (pre and post). The ANOVA was also employed to look at mean differences between two or more treatment groups or populations. The ANOVA's greater impact is that it can be used with more than two groups or samples. Therefore, in this study the ANOVA allowed for determining if significant differences exist between the sample means of more than one variable (Gravetter, 2013).

To address research question one, ("Is there a significant difference between the pre and post DAT scores among students attending a pre-dental enrichment program?"), the within group (or repeated measures) t-test will was used to look at the effect of the pre-dental program on post DAT scores. The advantage of using the within group t-test is that it uses the same participants in all treatment conditions (the AEP). Therefore, there is no risk that any of the participants are different. It also measures the amount of change that occurs for each person (Gravetter, 2013).

For research question two, ("What percentage of students will gain admission to dental school after attending the AEP?"), the chi-square test was used for analysis. The chi-square is a non-parametric test is used with categorical data or classifications such as in the case of the AEP and admission (Gravetter, 2013). For example, the analysis looked at the percentage of students completing the AEP who were offered admission to dental school. The outcome was either admitted or not admitted. So, out of 48 students who completed the AEP, how many were admitted and how many were not admitted.

The study also explored student satisfaction, such as whether students admitted to dental school perceived the AEP program positively? With regard to research question three, ("What

program characteristics best predict student satisfaction among students in a pre-dental enhancement program (AEP)?”), a regression analysis model was employed. A regression analysis of specific program variables on student self-reported satisfaction was conducted. The common reason and use of Regression Analysis is for prediction (Gravetter, 2013). For example, this study evaluated if the variables of doing well on the four modules (Biology, Chemistry, Organic Chemistry and Math) predicted a higher post DAT score? Another regression was; does the student’s mentorship with the dental application predict the student’s admission status? Other program variables will be conducted for prediction. Several questions in the program survey addressed correlational variables. These include questions regarding the online modules ability to prepare the students to take the DAT (questions 28 through 33). Individual regression coefficients and corresponding t-tests were utilized for individual predictors. The F-test was used to test the significance of the regressions. This was used so that results of the regression equation could be determined to be significantly greater than would be expected if there were no relationship between the variables in the model (Gravetter, 2013). The percentage of variance was tested with r^2 . All tests indicated above were analyzed with a $p < 0.05$ or less.

Conceptual Framework and Implications for Methods of Analysis

Each of the research questions were also be informed by the conceptual frameworks discussed in the literature review. Question one, “Is there a significant difference between the pre and post DAT scores among students attending a pre-dental enrichment program?”; is related to the conceptual ideas of Claude Steele’s stereotype threat and taking high stakes exams such as the DAT (Steele, 1997; Steele & Aronson, 1995). During their time in the AEP, students were given the opportunity to learn study skills strengthening, time management, and skills on dealing with test anxiety. Additionally, students were exposed to panels of ethnically diverse faculty

dentists who have achieved numerous career goals. The AEP students viewed these faculty as mentors and how they too can one day achieve their goal of becoming a dentist. These aspects of the AEP inform question one and help to remove the stereotype threat as students who complete the AEP move forward in the admission process.

Question two, “What percentage of students will gain admission to dental school after attending the AEP”? , was viewed through the lens of both student involvement and the I-E-O model by Astin (Astin, 1984, 1993). The main desire of the students who were accepted in the AEP was to be admitted to dental school so that they can fulfil their dream of becoming a dental professional. For most of these students the road has been difficult due to family background, finances, access to academic rigor and preparedness, and the sheer lack of opportunities afforded to them when compared to others of more affluent situations. However, this has impacted their ability to work hard and demonstrate determination. The research of Tinto has shown that early involvement in campus life, study habits, and mentoring with peers and faculty can improve the student’s ability to persist to graduation (Tinto, 1987, 1993). Regarding Astin’s I-E-O Model, the level of inputs (I) the student brings to the institution impacts their commitment, while the environment (E) of the institution shapes the student, which leads to the outcome (O) (Astin, 1993). With regard to the AEP, whether or not the student is accepted to dental school can be informed by many of the AEP variables and how involved the student becomes during the program. There are many opportunities for students to become involved with their AEP peers while living on campus, studying, completing the online modules, as well as taking advantage of the faculty mentoring. In these ways, students can improve their academic and professional skills and ability to be a competitive candidate for admissions.

The third and last research question, “What program characteristics best predict student satisfaction among students in a pre-dental enhancement program (AEP)?” was best analyzed according to Astin’s I-E-O model. When considering “taxonomy of student outcomes”, the AEP student’s psychological affective (non-cognitive) outcome can be seen in their attitude during the program, working diligently on the AEP material and their drive to study and work hard. Likewise, the psychological cognitive part of the student’s outcome can be seen in their ability to do well in the program, handle the rigors of material, and achieve the goals in the AEP. Considering the behavioral aspects of Astin’s model, the behavior affective outcomes are assessed by evaluating the friendships and relationships they form with fellow students as well as faculty members in addition to how well they are able to balance school work and personal time. Lastly, the behavioral cognitive outcomes can be seen in the student’s ability to do well on the DAT and be admitted to dental school. If the AEP student works diligently and applies the knowledge they learned during their time in the program, their behavioral cognitive outcome will most likely be favorable (Astin, 1993; Schuh et al., 2010)

Table 6: Astin’s I-E-O Model Aligned with the AEP

Variables From I-E-O Model	AEP Data Source
Input	GPA, family background, previous education, desire to succeed, commitment to the program, values, beliefs, goals, aspirations
Environment	AEP program variables: residential experiences, peers, faculty mentors, skills strengthening, professional skills, online academic modules, online DAT prep module, essay writing, mock interview experience
Outcome	DAT test score, Admission to dental school

Ethical Considerations

Ethical considerations are a serious part of the research process. It is important to conduct research in an ethical, honest and legal manner and to follow all guidelines set forth. This way, participants will continue to trust the process of research. The primary investigator of this study completed the IRB CITI Training UMKC in March, 2013. All records in this study were kept confidential. The program survey was anonymous as students were able to take the survey at a site other than the dental school program. They were sent a link to Survey Monkey™. The survey contained no personal identifiers. Student demographic information was kept in a file for statistical information only, but not linked with their names. All GPA's, DAT scores and other student information was confidential and Family Education Rights and Privacy Act (FERPA) guidelines applied. Only the student researcher had access to the data which was accessed with a username and password known to the researcher. A written acceptance letter from the Institutional Review Board at the University of Missouri-Kansas City confirmed the study had been through the process of review (See Appendix C). All information was given to the students with regard to how their information was stored and secured. Published data will not use any names or key identifiers to student personal information.

