2020

An Analysis of One Medical School's Student Mentoring Practices

Soraya Smith
University of Central Florida

AN ANALYSIS OF ONE MEDICAL SCHOOL'S STUDENT MENTORING PRACTICES

by

SORAYA SMITH
B.A. University of Central Florida, 1997
M.B.A. University of Central Florida, 2003

A dissertation submitted in partial fulfillment of the requirements
for the degree of Doctor of Education in Educational Leadership
in the Department of Educational Leadership and Higher Education
in the College of Community Innovation and Education
at the University of Central Florida
Orlando, Florida

Summer Term
2020

Major Professor: Thomas Vitale

ABSTRACT

Mentoring for medical students has been shown to be beneficial for mentees and mentors, aiding in career development, improved academics, and personal benefits like reducing burnout. The provision of mentoring is also an accreditation standard for all allopathic medical schools in the United States. This study examined a mentoring program in one urban medical school during the 2019-2020 academic year. The purpose of this study was to determine participant perceptions of their mentoring experiences and alignment with the qualities of the career and academic advising and mentoring standards identified by the literature, looking specifically at *programmatic structure*, *oversight*, *integration into the medical education curriculum*, *guided matching process* and *training* (Tan, Teo, Pei, Sng, Yap, Toh, & Krishna, 2018). Utilizing a 26-item questionnaire sent to 1,097 students and 39 faculty mentors, perceptions of the mentoring experience were measured. Responses were analyzed using descriptive statistics and an independent samples t-test to compare means between groups. With a response rate of 27.73%, data indicated participants found the closest alignment to the construct of *training* within this institution. Findings indicated no statistically significant differences in means between students and alumni. Between mentors and students, mentors were found to have a statistically significant higher mean in *programmatic structure* and *training* constructs. For mentors and alumni, mentors were found to have a statistically significant higher mean in the area of *training*.

Mentoring programs need to be aligned with mentoring standards that promote the most effective mentor-mentee relationship. However, with an emergence of a new generation of medical students with more distinct needs, future research is necessary to determine characteristics of successful mentors and determining how to assign students to mentors for

effective mentoring. Identifying disconnects between a mentor program and mentoring best practices could assist in improving mentoring outcomes and satisfaction.

Keywords: Mentor, Mentoring, Advising, Medical Students

ACKNOWLEDGMENTS

Never in my wildest dreams did I think I would one day be completing a dissertation. There are so many people I need to thank because I have truly never felt so supported in a journey as much as I did while in this program. First and foremost, my family – from my father who continually pestered me to apply for a doctoral program, to my mother who kept feeding me while I was writing, to my sister who helped read my drafts and to my daughter, Mia, who kept me going when I was tired. You will never know how much I love and appreciate all of you.

I would like to thank my dissertation committee who gave willingly of their time and expertise to ensure my success. To my chair, Dr. Thomas Vitale, your support, feedback, and snacks during long meetings were very much appreciated. To Dr. Lee Baldwin, your quiet manner and your expert knowledge of statistics and research was incredibly helpful. Dr. William Gordon, your insight and willingness to help will always be appreciated. And finally, I need to thank my boss and friend, Dr. Marcy Verduin. She has always believed in me and her dedication and willingness to help and her support will never be forgotten.

To all the medical students and faculty who participated in this study and gave me such encouraging words of support, I am forever grateful for the time you gave to participate and help me with this study. Thank you!

A great big thank you needs to be said to all my friends and coworkers who believed in me and supported me through this journey. They say a dissertation topic is never interesting to anybody but the author, but my friends listened patiently as I described my study and helped me through times of self-doubt or just pure exhaustion.

And finally, to my cohort, especially my support group. I am honored to have been part of this group of students who were dedicated, compassionate, and always made me feel like part of the team. I know I could not have done this without you.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

AAMC	Association of American Medical Colleges
AMA	American Medical Association
CiM	Careers in Medicine
GQ	Medical School Graduation Questionnaire
LCME	Liaison Committee on Medical Education
M1	Medical Student (First Year)
M2	Medical Student (Second Year)
M3	Medical Student (Third Year)
M4	Medical Student (Fourth Year)

CHAPTER ONE – INTRODUCTION

Background of the Study

According to the Association of American Medical Colleges (AAMC), the not-for-profit organization that serves and leads the academic medicine community in the United States, many US medical schools organize their curriculum in a similar fashion, dividing it into pre-clinical and clinical components (Association of American Medical Colleges, n.d.). In a traditional four-year curriculum, the pre-clinical portion involves two years of science and basic medical concepts, and the clinical portion consists of rotations where medical students receive instruction and hands-on patient care in major specialties (Association of American Medical Colleges, n.d.). All medical schools that share a common goal of preparing students for residency training and ultimately practicing medicine are required to adhere to national accreditation standards set by the Liaison Committee on Medical Education (LCME) (Association of American Medical Colleges, 2018).

One accreditation standard set for all medical schools involves the mentoring of medical students. The LCME calls for medical schools to "...provide effective academic support and career advising to all medical students to assist them in achieving their career goals and the school's medical education program objectives" (Association of American Medical Colleges, 2018, p. 18). To meet this standard, medical schools usually have some form of a mentoring program to provide students support and guidance during their undergraduate medical education (Fornari, Murray, Menzin, Woo, Clifton, Lombardi & Shelov, 2014). Mentors in medical school can be both a source of professional guidance and support for students navigating the medical school curriculum. The Medical School Graduation Questionnaire (GQ), a national survey

administered annually by the AAMC to all medical school fourth year students, includes items related to mentoring and advising. According to the 2019 *All Schools Summary Report,* 47.4% of student respondents (N= 15,653) from all allopathic schools in the United States reported mentoring as being particularly useful in career choice and planning (Association of American Medical Colleges, 2019). However, only 44.3% of student respondents reported being very satisfied with faculty mentoring they received (N = 14,990) (Association of American Medical Colleges, 2019).

Because mentoring programs vary among medical schools, it is difficult to measure and achieve consistent mentoring outcomes (Tan, Teo, Pei, Sng, Yap, Toh & Krishna, 2018). Some programs are longitudinal, others focus solely on the clinical years of training. In addition, mentoring is usually combined with other practices such as preceptorship or supervision, making it more difficult to evaluate (Sng, Pei, Toh, Peh, Neo & Krishna, 2017). A more thorough understanding of mentoring relationships is crucial to their effective development and oversight (Sng et al., 2017). Selecting and training mentors varies widely across medical schools, as does program structure, ranging from formal to informal (Fornari et al., 2014). Additionally, few mentoring programs evaluate their effectiveness past mentee satisfaction, and even fewer evaluate other mentoring program factors, such as cost (Nimmons, Ginny & Rosenthal, 2019).

Additionally, today's medical student is different than those that came before. According to the 2018 Matriculating Student Questionnaire released by the AAMC, 83.7% of matriculating medical students (N=15,447) in 2018 were between the ages of 20 – 25 years old (AAMC, 2018). This age range is known as millennials. Millennials are those born between 1980 and 2000 who comprise about 25% of today's workforce and will account for 40 – 70% of the workforce between 2020 and 2025 (Waljee, Chopra & Saint, 2018). The millennial generation is

characterized as struggling with conflict resolution and looking for specific direction and feedback in the workplace (Lourenco & Cronan, 2017). They seek and value mentoring, as it is an avenue for providing frequent feedback in a way that is real-time (Lourenco & Cronan, 2017). Medical students of the millennial generation need help navigating a modern learning landscape and are more comfortable expecting support when facing challenges rather than solving problems solely on their own (Roberts, Newman & Schwartzstein, 2012). Students of this generation are also more anxious when exposed to new learning situations, resulting in a preference for a more structured learning environment (Roberts et al., 2012). The literature herein supported the need to investigate perceptions of mentoring practices with the intent of improving services to medical students. The determinations found in this study could assist medical schools in assigning mentors for more successful mentoring relationships, as well as assisting faculty in developing effective advising skills as well as assisting students in developing a readiness and ability to be mentored.

Problem Statement

With an emergence of a new generation of medical students with more distinct needs, the mentoring program for both participants – mentors and medical students (mentees) – needs to be aligned with mentoring standards that promote the most effective mentor-mentee relationship. Identifying large gaps between specific mentor program characteristics and mentoring standards could assist in improving mentoring outcomes. As previously stated, the Liaison Committee on Medical Education (LCME) requires that medical schools "...provide effective academic support and career advising to all medical students to assist them in achieving their career goals and the school's medical education program objectives (LCME, 2018, p. 18)." Therefore, the problem

studied was the lack of accepted standards regarding mentoring for medical students and exploring best practices following a combined mentoring framework of Tan and colleagues regarding mentoring of medical students based on flexibility and structure (Tan et al., 2018), and current insights into medical student mentoring provided by Nimmons and colleagues (Nimmons et al., 2019).

Purpose of the Study

The purpose of this study was to determine participant perceptions of their mentoring experiences and alignment with the qualities of the career and academic advising and mentoring standards identified by the literature.

Definition of Terms

According to the Association of American Medical Colleges (AAMC), many medical schools in the United States organize training into pre-clinical and clinical phases (Association of American Medical Colleges, 2018). The pre-clinical phase typically contains two years of basic science training followed by two years of clinical rotations, where medical students receive hands-on training with patients in specialties such as surgery, obstetrics and gynecology, and family medicine (Association of American Medical Colleges, 2018). This curriculum varies among medical schools.

Allopathic Schools

According to the American Academy of Family Physicians (AAFP), allopathic schools confer an MD (medical doctor) degree on their graduates (AAFP, n.d.). Traditionally, training

consists of two years of basic science courses followed by two years of clinical rotations (AAFP, n.d.) for a total of four years.

Mentor

A mentor can be defined as someone who is in an active, ongoing relationship with a mentee to help maximize his or her potential and to reach personal and professional goals (Frei, Stamm & Buddeberg-Fischer, 2010). In this relationship, the mentor provides time, support, and encouragement to a mentee (Kuhn, Gordon & Webber, 2006). This definition was utilized by the Association of American Medical Colleges (AAMC) for their *Careers in Medicine* program. For the purposes of this study, the term mentor and advisor were used interchangeably.

Mentoring

There are several definitions of mentoring, but many share a common theme: it involves communication and is based on a relationship (Gisbert, 2017). For the purposes of this study, mentoring was defined as a dynamic, mutually beneficial relationship between an experienced clinician and undergraduate medical student focused upon advancing the development of the mentee (Sheri, Too, Chuah, Toh, Mason & Krishna, 2019).

Millennials

For the purposes of this study, millennials were defined as individuals who are entering medicine today and were born between 1980 and 2000 (Waljee et al., 2018).

Conceptual Framework

The conceptual framework addressed the overarching best practices for effective mentoring. The work of Tan and colleagues in 2018 described two overall components of an effective mentoring framework – flexibility and structure. With flexibility, the mentor meets the changing and specific needs of mentees (Tan et al., 2018). As the relationship evolves, mentoring also needs to evolve within the accepted structure set by the organization (Tan et al., 2018). With this structure in place, the mentoring process is consistent for all mentees, ensuring compliance with best practices (Tan et al., 2018). Utilizing these two concepts of structure and flexibility as a foundation, Tan and colleagues developed a mentoring framework to provide a consistent approach to mentoring and to aid in effectiveness. Their five framework components, referred to as pillars, include: *programmatic structure*, *oversight*, *integrating mentoring with existing curricula*, *employing a guided matching process*, and *recommendations for mentor and mentee training* (Tan et al., 2018).

Programmatic structure refers to the mentoring program having clear goals and a focus for what the mentoring program will achieve as determined by the school (Tan et al., 2018). There need to be clear expectations and mentors should have access to tools and resources necessary to perform their roles (Nimmons et al., 2019). Oversight is an important component of the framework, as it involves setting the culture for the program (Tan et al., 2018). The school has the task of developing the responsibilities of mentors and mentees, and providing methods to evaluate mentoring, both from the mentor and mentee perspective (Tan et al., 2018). The evaluation of the mentoring program helps ensure adjustments are made as needed or when problems are encountered (Newby & Heide, 2013). Mentoring programs need to be integrated into the existing medical education curriculum as well (Tan et al, 2018). The medical student

curriculum is on a continuum, and the content and reasons for mentoring should change as well, especially for the meaning of the mentoring relationship to grow (Dobie et al., 2010). A guided matching process should also be utilized (Tan et al., 2018), where matches between mentors and mentees are done thoughtfully instead of randomly. Having a guided matching process helps to ensure that all needs and experiences are optimally matched between a mentor and mentee (Newby & Heide, 2013). Mentors and mentees should be provided training to enhance the effectiveness of mentors as well as to allow mentees to know how to act within the parameters of the relationship (Sheri et al., 2019).

This framework was chosen because of its more recent article reviews and because the focus was on novice mentoring, which Tan and colleagues defined as a mutually beneficial relationship that involves an experienced clinician and an undergraduate medical student (Tan et al., 2018), which was the focus of this study.

Research Questions

These research questions were selected to ensure that mentoring practices at the target school for this research aligned with standards recommended in the literature and to continually improve mentoring experiences for both medical students and mentors.

Research Question One: To what extent do the perceptions of mentoring practices by students and mentors align with practice standards recommended by the literature?

Research Question Two: How do the perceptions of mentoring align between medical students or alumni and mentors?

a. How do the perceptions of mentoring align between first year students and mentors?

b. How do the perceptions of mentoring align between second year students and mentors?

c. How do the perceptions of mentoring align between third year students and mentors?

d. How do the perceptions of mentoring align between fourth year students and mentors?

e. How do the perceptions of mentoring differ between alumni and enrolled students?

Limitations

Medical schools in the United States, although similar in certain respects, vary in terms of mentoring programs so applicability to other medical schools is limited. The medical education curriculum is also different than other educational programs and may not be applicable to students outside of this designation. Additionally, the study collected data from a single institution and was conducted over one academic year timeframe and not longitudinally. Limitations for this study also include that the population is small, consisting of participants from one medical school.

Delimitations

Delimitations for this dissertation included collecting data only from the medical school program students, faculty mentors, and alumni.

Assumptions

The assumptions for this dissertation were that those who completed the survey answered the questions honestly based on confidentiality. Other assumptions included that those who completed the survey understood the questions and that the interpretation of the data were an accurate reflection of their experiences. Participants were all present students, graduates, or mentors of the same medical college.

Organization of the Study

Mentoring is an important component of the medical education process. It has been shown to promote success in practice, help in choosing a career, and enhance research productivity (Park, Adamiak, Jenkins & Myhre, 2016). Advising and mentoring have been found to be influential on a student's specialty choice (Careers in Medicine, 2019). Students who are mentored have a greater sense of wellbeing and a higher satisfaction with their education compared to students who are not mentored (Park et al., 2016).

The goal of this study was to investigate perceptions of mentoring practices with the intent of improving services to students. Mentors in medical school can be either a source of acclimation into medicine in general or a specific specialty (Careers in Medicine, 2019). The determinations found in this study could assist medical schools in both assigning successful mentoring relationships, as well as assisting faculty in developing these advising qualities and assisting students in their readiness to be mentored. Matches should be implemented in a way that provide the highest chances of success for the mentoring relationship (Nimmons et al., 2019). Practical implications could be determined regarding developing methods on how to best assign mentors or determining characteristics of effective mentors. However, limitations on this study would have to be considered, as well as suggestions for the generalizability of the study.

This dissertation is organized into five chapters. Chapter One includes the background of the study, problem statement, purpose statement, definition of terms, conceptual framework, research questions, limitations, delimitations, and assumptions. Chapter Two is a literature review, which includes an overview of medical education, an overview of mentoring in general, and mentoring in medical education. It also includes a description of the millennial generation and ends with an in-depth discussion of the conceptual framework. Chapter Three describes the

methodology, including a description of participants, instrumentation, data collection and data analysis. Chapter Four presents the results for the research questions. And finally, Chapter Five provides a summary of the study, discussion of the findings, implications for practice, and recommendations for future research. Limitations on this study are discussed as well.

CHAPTER TWO – LITERATURE REVIEW

Characteristics of a mentoring program that is established for both mentors and medical students (mentees) need to be aligned with those standards that promote the most effective mentor-mentee relationship. Identifying potential disconnects between a specific mentor program and mentoring standards could assist medical schools in improving mentoring outcomes. The purpose of this study was to determine participant perceptions of their mentoring experiences and the alignment with the qualities of career and academic advising and mentoring standards identified by the literature, following primarily Tan and colleagues' framework for mentoring of medical students (Tan et al., 2018). The perception of mentoring experiences was assessed for medical students and mentors at an urban school of medicine, including current students, as well as graduates of the previous seven classes.

This literature review is divided into a brief overview of the medical education process in the United States, an overview of mentoring in general, an overview of mentoring in medical education, and a description of the millennial generation, as this is the predominant generation of medical students at this school of medicine. The final section of the literature review focuses on the conceptual framework utilized in the study. The brief overview of medical education provides a quick glance at the history of how medical education has been structured in the United States and the current medical education process. The mentoring section provides an overview of mentoring, particularly how it has been developed and utilized in the business field. The mentoring in medical education section focuses on nuances within mentoring that appear in academic medicine, specifically mentoring in undergraduate medical education. The focus is on current literature regarding mentoring and medical education and issues surrounding the

provision of effective mentoring. Next, the section on millennials discusses the specific mentoring needs of this generation. Finally, the conceptual framework section delves into a description of mentoring best practices. Besides some limited seminal research articles, the bulk of the literature review is comprised of articles from 2009 through 2019.

Overview of Medical Education

In the early 1900s, changes were being made to the way medical education occurred in the United States. Prior to the twentieth century, medical education in the United States was very heterogenous (DeZee, Artino, Elnicki, Hemmer, & Durning, 2012). Up through the middle of the 19th century, the predominant form of medical education in the United States was an extended apprenticeship (Custer & ten Cate, 2018). To become a physician during that time, students utilized one of three systems – an apprenticeship, proprietary schools where the faculty were those physicians who owned the medical college, or a university system (Halperin, Perman & Wilson, 2010). According to the American Medical Association (AMA), there were 25,171 medical students in 1900, with over 90% of them being enrolled in allopathic schools (granting M.D. degrees) that were either proprietary or university based (Barzansky, 2010). These schools taught a range of treatment options, while the remaining types of medical schools focused on a specific theory of medicine, such as homeopathy or physiomedical (Barzansky, 2010). Medical students were taught via lectures and by observing experienced physicians (Ryan, 2015). Between 1830 and 1845, the number of medical schools in the United States had doubled, and, at that time, the typical length of medical school to obtain a degree (and a license, as schools had the authority to grant those as well) was sixteen weeks (Eaglen, 2017). Admission requirements varied widely amongst medical schools, with some requiring only completion of high school and

others requiring two or more years of college (Barzansky, 2010). By the end of the 19th century, most medical schools were only two years in length (Custer & ten Cate, 2018). With these short courses of study and simpler graduation requirements, the public and medical societies began growing more concerned about the quality of medical education in the United States (Eaglen, 2017). In 1844, the Medical Society of the State of New York presented three resolutions – that four-month courses were too short to learn medicine, the standards of education for granting diplomas was too low, and that allowing faculty to also grant licenses opened the door for abuses of power (Eaglen, 2017). However, as it would be difficult for one state to change the course of medical education, it would take a national organization to help solve the problems of medical education and speak on behalf of the profession (Eaglen, 2017).

In 1847 the American Medical Association (AMA) was formed to improve the quality of medical education and created the Committee on Medical Education to specifically look at how medical schools were structured (Eaglen, 2017). In 1876, the American Medical Colleges Association was formed (eventually changing its name to the Association of American Medical Colleges by 1891) (Eaglen, 2017). Both organizations would help develop accreditation standards for how medical education was to be delivered in the United States.

William Osler

During this same period, there were two men who left a lasting imprint on the delivery of medical education in the United States. The first was William Osler, a Canadian trained physician, who moved to America in 1884 to teach at America's oldest and largest medical school, the University of Pennsylvania (Bliss, 1999). Prior to that, he had established himself as a prominent researcher and medical educator in Montreal, well-loved by his students (Bliss,

1999). He was an educational reformer and actively involved in making Montreal's McGill Faculty of Medicine one of the most progressive in North America (Bliss, 1999). In 1889, he was appointed as a professor of medicine at the then newly established John Hopkins University School of Medicine (Ryan, 2015). John Hopkins was considered "…the most important medical facility in North America in the 1890s" (Bliss, 1999, p. 831). In 1892 he published *The Principles and Practice of Medicine*, a medical textbook that became an international success with new editions published every few years, even after Osler's death (Leach & Coleman, 2019).

Osler proposed that students learn at the patient's bedside, where experienced physicians could mentor students and demonstrate proper techniques (Ryan, 2015). At Johns Hopkins, Osler instituted the clinical clerkship, where students were not just observers, they were taught to do things at the bedside, marking the incorporation of students into hospitals and the medical field as beginning professionals (Bliss, 1999). Although the clinical apprenticeship model was not a new pedagogy, it was still relatively new in the United States at the time (Leach & Coleman, 2019). Osler believed that by teaching at the bedside he would be able to better assess students as they worked with patients, and this student- and patient-centered approach helped in making him an immensely popular teacher (Ryan, 2015). He was described as "…supportive and approachable for his students, and his commitment and undeniable interest in teaching was an example for all he worked with" (Leach & Coleman, 2019, p. 644). Osler found this method of teaching to be one that encouraged professionalism and communication for medical students (Leach & Coleman, 2019). His belief and insistence that students engage in hands-on learning to treat patients and for putting patient care at the center of medicine is still relevant today (Bliss, 1999).

Abraham Flexner

In 1908, Henry Pritchett, president of the Carnegie Foundation for the Advancement of Teaching, authorized and funded a study of schools of medicine and law (Barzansky, 2010). At that time, the improvement of American health care was the chief philanthropic concern of the Carnegie Foundation (Duffy, 2011). Abraham Flexner believed that the Osler-influenced Johns Hopkins University was the model for medical education (DeZee et al., 2012). Pritchett hired Abraham Flexner to complete this report because Pritchett wanted an educator (which Flexner was) instead of a medical practitioner (Barzansky, 2010). Pritchett felt the problem of medical schools was a problem of education and felt a professional educator would be better suited to the task (Duffy, 2011). Flexner had garnered the attention of Pritchett with the success of his own school, specializing in small classes meant to assist students in getting into the best colleges and universities (Halperin et al., 2010). Flexner's educational philosophy was that students learned best by doing and solving problems, rather than just rote memorization, which was commonplace in his day (Duffy, 2011).

