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Association Between Stress and Length of Program in Underrepresented Minority Physician Assistant Students

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Association Between Stress and Length of Program
in Underrepresented Minority
Physician Assistant Students

Michelle McWeeney

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Submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy

in the College of Education and Human Services

Seton Hall University
2020

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APPROVAL FOR SUCCESSFUL DEFENSE

Michelle McWeeney has successfully defended and made the required modifications to the text of the doctoral dissertation for the Ed.D. during this **Fall Semester 2020**.

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Abstract

The purpose of this study was to determine if there was a relationship between physician Assistant (PA) program length and stress measures in PA students, particularly PA students classified as underrepresented minorities in medicine. The stress measures included in this study were quality of life, mental well-being, emotional well-being, and physical well-being. Previous studies in PA education have examined the effect of PA program length on national certifying exam pass rates and have shown no relationship between the two. This was the first study examining the relationship between PA program length and stress measures. There is a documented lack of underrepresented minorities in the PA profession, and the majority of PAs are White females. The results of this study showed that shorter PA programs were associated with higher physical well-being scores. In addition, older students, males, and students with higher levels of PA school debt had lower scores for quality of life, mental well-being, emotional well-being, and physical well-being. The variable underrepresented minority in medicine status was not statistically significant in any of the regressions. Implications, limitations, and potential future research were all discussed.

Keywords: physician assistant training, underrepresented minorities in medicine, physician assistant program length, physician assistant stress, medical training stress

Acknowledgements

The completion of my doctorate would not have been possible without the help of so many people. I am thankful to have had such a supportive dissertation committee, Dr. Katie Smith, Dr. Robert Kelchen, and Dr. Lauren Twombly. Although they are all much younger than I am, they were all knowledgeable, patient, supportive, and I could not have asked for a more talented group of mentors. To me, they were my “Dream team”: Dr. Kelchen helped me with the stats, Dr. Smith helped me develop my final chapter, and Dr. Twombly was my guiding light who inspired me at every turn to keep going. Seton Hall is lucky to have you!

Thank you to the best colleagues, Dr. Chris Hanifin and Dr. Anthony Koutsoftas, who helped me along the way, and to Abby Saunders, my colleague, my friend, and the woman who has been on this journey with me. I am not sure we would have completed this journey without pushing each other to finish. To the entire PA department at Seton Hall, I could not ask for better co-workers who understood the importance of completing this doctorate and were always willing to help. For you I am grateful.

Thank you to my husband Dave, the smartest, hardest working man I know. Because of you, I can achieve almost anything. Your energy and your drive amaze me. Now there are two doctors in the house! To my children, Sydney, Madeleine, Colin, and Conner, your encouraging messages kept me going. I hope you all achieve more than Daddy and I have in your lifetime. I hope you realize you can accomplish anything with hard work and drive.

Thank you to my mom for always supporting me and for showing me how to be a strong woman. I am strong because of you. Although my dad did not live to see me complete this journey, I know he is proud. Finally, to Neil and Susan Chessin, my in-laws, without your help and support this would not have been possible.

Dedication

I dedicate this milestone to the following:

My children: Sydney, Madeleine, Colin, and Conner

Always remember my favorite quotes when the going gets tough:

“Believe you can and you are halfway there.” – Theodore Roosevelt

“The only person you are destined to become is the person you decide to be.” – Henry David Thoreau

“Twenty years from now you will be more disappointed by the things you didn’t do than by the ones you did do, so throw off the bowlines, sail away from safe harbor, catch the tradewinds in your sails. Explore, Dream, Discover.” – Mark Twain

“I’ve learned that people will forget what you said, people will forget what you did, but people will never forget how you made them feel.” – Maya Angelou

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CHAPTER 1

INTRODUCTION

Stress and psychological distress are concerns among young people worldwide and are rising issues among higher education students who seem to have more psychological distress than the general population (Deasy et al., 2014). Stress and psychological distress are relatively common in students in higher education institutions, affecting over 50% of college students (Furr et al., 2001). College is a stressful time, and stressors include academic work, uncertainty about the future, interpersonal relationship issues, and family issues (Chao, 2012).