CHAPTER 4

RESULTS

The purpose of this study was to examine the impact /outcomes of a hybrid pre-dental admission enhancement program (AEP) for underrepresented and/or disadvantaged students at the UMKC SOD. This was achieved by evaluating the admission status of students after completing the AEP, assessing the students DAT scores, and looking at any correlations between program variables and student admission and DAT score. The sample included AEP students from years 2011 through 2014 who completed the program (n=48). All students were full-time students pursuing admission to dental school. All 48 students completed the AEP outcome survey through Survey Monkey® and there was no missing data. The mean age was 24.29 (SD = 4.54) years of age. The mean overall GPA was 3.32 (SD=.327). The mean science GPA was 3.27 (SD = .299). Ethnicity and race were derived from the U.S. Census data (U.S. Census Bureau, 2011). In all U.S. Census data questions ethnicity is asked separately from race. For ethnicity, out of 48 students, 17 indicated they were Hispanic or Latino while 31 students indicated they were not from a Hispanic or Latino background. Regarding race, among the same 48 students who completed the AEP, 14 identified as Black/African American, 9 as American Indian/Alaskan Native/White, 5 Asian, 4 American Indian/Alaskan Native, 1 Asian/White, 1 American Indian, Alaska Native, Black or African American. Additionally, 14 students identified as White but from rural or underserved areas of the region. Out of 48 students who participated in the AEP, 32 (66.7%) were women, while 16 (33.3%) were men. The DAT academic average scores ranged from a low of 14 to a high of 23 with a mean score of 17.62 (SD = 1.78).

Table 7: Demographic Characteristics Among Participants in the AEP

Characteristic	n	%	Mean	SD
Age	48	100	24.29	4.54
Gender	48	100		
Male	16	33.3		
Female	32	66.7		
Ethnicity	48	100		
Hispanic/Latino	17	35.42		
Not Hispanic/Latino	31	64.58		
Race	48	100		
African American/Black	14	29.17		
American Indian/Alaskan Native/White	9	18.75		
Asian	5	10.42		
American Indian/Alaskan Native	4	8.33		
Asian/White	1	2.08		
American Indian/Alaska Native/Black	1	2.08		
White/disadvantaged	14	29.17		

From AEP years 2011 to 2014, out of 48 students, a total of 34 students have been accepted into dental school to date (70.83%). Two students from the 2014 year are still continuing their studies to complete their requirements for application and will apply in the next round, fall, 2015. Some of the 48 students were not qualified for grade reasons or changed their minds regarding their career choice. The next table gives a glimpse of each year's applications and acceptances.

Table 8: Applications and Acceptance of AEP Students 2011-2014.

AEP Year	Applications	UMKC Applications	Accepted UMKC	Other School Acceptance
2011	10	10	8	1-Meherry
2012	7	7	6	1-Howard
2013	11	9	8	
2014	10	9	10	

32 accepted to UMKC, 2 accepted to other dental schools. Total = 34 acceptance

The first research question for this study was, is there a significant difference between the pre/post DAT scores among students attending a pre-dental summer admission enhancement

program (AEP)? The T-Test was used to look at significant differences between mean pre-and post-DAT scores. The mean of the academic average (AA) of the pre-DAT scores was 16.00 and the mean AA of the post-DAT scores was 17.84. Post-DAT scores were found to have significantly increased when compared to the Pre-DAT scores ($t(18) = -7.18, p < .01$). This is an important finding in that the national academic average for the DAT is 18.1 (Garrison, McAllister, Anderson, & Valachovic, 2013). The AEP incorporates faculty mentors whom students can identify with as they work towards their goal of being admitted to dental school. The AEP students spend time with faculty working on their application essay, mock interview, and through panel discussions. Another purpose of the AEP is to help students prepare for the DAT by enhancing their academic skills through study skills strengthening, time management, and dealing with test anxiety. The academic rigor of the online modules for biology, chemistry, organic chemistry, math, and the DAT prep course give students the tools needed to increase their DAT AA scores at a statistically significant difference.

Correlations were also noted between several preparatory tools of the AEP and the quality of the DAT prep CE webinar. For example, students who had a higher level of education was correlated with those students who rated the quality of instruction of the DAT preparatory online module favorable ($r(46) = .30, p < .05$). Note, * $p < .05$; ** $p < .01$

Table 9: Correlations Between Preparatory Items of the AEP and DAT Prep

Measure	1	2	3	4	5	6	7	8	9
Level of Education	.30*								
Help in current education		.55**							
Help in job			.54**						
Help to solve problems				.44**					
Learned new skills					.47**				
Learned new info/facts						.45**			
Learned about self							.29*		
Learned new ideas								.61**	
Learned strengths									.52**

The second research question was what percentage of students gained admission to dental school after attending the AEP? The Chi Square test was used to evaluate question two. The chi square was used to determine whether the sample data would support or refute the question/hypothesis about the AEP students' ability to be admitted to dental school after completing the program. The results demonstrated to reject the null hypothesis. This means that there was a reasonably good fit between the data and the hypothesis ($p < .021$). This outcome suggests that there was a significant difference between the AEP students who completed the program and were offered admission compared to those students who were not offered admission, $\chi^2 (1, n=48) = .021, p < .05$. We hypothesize students who completed the AEP and were offered admission utilized the tools given to them and took advantage of all the program had to offer.

A Step-Wise Multiple Regression analysis was used to evaluate the third research question, what program characteristics best predict student satisfaction among students attending a pre-dental summer admission enhancement program (AEP)? Multiple Regression is the process of using several predictor variables in order to secure a more accurate prediction (Gravetter & Wallanu, 2013). These predictors are usually related to one another in some way and may overlap. The regression model explains what percentage each variable is predicting. In this study, (1) help in current or future education (42.3%), (2) learning new information and facts (8.2%), quality of the DAT preparatory CE webinar (4.4%), and quality of the SI leader in the math module (5.4%) accounted for a total of 60.3 % of the program characteristics that best predicted satisfaction in the AEP. In other words, the largest percentage of prediction for satisfaction of the AEP was attributed to help that the student's received during the AEP for their current or future education. So, if students felt they received help during the AEP for their

current/future educational needs, this characteristic of the program predicted at 42.3% that they would be satisfied with the program.