Flexner's report was finalized in June 1910 (Barzansky, 2010). His report had two sections – the first being a summary of suggested expectations (including curriculum, resources, and finances) for medical schools and the second being a survey of each of the current medical schools (Barzansky, 2010; Halperin et al., 2010). Flexner felt medical school applicants should have studied biology, chemistry, and physics before being admitted to medical school, and that medical students should have access to hospitals where they could participate in patient care under supervision (Barzansky, 2010). He believed medical education should utilize multiple pedagogies, such as bedside teaching, as well as clinical and laboratory experiences, and that students should be trained in the use of literature to enhance knowledge (Halperin et al., 2010).

While the American Medical Association (AMA) and Association of American Medical Colleges (AAMC) already had standards set and changes in place in line with what Flexner was proposing before the report was published, Flexner was able to articulate what changes were needed in medical education and provided an impetus to centralize support for reform to occur (Barzansky, 2010; Halperin et al., 2010). The Carnegie Foundation felt that criticisms of the report would be less antagonistic if they were aimed at a non-physician like Flexner as well (Duffy, 2011).

After the publication of Flexner's report, many non-University affiliated and private medical schools closed and the nationwide implementation of two-years of basic science, followed by two-years of a clinical medicine curriculum was integrated (DeZee et al., 2012). In 1912, the Federation of State Medical Boards was formed and agreed to base their accreditation policies on the academic standards set by the AMA's Council on Medical Education (Halperin et al., 2010). This led to more centralized decision making through the AMA and AAMC on medical education standards. After the end of World War, I, internships (supervised patient care following medical school) were developed and became the common standard (DeZee et al., 2012). Internships further grew in the 1930s and 1940s with hospital-based residencies that led to medical specializations (DeZee et al., 2012). In 1942, the Liaison Committee on Medical Education (LCME) was formed as a joint effort between the AMA and the AAMC and a way to oversee educational standards for medical schools in the United States (Eaglen, 2017). By 1975, the rate of medical school graduates was stable at approximately 15,000 annually and would remain that way until the end of the century (DeZee et al., 2012).

Medical Education Today

Currently in the United States, admission into medical school typically requires a bachelor's degree which can be in any major (Mowery, 2015). However most medical schools require prerequisite classes in such areas as biology, inorganic and organic chemistry, mathematics, and physics (Mowery, 2015). Students are also required to take and pass the Medical College Admission Test (MCAT), an all-day examination that tests students' knowledge of biology, chemistry, physics as well as social sciences (Mowery, 2015). This standardized exam is utilized by nearly all medical schools as a factor for admission (DeZee et al., 2012).

Most medical schools in the United States today still have a four-year curriculum divided into two years of basic sciences followed by two years of clinical clerkships (Mowery, 2015). Medical schools usually include in their curricula interaction with patients during the first two years, along with teachings on effective communication, humanism, and professionalism within the patient-doctor relationship (Mowery, 2015). The first two years are usually lecture and case-based learning, along with laboratory experiences (DeZee et al., 2012). In the third year, most medical students complete required core clinical clerkships in areas such as Internal Medicine, Surgery, Pediatrics and Psychiatry (Mowery, 2015). These clerkships consist of medical students working closely with resident physicians and an attending physician in a patient care setting (Mowery, 2015; DeZee et al., 2012).

During the fourth year, students take additional clinical clerkships, but they now have more flexibility in what clerkships to complete, allowing them more experience in the field in which they ultimately want to specialize (Mowery, 2015). At the same time, fourth year medical students apply for graduate medical education via a national matching program (DeZee et al., 2012). Upon graduating and receiving their medical degree, medical students typically spend

between three to seven years (depending on the specialty) in residency training to become board eligible (DeZee et al., 2012).

Flexner and Osler's beliefs that students learn more through doing and being involved with senior physicians persists today. Flexner called for a focus on cognitive and technical expertise abut also wanted educators to support the professional formation of students (Rabow, Remen, Parmelee & Inui, 2010). A theme throughout Flexner's report was how faculty role modeling and providing mentoring to students were integral factors in the professional development of students as physicians (Rabow et al., 2010).

This call for mentoring can still be seen in current medical school standards. The Liaison Committee on Medical Education requires medical schools to "...provide effective academic support and career advising to all medical students to assist them in achieving their career goals and the school's medical education program objectives" (LCME, 2018, p. 18). The Association of American Medical Colleges (AAMC) has developed a program – Careers in Medicine – centered on mentoring and preparing students for residency (Careers in Medicine, 2019). Determining what specialty to apply in and how to apply to residency programs is a major focus for medical students, and the Careers in Medicine *Career Planning Checklist* suggests that during their four years, students should meet with and seek out mentor advice at least nine times (Careers in Medicine, 2019a). Utilizing a mentor to navigate and grow within the medical profession is not unique to the field of medicine. Formal youth mentoring programs have been around since the late 19th and early 20th centuries where social movements utilized volunteers who wanted to assist disadvantaged youth (Eby, Allen, Hoffman, Baranik, Sauer, Baldwin, Morrison, Kinkade, Maher, Curtis & Evans, 2013). Mentoring in the college setting has been

shown to positively impact personal and educational outcomes (Eby et al., 2013). Mentoring has been applied in the business and education realms and is discussed further below.

Overview of Mentoring

To better understand the process of mentoring overall, a search was conducted utilizing ERIC and Business Source Premier with the search term "mentor*." Articles describing the mentoring process (both formal and informal) in the business arena were utilized. Mentoring is typically described as a relationship between two individuals, a mentor and mentee (Fornari et al., 2014). In the mentoring process "…an experienced, highly regarded, empathic person (the mentor) guides another usually younger individual (the mentee) in the development and re-examination of their own ideas, learning, and personal or professional development (Taherian & Shekarchikan, 2008, p. e95)."

Three different areas of mentoring scholarship exist – youth, academic and workplace (Eby et al., 2013). This study is concerned with mentoring in the academic and workplace arenas, as medical students undergo the academic side of medical school but are also preparing for a career in the specialty of their choice and as professionals. Adolescent and adult mentoring is often traced to Daniel Levinson's 1978 study on the lives of 40 adult men, identifying mentoring as a developmental milestone (Eby et al., 2013). Levinson believed that relationships outside one's family have a huge impact on human development, and that mentoring relationships could be utilized to help students integrate into the university and then in the workplace arena, combatting feelings of loneliness and family separation (Eby et al., 2013). Building on Levinson's study, the next seminal piece of research on workplace mentoring was completed by Kram in 1983, discussed further below (Allen, Eby, Chao & Bauer, 2017). Kram

described the phases of mentoring, in what is now referred to as informal mentoring (Allen et al., 2017).

A longitudinal study of 18 pairs of mentors/mentees conducted by Kram in 1983 led to the development of four phases of the mentoring relationship widely used today – initiation, cultivation, separation, and redefinition (Kram, 1983). Through initiation, there are increasingly positive expectations of what the mentoring relationship can produce, for example promotion opportunities for a mentee in the workplace (Kram, 1983). In this phase the mentee needs support and guidance and the mentor is the one with the potential to meet those needs (Newby & Heide, 2013). It is in this stage that the mentor and mentee get to know each other and develop goals for the relationship (Jones, 2013). It is also during this phase that both parties learn their respective roles, the potential boundaries for those roles, and the process for working within the relationship (Newby & Heide, 2013). This is also the time to address any fears and/or concerns with the relationship (Newby & Heide, 2013).

In the phases of cultivation and separation, the mentoring relationship begins to take shape and boundaries are defined (Kram, 1983). The cultivation phase begins with the mentor providing guidance, but by the end of this phase this changes more to just observation and feedback (Newby & Heide, 2013). With cultivation, the mentee's goals are clarified, and the mentor works to support those goals (Jones, 2013). The separation phase begins when the mentee gains increased confidence and independence (Newby & Heide, 2013). It is at this point that mentees begin to trust in their own abilities, and this culminates with the redefinition phase, where mentees no longer need the guidance of the mentor (Kram, 1983). It is at this point where the mentor challenges the mentee to become more autonomous (Jones, 2013). This is when the

mentee and mentor relationship is redrawn, where the mentee may have learned things that will take them down different paths than that of the mentor (Newby & Heide, 2013).

In the workplace, mentoring can assist with both the personal and professional development of a mentee (Eby et al., 2013). An individual who is entering the world of adulthood and work encounters different tasks as it relates to developing a sense of career and self (Kram, 1983). For example, it is through mentoring that mentees become oriented to the organization and to the profession (Eby et al., 2013). A mentor helps in supporting and counseling during this time, providing career and psychosocial support to a less experienced mentee (Kram, 1983; Menges, 2016). Mentoring helps mentees become socialized within the profession and achieve higher commitment to the organization, increased job satisfaction and more personal learning (Chun, Sosik & Yun, 2012). Mentors can help their proteges achieve a wide array of goals, such as personal or professional development, research, or academic development (Nimmons et al., 2019). They can be a source of career support, psychosocial support, or role modelling (Chun et al., 2012). They can be utilized to provide guidance, give advice, help with professional development, or help achieve a work-life balance (Henry-Noel, Bishop, Gwede, Petkova, & Szumacher, 2018). In providing both career support and personal support, mentors can help their mentees deal with concerns about themselves or their career by providing opportunities to learn ways to deal with personal or professional dilemmas (Allen et al., 2017). This overall description of mentoring can also be applied to mentoring in the medical education realm, as described below.

Mentoring in Medical Education

This portion of the literature review was conducted with the assistance of a research librarian. The following databases were utilized – ERIC, PubMed, CINAHL, and Science Direct. Search terms used were "mentor" AND "medical student" OR "medical school" OR "medical education" OR "undergraduate medical training."

The Association of American Medical Colleges (AAMC) *Careers in Medicine* program defines advising and mentoring as a process for assisting students in the clarification of life and career goals and the development of an educational plan to achieve these goals (Careers in Medicine, 2019). Goals of mentoring in medical schools vary but have been found to focus mainly on professional/career development, academic success, networking, or faculty retention (in the case of junior faculty being mentored) (Kashiwagi, Varkey & Cook, 2013). The advisor or mentor is concerned with the growth of the student in meeting their objectives (whether it be personal, academic, or career) (Careers in Medicine, 2019), mainly in applying for and beginning a residency program in their intended specialty. As previously stated, there are many definitions of mentoring. Descriptions such as coaching, advising or tutoring have been used interchangeably with mentoring, and mentoring can be considered to incorporate all these roles to some degree, but with a more complex and developed relationship (Geraci & Thigpen, 2017).

Types of Mentoring

Several methods of mentoring have been identified in the literature – including dyadic, multiple and team (Henry-Noel et al., 2018). The traditional dyad (one-on-one) model has been found to be the most common mentoring model, with the second most common being a combination of dyad and group (team) (Farkas, Allenbaugh, Bonifacino, Turner & Corbelli,

2019). The dyad model is effective as it establishes a strong relationship between the mentor and mentee (Asukaa, Halarib, & Halaric, 2016). Many times, the mentoring relationship is one between an experienced mentor and inexperienced mentee, however, group mentoring exists where a small group of mentees are mentored by an experienced mentor as well as each other (Wilson, Jacques, Fiddes & Palermo, 2013). A similar type of group mentoring is described as tiered, where there is a combination of faculty members, residents, and senior medical students that mentor junior medical students (Farkas et al., 2019). Tiered mentoring is built to provide mentoring across different positions, so that while residents provide mentoring to students for example, they are also being mentored themselves by faculty (Farkas et al., 2019). Peer mentoring is another form of mentoring, where a group of students share experiences and learn from each other (Wilson et al., 2013). Some medical schools institute a combination of dyad and group mentoring, where faculty members meet with a group of mentees for mentoring but also provide individualized sessions (Farkas et al., 2019). Finally, although mentoring is predominantly a face-to-face experience, it can utilize multiple communication methods, including email or online methods (Wilson et al., 2013). Online methods are utilized in distance or online mentoring, particularly for smaller institutions that have campuses separated from each other and need to obtain mentoring expertise that is not locally available at their home organization (Geraci & Thigpen, 2017).

Within each of these, the mentoring relationship can be formal or informal and is dynamic, evolving over time (Frei et al., 2010). Informal mentoring can be described as the self-selection between mentors and mentees (Henry-Noel et al., 2018). Mentors are usually sought out and selected by the mentee in informal mentoring (Geraci & Thigpen, 2017). This type of mentoring is flexible, absent of formal training and with undetermined goals and outcomes

(Henry-Noel et al., 2018). Informal mentoring does not have a specific time frame and the mentor and mentee decide the goals they want to accomplish (Menges, 2016). Informal mentoring is more focused on the needs of the mentee (Geraci & Thigpen, 2017). This type of mentoring develops spontaneously without involvement from the organization (Menges, 2016).

Where informal mentoring is self-organized, formal mentoring is initiated through the organization that assigns the mentors and then supports the relationship within the program (Menges, 2016). The concept of formal mentoring programs for medical students was not developed until the late 1990s (Frei et al., 2010). Formal mentoring is characterized by a stricter selection and training process, goals and expectations, and responsibilities (Henry-Noel et al., 2018). There can be contracts or other agreements and specific curricula and expectations (Geraci & Thigpen, 2017). Formal mentoring programs are usually developed and funded by the school (Asukaa et al., 2016). There is also the expectation of reports to the institution on the progress and plans of the mentoring relationship (Geraci & Thigpen, 2017). The timing of formal mentoring programs also varies, with most programs establishing mentoring within the first two years of the medical education curriculum, and some programs not implementing formal mentoring until the fourth year (Frei et al., 2010).

Within the mentor and mentee relationship, mentors can utilize different mentoring approaches. A study by Stenfors-Hayes and colleagues of ten mentors of a Swedish medical school found that the way the mentor perceived their role (whether to give advice, share what it means to be a doctor, or to listen and provide reflection) determined how they acted as a mentor as well as their relationship with their mentee (Stenfors-Hayes, Hult & Dahlgren, 2011). For example, a mentor that primarily focused on what it meant to be a doctor would find it more rewarding to witness their mentee's professional development (Stenfors-Hayes et al., 2011).

Mentors could be empowering, where they view the mentoring relationship as a partnership, developing the mentee to their full potential (Meeuwissen, Stalmeijer & Govaerts, 2019). This type of approach calls for a more reflective strategy, where mentors focus on sharing their experiences and their stories or teaching their mentees through personal reflection (Jones, 2013). A checking approach means the faculty mentor focuses more on following rules, making sure the mentee was meeting standards or institution requirements (Meeuwissen et al., 2019). Finally, mentors could take a directing approach where the mentor fulfills more of an authoritative role (Meeuwissen et al., 2019). In this case, mentors tell their mentees things they feel they should know and give them advice, which may not be based on what the mentee requests (Stenfors-Hayes et al., 2011).

Benefits of Mentoring

Mentoring has been shown to be beneficial to mentors and mentees (Nimmons et al., 2019), similar to those benefits found in the business arena such as personal or career counseling. The benefits of mentoring for medical students include such things as career development, improved relationships with faculty members, an improvement in academic performance, as well as personal benefits, such as improved self-esteem and reduced stress (Fornari et al., 2014). Mentees also feel better supported personally and report an overall higher feeling of well-being (Frei et al., 2010). Mentors can help support mentees in coping with stress and achieving an optimal work-life balance (Frei et al., 2010). Medical students with effective mentors have also been shown to be more likely to experience satisfaction as clinicians, and mentoring is viewed as a key factor contributing to a successful career in academic medicine (Gisbert, 2017; Dimitriadis, von der Borch, Stormann, Meinel, Moder, Reincke & Fischer, 2012). In the clinical arena,

mentoring can influence students' specialty choice and help reduce performance issues in patient care (Nimmons et al., 2019). Mentoring also provides a way for students to learn about interacting with colleagues and patients and gain insights into the medical profession (Kalén, Ponzer & Silén, 2012). Professionalism and personal development can also be enhanced by mentoring, with students learning via mentor role-modeling (Nimmons et al., 2019; Fornari et al., 2014).

Students are not the only beneficiaries of the mentor-mentee relationship. Faculty mentors also receive the personal satisfaction of helping students and their students' careers (Fornari et al., 2014). Benefits for mentors include professional development, intellectual stimulation and improvement of communication and teaching skills (Nimmons et al., 2019). Serving in a mentor role can also produce feelings of "…intense satisfaction and a renewed sense of purpose" (Coates, 2012, p. 94). Mentors also experience improved job satisfaction as they see the job "…through new eyes" (Coates, 2012, p. 93). This could lead to self-reflection about their roles as teachers and fortifying their identity and professional recognition (Fornari et al., 2014). Mentors can experience improved job performance, increased commitment to the organization, and improved attitudes that help prevent career plateauing (Chun et al., 2012). Effective mentors could groom future successors for their position, helping their own upward movement (Newby & Heide, 2013).

Medical schools can also benefit from the mentoring process. Through mentoring, there is a strengthened connection between the mentor and the school (Fornari et al., 2014). There is also the possibility of advancements in clinical care or research, as well as an increased commitment to teaching from faculty (Fornari et al., 2014). Mentoring also provides the school with information on issues and concerns students are facing as the flow of information between

faculty and students increases (Dimitriadis et al., 2012). It could also assist with the retention of faculty, as mentoring can help with avoiding premature departure, stagnation, or boredom amongst faculty (Newby & Heide, 2013).

Barriers to Mentoring

Effective mentoring may face challenges if there is a lack of structure or standards (Fornari et al., 2014). This can result in individual stress and role confusion (Taherian & Shekarchian, 2008). Spontaneous formation of mentoring relationships is found to be more effective, but it is more difficult to implement (Schäfer, Pander, Pinilla, Fischer, Von Der Borch & Dimitriadis, 2016). For programs that do not assign mentors to students, students have also faced challenges in finding a mentor (Nimmons et al., 2019). One longitudinal study of mentoring's impact on physician career success found that those physicians who described themselves as being "active, decisive and persistent" were positively correlated to having had a mentor (Stamm & Buddeberg-Fischer, 2011, p. 493). This may mean that medical students who are not as aggressive may have difficulty finding a mentor.

However, randomly assigning mentors to medical students can also lead to disappointing results so the matching process has been found to be important in mentoring programs (Schäfer et al., 2016; Nimmons et al., 2019). A 2013 study compared personal matchmaking for assigning students a mentor versus having students find a mentor online (Schäfer et al., 2016). They found significantly better results for finding a mentor via matchmaking than online mentor searching (97.2% for personal matching versus 80.7%, $p = .001$) (Schäfer et al., 2016).

Over time, mentors can develop considerable personal and private knowledge about their mentees which can lead to problems such as breach of confidentiality or lack of trust in mentors

(Taherian & Shekarchian, 2008). Mentoring relationships that do not function properly can have a negative impact on a mentee's professional development, resulting in self-esteem issues or low levels of satisfaction (Schäfer et al., 2016). Mentees could also feel neglected by their mentor, or feel manipulated by the relationship (Allen et al., 2017).

There is a considerable amount of time that needs to be taken to properly cultivate an effective mentoring relationship (Voetmann & Kendall, 2019). Potential mentors who may have the personality and background to be effective might also be those who have competing demands for their time, and this might impact their desire to mentor (Voetmann & Kendall, 2019). Challenges can also be found if the mentors have not been trained properly in how to be a mentor (Nimmons et al., 2019). Some programs do not provide specific education or training in the mentoring process (Gisbert, 2017). Faculty members in the clinical arena or who do not have a long background in academia could benefit more from mentor training. A mentor's academic rank or experience could have an impact on the mentoring relationship. A study of 135 faculty members conducted at The University of Oklahoma Health Sciences Center (OUHSC) in 2017 by Mickel and colleagues found that how a mentor self-assessed their own competency in areas such as maintaining communication or aligning expectations were higher in faculty with a higher academic rank and a biomedical science background (Mickel, Wiskur, James, VanWagoner, & Williams, 2018). This was believed to occur because a higher academic rank usually meant more experience in academia and/or formal mentoring (Mickel et al., 2018).

Programs also provide barriers to mentoring by their structure and dynamics, affecting the establishment of connections and long-term relationships (Goncalves & Bellodi, 2012). Mentoring needs to be seen and recognized as integral to the school (Gisbert, 2017). The role of the mentor in the program must be clear (Stenfors-Hayes et al., 2011). There is a lack of

academic recognition for mentors as it applies to their faculty annual reviews (Oelschlager, Smith, Tamura, Carline & Dobie, 2011). There are few schools that offer compensation for mentors or that consider mentoring when evaluating faculty for promotion (Fornari et al., 2014). Providing compensation or other incentives would allow mentors to feel more effective in their roles, as well as encourage students to fully utilize mentoring services (Careers in Medicine, 2019).

Mentors report difficulties in finding time to mentor alongside their other responsibilities, for example clinical duties (Goncalves & Bellodi, 2012; Fornari et al., 2014; Nimmons et al., 2019). Mentees find it difficult to meet with mentors in crowded medical school curricula, not wanting to risk taking away time from studying (Fornari et al., 2014). This occurs more frequently in programs that do not have protected time for mentors to engage in the mentoring process, which has been found to impact recruitment of mentors (Kashiwagi et al., 2013; Nimmons et al., 2019). A study conducted in 2019 compared an individual's willingness to volunteer as a mentor in programs that had protected time versus programs without protected time (Voetmann & Kendall 2019). Those in programs with protected time for mentoring were more likely to volunteer to mentor (M=5.74, SD=1.06) than those without protected time (M=5.15, SD=1.42) (Voetmann & Kendall, 2019).

The amount of time that is taken developing another individual can be draining to both the mentor's energy and productivity (Coates, 2012). Mentors might feel a sense of personal responsibility if their mentees do not meet their expectations (Coates, 2012). They may also expect the mentee to become an extension of them, leading to relationship conflicts (Gisbert, 2017). Mentors have also cited difficulty with mentees who are unwilling to learn or who

engage in destructive behaviors such as attempting to sabotage the relationship (Allen et al., 2017).

Unfortunately, unfavorable relational and psychological outcomes can occur with negative mentor/mentee experiences on both sides (Allen et al., 2017). Another significant barrier to mentoring occurs when mentors also have generational issues with mentees, a difficulty addressed in the millennial generation section of this dissertation below (Oelschlager et al., 2011).

Millennial Generation

For the purposes of this study, millennials were defined as individuals who are entering medicine today and were born between 1980 and 2000 (Waljee et al., 2018). This is a large generation, and in the year 2020, the millennial generation will outnumber all other generations added together (Boysen, Daste & Northern, 2016). They will account for 75% of the medical workforce in the year 2025 (Waljee et al., 2018).