Medical students and physician assistant (PA) students also experience stress during their educational programs. Stress and emotional disturbances among medical students is an important issue, documented by medical schools throughout the world (Holm et al., 2010). In a study by Sohail (2013), 20.83% of medical students reported severe stress and 71.67% reported moderate stress during medical school. Academic performance and quality of life can be impaired as a result of afflictions of stress and psychological distress (Deasy et al., 2014). When comparing medical students with non-medical students, a review of the literature shows that medical students perceive higher stress (Sohail, 2013).

PA schools have a similar curriculum to medical schools; however, the curriculum is shorter. PA programs are typically 2 to 3 years in length, and medical programs are typically 4 years in length. While medical students graduate and attend a residency program to continue their clinical training, PAs go into the workforce and receive on-the-job training. PA schools throughout the country follow national curricular standards; however, programs have discretionary latitude regarding curricular structure and length of program with a typical parameter of 20 to 36 months (Physician Assistant Education Association [PAEA], 2019). There

is variability in the academic structure, but most PA programs run on a semester model. The average number of credits for PA program completion is 106 credits (PAEA, 2019). The difference in length of program correlates with the number of breaks given to students, the number of electives and clinical rotations, and how the curriculum is structured.

Underrepresented minority (URM) students often begin their medical education under disadvantaged circumstances, and stress can contribute to their experiences in ethnically non-diverse academic environments, impeding their success in medical programs (Acheampong et al., 2019). Studies have shown that URM students have noted stress related to test scores, lack of role models, financial problems, lack of self-efficacy, and incompatibility of students' cultural beliefs with the dominant culture of the institution (Odom et al., 2007). These stressors have been shown to impede academic performance and success (Odom et al., 2007).

Physician Assistant Education

PAs are licensed health care professionals who can perform histories and physicals, diagnose medical conditions, treat patients, and prescribe medications. They work in almost every medical specialty under the supervision of physicians in every state across the country (American Academy of PAs [AAPA], n.d.-d). The profession started in the mid-1960s when physicians and educators realized there was a shortage of primary care providers in the United States. As many Navy corpsmen returned from the Vietnam War with significant medical experience, Duke University started the first PA program in the United States under the leadership of Dr. Eugene Stead to try to increase the availability of primary care providers in underrepresented areas of the country. The first graduating class of three students earned their PA degrees in 1967, and now there are approximately 9,000 PA students graduating each year (AAPA, n.d.-d).

Occupational therapy schools graduate approximately 4,939 students with master's degrees in occupational therapy per year (American Occupational Therapy Association, 2018); approximately 7,237 speech language pathologists graduate with master's degrees per year (American Speech-Language-Hearing Association, n.d.); and in 2019, 19,938 medical students graduated from medical school in the United States (Association of American Medical Colleges [AAMC], n.d.-b).

According to the Accreditation Review Commission on Education for the Physician Assistant (ARC-PA), in the United States, there were 186 accredited PA programs in 2014, 200 programs in 2015, 218 programs in 2016, 236 programs in 2018, and 246 programs in 2019, rendering it one of the fastest growing fields of study. The Bureau of Labor Statistics projects an increase in employment of 31% from 2018 to 2028 in the PA field, in pursuit of meeting the demand of the aging population's health care needs (U.S. Bureau of Labor Statistics, n.d.).

PA education has emerged as a competitive venture in the last decade, with a 10% annual increase in applicants. In the 2015–2016 application cycle to PA school, there were a total of 25,593 submitted applicants to PA programs and only 8,106 matriculants to PA programs, yielding a percentage of 31.7% applicants matriculating into PA school (The PA Pipeline to Practice: Applicant and Matriculant Data from CASPA, n.d.). Students have typically achieved a bachelor's degree prior to entering the PA program and graduate with the terminal degree of Master of Science in Physician Assistant. Applicants to PA educational programs must have prior medical experience in roles such as medical scribes, nursing assistants, medical assistants, EMTs, nurses, or athletic trainers (PAEA, 2019).

When PA students complete the didactic curriculum, the clinical phase of their education commences with rotations in pediatrics, internal medicine, surgery, obstetrics and gynecology,

family medicine, emergency medicine, and several electives including cardiology, dermatology, and surgical subspecialties. During their clinical rotations they work as part of the health care team with medical students, residents, physicians, nurses, medical assistants, and other allied health professionals (Jones, 2007).