Table 10: Summary of Regression Analysis for Variables Predicting AEP Satisfaction

	Model 1			Model 2		
Variable	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Education	.472	.082	.660	.636	.095	.890
Info/Facts				-.266	.093	-.380
<i>R</i> ²	.436			.527		
<i>F</i>	33.20*			23.44*		
	Model 3			Model 4		
Variable	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Education	.727	.099	1.02	.757	.094	1.06
Info/Facts	-.231	.090	-.331	-.256	.085	-.366
DAT Web	-.144	.064	-.281	-.186	.062	-.361
SI Math				.124	.049	.253
<i>R</i> ²	.580			.638		
<i>F</i>	18.87*			17.60*		

*p < .01

There were seven variables with a significant bivariate relationship when compared to Post-DAT scores. These seven variables were then entered into the Step-Wise Multiple Regression Model. This model accounted for predicting a 44.7 % higher Post-DAT score. Of this, technical assistance accounted for 29.9% and 14.8% for overall GPA. This is an important finding in a program which had the unique factor of a hybrid model.

Table 11: Regression Model – Predicting Improved Post DAT Scores

	Model 1			Model 2		
Variable	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Technical Assistance	1.23	.386	.574	1.13	.346	.512
Overall GPA				2.15	.818	.412
<i>R</i> ²	.329			.495		
<i>F</i>	10.80**			10.31*		

*p < .01; **p < .05

The third research question was regarding program satisfaction and what program characteristics best predicted satisfaction. The first regression predicting satisfaction showed

variable predictors of (1) help in current and future education plans, (2) learning new information and facts, (3) quality of the DAT CE webinar, and (4) quality of the SI for the math module. In reflecting on these outcomes, students who perceived that the AEP helped them with their educational goals were highly satisfied with the program. It has been shown that students who perceived to have greater involvement with their academic environment generally experience positive academic success (Astin, 1993). Therefore, if students engaged in the AEP activities and found them to help with their education, learning of new information and modules, it would make sense that these variables would predict satisfaction with the AEP. However, students were asked to do their best, to work hard and to engage and take advantage of the tools the AEP had to offer. So, faculty did motivate students to engage. Learning communities can also aid in linking students together in a type of cohort model allowing them to study together and experience collaborative learning (Tinto, 2003). The result of these satisfaction predictors can be seen in the AEP model. Students come together in two residential experiences, learn the material on site and then are able to keep in touch via email when working on their online modules.

The second satisfaction prediction model for the Post-DAT scores relates to how the students come to the AEP program. In other words, they come to the program with a certain amount of background knowledge, family history, and experiences which influence their time and dedication to the program. Their own perception that they are helped through any technical assistance of the program relates to how the AEP program is designed. If students feel they are offered help through the hybrid portion of the program in technical ways, then it seems feasible that this would predict their improvement in their DAT score. Likewise, the literature also suggests that students who have a solid GPA will likely do better on standardized tests. Hence, the second portion of the model reflects this prediction in improved DAT scores.

CHAPTER 5

DISCUSSION

It is the primary purpose of the academic institution to prepare students to work in an ever changing diverse society. In their article, Price and Grant-Mills (2010) discuss the primary mission of educating students to be competent oral health care professionals and to improve the oral health of the community (Price & Grant-Mills, 2010). Treating a diverse society is part of this mission. In order to do so, the dental education institution must continue to be vigilant in changing the culture of the dental school classes. Developing unique pedagogical delivery models to increase the diversity of dental school classes as well as changing admission practices that reflect a more holistic approach and decrease environmental barriers, are strategies dental schools can implement to reach these goals. The literature is clear that over half of the population will be comprised of a culturally diverse ethnic group by the year 2050. The literature also suggests that while U.S. dental schools have worked towards increasing the number of URM students, they are still woefully lacking in their representation of African American, American Indian, and Hispanic students. Therefore, our society is in need of oral health practitioners who can meet the needs of a more diverse society. The purpose of this study was to examine the impact /outcomes of a hybrid pre-dental admission enhancement program (AEP) for underrepresented and/or disadvantaged students at the UMKC SOD. The vision or mission of the AEP is to help prepare URM and disadvantaged students to become competitive candidates in the admission process.

The first research question and outcomes from this study are regarding the students DAT academic average (AA) scores. The study found a statistically significant difference in Post-DAT scores for all students who completed the AEP and who had taken the DAT twice for comparison (pre and post). These findings are similar to the study by Johnson (2013) who found

that URM/disadvantaged students participating in a summer enrichment program were able to significantly ($p < .001$) boost their AA DAT scores after completing the program (Johnson, 2013). Johnson also noted that the more self-reported disadvantages the students had the more they benefitted from the program. Other studies have also reported increased DAT scores after students completed enrichment programs aimed at providing students with comprehensive academic preparation, tools for study habits, exposure to the career of dentistry and the admission process (Nussbaum & Steele, 2007). Another study by Markel (2008) demonstrated that URM students who completed a six-week summer enrichment program significantly improved ($p < .001$) tests scores after attending the program. The program was designed to help students build their academic skills in vocabulary, reading, spelling, math, biology, chemistry, and physics. Post-achievement tests were all statistically significant ($p < .001$) after completion of the program and were stated to have the ability to help students be more competitive candidates for the dental school application process (Markel, Woolfolk, & Inglehart, 2008). While the Markel study demonstrated a summer program to be effective in 6 weeks, the AEP is designed for 10 weeks because it implements a hybrid/online design. This allows students access to the academic material 24/7, study time at any time of the day/night, and to stay connected to peers they met during their residential time in the program.