Each generation differs in their perspectives on personal life and work, as well as on the expectations they have for their future careers (Boysen et al., 2016). The millennial generation is sometimes characterized as having ambitions but difficulty in formulating realistic plans for achieving them (Keeling, 2003). They are also sometimes characterized as impatient, distracted, and entitled, but have also been described as empowered, collaborative, and innovative (Waljee et al., 2018). Millennials are digitally competent and connected through the internet, personal computers, and mobile phones (Boyson et al., 2016). Their generation has been impacted by a huge technology expansion and enhanced social networking (Waljee et al., 2018).

A study conducted by Borges and colleagues in 2010 of 426 first year medical students (197 Millennials and 229 students of the generation before them (Generation X)) found differences between the generations in the areas of achievement, affiliation and power (Borges, Manuel, Elam & Jones, 2010). *Achievement* was defined as the motive to succeed by excelling at things and surpassing standards, *affiliation* was defined as the motive to share with others and develop positive relationships and *power* was defined as the desire to influence and have an impact on others (Borges et al., 2010). Millennials scored higher on their need for affiliation and achievement than did Generation X (Borges et al., 2010). In terms of mentoring, this means millennials have more of a need to belong to social groups and teams (Borges et al., 2010). Millennials place high emphasis on the ability to find a coach and mentor to progress in the workplace (Boyson et al., 2016).

Mentors need to work closely with students to ensure the decision-making process is introduced, and that barriers to their chosen career paths are discussed (Keeling, 2003). As generational differences begin impacting the workplace, there is a need to create ways of passing on knowledge in the organization from older generations (who tend to be more committed to the organization) to the younger generation (Voetmann & Kendall, 2019). In medical education, faculty are usually chosen based on their years of experience and expertise (Roberts et al., 2012). This results in senior educators who were born in a different generation than their learners, leading to potential intergenerational tension and a difference in teaching techniques and learning styles (Roberts et al., 2012). Faculty members' prior educational experiences may prevent their ability to focus on millennials and their own unique learning needs (Roberts et al., 2012). Generalizations can also lead to misunderstandings, particularly in environments like hospitals where apprenticeship and hierarchy are the norm (Waljee et al., 2018). Generational differences

can also be more emphasized today with the rapid growth of new technologies and their daily use (Roberts et al., 2012).

These differences with the millennial generation must be acknowledged to achieve effective mentoring relationships. It is important to understand those factors that motivate this generation (Waljee et al., 2018). Millennials prefer frequent interactions and multitasking, which may make them appear needy and impatient, rather than engaged (Waljee et al., 2018). They also expect faculty to provide clear expectations and learning outcomes, and provide constant feedback (Borges et al., 2010). Faculty need to be aware of how their own generational biases could inhibit interactions and create a negative impact on learning (Roberts et al., 2012).

This generation is more open to feedback and crave more structure and direct observation of their own skills (Roberts et al., 2012). They also have less patience with delays to the support that they are searching for (Roberts et al., 2012). Proper understanding and acknowledgement of millennial generation characteristics can help in creating effective mentoring relationships.

Conceptual Framework

Mentoring is an important component of the medical education process. It has been shown to promote success in practice, help in choosing a career, and enhance research productivity (Park et al., 2016). Advising and mentoring have been found to be influential on a student's specialty choice (Careers in Medicine, 2019). Students who are mentored have a greater sense of wellbeing and a higher satisfaction with their education compared to students who are not mentored (Park et al., 2016).

Through thematic analysis of 34 articles related to mentoring after the year 2000, Tan and colleagues developed a mentoring framework based on five pillars – programmatic structure,

organization oversight, integrating mentoring into the curriculum, employing a matching process between mentors and mentees, and providing mentor and mentee training (Tan et al., 2018). These qualities are discussed in more detail below.

The Mentoring Framework

The mentoring framework developed by Tan and colleagues consists of five pillars – programmatic structure, organization oversight, integrating mentoring into the curriculum, employing a matching process between mentors and mentees, and providing mentor and mentee training (Tan et al., 2018). This study considered how different mentoring approaches are in medical schools and how many of them were between a senior clinician and a medical student (Tan et al., 2018). It allows for different settings and systems to operationalize programs that are based on elements of successful mentoring programs (Tan et al., 2018).

Programmatic structure refers to having clear goals and a focus for the mentoring program as determined by the school (Tan et al., 2018). Programs need to provide mentors with clear expectations and provide mentors with the tools and resources necessary (Nimmons et al., 2019). Defining the differences between present and desired levels of performance can be accomplished by setting goals, and this can also serve as a reference point for comparison when changes are implemented (Newby & Heide, 2013). Having established goals also provides for defining the relevance of participating in the mentoring program (Newby & Heide, 2013). Schools must provide a mentoring environment that helps with the development of trusting and open relationships (Sng et al., 2017). Protected time needs to be given for mentoring activities and some form of incentives should be offered (Nimmons et al., 2019). With faculty members and students having multiple responsibilities, if the mentor-mentee meetings do not have a focus

or purpose they are not prioritized (Dobie et al., 2010). The school must explicitly recognize and integrate mentoring into the structure of the school, recognizing its value (Gisbert, 2017).

Oversight is an important component of the framework as it helps set the culture for the program (Tan et al., 2018). The school needs to instill the values and responsibilities of mentors and mentees, and provide methods to evaluate mentoring, both from the mentor and mentee perspective (Tan et al., 2018). Nimmons and colleagues also provided current insights into medical student mentoring programs, looking at 82 articles from 1990 through 2018 (Nimmons et al., 2019). Both studies discuss how programs need clear, measurable objectives, and how mentoring centers on the school providing the administrative, financial, and matching support, as well as being the source of the culture for mentoring (Nimmons et al., 2019; Tan et al., 2018). With appropriate oversight, the school would know the different qualities and strengths of each mentor to better guide the mentoring relationship (Low, Toh, Y.L., Teo, Toh, Y.P. & Krishna, 2018). The mentoring process must be evaluated on a continuous basis to make sure adjustments are made as needed or when problems are encountered (Newby & Heide, 2013).

Mentoring programs need to be integrated into the existing medical education curriculum as well (Tan et al., 2018). The mentoring process is a continuum, ranging from institutional to personal (Sambunjak, Straus & Marusic, 2009). The institution side is focused on developing networks within the academic community and enhancing the mentees' visibility, with the personal side focusing on creating a safe space for mentees to share their thoughts and feelings (Sambunjak et al., 2009). Mentoring provides medical students with a space to talk about things not addressed elsewhere, like their lives and experiences of becoming a physician (Kalén et al., 2012). As content and reasons for the mentoring develop through a medical student's four years, the meaning to the mentoring relationship grows as well (Dobie et al., 2010). A meta-analysis

performed by Eby and colleagues in 2013 studied articles focused on mentoring support and relationship quality from the perception of the mentee from January 1985 through November 2010 (Eby et al., 2013). They wanted to look at instrumental support (mentor behaviors geared toward helping mentees achieve their goals), psychosocial support (mentor behaviors such as counseling and encouragement), and relationship quality (how mentees felt about the relationship) (Eby et al., 2013). They found that as interactions between the mentor and mentee increased, so did the mentee's perception of instrumental support ($p = .29$), psychosocial support ($p = .25$) and relationship quality ($p = .26$) (Eby et al., 2013). A study of 338 Air Force supervisors (mentors) and 228 associated mentees found a strong correlation ($r = 0.4$) between how often a mentor and mentee met and the perceived similarity the mentee felt with their mentor (Holt, Markova, Dhaenens, Marler, & Heilmann, 2016). Greater interaction frequency was found to be more strongly related to how a mentee felt about the quality of their mentoring in the workplace setting (Eby et al., 2013). This is further support for having protected time for mentor and mentee meetings to ensure consistent meeting occurrences happen for the relationship to develop.

A guided matching process should be utilized (Tan et al., 2018). Mentees should be able to provide feedback on their mentors and be allowed to end the mentoring relationship if it is not working (Tan et al., 2018). Concerns about formal mentoring assignments include ignoring the interpersonal aspect of the relationship, thus making the mentoring less effective (Sambunjak et al., 2009). Both mentors and mentees have a better chance of benefitting from the mentoring relationship if complementary goals and needs are matched (Newby & Heide, 2013). A study of 338 Air Force supervisors (mentors) and 228 associated mentees found that if mentees did not feel there was a perceived similarity between them and their mentor, they would typically find an

informal mentor (Holt et al., 2016). The similarity can be in the alignment of values, similar goals in medicine, similar personalities, or similar career paths (Geraci & Thigpen, 2017). Research has also shown that "deep-level similarity" such as similar attitudes, values, or personality, exhibits a strong and positive association with mentoring quality (Eby et al., 2013, p. 460). A guided matching process helps to ensure that all needs and experiences are optimally matched (Newby & Heide, 2013).

Mentors and mentees should be provided training. Training enhances mentor effectiveness and improves mentee satisfaction with their mentor (Sheri et al., 2019). Providing mentor training can help identify those individuals who may need supplemental training or who might have unattainable expectations (Newby & Heide, 2013). Mentors should be provided a list of senior mentors they can turn to that can provide guidance and support as they mentor their mentees (Tan et al., 2018; Sheri et al., 2019). Mentors need to be provided with training in the requirements of their role and how to deliver effective feedback (Nimmons et al., 2019; Tan et al., 2018). Mentors should be provided training on flexibility as the mentoring relationship changes over time (Newby & Heide, 2013). Additionally, training on determining or changing expectations for the mentoring relationship is also beneficial (Newby & Heide, 2013). Finally, mentors need to possess knowledge of the school and the school's culture, a factor that mentees may not find as available from other sources (Geraci & Thigpen, 2017).

The right type of mentors needs to be selected as well. One study conducted at the University of California – San Francisco identified key characteristics of outstanding mentors from the perspective of their mentees (Cho, Ramanan & Feldman, 2011). They identified five themes common in effective mentors – admirable personal qualities, acting as a career guide, making strong time commitments to meet, supporting work/life balance, and being a good role

model (Cho et al., 2011). The Association of American Medical Colleges (AAMC) calls for advisors who are empathetic, trustworthy, discreet, non-judgmental, and available (Careers in Medicine, 2019). Effective mentors need to have knowledge beyond specialty information and should stay abreast of current issues in the residency application process (Careers in Medicine, 2019). They need to be fully committed to their mentee and their goals and be honest in their communications (Henry-Noel et al., 2018; Geraci & Thigpen, 2017). An effective mentoring relationship means a mentor needs to be generous with their time and display patience with mentees, a factor found to have some influence on how mentees value the relationship (Geraci & Thigpen, 2017). Mentors should be available on a regular and ongoing basis (Frei et al., 2010). They need to be active listeners and able to adapt to the educational needs of different mentees (Henry-Noel et al., 2018; Frei et al., 2010). This calls for a flexibility on the part of mentors as the mentor-mentee relationship is dynamic, changing and maturing over time (Gisbert, 2017). Mentors need to be approachable and reputable in their field (although this was found to not be as important as personal and interpersonal characteristics) (Henry-Noel et al., 2018). Medical students are more interested in the mentor's trustworthiness, approachability, friendship and the "…ability to "connect" with them, facilitating the mentor's position as a role model" (Sng et al., 2017, p. 866). However, the mentor should have sufficient experience to be able to bring enough knowledge and resources to the mentoring relationship (Geraci & Thigpen, 2017).

The mentoring relationship also displays a certain amount of reciprocity as it refers to the commitment of the mentor and mentee (Low et al., 2018). As mentors need to display the qualities highlighted above, mentees need to be receptive to their mentor's advice and be an active contributor to the process (Low et al., 2018). For an effective mentoring relationship, mentees need to be able to communicate constructively, ensuring goals are clearly stated, and be

receptive to mentor feedback (Henry-Noel et al., 2018; Sambunjak et al., 2009). There also needs to be a respect of the mentor's time and keeping up with meetings (Henry-Noel et al., 2018; Gisbert, 2017). Mentees also need to know what is expected of them (Nimmons et al., 2019). The school should set up preliminary meetings between the mentor and mentee and help set the personal and professional expectations (Low et al., 2018). They also help establish the timeline and code of conduct for the relationship (Low et al., 2018). Finally, mentees need to take responsibility for the mentoring relationship and their own learning (Sambunjak et al., 2009; Gisbert, 2017; Sng et al., 2017). Mentees need to practice self-reflection to better understand their own weaknesses and provide for effective change (Sambunjak et al., 2009). Reflection helps the mentee learn more about complex situations and reflect on different components of becoming a physician (Kalén et al., 2012). The mentees' acknowledgement of their mentor can contribute to the mentor's sense of fulfilment which then in turn motivates them to continue mentoring and investing their time (Low et al., 2018).

Summary

The goal of this study is to investigate perceptions of mentoring practices with the intent of improving services to students. Mentors in medical school can be either a source of acclimation into medicine in general or a specific specialty (Careers in Medicine, 2019). Mentors need to be provided with training in the requirements of their role and how to deliver effective feedback (Nimmons et al., 2019; Tan et al., 2018). This will allow mentors to feel more effective in their roles, as well as encourage students to fully utilize mentoring services (Careers in Medicine, 2019). Mentees also need to know what is expected of them (Nimmons et

al., 2019). Protected time needs to be given for mentoring activities and some form of incentives should be offered (Nimmons et al., 2019).

Following these recommendations has been shown to be successful. At the University of Washington School of Medicine, matriculating students are assigned a mentor. Each mentor participates in monthly faculty development workshops to improve their mentoring skills, such as giving feedback (Oelschlager et al., 2011). These mentors were chosen based on demonstrated clinical and teaching effectiveness. The dean's office of the University of Washington School of Medicine funds each mentor at 25% of their salary (Oelschlager et al., 2011). In 2007, a survey of medical students was conducted on what students would contact their mentor for (overall response rate of 86.4% with n = 159 second-year students, n = 174 third-year students and n = 118 fourth-year students) and found students would contact their mentor first for all options – academic issues (49.6%), personal issues (36.2%) and professionalism issues (64.1%) before contacting other resources such as other faculty or the school counselor (Oelschlager et al., 2011). Oelschlager and colleagues found that by instituting some of the best practices listed previously, such as funding faculty time, developing faculty skills through training, and establishing a formal assignment system, the mentoring program created an environment where students wanted to utilize their mentor (Oelschlager et al., 2011).

Mentoring is an important component of the medical education process. It has been shown to promote success in practice, help in choosing a career, and enhance research productivity (Park et al., 2016). Advising and mentoring have been found to be influential on a student's specialty choice as well (Careers in Medicine, 2019). Mentored students report a greater sense of wellbeing and a higher satisfaction with their education (Park et al., 2016).

The determinations found in this study could assist medical schools in both assigning successful mentoring relationships, as well as assisting faculty in developing these advising qualities and assisting students in their readiness to be mentored. Best practices that will be utilized in the survey instrument include the following: programs need to have measurable objectives and provide oversight and structure (Nimmons et al., 2019; Tan et al., 2018). Matches should be implemented in a way that provides the highest chances of success for the mentoring relationship (Nimmons et al., 2019). Mentoring programs need to be integrated into the existing medical education curriculum (Tan et al., 2018). And finally, mentors and mentees should be provided training (Sheri et al., 2019). Determining those benefits for both mentors and mentees can help increase the effectiveness of the mentoring relationship as well as provide credibility for organizations developing and maintaining formal mentoring programs (Chun et al., 2012).

CHAPTER THREE – METHODOLOGY

The primary goal of this study was to determine alignment of participant perceptions of their mentoring experiences with the qualities of undergraduate medical education mentoring standards identified in the literature. Perceptions of the mentoring experience were also compared between mentors and mentees. A study by Heeneman and de Grave in 2019 of both mentors and mentees found that both groups considered comparable mentoring situations as essential for an effective mentoring relationship, and that the evolving nature of the mentoring relationship was apparent during different phases of the mentee's education (Heeneman & de Grave, 2019). As mentoring is a dynamic process, they also found any instruments used to evaluate mentoring should assess both the perspective of the mentor and mentee as well as the level of alignment along different stages of the medical education curriculum (Heeneman & de Grave, 2019).

The research questions that were studied are as follows:

Research Question One: To what extent do the perceptions of mentoring practices by students and mentors align with practice standards recommended by the literature?

Research Question Two: How do the perceptions of mentoring align between medical students or alumni and mentors?

a. How do the perceptions of mentoring align between first year students and mentors?

b. How do the perceptions of mentoring align between second year students and mentors?

c. How do the perceptions of mentoring align between third year students and mentors?

d. How do the perceptions of mentoring align between fourth year students and mentors?

e. How do the perceptions of mentoring differ between alumni and enrolled students?

Creating the instruments for both mentors and mentees for this study followed primarily the recommendations of Tan and colleagues' framework for mentoring of medical students based on the flexibility and structure of the mentoring program (Tan et al., 2018). The five overarching mentoring program characteristics that were studied were programmatic structure, organization oversight, integrating mentoring into the medical education curriculum, employing a matching process between mentors and mentees, and providing mentor and mentee training (Tan et al., 2018). The methodology utilized to answer the research questions presented are outlined in this chapter. Descriptive and inferential statistical analyses were both utilized to measure alignment of mentoring experiences. This chapter is organized into five sections: participants, instrumentation, data collection, data analysis and summary.

Participants

The target population for this study was medical students in an allopathic medical school located in the southeastern United States. Medical students in all years (i.e. first through fourth year) were considered part of the population, as well as the mentors in this program. The population for this study consisted of medical school students that were currently enrolled, as well as alumni from seven graduating classes (from 2013 – 2019), for a total of 609 alumni and 488 enrolled students at the time of the study. It also included 39 faculty mentors. Utilizing Krejcie and Morgan's (1970) formula for determining sample size, with a population of 1097 (alumni and enrolled students) a sample size of 285 would be necessary for adequate population representation for mentees (medical students and alumni) and 35 for mentors.

Each student, graduate and mentor had the opportunity to participate in the study. The average age and student numbers by gender can be found in Table 1 below. The fourth year

students who were currently enrolled at the time of the study were the class of 2020, the third year students were the class of 2021, the second year students were the class of 2022, and the first year students were the class of 2023. The remainder of the classes listed from 2013 through 2019 were classified as alumni.

Table 1
Demographic Characteristics of Medical Students Per Class

	Gender		
Class	Male	Female	Mean Age
	Alumni		
2013	16	20	25.2
2014	23	32	25.6
2015	37	41	24.3
2016	53	41	24.6
2017	54	59	25.1
2018	67	49	24.7
2019	56	61	24.0
	Currently Enrolled		
2020	70	51	24.6
2021	65	59	24.2
2022	68	51	24.2
2023	60	64	24.7
TOTAL	569	528	Total Average 24.65

Table 2 is a description of mentors, including how long they had been a member of the school's mentoring program, their specialty, and whether they were core or volunteer faculty. Core faculty members were paid by the school and volunteer faculty had a primary job elsewhere, such as a hospital or clinic. Volunteer faculty did not receive any type of compensation from the school. Faculty members who participated in the survey were mentors for this school either currently or had been at some time in the past.

Table 2
Demographic Characteristics of Mentors

No. of Mentors	Mentor Status (core or volunteer faculty member)	Gender	
		M	F
26	Core	11	15
13	Volunteer	9	4

Specialties Represented	
Allergy & Immunology	Pathology
Anatomy	Pediatric Endocrinology
Anesthesiology	Pediatrics
Cardiology	Pediatrics Critical Care
Emergency Medicine	Pharmacology
Endocrinology	Plastic Surgery
Family Medicine	Psychiatry
Internal Medicine	Pulmonology
Internal Medicine/Pediatrics	Rheumatology
Neurology	Thoracic Surgery
Neurosurgery	Vascular Surgery
Obstetrics and Gynecology	

At this medical school, incoming students are randomly assigned to a mentor upon matriculation. This mentor follows them throughout their four years of medical school, providing advisement and support in three areas – academic advising, career advising, and personal wellness. Students are free to meet with their mentor as often as they would like, but there are certain meeting requirements they need to complete each year. Students are introduced to their mentors in a group setting during their first year orientation, and then students are responsible for scheduling future meetings. New mentors are provided an overview of the mentoring program, either through an in-person meeting with the Associate or Assistant Dean for Students or via a PowerPoint that is provided to the mentor via email. The mentoring PowerPoint explains the overall mentoring program and the quantity and timing of required meetings. Mentors are also provided typical scenarios that a student might meet with a mentor for, and resources available to mentors when advising students (such as how to refer students to

the academic support services department or counseling services). The schedule of required meetings is explained further below, separated by academic year.

- First year medical students (M1 Year) – the first year of medical school begins in August and ends in May; M1 students have a group meeting with their mentor during orientation and then are required to meet with their mentor twice (once in the Fall and once in the Spring)
- Second year medical students (M2 Year) – the second year of medical school begins in August and ends in March; M2 students are required to meet with their mentor at least once during the year
- Third year medical students (M3 Year) – the third year of medical school begins in May and ends in May; M3 students are required to meet with their mentor twice
- Fourth year medical students (M4 Year) – the fourth year of medical school begins in June and ends in May; because M4 students are doing away rotations and interviewing for residencies, they rely more on specialty specific advice; M4 students are not required to meet with their mentors, only on an as-needed basis

As first year students would not have as much experience with mentors at the time of survey distribution, it was decided that all surveys would be administered halfway through the academic year to ensure that first year medical students would have had a chance to meet and interact with their mentor.

Instrumentation

A survey instrument was developed to measure perceptions of the mentoring process as experienced by currently enrolled students (at all stages of the medical education curriculum (i.e. years one through four)), faculty mentors, and alumni. Two parallel questionnaires were developed (mentors and mentees), as questionnaires are useful in gathering data about concepts that can be difficult to measure or quantify, such as how one feels or perceives an experience (Artino, LaRochelle, Dezee & Gehlbach, 2014). This decision was also prompted based on previous studies utilizing surveys to evaluate mentoring activities (Fleming, House,

Shewakramani Hanson, Yu, Garbutt, McGee, Kroenke, Abedin & Rubio, 2013; Heeneman & de Grave, 2019). Additionally, survey instruments are commonly utilized in medical education research (Artino et al., 2014). Online surveys also tend to eliminate the influence of an interviewer (Van Mol, 2017). Furthermore, in the case of a higher education setting, where students are usually provided an official university email address, complete email coverage is generally possible (Van Mol, 2017).