PA education is modeled on the traditional medical school curriculum with both didactic and clinical training. The first year of PA education is heavily science based, with courses in anatomy and physiology, pathophysiology, and genetics, as well as courses that teach hands-on clinical skills. The curriculum is generally an average of 27 months in length, compared with 38 months for the traditional medical school curriculum (American Academy of PAs, n.d.-c). The abbreviated curriculum means that PA students must learn a tremendous amount of material in a short amount of time, and PA students usually get less time off during the curriculum. Typically the same topics are covered in PA school as in medical school; however, in medical school the topics are often covered in greater depth because they provide 2 years of basic science training where PA schools provide 1 year of basic sciences (How a physician assistant career compares to a job as a doctor, n.d.). Medical students must complete 75 semester hours of course work the first 2 years followed by 2 years of clinical education. On average, PA students complete 73 semester hours of course work the 1st year in the didactic portion followed by 48 clinical hours in the 2nd year (O'Brien et al., 2012). These intense hours, the need to absorb tremendous amounts of information in short periods of time, and the need to acquire specific clinical skills are causes of stress in both medical and PA school (O'Brien et al., 2012).

When PA students graduate, they must pass a national assessment called the Physician Assistant National Certifying Exam (PANCE) to achieve eligibility to practice medicine. PAs are lifelong learners and must take a recertifying exam called the Physician Assistant National

Recertifying Exam (PANRE) every 10 years and must maintain 100 hours of continuing medical education (CME) every 2 years (National Commission on Certification of Physician Assistants [NCCPA], n.d.-b). In addition, certificate renewals are required every 2 years of programs where hands-on skills must be demonstrated, such as Basic Life Support, Advanced Cardiac Life Support, and Pediatric Advanced Life Support (NCCPA, n.d.-b).

There is a documented lack of diversity in the PA profession. Although the profession was founded to serve URM populations, White predominance in the industry does not mirror the steadily increasing minority population in the United States. It has been reported that the proportion of URM PAs has declined over the past 3 decades. Black PAs declined from 9.5% of the total number of PAs in 1980 to 7.8% in 2007. The American Indian population of PAs remained stable at around 0.5%. The percentage of the PA workforce that is Hispanic or Latino increased from 5.4% to 8.2% over this same time period, and although it reached a peak of 10.1% in 2005, it decreased to 8.2% in 2007 (DiBaise et al., 2015). Although medical student enrollment has increased 29.3% between 2002 and 2017, Black, Hispanic, American Indian or Alaskan Native students of both sexes were underrepresented in medical school, with a significant trend toward decreased representation from Black female students between 2002 and 2012 (Lett et al., 2019). According to a 2018 report published by the NCCPA, there were 131,139 practicing PAs in the United States, 68% of practicing PAs are female, and 86% identify as being White (NCCPA, n.d.-a).

History of Traditional and Accelerated Medical Education

In 1904, Sir William Osler, a Canadian physician, was the founding father of the new standardized medical curriculum established by the American Medical Association (AMA) and the AMA Council of Medical Education (ACME). Osler founded the rigorous didactic and

clinical curriculum at Johns Hopkins Medical School. Abraham Flexner was an American educator involved in education reform and was commissioned by the Carnegie Foundation to review medical education in the United States in the early 1900s. He was impressed by the 4-year medical model at John Hopkins and emphasized that 2 years of rigorous didactic training in the sciences should precede 2 years of intensive clinical training (Schwartz et al., 2018). The medical school model in the United States was based on the recommendations of Abraham and the medical model at Johns Hopkins. In the past century, medical schools have implemented several trials of a 3-year model, each time reverting to the original 4-year model. During World War II and the Vietnam War, a shortage of physicians prompted medical schools to meet the greater demand by implementing accelerated programs. In the 1970s, this practice was briefly resurrected with intent to decrease medical student debt.

In their literature review examining the history of accelerated medical programs in the 1970s, Schwartz et al. (2018) showed that the condensed, high volume curriculum resulted in an inordinate amount of academic stress, exhausting both students and faculty. A quarter of the students in these accelerated programs felt ill-prepared and voluntarily extended their medical education by 1 or 2 years. Other issues noted were lack of exposure to rural medicine, family medicine, and geriatrics, as well as lack of ethics and substance abuse training and lack of contact with mentors (Schwartz et al., 2018). However, there are no recent studies published examining the outcomes of these 3-year primary care programs, and no studies have been found comparing stress in these recent 3-year programs with the traditional 4-year programs.