Additionally, there is evidence which suggests that repeat testing on the DAT for students who have not met the minimum qualifying score, does improve the AA score (Ranney, Wilson, & Bennet, 2005). The national academic average for the DAT in 2011-2012 was 18.7 (Garrison et al., 2013). Students in the AEP have the opportunity to learn test taking strategies and how to navigate through test anxiety. Faculty from the UMKC Academic Success Center present information on these topics to aid students in studying efficiently in areas of

weakness rather than spending time on topics they have mastered. Armed with these strategies and the reported evidence on improvement with repeat testing, students should improve their DAT score the second time around.

Regarding admissions, there is a growing body of literature pertaining to a more holistic approach when reviewing applicants for dental school. An admission process which incorporates not only the review of standardized tests such as GPA, science GPA and the DAT, but also includes non-cognitive factors is essential to this process. The literature describes additional important items such as the personal statement (essay), personal interview, as well as dental shadowing, leadership, community outreach, social background, and ability to sustain academic achievement despite other circumstances (Price-Grant-Mills, 2010). Dental education has begun a movement in this direction. The UMKC School of Dentistry leans more towards a holistic review of the admission process. First, the office of student programs reviews applications for completeness of all information, verification of coursework, a GPA standard and DAT score. Students also write a personal statement. Applications include not only standardized tests but community service, shadowing in dental offices, and other extending circumstances and extracurricular activities of any kind. All of these entities are taken into account. If the application has merit, the student is invited for a face to face interview. The AEP incorporates these components into its program. For example, students write and receive feedback from faculty mentors who help them refine their personal essay statement so that they have a well-polished essay prior to application. Additionally, students go through a “mock” interview with faculty who are able to give them constructive feedback on how to improve. They also meet with an admission officer who mentors them on ways to improve their application. Items are discussed regarding the importance of their own unique application.

The second research question was, “what percentage of students gained admission to dental school after attending the AEP?” The study relied on the expertise of Astin (Astin, 1984, 1993) and Tinto (Tinto, 1987, 1993, 2003) to inform this question. Astin is well known in higher education for his theories and concepts in student involvement while Tinto describes students based on persistence. Their theories can help inform and support programs such as the AEP and to develop and implement strategies for helping students to be successful in college. Several important characteristics of the AEP can be seen to align with the theories of Astin such as the formation of group learning and collaboration with other students during their time on campus (Astin, 1984). The views of Tinto and persistence are reflected by the implementation of faculty mentors to aid students with their personal essay statements and mock interviews simulating the real interview process (Tinto, 1993, 2003).

The third research questions addressed the prediction of satisfaction with the AEP. It was found that a total of 60.3 % of the AEP program characteristics best predicted satisfaction. Of that 60.3%, help in current or future education plans accounted for the most at 42.3% followed by learning new information and facts at 8.2%, the quality of the DAT CE preparatory webinar at 4.4%, and 5.4% was attributed to the quality of the SI leader for the math module. These findings correlate with the overall primary purpose of the AEP, which is cultivate URM and disadvantaged students to become competitive candidates for the admission pool. Students who felt that the AEP helped them in their current or future educational plans were highly satisfied with the AEP. They also felt that particular program characteristics of learning new information and facts, the DAT CE Webinar and the SI leader in Math contributed to their satisfaction and success. In a second regression, almost 45% of the model predicted an improved AA Post-DAT score. Technical assistance accounted for almost 30% (29.9%) and Overall GPA accounted for

nearly 15% (14.8%). This aligns with another of the goals of the AEP which is to help students improve their academics and their DAT score, thereby ultimately becoming a more competitive candidate. In other words, students' perceived that the help they received in the AEP would aid them in their current or future educational plans, so they were satisfied with the program.

Additionally, they perceived that the information and facts they learned in the AEP including the Math material, gave them the advantage needed to improve academically. This also led to their satisfaction with the AEP.

For the program to be successful, many people must be involved. The outcomes of this study are supported by evidence from other studies (Brunson, Jackson, Sinkford, & Valachovic, 2010). In a study by Brunson, et al, (2010), reviewing best practices for dental schools in the Pipeline, Profession, and Practice: Community-Based Dental Education program, the authors reflect on the importance of establishing collaboration and partnerships to increase the diversity of the student body through these programs. Additionally, the authors discuss the need to have support from the Dean and other administrators (Brunson et al., 2010). The AEP has several collaborations within the university setting. Faculty from biological sciences developed and disseminates the online module material in biology, chemistry, organic chemistry and math. The AEP faculty are experts in their field and have first-hand knowledge of the types of questions asked on the DAT. Supplemental instructors are utilized for small group problem solving three times per week to review material and enhance synthesis and learning of the material (Rath et al., 2007). Additionally, faculty from the UMKC Center for Academic Success present information to students on test taking strategies, study habits, test anxiety, and time management skills. The UMKC School of Dentistry Office of Student Programs also work directly with each student in

reviewing their admission folder, providing specific information on how they can improve their application.

Many other enhancement/enrichment programs have demonstrated success over time (Bailit & Formicola, 2010; Brunson et al., 2010; Carreon et al., 2009; Formicola et al., 2009; Gonzalez G, 2011; Johnson et al., 2013; Markel et al., 2008; Nivet, 2010; Price & Grant-Mills, 2010). The characteristics most cited which are important in incorporating into a summer dental enrichment program are (1) science academic enrichment, (2) dental career development, (3) exposure to clinical experiences, and (4) financial assistance (Alexander & Mitchell, 2010). The AEP follows this model and incorporates an online piece with the academics portion (ADEA Bulletin, 2011). Preparation for the DAT, skills training, faculty mentoring and application support is also suggested as a critical components for an effective and successful dental enrichment program (Alexander & Mitchell, 2010). All of these suggested features are implemented in the AEP. The most distinguishing factor of the AEP which sets it apart from other summer enrichment programs is the hybrid/online approach. This allows students to study more often from their place of residence and have access to the academic materials 24/7, stay connected to their peers, and form online study groups.