Construction of the instrument began by reviewing major mentoring constructs in the literature, such as those defined by Frei and colleagues (Frei et al., 2010). The concepts of flexibility and structure (Tan et al., 2018) and Frei and colleagues' mentoring objectives of increasing interest in clinical specialties, developing professionalism and personal growth, and providing career counseling (Frei et al., 2010) were also evaluated for possible inclusion. Articles on mentoring that described the use of a survey instrument were also utilized in development. The survey instrument contained items on program objectives and oversight of the organization over the mentoring program (Nimmons et al., 2019; Tan et al., 2018). There were items on the perception of the matching process and whether there had been any training or expectations delineated for mentors or mentees. A question was also included on whether any protected time was provided for mentoring.

A 25-item questionnaire was developed for students and alumni. Twenty-three items in the survey were Likert-scale questions with four possible responses – *Strongly Agree, Agree, Disagree,* and *Strongly Disagree* (a "not applicable" option was also included). There was one ranking question where respondents were asked to rate characteristics important to them in a mentor (from one to eight) and one question asking for the reason mentoring meetings were held (for example, for academic concerns, personal concerns, etc.).

A 30-item questionnaire was developed for mentors. Twenty-eight items in the survey were Likert-scale questions with four possible responses – *Strongly Agree, Agree, Disagree,* and *Strongly Disagree* (a "not applicable" option was also included). The items were similar between mentor and student instruments, but the mentor instrument had one question about the school environment being conducive to mentoring, and three questions related to the mentor's experience with their mentees. The survey instruments can be found in Appendices B (Students), C (Mentors) and D (Alumni). On the student instrument, requested demographic data included gender, academic year (M1 through M4) and age range. On the alumni instrument, requested demographic data included gender, year of graduation (2013 – 2019), and age range upon graduation. For the mentor instrument, requested demographic data included gender, how long they had been a mentor for the medical school, and how long they had been a mentor in another capacity (i.e. for another department).

When designing the questions for the survey, certain guidelines were followed as developed by Dillman, Smyth and Christian (2014). Questions were grouped around topics to not only more effectively measure the constructs being evaluated, but also because when switching topics on a questionnaire, respondent's answers are likely to be less well thought out (Dillman et al., 2014). Moreover, grouped topics are easier to answer (Dillman et al., 2014). The survey was divided into overarching themes – section one studied career counseling, section two focused on the structure and flexibility of the mentor relationship, section three focused on the school environment, and section four of the student/alumni instrument and section five of the mentor instrument focused on mentor characteristics and available resources. The mentor instrument had five sections, and section four of the mentor instrument focused on mentee characteristics. It was decided that the survey would be implemented online, as web surveys can

gather responses from large numbers of people in a short time and at a low cost (Dillman et al., 2014).

To help ensure a strong survey, before the survey was administered, the objectives and survey instrument were reviewed by the Associate Dean of Students of the medical school. A list of the concepts being measured, along with associated item numbers and reference information, can be found in Table 3 below for mentees (students/alumni) and Table 4 below for mentors. There were five general subsections being evaluated corresponding to the five concepts of the mentoring framework – programmatic structure, oversight, integration into the medical education curriculum, guided matching process and training. The programmatic structure subsection contained five concepts being measured (such as the need to establish expectations for mentoring or explicitly recognizing and integrating mentoring into the structure of the school). The oversight subsection contained three concepts (with one item specific to the mentor instrument). The integration into the medical education curriculum subsection contained four concepts, the guided matching process subsection contained three concepts and finally the training subsection contained thirteen concepts (with three of those concepts being specific to the mentor instrument).

Table 3
Survey Item Construct - Students/Alumni

Construct	Item Number	Reference
Programmatic Structure		
Clarification of mentee's life goals (academic, career)	4	Careers in Medicine, 2019
Need to establish expectations for mentoring	5	Nimmons et al., 2019
Available, making strong time commitments to meet	14, 25	Careers in Medicine, 2019 Cho, Ramanan & Feldman, 2011

Construct	Item Number	Reference
Must explicitly recognize and integrate mentoring into the structure of the school, recognizing its value	20	Gisbert, 2017
Protected time needs to be given for mentoring activities	23	Nimmons et al., 2019
Oversight		
Need to provide mentors with the tools and resources necessary	19	Nimmons et al., 2019
Need to have measurable objectives and provide oversight and structure	21	Nimmons et al., 2019; Tan et al., 2018
Integration into Medical Education Curriculum		
Mentors should provide emotional support for both the mentee and the mentee's goals	1	Geraci & Thigpen, 2017
Has knowledge beyond specialty information; stays current regarding issues in the residency application process	2	Careers in Medicine, 2019
Expertise/reputable in their field	25	Henry-Noel et al., 2018
Is fully involved and integral to the mentee's success in the curriculum and beyond	3	Dimitriadis et al., 2012
Guided Matching Process		
Mentors and mentees should have some commonalities	13, 25	Geraci & Thigpen, 2017
Mentors should be non-judgmental, supportive	6, 15, 25	Careers in Medicine, 2019
Should implement matches between mentors and mentees that encourage success	22	Nimmons et al., 2019
Training		
Flexibility on the part of mentors as the mentor-mentee relationship is dynamic, changing and maturing over time	25	Gisbert, 2017
Mentor concerned with student growth in meeting objectives (personal, academic, or career)	8, 18	Careers in Medicine, 2019
Honest in communications, active listener, provide answers quickly	7, 11	Henry-Noel et al., 2018
Trustworthy & discreet	9, 25	Careers in Medicine, 2019
Approachable	10, 25	Henry-Noel et al., 2018
Admirable personal qualities, providing friendship for mentees and the "…ability to "connect" with them, facilitating the mentor's position as a role model"	12	Sng et al., 2017, p. 866; Cho, Ramanan & Feldman, 2011
Empathetic	16	Careers in Medicine, 2019
Able to adapt to the educational needs of different mentees	17	Henry-Noel et al., 2018

Table 4
Survey Item Construct – Mentors

Construct	Item Number	Reference
Programmatic Structure		
Clarification of mentee's life goals (academic, career)	4	Careers in Medicine, 2019
Need to establish expectations for mentoring	5	Nimmons et al., 2019
Available, making strong time commitments to meet	14, 29	Careers in Medicine, 2019 Cho, Ramanan & Feldman, 2011
Must explicitly recognize and integrate mentoring into the structure of the school, recognizing its value	21	Gisbert, 2017
Protected time needs to be given for mentoring activities and some form of incentives should be offered	24	Nimmons et al., 2019
Oversight		
Need to provide mentors with the tools and resources necessary	19	Nimmons et al., 2019
Need to have measurable objectives and provide oversight and structure	22	Nimmons et al., 2019; Tan et al., 2018
Mentors need conducive school environment	20	Low et al., 2018
Integration into Medical Education Curriculum		
Mentors should provide emotional support for both the mentee and the mentee's goals	1	Geraci & Thigpen, 2017
Has knowledge beyond specialty information; stays current regarding issues in the residency application process	2	Careers in Medicine, 2019
Expertise/reputable in their field	29	Henry-Noel et al., 2018
Is fully involved and integral to the mentee's success in the curriculum and beyond	3	Dimitriadis et al., 2012
Guided Matching Process		
Mentors and mentees should have some commonalities	13, 29	Geraci & Thigpen, 2017
Mentors should be non-judgmental, supportive	6, 15, 29	Careers in Medicine, 2019
Should implement matches between mentors and mentees that encourage success	23	Nimmons et al., 2019
Training		
Flexibility on the part of mentors as the mentor-mentee relationship is dynamic, changing and maturing over time	29	Gisbert, 2017
Mentor concerned with student growth in meeting objectives (personal, academic, or career)	8, 18	Careers in Medicine, 2019
Honest in communications, active listener, provide answers quickly	7, 11	Henry-Noel et al., 2018
Trustworthy & discreet	9, 29	Careers in Medicine, 2019
Approachable	10, 29	Henry-Noel et al., 2018

Construct	Item Number	Reference
Admirable personal qualities, providing friendship for mentees and the "…ability to "connect" with them, facilitating the mentor's position as a role model."	12	Sng et al., 2017, p. 866; Cho, Ramanan & Feldman, 2011
Empathetic	16	Careers in Medicine, 2019
Able to adapt to the educational needs of different mentees	17	Henry-Noel et al., 2018
Mentors need to be provided with training in the requirements of their role and how to deliver effective feedback	25	Nimmons et al., 2019; Tan et al., 2018
Mentees need to be able to communicate constructively, ensuring goals are clearly stated, and be receptive to mentor feedback	26	Henry-Noel et al., 2018
Respect of the mentor's time and keeping up with meetings	27	Henry-Noel et al., 2018; Gisbert, 2017
Need to take responsibility for the mentoring relationship and their own learning	28	Gisbert, 2017; Sng et al., 2017

Instrument Validity

Developing the survey followed the guidelines developed by the Association for Medical Education in Europe (AMEE), a worldwide organization with 90 member countries that promotes international excellence in education in the healthcare professions. *AMEE Guide No. 87: Developing Questionnaires for Educational Research* calls for input from experts in the field as well as potential participants (Artino et al., 2014). Once the instruments were developed, individual items were reviewed for ambiguity and wording and subject to evaluation by two content experts: both the Associate Dean for Students and the Assistant Dean for Planning and Knowledge Management for the medical school. The Associate Dean for Students has responsibility over the mentoring program at the medical school, and the Assistant Dean for Planning and Knowledge Management is responsible for assessment and evaluations.

Paying more attention to validity during the development of the survey is one way to create more efficient surveys (Gehlbach & Brinkworth, 2011). Once a draft survey was created, input was obtained from a student representative (a currently enrolled student) and a staff member who assists with implementation of the mentoring program at this medical school. Feedback was requested to ensure questions were not ambiguous. Input was also requested to ensure survey questions utilized the terminology students and mentors were accustomed to (Gehlbach & Brinkworth, 2011).

Internal Validity

There are certain main threats to internal validity that can arise within medical education research – two of which include history and instrumentation. Controlling for extraneous variables reduces the chances that internal validity would be affected (Flannelly, Flannelly &

Jankowski, 2018). *History* as a threat involves those experiences that a participant might go through during the experiment that are not part of the experiment itself (Flannelly et al., 2018). In this case for example, the mentoring program had undergone slight changes throughout the years. It would be difficult to assess whether those changes had an impact on responses. With *instrumentation* any change in the ability of the instrument to measure participant perceptions would be a threat to internal validity (Flannelly et al., 2018). This was controlled by administering the surveys via the Qualtrics survey system, an online software program that would not allow for different interpretation of results of the closed-ended questions.

Reliability

After the surveys were developed, a pilot study was conducted to prevent any barriers to participation such as technical issues with the survey software (Qualtrics) or a lack of understanding of the survey questions. The pilot study was also implemented to examine reliability and validity since this was a survey specifically created for this study. The survey was administered to eight individuals (n = 8) who were not part of the sample but were in one of three categories – either had experience in the education field, had some role in the school's mentoring process, or were totally chosen at random. Each participant was asked to complete either the student or mentor survey. As the alumni survey was almost identical to the student survey, it was left out of the pilot study. The participants were asked to complete the survey and to provide feedback on format or technical issues experienced during completion. The pilot respondents provided feedback that allowed for minor adjustments to the survey for formatting and technical reasons. This feedback also allowed for a reduction in grammatical errors and to

improve item clarity. Participants found the survey generally easy to understand and easy to complete.

Furthermore, Cronbach's alpha was utilized to determine internal reliability of the study constructs. Cronbach's alpha is a measurement commonly reported when developing instruments utilized to measure attitudes (Taber, 2018). The results were based on five completed surveys from the pilot study. The overall Cronbach's alpha was run on 23 items from the instrument with a resulting $\alpha = .967$, which is an acceptable result (Tavakol & Dennick, 2011). Table 5 below presents the subscales for each construct and their resulting Cronbach's alpha. The Cronbach's alpha results for each subscale was above the acceptable range of .70 (Taber, 2018). The results for oversight and integration into the medical education curriculum were lower than the other scales. However, both those scales had smaller item amounts which affects α (Tavakol & Dennick, 2011).

Table 5
Cronbach's Alpha for Subscales

Subscale	Number of Items	α
Programmatic Structure	5 Items	.976
Oversight	2 items	.796
Integration into Med Ed Curriculum	3 Items	.748
Matching	4 Items	.823
Training	9 Items	.960

Data Collection

The first step in the data collection process was to obtain permission for surveying students, alumni, and faculty members. This approval was obtained from the Assistant Dean of

Knowledge and Planning Management who oversees the surveying process at the medical school. Permission was obtained from the Assistant Dean of Knowledge and Planning Management as the researcher has access to email addresses for the students, alumni, and mentors. Next, the institution's Institutional Review Board (IRB) approval was obtained which included approved recruitment emails that were developed and utilized for the student, alumni, and mentor surveys, as well as the process for informed consent. On September 26, 2019, the questionnaire was exempted from further review by the Institutional Review Board. A copy of the exemption letter can be found in Appendix A. The recruitment email included an explanation of the study and an anonymous link to the survey via Qualtrics, a survey management software program. The survey was originally administered to medical students, mentors, and alumni in the middle of the academic year (January).

The survey for students, alumni and mentors was administered via email. Initial surveys were released in January to 488 students, 563 alumni and 39 mentors. By the end of January, there was a 14.52% completion rate from students, a 9.06% completion rate from alumni and a 30.77% completion rate from mentors. Reminder emails were sent twice afterwards to increase participation rates. Final participation rates were 37.70% for students, 18.39% for alumni and 48.72% for mentors. Students in higher education are a highly surveyed population group in society which could contribute to feelings of survey fatigue or non-engagement (Van Mol, 2017). It was stressed to participants that the surveys were completely anonymous, and the reasoning behind the study (i.e. to potentially improve the mentoring process at this institution) was included in the recruitment email.

Data from the surveys were downloaded from Qualtrics and then inputted into IBM Statistical Package for Social Sciences (SPSS) software, a statistical analysis program. The

surveys were completely anonymous for confidentiality. Data were stored on a secured server via Qualtrics that was accessed via a log-in and password. Any data that were downloaded into Microsoft Excel worksheets were also maintained on a secure server that was accessed via a log-in and password.

Data Analysis

Once the data were inputted into the IBM SPSS software, the following data analysis process was followed. First, demographic data were presented. Demographic information that was collected for mentees included age (or age upon graduation for alumni), gender, current year (first through fourth for currently enrolled students) or graduation year (for alumni). For mentors, demographic information collected included gender and length of time mentoring both in the mentoring program or in another capacity. Two research questions, described below, guided the study.

Research Question One

For research question one (To what extent do the perceptions of mentoring practices by students and mentors align with practice standards recommended by the literature?), responses for each item on the student, alumni and mentor surveys were input into the IBM Statistical Package for Social Sciences (SPSS) software. The responses ranged from one (strongly disagree) to four (strongly agree). Each construct was made up of a group of certain items on the questionnaire, and descriptive statistics including the overall mean, median and standard deviation were reported per construct (i.e. programmatic structure, oversight, guided matching process, integration into the medical education curriculum, and training). Items on the survey were divided as indicated in Table 6 below. Alignment was measured as the mean of the

responses to each of the constructs. Possible scores ranged from one to four with higher scores indicating more alignment. As four on a response is equal to "strongly agree," means that were higher responded to higher association (i.e. alignment) with the standard identified by the literature.

Table 6
Scoring of Constructs

Construct	Student / Alumni Instrument	Mentor Instrument
Programmatic Structure	Mean of Responses to Items	
Mentor and mentee developed plan to meet specific academic and career goals	4	4
Mentor and mentee established expectations for mentoring relationship	5	5
Mentor made time to meet with mentee	14	14
School recognized the importance and value of mentoring	20	21
There was protected and enough time to meet and achieve mentoring goals	23	24
Oversight	Mean of Responses to Items	
Mentor and mentee had the resources necessary for a successful mentoring relationship	19	19
School environment for mentors was conducive for the development of a successful mentoring relationship		20
There were measurable objectives and oversight for mentoring	21	22
Integrated into Medical Education Curriculum	Mean of Responses to Items	
Mentor supports specialty choice	1	1
Met with mentor for personal concerns	30	30
Met with mentor for academic concerns	30	30
Met with mentor regarding questions on extracurricular activities	30	30
Met with mentor for research concerns	30	30
Mentor helps with the residency application process	2	2
Met with mentor for residency application concerns	25	30
Met with mentor for specialty choice concerns	25	30
Mentor is integral in helping mentee reach academic and career goals	3	3
Guided Matching Process	Mean of Responses to Items	
Mentor and mentee have commonalities	13	13
Mentor provides emotional support	6	6
Mentor respects the mentee and is non-judgmental	15	15
How mentors and mentees were assigned was done in a way that encouraged success	22	23

Construct	Student / Alumni Instrument	Mentor Instrument
Training	Mean of Responses to Items	
Mentor can answer questions quickly and completely	7	7
Mentor checks in on mentee and is concerned with whether mentee is meeting goals	8	8
Mentor is a good listener and honest in their communication	11	11
Mentor is committed to helping mentee succeed	18	18
Mentor is trustworthy and discreet	9	9
Mentor is approachable and friendly	10	10
Mentor is a role model	12	12
Mentor is empathetic	16	16
Mentor provides feedback/support when requested by mentee	17	17
Mentors are provided training to learn their roles and responsibilities		25
Mentees able to communicate and receptive to feedback		26
Mentees are respectful of mentors' time		27
Mentees take responsibility for their own learning		28

Research Question Two

For the second research question (How do the perceptions of mentoring align between medical students or alumni and mentors?), the constructs per group (mentors, students or alumni) were analyzed utilizing an independent sample t-test to see if there were statistically significant differences between the mean for answers provided by students and alumni, answers provided by students and mentors, and answers provided by alumni and mentors. The level of significance was set at $p < .05$.

The responses were also divided by students (by academic year) to see if there were any significant differences between a first-year student (M1) just starting out their medical education career and a fourth-year student (M4) nearing the end of their undergraduate medical education in terms of responses.

Variables

The variables studied were defined as follows:

Independent Variables

There was one independent variable in this study – the role of the participant (whether mentor or mentee).

Dependent Variables

The dependent variable in this study was alignment with mentoring best practices. Alignment was measured as the mean of the responses to the items on the survey instrument as divided by construct (i.e. programmatic structure, oversight, integration into the medical education curriculum, guided matching process and training). Each item provided a statement regarding a mentoring construct and participants indicated the degree to which they either agreed or disagreed on a Likert-scale from one to four. The composite measure of alignment was computed as the mean score in each category, with possible scores ranging from one to four. Higher mean scores indicated more alignment with that construct.

Moderator Variables

Other variables explored included the length of time mentors had been mentoring and whether the mentor had experience beyond the mentoring program (i.e. in a previous institution). The student's age was also looked at to see whether that might influence a student's perception of their mentoring experience (specifically with the millennial generation).

Summary

One intent of this study was to potentially assist medical schools in both ensuring their mentoring program met some of the characteristics of effective mentoring relationships, as well

as assisting faculty in developing advising qualities that would help students throughout their education and subsequent career. By determining the alignment of participant perceptions of their mentoring experiences with those qualities of undergraduate medical education mentoring standards that are identified in the literature, perhaps areas of high satisfaction and low satisfaction could be determined. Previous studies found that how mentees perceive the quality of their mentoring was based mostly on how satisfied they were with the mentoring relationship overall (Schäefer et al., 2015). Satisfaction was also the best predictor for long term success in the mentoring relationship (Heeneman & de Grave, 2019). It is the hope that the survey provided valuable information on how mentors and mentees perceive the mentoring relationship, and if their experiences meet those standards in the literature such as having objectives for mentoring, providing students with mentors who possess some degree of flexibility and adaptiveness, or mentoring resources.

Chapter Four reviews the results of this survey in more detail. As the study intended to provide data to determine whether there was a significant difference between mentors' and students' perceptions of the mentoring experience, the following chapter will present the results of the data analysis for the research questions. Descriptive statistics will be presented, as well as specific results for each of the five constructs as it pertains to both research questions.

CHAPTER FOUR – RESULTS

This study intended to determine alignment of participant perceptions of their mentoring experiences with the qualities of career and academic advising and mentoring standards identified in the literature. More specifically, the study intended to provide data to determine whether there was a significant difference between mentors' and students' perceptions of the mentoring experience. This chapter presents the results of the descriptive and data analysis for the research questions stated below.

Research Question One: To what extent do the perceptions of mentoring practices by students and mentors align with practice standards recommended by the literature?

Research Question Two: How do the perceptions of mentoring align between medical students or alumni and mentors?

a. How do the perceptions of mentoring align between first year students and mentors?

b. How do the perceptions of mentoring align between second year students and mentors?

c. How do the perceptions of mentoring align between third year students and mentors?

d. How do the perceptions of mentoring align between fourth year students and mentors?

e. How do the perceptions of mentoring differ between alumni and enrolled students?

Descriptive statistics will include frequencies and percentages for demographic information on each group – students, alumni, and mentors. Descriptive statistics of frequencies, standard deviation, and means for each of the five mentoring constructs – programmatic structure, oversight, integration into existing medical education curriculum, guided matching process, and training – will also be presented. This will be followed by a presentation of the findings for both research questions and associated items.

Descriptive Statistics

This section presents demographic information on participants (mentors and mentees) in this study. Demographic information that was collected for mentees included age, gender, current year (first through fourth for currently enrolled students) or graduation year (for alumni). For alumni, age was captured as age at the time of their graduation. For mentors, demographic information collected included gender and length of time mentoring both within and outside of the mentoring program. Although both current students and alumni were considered mentees, differences of demographic information between classes and respondent type are presented below.

The survey was accessed by 222 students, 132 alumni and 22 mentors, however the survey was not completed by all who accessed it. The final sample included responses from students, alumni, and mentors who completed the survey through at least question number 12 (regarding being a role model). As seen in Table 7 below, this included 184 students, 112 alumni, and 19 mentors. This final sample was out of 488 students, 609 alumni and 39 mentors, with a total response rate of 27.73%. According to Krejcie and Morgan's sample size formula, with a population of 1097 (alumni and enrolled students), a sample size of 285 would be necessary for adequate representation for mentees and 35 for mentors (Krejcie & Morgan's, 1970). There were sufficient mentees (a total of 296 with alumni and students) in the sample size for adequate representation, but only 19 out of the required 35 mentors participated in the survey.