Problem Statement

Length of program in PA education has never been standardized. The range reported in the most recent PAEA survey is 20 months to 36 months in length, with a mean of 26.8 months

(PAEA, 2019). The length of the didactic phase can range from 30 to 120 weeks, and the average clinical phase can range 24 to 105 weeks (PAEA, 2019b). The ARC-PA publishes standards that dictate what needs to be taught and included in the curriculum; however, each program designs its curriculum, structures the courses, and determines how the material is delivered. Each program uses the ARC-PA standards to design their courses and their curriculum. The ARC-PA oversees a peer review and accreditation process to make sure each PA program is following the standards (Luke, n.d.-b). Previous research has shown no difference in PANCE pass rates based on length of program (Colletti et al., 2016). Some research has shown that longer programs and a higher number of credits increase the cost for students, lead to more stress related to faculty workload and clinical site placements, and delay the entry of qualified health care professionals into the field where they are needed to take care of aging and underserved populations (Colletti et al., 2016).

Medical training can be physically and psychologically demanding. Stress in medical education comes from academic pressure, perfectionist standards, exhausting work hours, changes in studying habits, lack of time, pressure from parents, and fear of failing exams (Slavin et al., 2014). Chronic stress can influence memory, learning, problem solving, and ultimately medical decision making and patient care (Ray & Joseph, 2010). Curricular changes to decrease stress have been implemented across the country with positive results; these adjustments have included pass-fail grading systems, changes to course content, decreasing contact hours, longitudinal electives, and mindfulness workshops (Slavin et al., 2014).

There is a small number of URM students in PA schools in the United States. PA students and faculty across the country are overwhelmingly White. According to the 2018 PAEA Matriculating Student Survey, 86.3% of students are White (PAEA, 2019). According to the

2018 PAEA Faculty Survey, 89.2% of faculty are White (DiBaise et al., 2015). A more diverse workforce in health-related professions has been shown to enhance patient satisfaction, improve health care access and quality, and help with recruitment of URM students (DiBaise et al., 2015). In addition, URM students are more likely than their White counterparts to provide health care to the underserved and practice primary care in underserved areas where there is a need for competent health care providers (DiBaise et al., 2015). Although there are important benefits of having URM students to provide high quality health care to underserved populations, the number of URM students seems to have declined in the past few decades. Health profession schools across the country have implemented recruitment and retention strategies for URM students. The most successful interventions for recruitment and retention of URM students have been standardized test preparation classes, admissions workshops, pipeline programs exposing students to professional options and mentoring programs, financial support, and basic skills programs for math and science (DiBaise et al., 2015).

With over 200 PA programs in the United States and no standardized length of program, there has not been much research on optimal program length and if it contributes to stress and psychological distress in students. This study investigated whether there is an association among length of program and quality of life; mental, emotional, and physical well-being in PA students; and self-confidence in ability to handle their problems.

Research Questions

1. What is the relationship between physician assistant program length and students' quality of life, mental well-being, emotional well-being, and physical well-being?
2. What is the relationship between physician assistant program length and students' confidence to be able to handle their personal problems?

3. What is the relationship between physician assistant program length and quality of life, mental well-being, emotional well-being, and physical well-being among underrepresented minority in medicine students?
4. What is the relationship between physician assistant program length and students' confidence to be able to handle their personal problems in underrepresented minority in medicine students?

Significance

PAs are an important part of the health care team. According to the AAPA, there are over 131,000 PAs practicing in the United States today. They have more than 400 million patient interactions per year, with 27% of PAs practicing in surgical subspecialties and approximately 21% practicing in primary care fields (AAPA, n.d.-d). The 2019 AAPA salary survey reported that 53% of PAs practice in an outpatient setting and 36% of PAs practice in outpatient offices (AAPA, n.d.-d). These statistics show that PAs have made health care more accessible for patients across the country in all fields and practice settings. In addition, a 2014 Harris survey reported that 93% of patients reported PAs to be trusted health care providers, 91% of patients surveyed said PAs improved the quality of health care, and 92% of patients surveyed said that PAs made it easier to get appointments (AAPA, n.d.-d). The United States Bureau of Labor Statistics (n.d.) projects that PA profession job opportunities will increase by 37,000 from 2018 to 2028, significantly faster than the average for all occupations. The demand for PAs is so high that three quarters of PAs receive multiple job offers upon graduation. These statistics demonstrate the importance of PAs in the health care field; therefore, it is important to optimize PA education and decrease curricular stress associated with length of program and PA education. The statistics also demonstrate that Blacks, Latinos, and American Indians are severely

underrepresented in health professions. A strong case for diversity can be made on the grounds of the public health benefits the number of minority health care providers mirroring their representation in the general population (Grumbach & Mendoza, 2008). Studying the optimal length of program to decrease stress levels in all students may have beneficial effects on PA student well-being.