Conceptual Framework

As discussed previously, this study was informed by several conceptual frameworks. First, the concepts and theories of Claude Steele and his work with stereotype threat; specifically in high stakes exams such as the DAT can be related in this study and explains the positive outcomes to research question one. The study found statistically significant differences in the Post-DAT scores for students completing the AEP. According to Claude Steele, there are several important factors to consider when designing a program that will aid in decreasing stereotype

threat in the academic institution. He refers to this as “wise”-schooling (Steele). In his 1997 article, Steele states that students, “will not be held under the suspicion of negative stereotypes about their group (Steele, 1997). Steele posits that to decrease stereotype threat for both those that identify with and those who do not identify with a domain, a few key items can help. One is to develop optimistic student-faculty relationships. The AEP incorporates this suggestion by exposing the students to faculty mentors whom they can emulate as they work towards their desire to be admitted to dental school. The AEP students spend time with faculty working on their application essay, mock interview, and through panel discussions. Another purpose of the AEP is to help students prepare for the DAT by enhancing their academic skills through study skills strengthening, time management, and dealing with test anxiety. Steele refers to these program factors as, “challenge over remediation” and “stressing the expandability of intelligence” (Steele, 1997). Through the academic rigor of the online modules for biology, chemistry, organic chemistry, math, and the DAT prep course, the students were able to increase their DAT AA scores at a statistically significant difference.

Steele and Aronson discussed in their 1995 article how African Americans can face difficult challenges when taking standardized tests which they refer to as a negative societal stereotype. This stereotype is a self-threat which can interfere with their ability to perform well on the test (Steele & Aronson, 1995). In their study it was determined that the stereotype threat resulted in students spending more time processing items, reduced speed and accuracy of responses to test items, test anxiety, and competition. The students in the study were academically strong, but related to the negative stereotype and therefore had lower expectations of themselves (Steele & Aronson, 1995). Decreasing stereotype threat can be achieved through improvement of situational changes such as a school design which removes negative stereotypes.

This type of change would incorporate items such as positive student-teacher relationships, giving students more challenging work to accomplish, and emphasizing that intelligence is not stagnant. All of these strategies work for both those students who identify with negative stereotypes and those who do not (Steele, 1997). The AEP incorporates several of these suggestions into its program.

The second research question was regarding admission to dental school after completing the AEP. This question was based on the ideas and theories of Astin (Astin, 1984) and Tinto. Their work with student involvement and persistence, respectively, lends information to how the characteristics of the AEP program would aid students in gaining admission to dental school. There was a statistically significant difference found between those students who completed the program and were offered admission compared to those students who were not offered admission. Astin (Astin, 1984) purports the necessity of student involvement and integration, while Tinto asserts the importance of college completion (Milem & Berger, 1997; Tinto, 1987). The AEP strives to involve the students as they stay on campus for their residential experience, learn valuable skills to boost their study habits and academics, and integrate with faculty through the essay review and mock interview process. All of these characteristics are described by Astin and Tinto in the Milem and Berger study (Astin, 1993; Milem & Berger, 1997; Tinto, 2003).

Secondly, student involvement theory and the Inputs-Environment-Outcome (I-E-O) model by Alexander Astin also align with the framework of the AEP. In his own words, Astin states “student involvement refers to the amount of physical and psychological energy that the student devotes to the academic experience” (Astin, 1984). A student makes an investment in his/her education through opportunities and experiences such as academics and personal development in college. How much they are involved will likely determine the outcome of their

success. Other factors influence student involvement such as time, where the student lives, student-faculty interactions, and academic versus extracurricular involvement. Astin posits that a combination of various types of involvement is important. The research tells us students who are more involved will also experience enhanced learning during their college life (Astin, 1984; Berger & Milem, 1999). In concert with Astin, Tinto's theories regarding student persistence also lend some important information to this study. In his 2003 article, Tinto described how learning communities can lead to academic success for students (Tinto, 2003). The idea is that the students in the learning community all have (1) shared knowledge, (2) shared knowing, and (3) shared responsibility. For example, for shared knowledge, students take courses together in a curricular shared experience. They then are able to develop higher cognitive levels of learning by sharing this knowledge with one another. In this way, the students form relationships in their academic experience, communicating both intellectually and socially. They then become responsible for learning in collaborative ways. The AEP mirrors Tinto's learning community model by emphasizing the residential experience and formulating a friendship of learners from the beginning of the program. Students study together and stay in touch when they leave the campus and begin the online models (Tinto, 1993, 2003).

The AEP students have many opportunities to become involved during their time in the program; and in several different ways which can thereby enhance their learning. First, during their residential time on campus living in the dorms with their classmates, they are able to develop what Astin refers to as peer groups. Astin suggests that a student's academics can be strongly influenced by their peers. Involvement with others in same learning peer group can positively influence the outcomes of one's learning (Astin, 1984). The AEP students develop and continue with these learning groups leading up to taking the DAT. Additionally, Astin supports

faculty involvement and discusses the need for teaching to be directed towards intended outcomes and what the student is actually doing rather than on technique. The AEP faculty are committed to developing relationships with the students as well as the intended outcome of helping the student to gain admission to dental school.

Astin's I-E-O model is also an important conceptual theory to consider for this study. Inputs are considered to be the various traits and characteristics students bring with them when they enroll in college. Environment is the whole of the college such as faculty, programs, peers, extracurricular, and the educational experiences. Lastly, outcomes are student characteristics after exposure to the college experience. In this model, the student outcome can be classified by outcome; cognitive and non-cognitive (affective); and data; psychological and behavioral. Therefore, the outcomes could be one of the four: (1) Psychological, Non-cognitive, (2) Psychological, Cognitive, (3) Behavior, Non-cognitive, and (4) Behavioral, Cognitive. Astin suggests that a student outcome can be classified simultaneously (Astin, 1993; Schuh et al., 2010).

The AEP aligns itself with the I-E-O model in that students come to the program with certain characteristics and family background that influence their abilities (I). The program provides them with a variety of experiences to enhance their learning and increase their academics during their participation (E). Lastly, we are able to measure many of the outcomes described by Astin. Psychological non-cognitive outcomes include student satisfaction with the AEP experience. This study demonstrated students to be highly satisfied with the AEP and many of its components. Additionally, students' values, attitudes and beliefs reflect this outcome and is evidenced by the regression model which demonstrated that help in current or future education accounted for 42.3% of satisfaction in the AEP. Psychological cognitive measures deal with

academics and are reflective of the student’s ability to do well on the DAT. This study demonstrated a statistically significant difference in post-DAT scores. Regarding behavioral non-cognitive outcomes, this is characterized by students’ personal habits and relationships. The AEP strives to help students build peer relationships with those in the program through the residential time on campus. Further, students learn study habits and better test taking strategies while in the program. Lastly, the behavioral cognitive outcome can be seen as the students’ development in a career, educational attainment, and other vocational achievement. Admission to dental school is a primary goal of these students, so the ability to be admitted after completing the AEP is evidence of this outcome. The AEP supplies the students with many tools to enhance their academics and learning skills as a means to achieve this ultimate goal. Completing all of the online modules, the DAT CE preparatory course and test taking skills can significantly augment their ability to become a competitive candidate in the admission pool. Below is a chart of how the AEP fits into Astin’s I-E-O outcome model.