Table 7
Participant Sample Sizes and Response Rates

	Population	Participants	Response Rate
Students	488	184	37.70%
Alumni	609	112	18.39%
Mentors	39	19	48.72%

Participant Demographic Information

The student mentoring instrument was sent via email to all four classes (i.e. first through fourth year) at the medical school. With 184 participants, there was a 37.7% response rate for students. The alumni mentoring instrument was also sent via email to the previous seven classes that graduated beginning in 2013. With 112 participants, there was a 18.39% response rate for alumni. Finally, the mentor instrument was sent via email to the faculty. There was a 48.72% response rate in this category.

First, demographic data for mentees (currently enrolled students and alumni) are presented. Table 8 presents these results for currently enrolled students. Eighty-two respondents were male, and 92 respondents were female. Out of the sample size, 69.6% of the students responding to the survey were from 23 to 27 years of age, and this age range falls into the millennial category, which was defined for this study as individuals who are entering medicine today and were born between 1980 and 2000 (Waljee, Chopra & Saint, 2018). Table 8 also shows the highest number of respondents were first year students (M1) at 25.5%, followed by fourth year students (M4) at 23.9% and third year students (M3) at 23.4%.

Table 8
Demographic Information of Student Participants

	N	%
Gender		
Male	82	44.6
Female	92	50.0
Missing	10	5.4
Age		
18 – 22	11	6.0
23 – 27	128	69.6
28 – 32	31	16.8
33 – 37	2	1.1
>37	2	1.1
Missing	10	5.4
Academic Year		
First year student (M1)	47	25.5
Second year student (M2)	39	21.2
Third year student (M3)	43	23.4
Fourth year student (M4)	44	23.9
Missing	11	6.0

N=Number of Respondents; %=Percentage of Respondents; Missing=respondents did not answer question

Table 9 presents the demographic information for alumni. For alumni, 58 respondents were male, and 51 respondents were female. The survey shows that 66.1% of students were in the age range of 23 to 27 when they graduated medical school, also falling into the millennial category as defined by this study. Table 9 also shows the highest number of respondents came from the class of 2018 with 23.2% of respondents, followed by the class of 2016 at 21.4% of respondents.

Table 9
Demographic Information of Alumni Participants

	N	%
Gender		
Male	58	51.8
Female	51	45.5
Missing	3	2.7
Age (upon graduation)		
18 – 22	1	.9
23 – 27	74	66.1
28 – 32	25	22.3
33 – 37	8	7.1
>37	1	.9
Missing	3	2.7
Academic Year		
Class of 2013	3	2.7
Class of 2014	5	4.5
Class of 2015	11	9.8
Class of 2016	24	21.4
Class of 2017	22	19.6
Class of 2018	26	23.2
Class of 2019	18	16.1
Missing	3	2.7

N=Number of Respondents; %=Percentage of Respondents; Missing=respondents did not answer question

Figure 1 below displays the age breakdown for both students and alumni. Again, the most predominant category for both groups was from 23 to 27 years of age. The next predominant category for both groups was from 28 to 32 years of age. This is consistent with the age distribution of medical students in the United States. The median age for matriculants to allopathic medical schools in the United States has been 23 since 2017 (AAMC, 2019b).

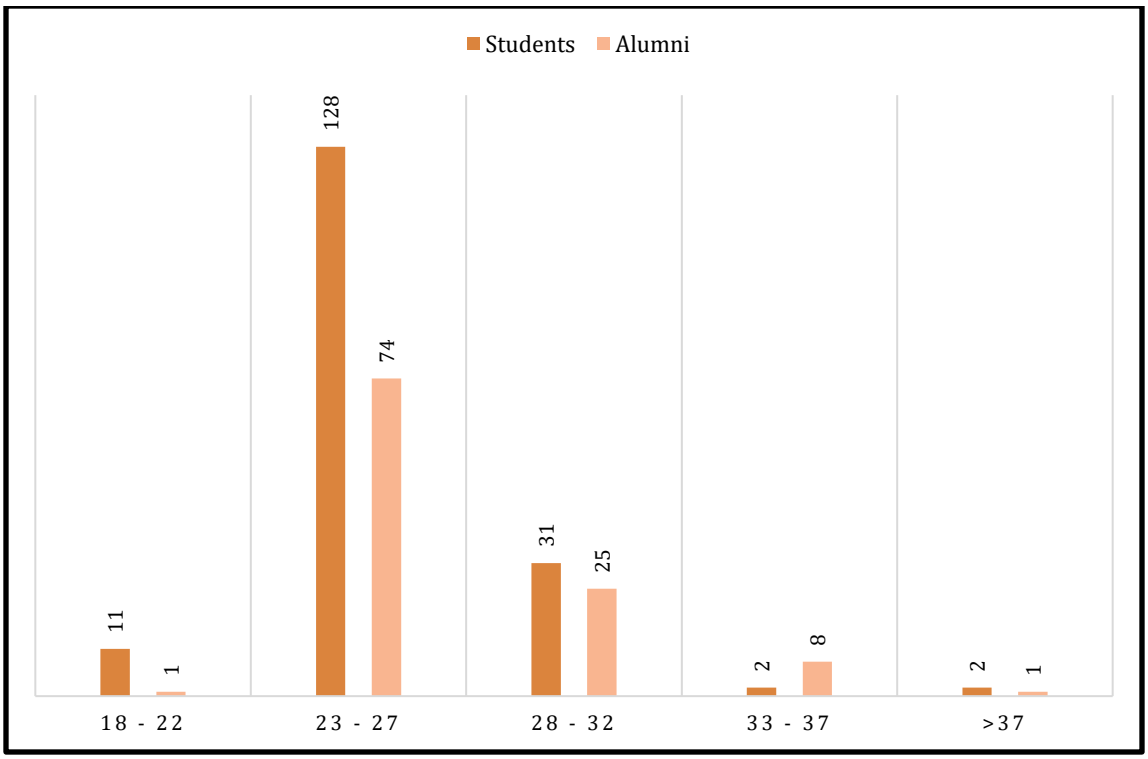

Figure 1 Age Distribution for Student and Alumni Respondents.

Finally, Table 10 presents the demographic information for mentor respondents. Out of 22 who accessed the survey, three did not complete the survey at all. Twelve of the mentor respondents were male and five were female, two respondents did not answer. Out of the 19 participants, 31.6% of them had been mentors for less than three years at the school, and 42.1% had more than six years of mentoring experience outside the program (in other words, via another capacity such as a research mentor or acting as a specialty career advisor). For all surveys, the demographic questions (e.g. gender and years mentoring) were located at the end of the mentor instrument, so those participants that partially completed the survey did not answer these questions.

Table 10
Demographic Information of Mentor Participants

	N	%
Gender		
Male	12	63.2
Female	5	26.3
Missing	2	10.5
Length of Time Mentoring at the Institution		
Less than 1 year through 3 years	6	31.6
4 years through 6 years	6	31.6
Greater than 6 years	5	26.3
Missing	2	10.5
Length of Time Mentoring in Another Capacity		
Less than 1 year through 3 years	6	31.6
4 years through 6 years	3	15.8
Greater than 6 years	8	42.1
Missing	2	10.5

N=Number of Respondents; %=Percentage of Respondents; Missing=respondents did not answer question

Research Question One

The first research question asked to what extent did the perceptions of mentoring practices by students (both currently enrolled and alumni) and mentors align with practice standards recommended by the literature. As a reminder, alignment was calculated by taking the average responses for each construct. Table 11 below displays the number of items measuring each construct, number of respondents, minimum and maximum scores for the constructs, mean and standard deviation for students, alumni, and mentors. The differences in mean between the groups will be explored further under the second research question.

Overall, there was no group (mentors, students, or alumni) that had a mean of less than three in any construct (and the highest score on any item was four – *strongly agree*). The mentor group had the highest reported mean in four out of the five constructs – programmatic structure

(M=3.316), integration into the medical education curriculum (M=3.461), guided matching process (M=3.198) and training (M=3.533). This was followed by the alumni group, with the second highest recorded mean in four out of the five constructs – programmatic structure (M=3.119), oversight (M=3.102), integration into the medical education curriculum (M=3.138) and guided matching process (M=3.116). All three groups had their highest mean and their lowest mean in the same categories. For mentors, the highest mean was found in training (M = 3.533) and the lowest mean was in oversight (M = 3.019). For alumni, the highest mean was also in training (M = 3.418) and lowest in oversight (M = 3.102). Finally, for students, the highest mean was in training (M = 3.435) and lowest in oversight (M = 3.011).

An analysis of the constructs shows the training construct appears to have the most alignment. Oversight had the least alignment overall. This will be examined within the individual construct sections below, as each construct will be explored further. The individual items that were used to compose the construct "score" are also explained in further detail in each section.

Table 11
Descriptive Statistics of Alignment with Constructs

Group	Number of Items	n	Min	Max	Median	M	SD
Programmatic Structure							
Students	5	184	2.00	5.00	3.556	3.069	.646
Alumni	5	112	1.00	4.00	3.200	3.119	.536
Mentors	5	19	2.60	4.00	3.400	3.316	.418
Oversight							
Students	2	175	1.00	5.00	3.000	3.011	.676
Alumni	2	108	1.50	5.00	3.000	3.102	.732
Mentors	3	18	2.00	4.00	2.833	3.019	.631
Integration into Existing Medical Education Curriculum							
Students	4	184	1.25	4.50	3.250	3.133	.749
Alumni	4	112	1.50	4.50	3.250	3.138	.672
Mentors	4	19	1.75	4.25	3.750	3.461	.769
Guided Matching Process							
Students	4	184	1.00	5.00	3.000	3.071	.752
Alumni	4	112	1.00	4.00	3.000	3.116	.613
Mentors	4	19	2.50	4.00	3.250	3.197	.405
Training							
Students	9	184	2.00	5.00	3.556	3.435	.513
Alumni	9	112	1.00	4.00	3.444	3.418	.505
Mentors	13	19	2.92	3.92	3.615	3.533	.330

n = number of respondents; Min = Observed minimum response; Max = Observed maximum response; M = mean; SD = Standard deviation

Programmatic Structure

With programmatic structure, a school provides the clear goals and focus for the mentoring program. Understanding the importance of mentoring and to further emphasize it within the curriculum, the school also provides protected time for mentoring activities. As can be seen for programmatic structure (shown in Table 12 below), the mean for mentors was the highest (M = 3.316), followed by alumni (M = 3.119) and then students (M = 3.069). The mentor group had the lowest variance of responses (SD = .418).

Table 12
Programmatic Structure

Group	Number of Items	n	Min	Max	Median	M	SD
			Programmatic Structure				
Students	5	184	2.00	5.00	3.556	3.069	.646
Alumni	5	112	1.00	4.00	3.200	3.119	.536
Mentors	5	19	2.60	4.00	3.400	3.316	.418

n = number of respondents; Min = Observed minimum response; Max = Observed maximum response; M = mean; SD = Standard deviation

Table 13 below separates the construct of programmatic structure into five separate items, measuring such values as developing expectations for the mentoring relationship, having enough resources, and having protected time to meet. Protected time means establishing time within a faculty member's workday or the student's curricular schedule to provide mentoring, instead of trying to find time to fit it in on top of other responsibilities. The first two columns – developing plans to meet specific career and academic goals and establishing expectations for the mentoring relationship had higher case numbers because these two items were near the beginning of the survey instrument, meaning if the participant did not complete the survey, they typically finished the first set of questions.

For mentors, making time to meet had the highest mean (M = 3.72) and having protected time to meet was the lowest (M = 2.89). Students and alumni had similar means reported. For students, the item regarding making time to meet, and the item concerning the school recognizing the importance and value of mentoring had an equal mean (M = 3.31). For students, the item establishing expectations had the lowest mean (M = 2.85). For alumni, similar to the student group, making time to meet had the highest mean (M = 3.42), followed by the school recognized the importance and value of mentoring (M = 3.35). The item establishing expectations had the lowest mean for alumni (M = 2.75).

Table 13
Programmatic Structure Construct Items

	Programmatic Structure				
	Develop plan to meet specific academic and career goals	Establish expectations for mentoring relationship	Making time to meet	School recognized the importance and value of mentoring	Protected and enough time to meet and achieve mentoring goals
			Mentors		
Cases	19	19	18	18	18
Mean	3.16	3.32	3.72	3.39	2.89
Median	3.00	3.00	4.00	4.00	3.00
Std. Deviation	0.688	0.582	0.461	0.916	0.963
Minimum	2	2	3	1	1
Maximum	4	4	4	4	4
			Students		
Cases	183	184	175	175	175
Mean	2.95	2.85	3.31	3.31	2.96
Median	3.00	3.00	3.00	3.00	3.00
Std. Deviation	1.023	1.013	0.793	0.815	0.925
Minimum	1	1	1	1	1
Maximum	5	5	5	5	5
			Alumni		
Cases	112	111	109	109	109
Mean	3.04	2.75	3.42	3.35	3.14
Median	3.00	3.00	3.00	3.00	3.00
Std. Deviation	0.805	0.836	0.549	0.672	0.713
Minimum	1	1	2	2	1
Maximum	5	5	4	4	5

Another concept related to programmatic structure that was explored in this construct was the idea of mentor accessibility. Accessibility refers to how easily a mentee could schedule a meeting with a mentor, how available the mentor was for guidance, and the ease with which a mentee could contact their mentor. For this item, eight mentor characteristics were presented, and respondents were asked to rate them in order of importance, with one being most important and eight being least important. As can be seen in Table 14, 71 students, 28 alumni and nine mentors found accessibility to be the most important or second most important characteristic a

mentor should possess. The other seven mentor characteristics will be reported under their correlating construct.

Table 14
Accessibility Mentor Characteristics

Rank Order of Importance	Students	Alumni	Mentors	Total
1 (most important)	27	13	6	46
2	44	15	3	62
3	22	29	4	55
4	35	23	1	59
5	23	11	2	36
6	17	7	0	24
7	3	5	1	9
8 (least important)	2	3	0	5
	173	106	17	296

Oversight

Oversight in the framework means setting the culture for the program (Tan et al., 2018). This construct refers to providing measurable objectives as well as the resources to meet those objectives for mentoring. Table 15 shows the overall ratings for oversight. Alumni had the highest mean in this category (M = 3.102), followed by mentors (M = 3.019), and then students (M = 3.011). Of the five constructs, oversight had the lowest mean for mentors.

Table 15
Oversight

Construct	Number of Items	n	Min	Max	Median	M	SD
			Oversight				
Students	2	175	1.00	5.00	3.000	3.011	.676
Alumni	2	108	1.50	5.00	3.000	3.102	.732
Mentors	3	18	2.00	4.00	2.833	3.019	.631

n = number of respondents; Min = Observed minimum response; Max = Observed maximum response; M = mean; SD = Standard deviation

Table 16 shows the ratings for individual items within the oversight construct. The question regarding school environment was only asked of mentors. Fostering a mentoring environment that is conducive for an effective relationship is important more in the mentor realm as they provide long term continuity in the organization and culture (Low et al., 2018). If this culture persists, faculty are more encouraged to mentor if they perceive it to be essential to their role as important leaders in the academic community (Low et al., 2018).

All three groups had similar results for each item mean. Mentors, alumni, and students had higher means for resources than for measurable objectives. For resources, alumni had the highest mean (M = 3.35), followed by mentors (M = 3.33) and students (M = 3.25). For measurable objectives, alumni again had the highest mean (M = 2.85), followed by students (M = 2.77) and mentors (M = 2.50). The mean regarding a conducive school environment was 3.22 for mentors.

Table 16
Oversight Construct Items

	Oversight		
	Resources necessary for a successful mentoring relationship	Measurable objectives and oversight for mentoring	School environment conducive for development of successful mentoring
	Mentors		
Cases	18	18	18
Mean	3.33	2.50	3.22
Median	3.00	2.00	3.00
Std. Deviation	0.594	0.786	0.878
Minimum	2	1	1
Maximum	4	4	4
	Students		
Cases	175	175	
Mean	3.25	2.77	
Median	3.00	3.00	
Std. Deviation	0.746	0.955	
Minimum	1	1	
Maximum	5	5	
	Alumni		
Cases	109	108	
Mean	3.35	2.85	
Median	3.00	3.00	
Std. Deviation	0.750	0.984	
Minimum	1	1	
Maximum	5	5	

Integration into Existing Medical Education Curriculum

Integration into the existing medical education curriculum revolves around making mentoring part of the everyday at the institution – having mentors integral to helping students reach both career and academic goals. Table 17 below shows that mentors had a higher mean in this construct (M = 3.980) than either students (M=3.421) or alumni (M=3.337).

Table 17
Integration into Medical Education Curriculum

Group	Number of Items	n	Min	Max	Median	M	SD
Integration into Existing Medical Education Curriculum							
Students	4	173	1.83	5.17	3.500	3.421	.632
Alumni	4	106	1.50	5.17	3.333	3.337	.648
Mentors	4	17	2.83	4.83	4.000	3.980	.475

n = number of respondents; Min = Observed minimum response; Max = Observed maximum response; M = mean; SD = Standard deviation

Table 18 below shows the individual items that made up the integration construct. The first two items, supporting specialty choice and help with the residency application process center around the process of choosing a specialty and the process for applying to residency programs (i.e. developing a curriculum vitae, writing a personal statement, preparing for the interview process, etc.). Students had the highest recorded mean in both items, with a mean of 3.77 for supporting specialty choice and a mean of 3.52 for help with residency application process.

The final item, reasons to meet, was a multi-response question where respondents could select the reasons students and alumni met with a mentor (or why mentors were contacted for meetings). This column showed the average number of reasons a respondent chose to meet with a mentor, or that a mentor indicated a student chose to meet with him/her. The specific reasons are presented in Table 19 below.

Table 18
Integration into Medical Education Curriculum Construct Items

Integration into Medical Education Curriculum				
	Support specialty choice	Help with Residency Application Process	Integral to reaching academic & career goals	Reason to Meet – academic, personal, research, extracurricular activities, residency, specialty choice
		Mentors		
Cases	19	19	19	19
Mean	3.53	3.32	3.21	3.790
Median	3.00	3.00	3.00	4.00
Std. Deviation	0.612	1.108	0.855	2.123
Minimum	3	1	2	0
Maximum	5	5	5	6
		Students		
Cases	184	184	184	184
Mean	3.77	3.52	2.90	2.348
Median	4.00	3.00	3.00	2.00
Std. Deviation	0.777	1.051	1.016	1.721
Minimum	1	1	1	0
Maximum	5	5	5	6
		Alumni		
Cases	112	112	112	112
Mean	3.54	3.29	3.04	2.670
Median	4.00	3.00	3.00	2.50
Std. Deviation	0.613	.767	0.832	1.467
Minimum	1	1	1	0
Maximum	5	4	5	6

As previously stated, the final item, reasons to meet, was a multi-response question where respondents could select the reasons students and alumni met with a mentor (or why mentors were contacted for meetings). This item is explored further in Table 19 below. The most selected reason was residency application and the match process (where students aim to match with a residency program they have applied to and interviewed with) which made up 72.7% of all cases. This was followed by specialty choice at 52.1% and academic concerns at 49.5%. As this was a multiple selection item, percentages could add up to more than 100%.

Table 19
Descriptive Statistics for Meeting Reasons

Reason for Meeting	Mentors	Students	Alumni	Total	Percent of All Cases
Academic Concerns	14	88	54	156	49.5%
Information on Extracurricular Activities	9	46	31	86	27.3%
Personal Concerns	11	29	15	55	17.5%
Research Concerns	12	57	44	113	35.9%
Residency Application/Match Process	15	122	92	229	72.7%
Specialty Choice	11	90	63	164	52.1%

This question also contained an "other" selection, where respondents could write in a reason to meet with their mentor if it was not an offered choice. For students, of the 17 who wrote in an option, 15 said the only reason they met was because it was required. One said they met for curriculum vitae review, and one wrote N/A. For alumni, there was only one additional response, and the respondent indicated they met with their mentor for emotional support.

Two additional items that were explored in the integration into the medical education curriculum construct was the concept of a mentor's expertise in his/her field and how supportive a mentor was towards their mentee. These two items were a part of the eight mentor

characteristics presented, where respondents were asked to rate them in order of importance, with one being most important and eight being least important. As can be seen in Table 20, there appeared to be an even split between respondents who found expertise in the field to be an important characteristic or the least important characteristic a mentor should possess. Thirty-five students, 20 alumni and no mentors found this to be the most important characteristic and 38 students, 14 alumni and 6 mentors found expertise in the field to be the least important characteristic a mentor should possess.

Table 20 also demonstrates the importance of being supportive as a mentor as demonstrated by mentors, students, and alumni. For students and alumni, being supportive was the most important or second most important characteristic a mentor could possess. The mentor group appeared to have more varied responses in this category.

Table 20
Expertise in the Field and Supportive Mentor Characteristics

Expertise in the Field				
Rank Order of Importance	Students	Alumni	Mentors	Total
1 (most important)	35	20	0	55
2	16	15	0	31
3	17	15	2	34
4	16	10	1	27
5	14	9	1	24
6	15	12	4	31
7	22	11	3	36
8 (least important)	38	14	6	58
	173	106	17	296

Supportive				
Rank Order of Importance	Students	Alumni	Mentors	Total
1 (most important)	38	23	2	63
2	40	26	3	69
3	29	15	3	47
4	16	14	6	36
5	21	18	3	42
6	16	4	0	20
7	9	6	0	15
8 (least important)	4	0	0	4
	173	106	17	296

Guided Matching Process

Guided matching process refers to assigning mentors and mentees in a more thoughtful manner as opposed to randomly. This construct involves selecting mentors that can provide emotional support as well as assigning students to mentors with whom they have something in common.

Table 21 shows the three groups had similar means, with mentors at 3.197, alumni at 3.116 and students at 3.071. Next to the oversight construct, this was the second lowest rated construct in terms of means out of the five constructs.

Table 21
Guided Matching Process

Group	Number of Items	n	Min	Max	Median	M	SD
			Guided Matching Process				
Students	4	184	1.00	5.00	3.000	3.071	.752
Alumni	4	112	1.00	4.00	3.000	3.116	.613
Mentors	4	19	2.50	4.00	3.250	3.197	.405

n = number of respondents; Min = Observed minimum response; Max = Observed maximum response; M = mean; SD = Standard deviation

Table 22 below shows the individual items that make up the construct. There were four items analyzed in this construct. The item having a lot in common had the lowest mean for all three groups, with alumni at 2.79, students at 2.82 and mentors at 2.89. The highest mean was in the item regarding being respectful and non-judgmental, which refers to how mentees felt about their mentors being respectful and non-judgmental towards them, and how mentors felt they acted in this capacity. The mean for students was 3.67, mentors were 3.61 and alumni were 3.54 for this item. The final item measured how respondents felt their mentor or mentee was assigned to them, and whether it had been done in a way to encourage a successful mentoring relationship. Alumni had the highest mean in this item at 3.16.