CHAPTER 2

LITERATURE REVIEW

The purpose of the literature review is to discuss the significant factors related to this study including length of program, effects of stress and psychological distress, and lack of URM students in medicine. It will specifically look at characteristics of students who attend accelerated programs and potential consequences length of program has on students and institutions. This literature review will define stress, physical stress, and psychological stress and will discuss curricular changes that can affect stress levels of students. Lastly, this literature review will discuss underrepresented students in higher education, their disparate representation in health sciences, and strategies directed toward recruiting URM students, as well as curricular changes implemented to increase the number of URM students in medicine.

The theoretical framework used in this literature review is Lazarus and Folkman's (1984) Transactional Theory of Stress and Coping, which explains stress as the result of transactions between the individual and the environment.

Physician Assistant Program Length Review

The length of PA programs across the country range from 20 months to 36 months, and each institution has its own unique curriculum (PAEA, 2019). The ARC-PA dictates components that must be taught in the didactic curriculum and benchmarks for rotations in the clinical phase of the curriculum; however, each institution establishes the individual courses and curricular sequencing. Most PA programs run on a semester model with an average of 106 credits for program completion (PAEA, 2019).

Studies of stress among health professions students found that medical students and PA students reported similar stress levels overall; however, PA students had an increased tendency

to progress toward mood disturbances and had differences in their ability to adjust to stress compared with medical students (Hernandez et al., 2010). Hernandez et al. (2010) hypothesized that this may be due to condensed curriculum intensity of PA programs versus standard 48-month medical school curriculum. PA programs and medical school are both intense, and they deliver similar courses; however, the medical school curriculum explores the basic sciences in greater depth than does PA school curriculum and has longer clinical rotation time (PA school vs medical school, n.d.). The authors also concluded that further research is needed to see if progression to mood disturbance is related to length of curriculum, personal characteristics, or mental health history (Hernandez et al., 2010). PA school averages 58.1 weeks of didactic education and 54.3 weeks of clinical education, where the didactic curriculum of most medical schools ranges between 56 and 96 weeks, and the clinical curriculum ranges between 56 and 96 weeks. The courses and the rotations are similar; however, medical school rotations last on average 2 weeks longer than they do for PA school and have more elective time. In addition, the basic science component is more extensive with courses in embryology and microbiology, which are not required in PA school (PAEA, 2018a; AAMC, n.d.-d). Some PA educators in the 1990s believed that protracted curriculum with extended didactics and clinical experience made for superior programs and higher national certifying exam scores (McDowell et al., 1999). However, more recent studies have examined the effect of length of curriculum on the quality of PA education. In a study by Colletti et al. (2016) comparing length of curriculum with PANCE pass rates, there was no statistically significant relationship. In addition, the same study found that longer curriculum can lead to adverse consequences such as prolonged student debt and delayed output of PAs into the workforce (Colletti et al., 2016).

Other health science fields have performed research related to the effect of length of program on outcomes. In a study comparing graduates from a traditional nursing program to graduates from an accelerated nursing program, both groups of nurses were found to have positive transition experiences to the workplace, high job satisfaction, and low intention of leaving nursing careers (Read & Laschinger, 2017). Another study on accelerated nursing programs found that typical students in accelerated nursing programs are motivated, older, and have higher academic expectations than traditional entry-level nursing students (Bowie & Carr, 2013). Most accelerated nursing students have had at least 2 prior years of experience working in health-related fields. Several studies found that the percentage of males in accelerated programs was twice that of males in traditional nursing programs (Bowie & Carr, 2013). This suggested that males desire a faster pace in education as a pipeline to earlier earning potential. These studies showed that accelerated programs can attract students with certain characteristics that will often affect program outcomes.

Longer programs with more credit hours affect individual PA departments and demand recruitment of additional educators at a time when there are significant faculty shortages across the country (Colletti et al., 2016). According to the 2018 PAEA Program Survey, 22.3% of PA programs across the country had vacancies for full-time faculty members, and over 61.7% of programs reported that lack of qualified candidates was a moderate or serious barrier to filling these vacancies (PAEA, 2018b).