Table 12: AEP Outcome Model of Astin’s I-E-O Model

	Outcome	
DATA	Non-Cognitive (Affective)	Cognitive
Psychological	<i>Student satisfaction with the AEP, values, attitudes, beliefs</i>	<i>Academic Achievement – Improved DAT score, Increased knowledge of DAT subject matter – biology, chemistry, organic chemistry, math.</i>
Behavioral	<i>Personal Habits – Study Habits, Time management, Test taking strategies, Test anxiety, Essay writing, Interview skills</i>	<i>Level of educational attainment & Career development – Admission to dental school,</i>

Limitations

Certain limitations of the study must be acknowledged when considering the implications of study results. The first limitation relates to sample size. The sample size (n=48) was the only data available to evaluate ex-post facto for the admission enhancement program to date. The program has only been in existence since 2011, therefore it was not feasible to obtain a larger sample size. Although the sample size limits inferences to other populations (N), the strength of the findings were significant. Another limitation is the fact that this study was conducted in one dental school university setting. There are numerous enrichment or post-baccalaureate programs in U. S. dental schools. Therefore, the results cannot be generalized to all other U. S. dental schools.

Future Studies

Future studies evaluating the outcomes of the AEP program should include a more representative sample of pre-dental summer enrichment students. Additionally, long term results which follow the AEP students who were admitted to dental school should be followed, through each year of dental school to graduation. It would be interesting to include an evaluation of the student's GPA, science GPA and how well they perform on the national boards, compared to students who did not complete the AEP. Future studies incorporating some qualitative data from focus groups of AEP students would perhaps enhance the quantitative outcomes of the study and help to shape and make important changes to the program. Future studies could also include perceptions of the faculty who participate in the AEP as mentors.

Conclusion

Dental schools in the United States have been struggling with the low enrollment /admission of African American, American Indian, and Hispanic students into dental school for

many years. The effects of this low enrollment directly impacts our society as the demographics continue to rapidly change. It is clear there will not be enough culturally diverse oral health providers to meet these needs unless U.S. dental schools implement changes in programs, curriculum, and admission practices that will remove barriers that allow for a more diverse student class (Haden et al., 2003; "Healthy People 2020. ," 2012). This is an important ingredient in dental education as diversity enhances the life of all learners (Alexander & Mitchell, 2010). The UMKC School of Dentistry is committed to diversity through the AEP and other programs it has in place. The responsibility of dental educators is critical in that we must review the barriers and challenges that students of color face when considering dentistry as a career and strive to implement strategies which will aid students in becoming competitive candidates (Formicola et al., 2010).

The purpose of this study was to examine the impact /outcomes of a hybrid pre-dental admission enhancement program (AEP) for underrepresented and/or disadvantaged students at the UMKC SOD. Although the sample was limited to students who completed the AEP at the UMKC School of Dentistry, the findings from this study suggest that students who completed the AEP were highly satisfied with the program. In addition, the AEP served to help students increase the academics in preparation for the DAT, aided in their application process with the personal statement and mock interview and assisted students in becoming more competitive candidates for the dental school admission pool. This study can serve as a model to other U. S. dental schools who desire to develop a similar summer enhancement program in order to increase the number of culturally/ethnically diverse students to their student body.

APPENDIX A
Essay Review Rubric

Appendix A: Essay Review Rubric

Categories	Poor	Fair	Good	Excellent
Introduction	Details are lacking or uninteresting. Story is told rather than demonstrated.	There are clear points but they lack detail and creativity.	Well-developed main points. Details are descriptive and interesting. Clear point of view.	Points are cleverly-developed with lively description. Clear and consistent point of view.
Main Points/ Body	Details are lacking or uninteresting. Story is told rather than demonstrated.	There are clear points but they lack detail and creativity.	Well-developed main points. Details are descriptive and interesting. Clear point of view.	Points are cleverly-developed with lively description. Clear and consistent point of view.
Organization/ Structure	No discernable organization. Transitions are not present.	Organization is clear. Transitions are present.	Logical progression of ideas. Transitions are present equally throughout essay.	Logical progression with a clear structure that enhances the story. Transitions are mature and graceful.
Style, Sentence, Flow, Diction	Writing is confusing, hard to follow. Contains fragments and/or run-on sentences.	Writing is clear, but sentences may lack variety.	Writing is clear and sentences have varied structure.	Writing is smooth, skillful, and coherent. Sentences are strong and expressive. Uses colorful language.
Mechanics	Distracting errors in grammar, punctuation, spelling, and capitalization.	A few errors in punctuation, grammar, spelling, and capitalization.	Generally correct with a few minor errors in punctuation, spelling, grammar, or capitalization.	No errors in punctuation, spelling, grammar, or capitalization.

APPENDIX B

Mock Interview Rubric

Appendix B: Mock Interview Rubric

INTERVIEW EVALUATION FOR THE ADMISSIONS ENHANCEMENT PROGRAM (AEP)

AEP Student: _____ Interviewer: _____ Date: _____

As you evaluate this student during a mock interview for admission into the DDS program, the most important information that you can provide as feedback to the student are your impressions/opinions of the student's preparation to enter the School of Dentistry, successfully navigate the curriculum and become a contributing member of the dental profession. Your participation as an interviewer in the Admissions Enhancement Program is greatly appreciated. Feedback to the AEP students regarding interview style and areas for improvement will be valuable to them as they prepare for their application to dental school.