Table 22
Guided Matching Process Construct Items

	Guided Matching Process			
	Having a lot in common	Emotional Support	Respect and Non-Judgmental	Mentor/mentee assigned in a way to encourage success
	Mentors			
Cases	18	19	18	18
Mean	2.89	3.37	3.61	2.94
Median	3.00	3.00	4.00	3.00
Std. Deviation	0.963	0.496	0.502	1.056
Minimum	2	3	3	1
Maximum	5	4	4	5
	Students			
Cases	175	184	175	175
Mean	2.82	3.08	3.67	2.77
Median	3.00	3.00	4.00	3.00
Std. Deviation	0.987	1.162	0.589	1.315
Minimum	1	1	1	1
Maximum	5	5	5	5
	Alumni			
Cases	109	112	108	108
Mean	2.79	3.02	3.54	3.16
Median	3.00	3.00	4.00	3.00
Std. Deviation	0.794	0.838	0.618	1.006
Minimum	2	1	2	1
Maximum	5	5	5	5

Other items that were explored around guided matching process was the idea of sharing common interests and common values between mentors and mentees. Again, for this item, eight mentor characteristics were presented, and respondents were asked to rate them in order of importance, with one being most important and eight being least important. As can be seen in Table 23, having common interests was ranked as the least important characteristic for students, alumni, and mentors with a total of 91 out of 296. Additionally, having common values was also ranked low, with most students ranking it five or below, 28 alumni ranking it number seven, and eight mentors ranking it number seven as well.

Table 23
Common Interests/Values Mentor Characteristics

Common Interests				
Rank Order of Importance	Students	Alumni	Mentors	Total
1 (most important)	8	2	1	11
2	2	3	0	5
3	8	3	0	11
4	15	12	1	28
5	13	16	0	29
6	31	17	4	52
7	47	18	4	69
8 (least important)	49	35	7	91
	173	106	17	296
Common Values				
Rank Order of Importance	Students	Alumni	Mentors	Total
1 (most important)	10	1	0	11
2	4	5	0	9
3	18	10	0	28
4	19	9	1	29
5	39	15	1	55
6	32	23	5	60
7	30	28	8	66
8 (least important)	21	15	2	38
	173	106	17	296

Training

The construct of training revolves around guidance mentors and mentees are provided before beginning a mentoring relationship. Table 24 below shows the means for each group in the training construct. The mean for mentors was the highest (M = 3.533), followed by students (M = 3.435) and alumni (M = 3.418).

Table 24
Training Construct

Group	Number of Items	n	Minimum	Maximum	Median	M	SD
			Training				
Students	9	184	2.00	5.00	3.556	3.435	.513
Alumni	9	112	1.00	4.00	3.444	3.418	.505
Mentors	13	19	2.92	3.92	3.615	3.533	.330

n = number of respondents; Min = Observed minimum response; Max = Observed maximum response; M = mean; SD = Standard deviation

Table 25 shows the individual items in the training construct, which were the most of any construct. Four items were specific to the mentor group – whether training was provided, if mentees were communicative and receptive to feedback, if mentees were respectful of the mentor's time, and if mentors found mentees were responsible for their own learning. The lowest mean for all three groups was in the item regarding whether mentors checked in with mentees and were concerned with mentees meeting their goals.

Table 25
Training Construct Items

	Training												
	Answer Questions Quickly & Completely	Checks In; Concerned with Meeting Goals	Good Listener & Honest	Committed to Helping Mentees Succeed	Trustworthy Discreet	Approachable & Friendly	Role Model	Empathetic	Providing Feedback & Support	Provided Training	Mentee Communicates Receptive to Feedback	Mentees Respect Mentor Time	Mentees Responsible for Own Learning
						Mentors							
Cases	19	19	19	18	19	19	19	18	18	17	17	17	17
Mean	3.79	3.11	3.74	3.83	3.79	3.74	3.63	3.72	3.72	3.00	3.18	3.35	3.24
Median	4.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.00	3.00	3.00	3.00
Std. Deviation	0.419	0.567	0.452	0.383	0.419	0.452	0.597	0.461	0.461	0.707	0.529	0.606	0.562
Minimum	3	2	3	3	3	3	3	3	3	2	2	2	2
Maximum	4	4	4	4	4	4	5	4	4	4	4	4	4
						Students							
Cases	184	184	184	175	184	184	184	175	175				
Mean	3.33	2.64	3.63	3.57	3.67	3.68	3.16	3.63	3.66				
Median	3.00	3.00	4.00	4.00	4.00	4.00	3.00	4.00	4.00				
Std. Deviation	.844	1.092	0.597	0.648	0.595	0.562	1.074	0.646	0.613				
Minimum	1	1	2	2	2	2	1	2	2				
Maximum	5	5	5	5	5	5	5	5	5				
						Alumni							
Cases	106	106	106	103	106	106	106	103	103				
Mean	3.37	2.97	3.48	3.50	3.56	3.58	3.31	3.56	3.44				
Median	3.00	3.00	4.00	4.00	4.00	4.00	3.00	4.00	3.00				
Std. Deviation	0.622	0.810	0.651	0.592	0.649	0.567	0.809	0.621	0.572				
Minimum	1	1	1	2	1	1	1	2	2				
Maximum	5	5	5	5	5	4	5	5	4				

Table 26 below shows how students, alumni and mentors rated the mentor characteristics of flexibility, approachability, and trustworthiness. These items were out of eight mentor characteristics that respondents could rank in order of one (most important) to eight (least important). Flexibility was rated as least important for students and alumni, with 48 out of 173 students and 31 of 106 alumni rating it as eight. Most mentors did not rate it as lowly, with seven out of 17 rating flexibility as a five out of eight. No group had any respondent rate flexibility as number one. Approachability was rated very highly by both students and mentors, with both groups having many respondents in the top 3 (119 out of 173 students and 62 out of 106 alumni respondents). Mentor respondents also rated it highly, with 11 out of 17 rating it as number two. And finally, for trustworthiness, there was a more even split for students and alumni, with most of the answers falling in the top categories but nothing with a huge majority. For mentors, seven out of 17 mentor respondents rated it as number one.

Table 26
Flexibility, Approachability, and Trustworthiness Mentor Characteristics

Flexibility

Rank Order of Importance	Students	Alumni	Mentors	Total
1 (most important)	0	0	0	0
2	3	0	0	3
3	5	2	1	8
4	11	8	3	22
5	26	13	7	46
6	36	24	4	64
7	44	28	0	72
8 (least important)	48	31	2	81
	173	106	17	296

Approachability

Rank Order of Importance	Students	Alumni	Mentors	Total
1 (most important)	30	19	1	50
2	41	26	11	78
3	48	17	2	67
4	25	19	2	46
5	16	14	1	31
6	10	8	0	18
7	3	2	0	5
8 (least important)	0	1	0	1
	173	106	17	296

Trustworthy

Rank Order of Importance	Students	Alumni	Mentors	Total
1 (most important)	25	28	7	60
2	23	16	0	39
3	26	15	5	46
4	36	11	2	49
5	21	10	2	33
6	16	11	0	27
7	15	8	1	24
8 (least important)	11	7	0	18
	173	106	17	296

Research Question Two

The second research question looked at the perceptions of mentoring between medical students and alumni, medical students and mentors, and mentors and alumni. Additionally, perceptions between each of the student years (i.e. first through fourth years of currently enrolled students) were also reviewed. The data collected were analyzed utilizing an independent samples t-test to see if there were statistically significant differences between the mean for each of the constructs between students and alumni, students and mentors, and alumni and mentors as divided by construct (i.e. programmatic structure, oversight, integration into the medical education curriculum, guided matching process and training). As a reminder, each construct is composed of how a group of certain items on the questionnaire were answered by each group. The level of significance was set at $p < .05$.

Table 27 below shows a comparison of means between students and alumni. The difference in the means between students and alumni did not reach a level of statistical significance in any of the five groups. There also did not appear to be notable numerical differences in the means between both groups either as can be seen in the differences between means column (M_{diff}).

Table 27
Independent Samples T-Test for Students and Alumni

Construct	Students				Alumni							
	Mean	SD	Min	Max	Mean	SD	Min	Max	M_{diff}	*df*	*t*	*p*
Programmatic Structure	3.069	.646	2.00	5.00	3.119	.536	1.00	4.00	.050	267.233	-.715	.475
Oversight	3.011	.676	1.00	5.00	3.102	.732	1.50	5.00	.091	281.000	-1.059	.291
Integration	3.133	.749	1.25	4.50	3.138	.672	1.50	4.50	.005	294.000	-.061	.952
Guided Matching Process	3.071	.752	1.00	5.00	3.116	.613	1.00	4.00	.045	270.066	-.566	.572
Training	3.435	.513	2.00	5.00	3.418	.505	1.00	4.00	.017	294.000	.282	.778

SD = Standard deviation; Min = Observed minimum response; Max = Observed maximum response; M_{diff} = Mean differences; df = degree of freedom

Table 28 below shows a comparison of means between students and mentors. The means were found to be statistically different in two areas. The first area was the programmatic structure construct between students (M = 3.069, SD = .646) and mentors (M = 3.316, SD = .418); t (-2.305), p = .029. The second area was the training construct between students (M = 3.435, SD = .513) and mentors (M = 3.533, SD = .330); t (-2.671), p = .013. Thus, mentors having a higher mean and therefore more alignment in the areas of programmatic structure and training constructs was statistically significant.

Table 28
Independent Samples T-Test for Students and Mentors

Construct	Students				Mentors							
	Mean	SD	Min	Max	Mean	SD	Min	Max	M_{diff}	*df*	*t*	*p*
Programmatic Structure	3.069	.646	2.00	5.00	3.316	.418	2.60	4.00	.247	27.810	-2.305	.029
Oversight	3.011	.676	1.00	5.00	3.019	.631	2.00	4.00	.008	191	.574	.567
Integration	3.133	.749	1.25	4.50	3.461	.769	1.75	4.25	.328	201	-1.809	.072
Guided Matching Process	3.071	.752	1.00	5.00	3.197	.405	2.50	4.00	.127	32.733	-1.172	.250
Training	3.435	.513	2.00	5.00	3.533	.330	2.92	3.92	.098	26.446	-2.671	.013

SD = Standard deviation; Min = Observed minimum response; Max = Observed maximum response; M_{diff} = Mean differences; df = degree of freedom

Table 29 below shows a comparison of means between alumni and mentors. Here the means were found to be statistically different only in the construct of training between alumni (M = 3.418, SD = .505) and mentors (M = 3.533, SD = .330); t (-2.724), p = .010. Thus, mentors having a higher mean and therefore more alignment in the training construct was statistically significant.

Table 29
Independent Samples T-Test for Alumni and Mentors

Construct	Alumni				Mentors							
	Mean	SD	Min	Max	Mean	SD	Min	Max	M_{diff}	*df*	*t*	*p*
Programmatic Structure	3.119	.536	1.00	4.00	3.316	.418	2.60	4.00	.197	129	-1.523	.130
Oversight	3.102	.732	1.50	5.00	3.019	.631	2.00	4.00	.083	124	1.020	.309
Integration	3.138	.672	1.50	4.50	3.461	.769	1.75	4.25	.323	129	-1.892	.061
Guided Matching Process	3.116	.613	1.00	4.00	3.197	.405	2.50	4.00	.081	129	-.557	.579
Training	3.418	.505	1.00	4.00	3.533	.330	2.92	3.92	.115	31.820	-2.724	.010

SD = Standard deviation; Min = Observed minimum response; Max = Observed maximum response; M_{diff} = Mean differences; df = degree of freedom

Finally, Table 30 below shows independent samples t-test between mentors and each year of currently enrolled students – M1 (first year students), M2 (second year students), M3 (third year students) and M4 (fourth year students). Between M1 students and mentors there was no statistically significant differences between means in any of the five constructs.

Between M2 students and mentors, statistically significant differences between means were found in three of the five constructs. The first area was the programmatic structure construct between second year students (M = 2.918, SD = .583) and mentors (M = 3.316, SD = .418); t (-2.653), p = .010. The second area was the integration into the medical education curriculum construct between second year students (M = 3.013, SD = .686) and mentors (M = 3.461, SD = .769); t (-2.242), p = .029. The third area was the training construct between second year students (M = 3.345, SD = .466) and mentors (M = 3.533, SD = .330); t (-2.993), p = .004.

Between M3 students and mentors there was no statistically significant differences between means in any of the five constructs. Finally, between M4 students and mentors there were statistically significant differences in means in two out of the five constructs. The first area was the programmatic structure construct between fourth year students (M = 3.005, SD = .733) and mentors (M = 3.316, SD = .418); t (-2.128), p = .038. The second area was the integration into the medical education curriculum construct between fourth year students (M = 2.926, SD = .803) and mentors (M = 3.461, SD = .769); t (-2.455), p = .017.

Table 30
Comparison of Means between Mentors and Student Years

Construct	Students		Mentors					
	Mean	SD	Mean	SD	M_{diff}	*df*	*t*	*p*
				M1 Students				
Programmatic Structure	3.247	.541	3.316	.418	.069	64	-.498	.620
Oversight	3.149	.675	3.019	.631	.130	63	1.290	.202
Integration	3.512	.693	3.461	.769	.051	64	.258	.798
Matching Process	3.335	.692	3.197	.405	.138	55.419	1.004	.320
Training	3.489	.519	3.533	.330	.044	48.348	-1.673	.1010
				M2 Students				
Programmatic Structure	2.918	.583	3.316	.418	.398	56	-2.653	.010
Oversight	3.051	.523	3.019	.631	.032	55	.875	.385
Integration	3.013	.686	3.461	.769	.448	56	-2.242	.029
Matching Process	2.942	.635	3.197	.405	.255	51.775	-1.853	.070
Training	3.345	.466	3.533	.330	.188	45.600	-2.993	.004
				M3 Students				
Programmatic Structure	3.084	.639	3.316	.418	.232	51.028	-1.698	.096
Oversight	2.977	.715	3.019	.631	.042	59	.316	.753
Integration	3.157	.673	3.461	.769	.304	60	-1.567	.122
Matching Process	3.099	.627	3.197	.405	.098	51.581	-.739	.463
Training	3.486	.447	3.533	.330	.047	60	-1.633	.108
				M4 Students				
Programmatic Structure	3.005	.733	3.316	.418	.311	56.101	-2.128	.038
Oversight	2.875	.756	3.019	.631	.144	60	-.210	.834
Integration	2.926	.803	3.461	.769	.535	61	-2.455	.017
Matching Process	2.977	.694	3.197	.405	.220	55.385	-1.573	.121
Training	3.450	.514	3.533	.330	.083	61	-1.740	.087

Summary

This chapter presented the results of the statistical analysis performed on the data. This included a demographic analysis of the sample and an analysis of constructs on each of the instruments – mentor, student, and alumni. Results from the first question revealed that overall, there was no group (mentors, students, or alumni) that had a mean of less than 3.0 in any construct (and the highest score on any item was 4 – *strongly agree*). The training construct appeared to have the most alignment with all three groups (mentors M = 3.533, alumni M = 3.418 and students M = 3.435). The oversight construct appeared to have the least alignment, again with each of the groups (mentors M = 3.019, alumni M = 3.102, and students M = 3.011).

Research question two looked at the means between each of the groups to see if they were statistically different. A comparison of means between students and alumni found no statistically significant differences in any of the five constructs. Between mentors and currently enrolled students, mentors were found to have a statistically significant higher mean and therefore more alignment in the areas of programmatic structure and training constructs. For mentors and alumni, again mentors were found to have a statistically significant higher mean and more alignment in the area of training. Within each class, both M2 students and M4 students were found to have statistically significant differences in means with mentors with certain constructs.

The next chapter will analyze the data considering the literature review and a discussion of the implications that came from the study. These implications for practice are provided to possible allow for improvement to the mentoring program at this school. Additionally, limitations of the current study are discussed, and future research recommendations are provided.

CHAPTER FIVE – DISCUSSION

In Chapter Four, an analysis of the data and presentation of the results were reported. This chapter contains a summary of the study, discussions of findings for research questions one and two, implications for practice, recommendations for future research, limitations, and conclusions. The implications for practice and recommendations for future research are provided to allow for more understanding of effective mentoring practices and methods to potentially improve the mentoring program at this institution.

Summary of the Study

In the United States, all allopathic (i.e. schools granting M.D. degrees) are required to adhere to national accreditation standards set by the Liaison Committee on Medical Education (LCME) (Association of American Medical Colleges, 2018). One of these accreditation standards calls for schools to provide effective academic and career advising through the mentoring of medical students. Through a deeper understanding of mentoring relationships, more effective development and mentoring can take place (Sng et al., 2017). However, a mix of factors makes determining mentoring best practices difficult. Program structures run the gamut from formal to informal, and the selection and training of mentors vary widely across medical schools (Fornari et al., 2014). Additionally, medical schools in the United States are facing a new generation of medical students. When it comes to interactions in the workplace, the millennial generation is characterized as struggling with conflict resolution and looking for specific direction and feedback (Lourenco & Cronan, 2017). The literature herein supported the need to investigate perceptions of mentoring practices with the intent of improving services to students. The determinations found in this study could assist medical schools in assigning

mentors for more successful mentoring relationships, as well as assisting faculty in developing effective advising qualities. Students could also benefit by better understanding the mentoring process which in turn could improve both their readiness to be mentored and their ability to be an active participant in the mentoring relationship.

The problem studied was the lack of accepted standards regarding mentoring for medical students and exploring best practices. This followed primarily a combined mentoring framework of Tan and colleagues regarding mentoring of medical students based on the flexibility of mentors and structure of the program (Tan et al., 2018), as well as current insights into medical student mentoring provided by Nimmons and colleagues (Nimmons et al., 2019). The purpose of this study was to determine participant perceptions of their mentoring experiences and alignment with the qualities of the career and academic advising and mentoring standards identified by the literature.

Conceptual Framework

The conceptual framework addressed the overarching best practices for effective mentoring. The work of Tan and colleagues in 2018 described two overall components of an effective mentoring framework – flexibility and structure. The mentor needs to be flexible to meet the changing and specific needs of mentees (Tan et al., 2018). The relationship changes as the mentee goes through the curriculum, and as the relationship evolves, mentoring also needs to evolve within the accepted structure set by the school (Tan et al., 2018). Five framework components, referred to as pillars, include: programmatic structure, oversight, integrating mentoring with existing curricula, employing a guided matching process, and recommendations for mentor and mentee training (Tan et al., 2018).

Research Questions

These research questions were developed to ensure that mentoring practices at the target school for this research aligned with standards recommended in the literature and to continually improve mentoring experiences for both medical students and mentors.

Research Question One: To what extent do the perceptions of mentoring practices by students and mentors align with practice standards recommended by the literature?

Research Question Two: How do the perceptions of mentoring align between medical students or alumni and mentors?

a. How do the perceptions of mentoring align between first year students and mentors?

b. How do the perceptions of mentoring align between second year students and mentors?

c. How do the perceptions of mentoring align between third year students and mentors?

d. How do the perceptions of mentoring align between fourth year students and mentors?

e. How do the perceptions of mentoring differ between alumni and enrolled students?

The population for this study consisted of medical school students that were currently enrolled in an allopathic medical school located in the southeastern United States, as well as alumni from seven graduating classes (from 2013 – 2019), for a total of 609 alumni and 488 enrolled students at the time of the study. The population also included 39 faculty mentors. The final sample included 184 students, 112 alumni and 19 mentors with a total response rate of 27.73%.

Once the data were inputted into the IBM SPSS software, data analysis were performed on the demographic data. Demographic information that was collected for mentees included age (and this was captured as age upon graduation for alumni participants), gender, current year (first through fourth for currently enrolled students) or graduation year (for alumni). For mentors,

demographic information collected included gender and length of time mentoring both within and outside of the mentoring program. Each construct was measured utilizing a group of certain items on the questionnaire, and descriptive statistics including the overall mean, median and standard deviation were reported per construct (i.e. programmatic structure, oversight, guided matching process, integration into the medical education curriculum, and training). Alignment was measured as the mean of the responses to each of the constructs.

For the second research question, the constructs per group (mentors, students and alumni) were analyzed utilizing an independent sample t-test to see if there were statistically significant differences between the mean for answers provided by students and alumni, answers provided by students and mentors, and answers provided by alumni and mentors. An independent samples t-test was also run between mentors and first year students, mentors and second year students, mentors and third year students and mentors and fourth year students.

Discussion of Research Question One

The first research question focused on the alignment between mentors, students and alumni and the constructs that made up the mentoring framework. When reporting the results, there was no group (mentors, students, or alumni) that had a mean of less than three in any of the five constructs. Utilizing the assumption that a higher mean demonstrated more alignment (agreement) with a construct, overall, there appeared to be alignment with the five constructs of the framework. Each construct will be addressed separately below.

Programmatic Structure

The concept of programmatic structure in mentoring focuses on how the organization (school) sets up the mentoring program. There needs to be clear goals and a focus for what

mentoring is meant to achieve (Tan et al., 2018). An institution needs to provide mentors with clear expectations and those resources necessary to effectively mentor a student (Nimmons et al., 2019).

The school is also responsible for the development of the mentoring environment. For example, protected time needs to be provided for mentoring activities (Nimmons et al., 2019). Faculty and students have multiple responsibilities within their day, and time needs to be carved out for mentoring instead of merely being added on top of everything else. For mentors, making time to meet had the highest mean at 3.72 and having protected time to meet was the lowest at 2.89. This might indicate that mentors made the most of trying to meet with mentees when needed, but there did not seem to be enough time allotted to accomplish these meetings. There seemed to be agreement with students (M = 3.31) and alumni (M = 3.42) regarding mentors being able to make time to meet. This was also seen in the rating of the mentor characteristic, accessibility. Seventy-one students, 28 alumni and nine mentors found accessibility to be the most important or second most important characteristic a mentor should possess.