INTERVIEWER'S NUMERICAL EVALUATION (1-5) WITHIN THE DOMAINS OF:

Critical Thinking and Coping Skills

- 5 - Clear and consistent critical thinking and judgment with strong coping skills/support systems.
- 4 -
- 3 - Acceptable critical thinking, judgment and coping skills/support systems.
- 2 -
- 1 - Less than acceptable critical thinking, judgment and coping skills/support systems.
- 0 - Inappropriate applicant to the School of Dentistry.

Comments:

Rating: _____

Dental Orientation (Commitment & Aptitude)

- 5 - Strongly committed and depth of understanding.
- 4 -
- 3 - Committed with a clarity of understanding.
- 2 -
- 1 - cursory commitment and little understanding.
- 0 - Inappropriate applicant for the School of Dentistry.

Comments:

Rating: _____

Personal Attributes (Personal values, Ethical values, Leadership, Time management skills, extracurricular activities)

- 5 - Upmost understanding of self, high ethical values, demonstrates management skills.
- 4 -
- 3 - Adequate understanding of self, ethical values and demonstration of management skills.
- 2 -
- 1 - Little understanding of self, demonstration of ethical values and management skills.
- 0 - Inappropriate applicant for the School of Dentistry.

Comments:

Rating: _____

Commitment to Community (Social Conscience, On-going volunteer activities)

- 5 - Extended, on-going history and value of commitment to their community.
- 4 -
- 3 - Strong history and value for community commitment.
- 2 -
- 1 - Limited history of community commitment.
- 0 - Inappropriate applicant for the School of Dentistry.

Comments:

Rating: _____

Interview Behaviors (Appearance, posture, tone of voice)

- 5 - Conveys enthusiasm, confidence, maturity and professionalism.
- 4 -
- 3 - Some display of desired behaviors but appeared nervous and unsure.
- 2 -
- 1 - Little demonstration of desired interview behaviors.
- 0 - Inappropriate applicant for the School of Dentistry.

Comments:

Rating: _____

SOME SUGGESTED INTERVIEW QUESTIONS

1. What distinguishes this student from other candidates?

Are there any unique circumstances or obstacles this candidate made you aware of?

Comments:

2. Do you feel the student's responses demonstrate the potential to succeed in the demands of the Dental School Curriculum (22-25 hrs/semester)?

Comments:

3. How would you describe his/her demeanor and communication skills?

Did the candidate demonstrate a demeanor and communication skills sufficient to facilitate rapport with his/her patients and colleagues?

Comments:

4. Did the candidate provide evidence of the use of critical thinking skills in his/her daily life as well as his/her academic life?

Did he/she display coping skills and support systems that will assure his/her success throughout the Dental School experience?

Comments:

5. Do you feel that the candidate is choosing dentistry for the proper reasons?

What are the outstanding experiences of this candidate that affirm his/her understanding and commitment to the dental profession?

Comments:

6. Has the candidate exhibited compassion and an ongoing commitment to his/her community?

Comments:

7. "Why is it critical for the dental community of your state to address the needs of rural and underserved communities?

How do you see yourself addressing the needs of rural or underserved communities in the future?" (REQUIRED QUESTION)

Comments:

APPENDIX C

IRB Cover and Approval Letter

Appendix C: IRB Cover Letter



“The Outcomes of an Innovative Hybrid Pre-Dental Enhancement Program among Underrepresented Minority and Disadvantaged Students”

Cover Letter

Dear Students from the Admission Enhancement Program (AEP),

As part of the University of Missouri-Kansas City, School of Dentistry’s commitment to academic excellence, we are asking that you complete this survey in order to obtain feedback regarding your participation in the Admission Enhancement Program. Your feedback will then be used to revise and enhance the program for future students.

The survey should take no longer than 30 minutes to complete. Participation in this study is voluntary. Please do not identify yourself in any way on the survey. Results of the research will be used in a dissertation and submitted for publication consideration in a professional journal. Every reasonable effort will be made to ensure anonymity. No personal identifiers will be used in reporting the information collected.

Thank you in advance for your time and effort in completing the survey. We truly do value your recommendations and suggestions. The survey information can be found at

www.surveymonkey.com

Sincerely,

Carrie L. Hanson, RDH, MA
Associate Professor, Director
Admission Enhancement Program
650 East 25th Street
Kansas City, MO
64108
hansoncl@umkc.edu
(816)235-2061

Office of Research Services

FAX: 816235-5602

NOTICE OF EXEMPT AMENDMENT

Principal Investigator: Bonita Butner 328 Education Bid Kansas City, MO 64110

Protocol Number: 13443 Protocol Title: The Development and Impact of an Innovative Hybrid Dental Admissions Enhancement Program Type of Review: Exempt

Date of Determination: 11/0312014

Dear Dr. Butner, A member of the UMKC Research Compliance Office reviewed the following: -Change in PI to Dr. Bonita Butner

Addition of study team personnel

Your amendment is approved and the study retains its exempt status. As with the initial determination, changes to the study must be promptly reported.

When the study is complete, you are required to submit a Final Report. Please contact the Research Compliance Office (email: umkcirb@umkc.edu; phone: (816)235-5927) if you have questions or require further information. Thank you,

Simon MacNeill UMKC!RB

APPENDIX D

Admission Enhancement Program Survey

Appendix D: Admission Enhancement Program Survey

UNIVERSITY OF MISSOURI-KANSAS CITY SCHOOL OF DENTISTRY

“Admissions Enhancement Program (AEP)”
Program Assessment

As part of the University of Missouri-Kansas City, School of Dentistry’s commitment to academic excellence we are conducting this survey in order to obtain feedback regarding the Admission Enhancement Program. Your feedback will then be used to revise and enhance the program for students next year. Thank you in advance for your time and effort in completing this evaluation. We truly do value your recommendations and suggestions.

1. Please rate the following questions from 1 to 5 (or zero if not applicable).

5=Strongly agree

4=Agree

3=Not Sure/Neutral

2=Disagree

1=Strongly Disagree

0=Not applicable

To what extent do you believe AEP will help you in the future?

____(1) This program will help me when in my current or future education.

____(2) This program will help me in my future career plans.

____(3) In this program I learned new ways of solving problems for school.

____(4) In this program I learned new skills for dental school preparation.

____(5) I learned a lot of information and facts in this program.

How did the AEP help you personally?

____(6) During this program I learned more about myself.

____(7) This program made me think more about my own ideas and feelings.

____(8) This program helped me to understand my own strengths.

How difficult was the program?