Having established goals and expectations is also another important component of programmatic structure. Providing expectations helps define the relevance of participating within the mentoring program (Newby & Heide, 2013). This was the lowest rated item in this category for both students (M = 2.85) and alumni (M = 2.75). Another item that was rated somewhat lower than the rest was developing a plan to meet specific career and academic goals (students M = 2.95, alumni M = 3.04). This may be attributable to this generation, as millennials tend to expect faculty to provide clear expectations and learning outcomes, as well as provide constant feedback (Borges et al., 2010). Mentors rated this item with a mean of 3.32, and

perhaps there is a disconnect with how mentors perceive they are establishing expectations and how mentees are receiving this information.

Oversight

Where programmatic structure sets the framework for the mentoring program, oversight focuses on developing the culture of the school's mentoring program and knowing the intricacies of what is happening within the program. For example, with appropriate oversight, the school would know the different qualities and strengths of each mentor to better guide the mentoring relationship which would then impact matching (Low, Toh, Y.L., Teo, Toh, Y.P. & Krishna, 2018). Not only is the school responsible for developing the goals of mentoring, they also need to instill the values and responsibilities of mentors and mentees (Tan et al., 2018). There should also be methods for evaluating mentoring for both mentors and mentees (Tan et al., 2018).

Out of all five constructs, oversight had the lowest means from all three groups – mentors (M = 3.019), students (M = 3.011) and alumni (M = 3.102). Mentees may feel that the school does not evaluate mentors and that students are unable to request a new mentor or provide feedback if they perceive the relationship is not working. Lower means were found in the item regarding having measurable objectives and oversight for mentoring with alumni having a mean of 2.85, followed by students at 2.77 and mentors at 2.50. Having the necessary resources had higher means in all three groups (mentors M = 3.33, students M = 3.25, alumni M = 3.35). This might mean that although mentors and mentees felt resources were available, they were unsure what resources were necessary as the school had not done as thorough a job in providing objectives for the mentoring relationship.

Mentors had a mean of 3.22 regarding the school environment being conducive to mentoring. This question concerns such things as providing mentor incentives or utilizing mentoring in the promotion and evaluation system for faculty within the school. When mentors feel the school environment is conducive for an effective relationship, it helps provide long term continuity in the organization and helps set the mentoring culture (Low et al., 2018). Establishing this culture will allow for more satisfied faculty mentors if they perceive it to be essential to their role as important leaders in the academic community (Low et al., 2018). With an effective mentoring culture, future mentors could also be easily recruited.

Integration into Existing Medical Education Curriculum

The Liaison Committee on Medical Education (LCME) requires medical schools to provide effective mentoring not only to help medical students achieve their goals, but also "…the school's medical education program objectives" (LCME, 2018, p. 18). Mentoring can play a role by supplementing the medical education curriculum, while at the same time helping students achieve their ultimate career goals. One of the qualities of mentoring in medical education is that it provides medical students a space to talk about things that may not be addressed elsewhere, like personal concerns or the experience of becoming a physician (Kalén et al., 2012). This could also include things like curricular concerns or issues with the program. Mentors can then provide critical feedback to administration on these types of issues that may not be apparent through other methods.

Mentors can also assist students with developing networks within the academic community and enhancing the mentees' visibility, with the personal side focusing on creating a safe space for mentees to share their thoughts and feelings (Sambunjak et al., 2009). Mentors

had a higher mean in this construct at 3.461 than either students (M=3.133) or alumni (M=3.138). As mentors for this program are also faculty members, perhaps mentors better understood how mentoring could be integrated into the curriculum, or what the goals of mentoring were. Both the student and alumni group had lower means in the item being integral to reaching academic and career goals (students M = 2.90, alumni M = 3.04). This might be due to some confusion on what the role of mentors should be, especially if there are already resources for academic support (such as peer tutors or an academic support department). Further evidence on this focus on career goals can also be seen below regarding how mentees felt about residency application support from their mentors.

With the individual items in this construct, supporting specialty choice revolves around the process of determining a specialty to apply for and being supported in that choice (in other words, a mentee might perceive their mentor is trying to convince them to choose a specific specialty or trying to dissuade them from applying for a competitive specialty). The process for applying to residency programs involves aiding with the residency application process, such as reviewing personal statements or perhaps writing a letter of recommendation. Students had the highest recorded mean in both items, with a mean of 3.77 for supporting specialty choice and a mean of 3.52 for help with the residency application process. The final item, reasons to meet, was a multi-response question where respondents could select the reasons students and alumni met with a mentor (or why mentors were contacted for meetings). The most selected reason was residency application and match process which made up 72.7% of all cases. This was followed by specialty choice at 52.1% and academic concerns at 49.5%. Perhaps more needs to be done to position mentors as an academic resource and not only a career resource. This might involve having mentors reach out to academically struggling students to provide resources.

Guided Matching Process

Guided matching process refers to assigning mentors and mentees in a more thoughtful manner as opposed to randomly. There is the possibility of a more successful relationship if complementary goals and needs are matched (Newby & Heide, 2013). The similarity can be in the alignment of values, similar goals in medicine, similar personalities, or similar career paths (Geraci & Thigpen, 2017). Having a guided matching process versus a random one allows for a better chance for similar mentors and mentees to be assigned (Newby & Heide, 2013). Of course, regardless of the method employed, not all matches are necessarily successful. Mentees should be able to provide feedback on their mentors and be allowed to end the mentoring relationship if it is not working (Tan et al., 2018). Next to oversight, this was the second lowest rated construct in terms of means out of the five constructs. The three groups had similar means, with mentors at 3.197, alumni at 3.116 and students at 3.071.

Interestingly, although literature shows that having similarities can help enhance the mentor relationship (Newby & Heide, 2013; Geraci & Thigpen, 2017), the item on the survey on having a lot in common had the lowest mean for all three groups, with alumni at 2.79, students at 2.82 and mentors at 2.89. The item regarding having common interests was also ranked as the least important characteristic for a mentor to possess for students, alumni, and mentors with a total of 91 out of 296. Additionally, having common values was also ranked low, with most students ranking it five or below, 28 alumni ranking it number seven, and eight mentors ranking it number seven as well. Perhaps with the millennial generation, as they are on average significantly younger than faculty members and are medical students and not physicians yet, they did not expect to necessarily have a lot in common, so other factors in the relationship became more important.

The highest mean was in the item on showing respect and being non-judgmental, which refers to how mentees felt about their mentors being respectful and non-judgmental towards them, and how mentors felt they acted in this capacity. The mean for students was 3.67, mentors were 3.61 and alumni were 3.54. Perhaps mentees were not as interested in how much they had in common with their mentors as to how their mentors treated them. This could help when it comes to matching mentors and mentees if the focus is on providing both groups with guidelines on being respectful and providing non-judgmental feedback.

Training

The construct of training included much more than just training mentors for their roles. Of course, with proper training mentor effectiveness can be enhanced and therefore improve mentee satisfaction (Sheri et al., 2019). But this construct involved much more than that. This construct also involved selecting the right type of mentor. The Association of American Medical Colleges (AAMC) calls for advisors who are empathetic, trustworthy, discreet, non-judgmental, and available (Careers in Medicine, 2019). Providing mentor training can help identify those individuals who may need supplemental training or who might have unattainable expectations (Newby & Heide, 2013).

This construct also involves some responsibility on the part of the mentee. Mentees need to be receptive to feedback and be an active contributor in the mentoring process (Low et al., 2018). There also needs to be a respect of the mentor's time and for mentees to keep up with meetings (Henry-Noel et al., 2018; Gisbert, 2017). Mentees need to take responsibility for the mentoring relationship as well as their own learning (Sambunjak et al., 2009; Gisbert, 2017; Sng

et al., 2017). For this construct, the means for mentors was the highest (M = 3.533), followed by students (M = 3.435) and alumni (M = 3.418).

For this construct, the individual item that had the lowest mean for mentors was regarding having been provided training as a mentor (M = 3.00). Although as mentioned previously the Associate or Assistant Dean of Students meet with new mentors, perhaps more interaction is needed between the school and mentors. More faculty development sessions could perhaps be implemented. Mentors might need an avenue to voice concerns about students or to work with other mentors on common issues they experience.

Students rated the item on having their mentor check in on them as the lowest item with a mean of 2.64. Similarly, alumni rated that item the lowest as well at 2.97. Again, this might be unique to this millennial generation, who prefer frequent interactions and multitasking (Waljee et al., 2018). Mentors rated this characteristic of checking in with mentees with a mean of 3.11, so they may have not perceived a concern with how often they were checking in with their mentees.

Flexibility was rated as the least important mentor characteristic for students and alumni, with 48 out of 173 student respondents rating it as eight, and 31 of 106 alumni respondents rating it as an eight as well. Most mentors did not rate it as lowly, with seven out of 17 rating flexibility as a five out of eight. No group had any respondent rate flexibility as number one. Approachability was rated very highly by both students and mentors, with both groups having rated it in the top three (119 out of 173 students and 62 out of 106 alumni respondents). Mentor respondents also rated it highly, with 11 out of 17 rating it as number two. This might mean that mentees found their mentors to be flexible already with their scheduling and how they approached the mentoring process, or that mentees needed mentors that they could turn to without hesitation and found that to be much more important.

Summary

When looking at the overall results of the survey, there appears to be above average alignment with the five constructs with all groups (mentors, alumni, and students). Mentors seem to have the most alignment, especially in the training construct. The mentor group had the highest reported mean in four out of the five constructs – programmatic structure (M=3.316), integration into the medical education curriculum (M=3.461), guided matching process (M=3.198) and training (M=3.533). Mentors perceived themselves to be approachable and friendly and concerned about their students. Mentors were viewed as accessible and approachable, which ranked as more important to students and alumni rather than having things in common. Respondents felt that the school provided resources, but not enough oversight when it comes to providing objectives for the mentoring program. When it comes to residency applications, students and alumni felt they were supported by mentors, but that more could be done when it came to reaching academic goals and being checked in on by a mentor.

Interestingly, each group also reported the highest mean and lowest mean for their groups in the same categories. Each group had the most alignment reported in the training construct (mentors M = 3.533, alumni M = 3.418, students M = 3.435). Each group had the lowest perceived alignment measured in the oversight construct (mentors M = 3.019, alumni M = 3.102, students M = 3.011).

Discussion of Research Question Two

It is interesting that there were no statistically significant differences between means in any of the five constructs between students and alumni. Even after being out of a medical school for some time, alumni still find the same things important for mentoring and characteristics of

their mentor. Between students and mentors there were two constructs that had statistically significant differences between means – training and programmatic structure. Having established goals and expectations is an important component of programmatic structure. Providing expectations helps define the relevance of participating within the mentoring program (Newby & Heide, 2013). This was the lowest rated item in this category for both students (M = 2.85) and alumni (M = 2.75). This may be attributable to this generation, as millennials tend to expect faculty to provide constant feedback (Borges et al., 2010). Mentors rated this item with a mean of 3.32, and perhaps there is a disconnect with how mentors perceive they are establishing expectations and how mentees are receiving this information. The same could be said about training, with the student mean (M = 3.435) lower than the mentor mean (M = 3.533). Mentors might perceive themselves to be approachable and friendly and committed to helping their mentee succeed, but there may be again a disconnect in how mentees are receiving this information.

Between alumni and mentors, only one construct had statistically significant differences – training. For mentors, their highest reported mean was in the item commitment to helping mentees succeed at 3.83. The lowest mean was regarding having been provided training as a mentor at 3.00. Students rated the item on having the mentor check in on them as the lowest item with a mean of 2.64. Similarly, alumni rated that item the lowest as well at 2.97. Again, this might be unique to this millennial generation, who prefer frequent interactions and multitasking (Waljee et al., 2018). Mentors rated this characteristic of checking in at 3.11 so perhaps they felt they were checking in sufficiently, or they were following the requirements of the program which did not call for frequent meetings between mentors and mentees.

Finally, between M1 students and mentors there was no statistically significant differences between means in any of the five constructs. This may be because M1 students may not have had enough time to interact with their mentors and therefore were answering the survey based on what they believed a mentor relationship should look like. Between M2 students and mentors, statistically significant differences between means were found in three of the five constructs. The first area was the programmatic structure where mentors found more alignment than second year students. The second area was the integration into the medical education curriculum where again mentors appeared to have more alignment than second year students. Finally, the training construct was also found to be statistically significant in the mean differences, again with mentors showing more alignment. The reason for this might be the particular academic year. M2 students usually undergo a lot of stress during their academic year, with it being a significantly shorter academic year (going from August to March) and culminating with a licensing exam. With the amount of stress students undergo during this time, they may have looked for more structure and guidance from their mentors. They may have needed more academic guidance and might have preferred more frequent interactions from their mentor.

Between M3 students and mentors there was no statistically significant differences between means in any of the five constructs. Finally, between M4 students and mentors there were statistically significant differences in means in two out of the five constructs – programmatic structure and integration into the medical education curriculum. During the fourth year, medical students are busy applying to residency programs. They may not have relied on their mentors as much if they were looking for specialty specific guidance or they may not have felt their mentors had much to offer during this time.

Implications for Practice

One of the main implications for practice that can be gleaned from the survey results is that schools need to take more responsibility in the overall setup and administration of the mentoring program. Not only is the school responsible for developing the goals of mentoring, they also need to instill the values and responsibilities of mentors and mentees (Tan et al., 2018). Out of all five constructs, oversight had the lowest means from all three groups – mentors (M = 3.019), students (M = 3.011) and alumni (M = 3.102). Although respondents felt that the school provided resources, not enough oversight was demonstrated when it came to providing objectives for the mentoring program. With oversight, the culture of the school's mentoring program is developed, and the school has more knowledge about how the mentoring program is running. An institution needs to provide mentors with clear expectations and those resources necessary to effectively mentor a student (Nimmons et al., 2019). The school is responsible for the development of the mentoring environment. If the culture is successfully established, it could help with the retention and recruitment of faculty mentors if they perceive mentoring to be essential to their roles as academic leaders in the school (Low et al., 2018).

Similarly, when dealing with students of the millennial generation, it seems mentees valued being respected and supported more than they did having anything in common with their mentor. They prefer more frequent interactions, as well as having their mentor check in on them. This might be contrary to what mentors are accustomed to, perhaps relying on mentees to take responsibility for their own learning and reaching out when needed. This communication disconnect could be worked on to the benefit of both groups with more program oversight, allowing mentees to feel supported and cared for, and providing a structure for mentors to check in on a regular basis. For example, protected time needs to be given for mentoring activities

(Nimmons et al., 2019). Faculty and students have multiple responsibilities within their day, and time needs to be carved out for mentoring and not added on top of everything else. Mentors made the most of trying to meet with mentees when needed, but there did not seem to be enough protected time to accomplish these meetings. Students and alumni also seemed to agree that mentors made time to meet, and this was reflected in the high rating the mentor characteristic, accessibility, received. The school could also require more meetings throughout the year which could enhance the feeling for mentees of being reached out to and supported.

Finally, between M1 students and mentors there was no statistically significant differences between means in any of the five constructs. Between M2 students and mentors, statistically significant differences between means were found in three of the five constructs – programmatic structure, integration into the medical education curriculum, and training. Within each of these constructs, mentors were shown to have more alignment with that construct than did second year students. As previously mentioned, second year students usually undergo a lot of stress during their academic year, both with the year being significantly shorter (beginning in August and ending in March) and culminating with a licensing exam that can be anxiety inducing as some specialties give the score a lot of weight when ranking students for residency match (Green, Angoff & Encandela, 2016). There could be more guidance provided to mentors on how and when to provide feedback based on the academic year of their mentee.

Between M4 students and mentors there were statistically significant differences in means in two out of the five constructs – programmatic structure and integration into the medical education curriculum. During the fourth year, medical students are busy applying to residency programs. They may not have relied on their mentors as much if they were not looking for specialty specific guidance so perhaps mentors could focus more on helping their mentees

network or ensure that they are following residency application deadlines. Each academic year has its own goals and unique stressors that could perhaps be mitigated by specific mentoring activities. More programmatic structure could be utilized to develop academic year specific mentoring objectives.

Recommendations for Further Research

The first recommendation for further research involves deploying the survey instruments at other medical schools. Since each medical school has their own distinct mentoring programs, it would be interesting to see if there were similar results, especially between academic years. As this specific program is a formal mentoring program, it would also be interesting to see a comparison between formal and informal mentoring programs from other institutions.

Secondly, the fact that the survey was completely anonymous also did not allow for further analysis in respect to certain areas. For example, it would have been interesting to see if how a student was performing academically had any impact on their responses to the survey. Students who were struggling might have felt abandoned by their mentor or those who were doing well may have had a more positive view of mentoring, regardless of whether they had ever utilized their mentor.

Also, a paired samples survey would have been helpful to see how a specific mentor and mentee perceived their mentoring experience, and what the alignment would have been in those situations. It would also have been interesting to see if there had been any changes in perceptions the further removed a respondent was from their graduation year. Not knowing who answered the survey also did not allow for further analysis into how mentors perceived they were

doing or how the length of time they had spent mentoring whether inside or outside the program impacted their responses.

Finally, as survey instruments provide more of a superficial analysis of perception, perhaps conducting interviews or focus groups with both groups of mentors and mentees could provide for deeper analysis of mentoring perceptions. Both methods could allow for the detection of common themes to mentoring. This could also help provide context to the survey results.

Limitations

Medical schools in the United States, although similar in certain respects, vary in terms of mentoring programs so applicability to other medical schools is limited. Medical education curriculum is also different than other educational programs and may not be applicable to students outside of this designation. Additionally, the study collected data from a single institution and was conducted over one academic year timeframe and not longitudinally. There were 21,869 matriculants in the 2019-2020 academic year in medical schools in the United States according to the Association of American Medical Colleges FACTS data report (AAMC, 2019a). A much larger sample size would have been necessary to generalize this research to other schools. Generalizing to mentors throughout the United States is also difficult, as some medical schools combine mentoring and advising programs or vary between formal and informal mentoring (Fornari et al., 2014).

This final sample was out of 488 students, 609 alumni and 39 mentors, with a total response rate of 27.73%. It was determined that with a population of 1097 (alumni and enrolled students) a sample size of 285 would be necessary for adequate representation for mentees and

35 for mentors (Krejcie & Morgan's, 1970). The final sample size contained an adequate number of mentees (296 total with alumni and students), but only 19 out of 35 mentors participated in the survey. It would have been interesting to see the results if more mentors had taken part in the survey.

Another potential limitation is the reliance on self-reporting. The information provided was based on personal experience, it would have been interesting to see other confirming data such as mentee academic progress. Also, if mentees or mentors did not honestly believe the survey was anonymous, they may have provided what they considered to be correct answers.

Conclusions

Mentoring is an important component of the medical education process. It has been shown to promote success in practice, help in choosing a career, and enhance research productivity (Park et al., 2016). Advising and mentoring have been found to be influential on a student's specialty choice (Careers in Medicine, 2019). Students who are mentored have a greater sense of wellbeing and a higher satisfaction with their education compared to students who are not mentored (Park et al., 2016). This study demonstrates the importance of exploring both mentor and mentee perceptions of mentoring as both groups may see the same characteristics differently.

The goal of this study was to investigate perceptions of mentoring practices with the intent of improving services to students and assigning successful mentoring relationships. Developing mentoring skills could assist faculty when it comes to guiding students. Identifying characteristics of effective mentoring programs could aid students with the development of skills to take full advantage of the mentoring relationship. The results of the study could likewise be

utilized to develop future faculty development sessions. This data could also be beneficial in determining how to assign students. Finding ways to provide a mentoring foundation from the school, regardless of mentoring system, would be beneficial for students navigating the medical education curriculum and residency process.

APPENDIX A
IRB APPROVAL LETTER

UNIVERSITY OF CENTRAL FLORIDA

Institutional Review Board
FWA00000351
IRB00001138
Office of Research
12201 Research Parkway
Orlando, FL 32826-3246

EXEMPTION DETERMINATION

September 26, 2019

Dear Soraya Smith:

On 9/26/2019, the IRB determined the following submission to be human subjects research that is exempt from regulation:

Type of Review:	Initial Study, Category 2
Title:	An Analysis of One Medical School's Student Mentoring Practices
Investigator:	Soraya Smith
IRB ID:	STUDY00000845
Funding:	None
Grant ID:	None

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made, and there are questions about whether these changes affect the exempt status of the human research, please contact the IRB. When you have completed your research, please submit a Study Closure request so that IRB records will be accurate.

If you have any questions, please contact the UCF IRB at 407-823-2901 or irb@ucf.edu. Please include your project title and IRB number in all correspondence with this office.

Sincerely,

Racine Jacques, Ph.D.
Designated Reviewer

APPENDIX B
MENTORING INSTRUMENT STUDENT

Mentoring Instrument – Student

I have read the informed consent and agree to participate in this survey.

- ❒ Yes
- ❒ No

Directions: Please read each item carefully and select the option that most closely resembles your self-perception and experience related to mentoring (i.e. your Dean's Advising Academy Leader) while in the UCF College of Medicine.

Section 1

Item My mentor…	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree	N/A
1. supports my specialty choice.					
2. helps me with the residency application process (e.g. reviewing my curriculum vitae, personal statement, application).					
3. is integral in helping me reach my academic and career goals.					

Section 2

Item My mentor…	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree	N/A
4. and I developed a plan to meet my specific academic and career goals.					
5. and I establish expectations for our mentoring relationship.					
6. provides emotional support.					
7. can answer my questions quickly and completely.					
8. checks in on me and is concerned with whether I am meeting my goals.					
9. is trustworthy and discreet.					

10. is approachable and friendly.					
11. is a good listener and honest in their communication.					
12. is one of my role models.					
13. and I have a lot in common.					
14. makes time to meet with me.					
15. respects me and is non-judgmental.					
16. is empathetic.					
17. provides feedback/support when I request it.					
18. is committed to helping me succeed.					

Section 3

Item	**1 Strongly Disagree**	**2 Disagree**	**3 Agree**	**4 Strongly Agree**	**N/A**
19. My mentor and I had the resources necessary for a successful mentoring relationship.					
20. The school recognized the importance and value of mentoring.					
21. There were measurable objectives and oversight for mentoring.					
22. How my mentor was assigned to me was done in a way that encouraged success.					
23. There was protected and enough time to meet and achieve mentoring goals.					

Section 4

24. Below please find eight mentor characteristics. Reorder the items below to rank them from most important (top) to least important (bottom) by dragging the items to reorder:

- ❒ Accessibility
- ❒ Approachability
- ❒ Common interests
- ❒ Common values
- ❒ Expertise in his/her field
- ❒ Flexibility
- ❒ Supportive
- ❒ Trustworthy

25. Which of the following reasons would you normally meet with your mentor for? (please select all that apply):

- ❒ Academic concerns
- ❒ Information on potential extracurricular activities
- ❒ Personal concerns
- ❒ Research concerns
- ❒ Residency application/Match process
- ❒ Specialty choice
- ❒ Other:_____

Please select the academic status that best represents you on August 1, 2019.