- ____(9) I had difficulty with the Math course work.
- ____(10) I had difficulty with the Chemistry course work
- ____(11) I had difficulty with the Organic Chemistry course work.
- ____(12) I had difficulty with the Biology course work.
- ____(13) It was not always clear to me what I was supposed to do for this program.
- ____(14) The Aleks enhanced the online module for Math
- ____(15) The Connect and Learn Smart enhanced the Science modules.

2. **For the following three questions 1=Yes and 2=No**

- ____(16) Did you enjoy participating in the *Admissions Enhancement Program*?
- ____(17) Would you take another Hybrid program like this?
- ____(18) Would you recommend this program to someone else?

3. Below is a partial list of the subjects covered in this course. Please circle the appropriate response for Quality of Instruction:

5=Outstanding 4=Very Good 3=Average 2=Below Average 1=Far Below Average

Quality of Instruction

On-Site Experience 5 4 3 2 1 NA

Comments:

Math Module 5 4 3 2 1 NA

Comments:

Chemistry Module 5 4 3 2 1 NA

Comments:

Organic Chemistry Module 5 4 3 2 1 NA

Comments:

Biology Module 5 4 3 2 1 NA

Comments:

DAT – Prep Online Course 5 4 3 2 1 NA

Comments:

SI Leaders Instruction:

Math SI Leader 5 4 3 2 1 NA

Comments:

Chemistry SI Leader 5 4 3 2 1 NA

Comments:

Organic Chemistry SI Leader 5 4 3 2 1 NA

Comments:

Biology SI Leader 5 4 3 2 1 NA

Comments:

Management/Academic Skills Information (CAD) 5 4 3 2 1 NA

Comments:

Alternative Careers Exploration
(Panels for Dental Research, Education & Public Health) 5 4 3 2 1 NA

Comments:

**Mentoring in Application for Dental School
(Essay and Interview review)**

5 4 3 2 1 NA

Comments:

4. Please rate the following questions:

5=Outstanding 4=Very Good 3=Average 2=Below Average 1=Far Below Average

How much did the following elements contribute to your success in this program?

- ____(19) Power point learning modules on Blackboard.
- ____(20) Required time with the **SI Leaders** to help with On-line Course Content.
- ____(21) Discussion board threads on Blackboard.
- ____(22) Interactions and facilitations from each On-Line course instructor when needed.
- ____(23) Direct e-mail contact with course instructors.
- ____(25) Direct e-mail with other students in the AEP.
- ____(25) Online Module assignments.
- ____(26) Technical assistance from Blackboard on Main Campus when needed.

5. Please rate the following questions:

5=Strongly Agree 4 = Agree 3=Neutral 2=Disagree 1=Strongly Disagree

To what extent do you feel the material prepared you for the DAT?

- ____(28) The Math Module prepared me for the DAT
- ____(29) The Chemistry Module prepared me for the DAT
- ____(30) The Organic Chemistry Module prepared me for the DAT
- ____(31) The Biology Module prepared me for the DAT
- ____(32) The CE Webinar prepared me for the DAT
- ____(33) The TEST Taking Strategies prepared me for the DAT.

6. Please provide short answers to the following questions.
- (34) Tell us how you originally were notified or found out about the *Admissions Enhancement Program*.
- (35) What qualities does a student need to be successful in the *Admissions Enhancement Program*?
- (36) What are two of the most positive aspects of the *Admissions Enhancement Program*?
- (37) What are two of the most negative aspects of the *Admissions Enhancement Program*?
- (38) Did your expectations and opinions of the program change over the semester? If so, what do you think most changed your opinion?
- (39) How well do you believe you achieved the objectives of the program?
- (40) When you were studying for your on-line course work and needed help, how did you get it?
- (41) If you could, what changes would you make to the *Admissions Enhancement Program*?
- (42) Did using the Blackboard and Modules in an on-line course format have an impact upon your opinion of this program, if any?
- (43) Have you or will you be applying to the UMKC School of Dentistry?
- (44) What plans do you have for using the information gained in this program for your career?

- (45) Would you PAY for the AEP course? If yes, how much would you be willing to pay given all the course materials you were exposed to?
- a. \$1000
 - b. \$1500
 - c. \$2000
 - d. \$2500

Census Data:

- (46) What is your current age?
- (47) What is your gender?
- a. Male
 - b. Female
- (48) What is your race?
- a. American Indian & Alaska Native
 - b. Asian
 - c. Black or African American
 - d. Native Hawaiian & Other Pacific Islander.
 - e. White
 - f. American Indian & Alaska Native & White
 - g. Asian & White
 - h. American Indian & Alaskan Native & Black or African American.
- (49) What is your ethnicity
- a. Hispanic or Latino
 - b. Not Hispanic or Latino

Thank you for completing the evaluation! 😊

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Vita

Carrie L. Carter-Hanson was born April 30, 1962 in Tulsa, Oklahoma. She attended public school in several states including Gilroy, California; Chatham, New Jersey; Houston, Texas; and Bonita, California. She graduated from Bonita Vista High School in 1980. She attended Northern Arizona University (NAU) in Flagstaff, Arizona and graduated in 1985 with a bachelor of science in dental hygiene.

Carrie worked in private practice and in public health for the state of Arizona for several years before returning to school to obtain her master's degree in 1988. While going to school she began teaching part-time in the division of dental hygiene at NAU. She graduated from Northern Arizona University with a Master of Arts in Education, Counseling and Human Relations in 1992. She was then offered a full time tenure track appointment at the University of Missouri-Kanas City (UMKC), School of Dentistry as an Assistant Professor. She continued that appointment teaching in clinic and community dentistry in the classroom until 1997. At that time she returned to private practice for 6 years. In 2004, she was asked to return to UMKC as a full time clinical instructor. Since that time she has served in many roles and capacities at the university.

In 2012 she was named the Director of the Admission Enhancement Program. Recently she was named Director of Continuing Education for the School of Dentistry. Currently, she also coordinates two online courses for dental hygienists who desire to enter the public health safety net and serve patients who have limited or no access to appropriate oral health care. Additionally, she teaches nutrition to senior dental hygiene students and provides clinical instruction one day per week to junior dental hygiene students.