- ❒ First-year student (M1)
- ❒ Second-year student (M2)
- ❒ Third-year student (M3)
- ❒ Fourth-year student (M4)

Gender:

- ❒ Male
- ❒ Female

Age:

- ❒ 18 – 22
- ❒ 23 – 27
- ❒ 28 – 32
- ❒ 33 – 37
- ❒ > 37

I am interested in the same specialty as my mentor.

- ❒ Yes
- ❒ No
- ❒ Undecided

APPENDIX C
MENTORING INSTRMENT MENTOR

Mentoring Instrument – Mentor

I have read the informed consent and agree to participate in this survey.

- ❒ Yes
- ❒ No

Directions: Please read each item carefully and select the option that most closely resembles your self-perception and experience related to mentoring (i.e. as a Dean's Advising Academy Leader) while in the UCF College of Medicine.

Section 1

Item As a mentor, I helped my mentee…	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree	N/A
1. by supporting their specialty choice.					
2. with the residency application process (e.g. reviewing their curriculum vitae, personal statement, application).					
3. by being integral in helping them reach their academic and career goals.					

Section 2

Item As a mentor, I helped my mentee…	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree	N/A
4. by developing a plan to meet their specific academic and career goals.					
5. by establishing expectations for our mentoring relationship.					
6. by providing emotional support.					
7. by answering questions quickly and completely.					
8. by checking in on them and being concerned with whether they are meeting their goals.					

9. by being trustworthy and discreet.					
10. by being approachable and friendly.					
11. by being a good listener and honest in my communication.					
12. by being a role model.					
13. by having a lot in common.					
14. by making time to meet with them.					
15. by respecting them and being non-judgmental.					
16. by being empathetic.					
17. by providing feedback/support when requested.					
18. by being committed to helping them succeed.					

Section 3

Item	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree	N/A
19. My mentee and I had the resources necessary for a successful mentoring relationship.					
20. The school environment was conducive for the development of a successful mentoring relationship.					
21. The school recognized the importance and value of mentoring.					
22. There were measurable objectives and oversight for mentoring.					
23. How my mentee was assigned to me was done in a way that encouraged success.					
24. There was protected and enough time to meet and achieve mentoring goals.					
25. I was provided training prior to mentoring to learn my role and responsibilities.					

Section 4

Item As a mentor I found my mentee…	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree	N/A
26. able to communicate and receptive to feedback.					
27. respectful of my time.					
28. able to take responsibility for their own learning.					

Section 5

29. Below please find eight mentor characteristics. Reorder the items below to rank them from most important (top) to least important (bottom) by dragging the items to reorder:

- ❒ Accessibility
- ❒ Approachability
- ❒ Common interests
- ❒ Common values
- ❒ Expertise in his/her field
- ❒ Flexibility
- ❒ Supportive
- ❒ Trustworthy

30. Which of the following reasons would your mentee normally meet with you for? (please select all that apply):

- ❒ Academic concerns
- ❒ Extracurricular activities
- ❒ Personal concerns
- ❒ Research concerns
- ❒ Residency application/Match process
- ❒ Specialty choice
- ❒ Other:_____

Gender:

- ❒ Male
- ❒ Female

How long have you been a mentor in the Dean's Advising Academy?

- ❒ 1 – 3 years
- ❒ 3 – 5 years
- ❒ > 5 years

How long have you been a mentor/advisor in another capacity?

- ❒ 1 – 3 years
- ❒ 3 – 5 years
- ❒ > 5 years

APPENDIX D
MENTORING INSTRUMENT ALUMNI

Mentoring Instrument – Alumni

I have read the informed consent and agree to participate in this survey.

- ❒ Yes
- ❒ No

Directions: Please read each item carefully and select the option that most closely resembles your self-perception and experience related to mentoring (i.e. your Dean's Advising Academy Leader) while in the UCF College of Medicine.

Section 1

Item My mentor…	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree	N/A
1. supported my specialty choice.					
2. helped me with the residency application process (e.g. reviewing my curriculum vitae, personal statement, application).					
3. was integral in helping me reach my academic and career goals.					

Section 2

Item My mentor…	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree	N/A
4. and I developed a plan to meet my specific academic and career goals.					
5. and I established expectations for our mentoring relationship.					
6. provided emotional support.					
7. answered my questions quickly and completely.					
8. checked in on me and was concerned with whether I am meeting my goals.					

9. was trustworthy and discreet.					
10. was approachable and friendly.					
11. was a good listener and honest in their communication.					
12. was one of my role models.					
13. and I had a lot in common.					
14. made time to meet with me.					
15. respected me and was non-judgmental.					
16. was empathetic.					
17. provided feedback/support when I request it.					
18. was committed to helping me succeed.					
19. was a person who was chosen by me.					

Section 3

Item	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree	N/A
20. My mentor and I had the resources necessary for a successful mentoring relationship.					
21. The school recognized the importance and value of mentoring.					
22. There were measurable objectives and oversight for mentoring.					
23. How my mentor was assigned to me was done in a way that encouraged success.					
24. There was protected and enough time to meet and achieve mentoring goals.					

Section 4

25. Below please find eight mentor characteristics. Reorder the items below to rank them from most important (top) to least important (bottom) by dragging the items to reorder:

- ❒ Accessibility
- ❒ Approachability
- ❒ Common interests
- ❒ Common values
- ❒ Expertise in his/her field
- ❒ Flexibility
- ❒ Supportive
- ❒ Trustworthy

26. Which of the following reasons would you normally meet with your mentor for? (please select all that apply):

- ❒ Academic concerns
- ❒ Extracurricular activities
- ❒ Personal concerns
- ❒ Research concerns
- ❒ Residency application/Match process
- ❒ Specialty choice
- ❒ Other:_____

Please select the academic status that best represents you on August 1, 2019.

- ❒ Class of 2013
- ❒ Class of 2014
- ❒ Class of 2015
- ❒ Class of 2016
- ❒ Class of 2017
- ❒ Class of 2018
- ❒ Class of 2019

Gender:

- ❒ Male
- ❒ Female

Age upon graduation from medical school:

- ❒ 18 – 22
- ❒ 23 – 27
- ❒ 28 – 32
- ❒ 33 – 37
- ❒ > 37

I was interested in the same specialty as my mentor.

- ❒ Yes
- ❒ No
- ❒ Undecided at the time

REFERENCES

Allen, T., Eby, L., Chao, G., Bauer, T. (2017). Taking stock of two relational aspects of organizational life: Tracing the history and shaping the future of socialization and mentoring research. *Journal of Applied Psychology, 102(3),* 324–337. http://dx.doi.org/10.1037/apl0000086

American Academy of Family Physicians. (n.d.). *Types of medical school programs and how they lead into primary care.* Retrieved from https://www.aafp.org/medical-school-residency/premed/programs.html

Artino, A., LaRochelle, J., Dezee, K., & Gehlbach, H. (2014). Developing questionnaires for educational research: AMEE Guide No. 87. *Medical Teacher 36(6),* 463-474. DOI: 10.3109/0142159X.2014.889814

Association of American Medical Colleges. (n.d.). *Aspiring docs fact sheets: What medical school is like*. Retrieved from: https://students-residents.aamc.org/choosing-medical-career/article/what-expect-medical-school/

Association of American Medical Colleges. (2018). Functions and Structure of a Medical School: Standards for accreditation of medical education programs leading to the MD degree. Retrieved from: http://lcme.org/publications/

Association of American Medical Colleges (2019). Medical School Graduation Questionnaire 2019 All Schools Summary Report. Retrieved from: https://www.aamc.org/download/498790/data/2019gqallschoolssummaryreport.pdf

Association of American Medical Colleges. (2019a). U.S. Medical School Applications and Matriculants by School, State of Legal Residence, and Sex, 2019-2020. *FACTS:*

Applicants, matriculants, enrollment, graduates, MD-PhD, and residency applicants data. Retrieved from: https://www.aamc.org/system/files/2019-11/2019_FACTS_Table_A-1.pdf

Association of American Medical Colleges (2019b). Matriculating Student Questionnaire 2019 All Schools Summary Report. Retrieved from: https://www.aamc.org/system/files/2019-12/2019%20MSQ%20All%20Schools%20Summary%20Report.pdf

Asukaa, E., Halarib, C., & Halaric, M. (2016). Mentoring in medicine: A retrospective study. *American Scientific Research Journal for Engineering, Technology, and Sciences (ASRJETS), 19(1),* 42-52.

Barzansky, B. (2010). Abraham Flexner and the era of medical education reform. *Academic Medicine, 85,* S19-S25. DOI: 10.1097/ACM.0b013e3181f12bd1

Bliss, M. (1999). William Osler at 150. *Canadian Medical Association Journal, 161(7),* 831-834.

Borges, N., Manuel, S., Elam, C., & Jones, Bonnie. (2010). Differences in motives between Millennial and Generation X medical students. *Medical Education, 44,* 570–576. doi:10.1111/j.1365-2923.2010.03633.x

Boysen, P., Daste, L., Northern, T. (2016). Multigenerational challenges and the future of graduate medical education. *Ochsner Journal (16),* 101–107.

Careers in Medicine. (2019). About advising. *Association of American Medical Colleges.* Retrieved from: https://www.aamc.org/cim/advisorsandliaisons/advisors/advisingstudents/337726/aboutadvising.html

Careers in Medicine (2019a). Career planning checklist. *Association of American Medical Colleges.* Retrieved from: https://www.aamc.org/cim/download/494378/data/cimchecklist.pdf

Cho, C., Ramanan, R., & Feldman, M. (2011). Defining the ideal qualities of mentorship: A qualitative analysis of the characteristics of outstanding mentors. *The American Journal of Medicine, 124(5),* 453-458. DOI: 10.1016/j.amjmed.2010.12.007

Chun, J., Sosik, J., & Yun, N. (2012) A longitudinal study of mentor and protégé outcomes in formal mentoring relationships. *Journal of Organizational Behavior, 33,* 1071–1094. DOI: 10.1002/job.1781

Coates, W. (2012). Being a mentor: What's in it for me? Academic Emergency Medicine, 19, 92-97.

Custer, J. & ten Cate, O. (2018). The history of medical education in Europe and the United States, with respect to time and proficiency. *Academic Medicine, 93(3),* 549-554.

DeZee, K., Artino, A., Elnicki, M., Hemmer, P. & Durning, S. (2012). Medical education in the United States of America. *Medical Teacher, 34(7),* 521-525, DOI: 10.3109/0142159X.2012.668248

Dillman, D., Smyth, J. & Christian, L. (2014). Internet, phone, mail, and mixed-mode surveys: The tailored design method. Hoboken, NJ: John Wiley & Sons, Inc.

Dimitriadis, K., von der Borch, P., Stormann, S., Meinel, F., Moder, S., Reincke, M. & Fischer, M. (2012). Characteristics of mentoring relationships formed by medical students and faculty. *Medical Education Online, 17(1),* DOI: 10.3402/meo.v17i0.17242

Dobie, S., Smith, S. & Robins, L. (2010). How assigned faculty mentors view their mentoring relationships: An interview study of mentors in medical education. *Mentoring &*

Tutoring: Partnership in Learning, 18(4), 337-359. DOI: 10.1080/13611267.2010.511842

Duffy, T. (2011). The Flexner report – 100 years later. *Yale Journal of Biology and Medicine, 84,* 269-276.

Eaglen, R. (2017). Academic quality and public accountability in academic medicine: The 75-year history of the LCME. Washington, DC: Liaison Committee on Medical Education.

Eby, L., Allen, T., Hoffman, B., Baranik, L., Sauer, J., Baldwin, S., Morrison, A., Kinkade, K., Maher, C., Curtis, S., & Evans, S. (2013). An interdisciplinary meta-analysis of the potential antecedents, correlates, and consequences of protege perceptions of mentoring. *Psychological Bulletin, 139*(2), 441-476. doi:10.1037/a0029279

Farkas, A., Allenbaugh, J., Bonifacino, E., Turner, R. & Corbelli, J. (2019). Mentorship of US medical students: A systematic review. *Journal of General Internal Medicine.* DOI: 10.1007/s11606-019-05256-4

Flannelly, K., Flannelly, L. & Jankowski, K. (2018). Threats to the internal validity of experimental and quasi-experimental research in healthcare. *Journal of Health Care Chaplaincy, 24,* 107–130. DOI: 10.1080/08854726.2017.1421019

Fleming, M., House, S., Shewakramani, V., Yu, L, Garbutt, J., McGee, R., Kroenke, K., Abedin, Z., Rubio, D., (2013). The mentoring competency assessment: Validation of a new instrument to evaluate skills of research mentors. *Academic Medicine, 88 (7),* 1002 – 1008.

Fornari, A., Murray, T., Menzin, A., Woo, V., Clifton, M., Lombardi, M. & Shelov, S. (2014). Mentoring program design and implementation in new medical schools. *Medical Education Online, 19(1).* DOI: 10.3402/meo.v19.24570

Frei, E., Stamm, M. & Buddeberg-Fischer, B. (2010). Mentoring programs for medical students – a review of the PubMed literature 2000-2008. *BMC Medical Education, 10(32).* Retrieved from: http://www.biomedcentral.com/1472-6920/10/32

Gehlbach, H. & Brinkworth, M. (2011). Measure twice, cut down error: A process for enhancing the validity of survey scales. *Review of General Psychology, 15(4),* 380–387. DOI: 10.1037/a0025704

Geraci S., Thigpen S. (2017). A review of mentoring in academic medicine. *The American Journal of Medical Sciences, 353,* 151–157.

Gisbert, J. (2017). La relación mentor-aprendiz en medicina (Mentor-mentee relationship in medicine). *Gastroenterologia y Hepatologia, 40(1),* 48-57.

Goncalves, M. & Bellodil, P. (2012). Mentors also need support: a study on their difficulties and resources in medical schools. *Sao Paulo Medical Journal, 130(4),* 252.258.

Green, M., Angoff, N., & Encandela, J. (2016). Text anxiety and United States Medical Licensing Examination scores. *Clinical Teacher, 13(2),* 142-146. DOI: 10. 1111/tct.12386

Halperin, E., Perman, J., & Wilson, E. (2010). Abraham Flexner of Kentucky, his report, medical education in the United States and Canada, and the historical questions raised by the report. *Academic Medicine, 85,* 203-210.

Heeneman, S. & de Grave, W. (2019). Development and initial validation of a dual-purpose questionnaire capturing mentors' and mentees' perceptions and expectations of the mentoring process. *BMC Medical Education, 19(133).* DOI: 10.1186/s12909-019-1574-2

Henry-Noel, N., Bishop, M., Gwede, C., Petkova, E., Szumacher, E. (2018). Mentorship in medicine and other health professions. *Journal of Cancer Education.* https://doi.org/10.1007/s13187-018-1360-6.

Holt, D., Markova, G., Dhaenens, A., Marler, L., Heilmann, S. (2016). Formal or informal mentoring: What drives employees to seek informal mentors? *Journal of Managerial Issues, 28(1-2),*67-82.

Jones, J. (2013). Factors influencing mentees' and mentors' learning throughout formal mentoring relationships. *Human Resource Development International, 16(4),* 390–408. http://dx.doi.org/10.1080/13678868.2013.810478

Kalén, S., Ponzer, S., & Silén, C. (2012). The core of mentorship: Medical students' experiences of one-to-one mentoring in a clinical environment. *Advances in Health Sciences Education, 17,* 389–401. DOI 10.1007/s10459-011-9317-0

Kashiwagi, D., Varkey, P. & Cook, D. (2013). Mentoring programs for physicians in academic medicine: A systematic review. *Academic Medicine, 88(7),* 1029-1037.

Keeling, S. (2003). Advising the millennial generation. *NACADA Journal, (1 & 2), 30-36.*

Kram, K. (1983). Phases of the mentor relationship. *Academy of Management Journal, 26(4),* 608-625.

Krejcie, R. & Morgan, D. (1970). Determining sample size for research activities. *Educational and Psychological Measurement, 30,* 607-610.

Kuhn, T., Gordon, V., & Webber, J. (2006). The advising and counseling continuum: Triggers for referral. *NACADA Journal, 26 (1),* 24-31. Retrieved from: https://www.nacadajournal.org/doi/pdf/10.12930/0271-9517-26.1.24

Leach, H., & Coleman J. Osler centenary papers: William Osler in medical education. *Postgrad Med J, 95,* 642–646. doi:10.1136/postgradmedj-2018-135890

Lourenco, A. & Cronan, J. (2017). Teaching and working with millennial trainees: Impact on radiological education and work performance. *Journal of the American College of Radiology, 14 (1),* 92-95. https://doi.org/10.1016/j.jacr.2016.06.029

Low, C., Toh, Y.L., Teo, S., Toh, Y.P. & Krishna, L. (2018). A narrative review of mentoring programmes in general practice. *Education for Primary Care, 29(5),* 259-267, DOI: 10.1080/14739879.2018.1474723

Meeuwissen, S., Stalmeijer, R., & Govaerts, M. (2019). Multiple-role mentoring: Mentors' conceptualisations, enactments and role conflicts. *Medical Education, 53,* 605-615. DOI: 10.1111/medu.13811

Menges, C. (2016). Toward improving the effectiveness of formal mentoring programs: Matching by personality matters. *Group & Organization Management, 41(1),* 98 –129. DOI: 10.1177/1059601115579567

Mickel, Wiskur, James, VanWagoner, & Williams. (2018). Assessing faculty capacity to build an effective mentoring network at an academic health sciences center. *The Journal of Faculty Development, 32(3),* 35-46.

Mowery, Y. (2015). A primer on medical education in the United States through the lens of a current resident physician. *Journal of Thoracic Disease, 7(10):*E473-E481. DOI: 10.3978/j.issn.2072-1439.2015.10.05

Newby, T. & Heide, A. (2017). The value of mentoring. *Performance Improvement Quarterly, 26(2),* 141-158, DOI: 10.1002/piq

Nimmons, D., Giny, S., & Rosenthal, J. (2019). Medical student mentoring programs: current insights. *Advances in Medical Education and Practice, 10,* 113-123. DOI: 10.2147/AMEPSI54974

Oelschlager, A., Smith, S., Tamura, G., Carline, J. & Dobie, S. (2011). Where do medical students turn? The role of the assigned mentor in the fabric of support during medical school. *Teaching and Learning in Medicine, 23 (2),* 112-117. DOI: 10.1080/10401334.2011.561664

Park, J., Adamiak, P., Jenkins, D. & Myhre, D. (2016). The medical students' perspective of faculty and informal mentors: A questionnaire study. *BMC Medical Education, 16 (4).* DOI 10.1186/s12909-016-0526-3

Rabow, M., Remen, R., Parmelee, D., & Inui, T. (2010). Professional formation: Extending medicine's lineage of service into the next century. *Academic Medicine, 85(2),* 310-317.

Roberts, D., Newman, L., & Schwartzstein, R. (2012). Twelve tips for facilitating Millennials' learning. *Medical Teacher, 34,* 274-278.

Ryan, T. (2015). Osler and his teaching: relevant today. *Postgraduate Medicine, 91(1080),* 540-541.

Sambunjak, D., Straus, S., & Marusic, A. (2009). A systematic review of qualitative research on the meaning and characteristics of mentoring in academic medicine. *Journal of General Internal Medicine, 25(1),* 72–78. DOI: 10.1007/s11606-009-1165-8

Schäfer, M., Pander, T., Pinilla, S., Fischer, M., Von Der Borch, P., & Dimitriadis, K. (2016). A prospective, randomised trial of different matching procedures for structured mentoring programmes in medical education. *Medical Teacher, 38,* 921-929.

Sheri, K., Too, J., Chua, S., Toh, Y., Mason, S. & Krishna, L. (2019). A scoping review of mentor training programs in medicine between 1990 and 2017. *Medical Education Online*, *24.* https://doi.org/10.1080/10872981.2018.1555435

Sng, J., Pei, Y., Toh, Y., Peh, T., Neo, S. & Krishna, L. (2017). Mentoring relationships between senior physicians and junior doctors and/or medical students: A thematic review. *Medical Teacher, 39(8),* 866-875. DOI: 10.1080/0142159X.2017.1332360

Stamm, M. & Buddeberg-Fischer, B. (2011). The impact of mentoring during postgraduate training on doctors' career success. *Medical Education, 45,* 488-496. DOI: 10.1111/j.1365-2923.2010.03857.x

Stenfors-Hayes, T., Hult, K., & Dahlgren, L. (2011). What does it mean to be a mentor in medical education? *Medical Teacher, 33,* e423-e428. DOI 10.3109/0142159X.2011.586746*: e423–e428*

Taber, K. (2018). The use of Cronbach's Alpha when developing and reporting research instruments in science education. *Research in Science Education, 48,* 1273–1296. DOI 10.1007/s11165-016-9602-2

Taherian, K. & Shekarchian, M. (2008). Mentoring for doctors. Do its benefits outweigh its disadvantages? *Medical Teacher, 30 (4),* e95-e99, DOI: 10.1080/01421590801929968

Tan, Y., Teo, S., Pei, Y., Sng, J., Yap, H., Toh, Y. & Krishna, L. (2018). A framework for mentoring of medical students: thematic analysis of mentoring programmes between 2000 and 2015. *Advances in Health Science Education, 23,* 671-697. DOI: https://doi.org/10.1007/s10459-018-9821-6

Tavakol, M. & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education, 2,* 53-55. DOI: 10.5116/ijme.4dfb.8dfd

Van Mol, C. (2017). Improving web survey efficiency: the impact of an extra reminder and reminder content on web survey response. *International Journal of Social Research Methodology, 20(4),* 317-327. DOI: 10.1080/13645579.2016.1185255

Voetmann, K. & Kendall, D. (2019) Seeking quality mentors: Exploring program design to increase mentor participation. *Journal of Organizational Psychology, 19(3), 93-102.*

Waljee J., Chopra V., Saint S. (2018). Mentoring millennials. *JAMA, 319(15),* 1547–1548. doi:10.1001/jama.2018.3804

Wilson, M., Jacques, R., Fiddes, P. & Palermo, C. (2013). Mentoring of medical students: A cross-sectional study. *Focus on Health Professional Education: A Multi-Disciplinary Journal, 14(3),* 38-48.