There is also a severe national deficiency of clinical sites for students to complete their educational clinical requirements. Longer programs typically have more clinical rotation weeks, necessitating more clinical rotation sites. The median weeks for clinical rotations is 54, but some programs have a total of 105 clinical weeks (PAEA, 2019). In a 2013 study, it was found that

95% of representatives from PA programs were concerned about having an adequate number or clinical sites for their students, placing enormous stress on the faculty (Begley, 2018). In the past several years, some programs have been denied accreditation or have been placed on probationary status by the ARC-PA due to lack of clinical placements for their students (Coulson, 2017).

Length of program has important implications for students. The price tag for the student must be factored into length of program. Longer programs demand completion of additional academic credits and commensurate tuition. Students in extended programs incur increased tuition debt, which can exceed \$100,000 at private institutions (Colletti et al., 2016). Long-range plans to pay back debt may lure graduates toward medical subspecialties with higher salaries, as opposed to a lower paying primary care field to care for underserved populations (Colletti et al., 2016). The founding principles of the PA profession show that it was designed to provide medically underserved populations with primary care; unfortunately, these founding principles are being abandoned because of ballooning student debt: graduating PA students can earn significantly more money when they work in medical subspecialties. The difference in compensation across specialties is drastic: physicians in neurological surgery, the top-earning specialty, make an average almost 3 times as much as those in family medicine, who are at the bottom of the specialty income distribution (Li, 2018). The salary gap for PAs in primary care compared to specialty fields is smaller than the gap between primary care physicians and specialty physicians. Average PA salaries in primary care are \$99,000 per year in the United States, and average specialty salaries are \$109,000 dollars per year in the United States (AAPA, 2019).

Clinical rotation shortages lead to additional incurred cost to students who must travel and/or acquire housing for distant site opportunities (Coulson, 2017). Re-evaluation of curricular requirements that extend beyond what is required by the ARC-PA could positively influence the existing crises of clinical site shortages. Needing to travel long distances to clinical rotations or spending more money on distant housing can potentially increase student stress levels (Coulson, 2017).

Definitions and Theories of Stress and Consequences of Physical Stress

The medical definition of stress is physical, mental, or biological factors that cause bodily or mental tension (*Definition of Stress*, n.d.). Stress can be derived from intrinsic or extrinsic factors. Extrinsic stress can derive from situations involving work, family, social, or financial issues. Intrinsic stress can be related to health concerns or mental health issues.

Prolonged physical stress can ultimately harm the body. Musculoskeletal ramifications are tight muscles, generalized tension, and tension headaches (WebMD, 2020). Stress can impact the cardiovascular system with increases in heart rate, stronger heart muscle contractions pumping more blood in the body resulting in enlarged blood vessels and high blood pressure (WebMD, 2020). During times of stress, the “fight or flight” response is elicited, resulting in changes in the endocrine and nervous systems and causing the release of catecholamines like epinephrine and norepinephrine into the blood stream. This causes racing heart rate, increasing blood pressure, and rapid respiration. Glucose is released into the bloodstream to provide the body with energy. In addition, the hypothalamic pituitary adrenal (HPA) axis relies on signals from the sympathetic nervous system. The HPA axis is the system which coordinates the nervous system and endocrine system in the body and coordinates the two systems working together to manage bodily responses. Signals are sent from the hypothalamus and pituitary gland to the

adrenal, and cortisol is released. Cortisol continues to keep the body prepared to handle stress. Research has shown that over time, stress causes long-term physical effects on the body like high blood pressure, atherosclerosis, anxiety, depression, and addiction (*Definition of Stress*, n.d.).

Pertinent theories of stress in the literature describe the stress response and have been built upon over time. The first is Hans Selye's theory of systemic stress, based on physiology and psychobiology. Selye, an endocrinologist, conceived the General Adaptation Syndrome (GAS) concept. In animal studies, he found when prolonged stimuli are applied, non-specific changes in the biologic system ensue (Selye, 1950). GAS consists of three phases known as the alarm reaction, the stage of resistance, and the stage of exhaustion. The alarm reaction consists of an initial shock phase and countershock phase. During the shock phase, there is autonomic nervous system excitability, increased adrenaline, and gastrointestinal ulcerations. In the countershock phase, there is increased adrenocortical or "stress hormone production" activity. In the resistance phase, the alarm symptoms disappear, and the organism adapts to the stressor. During the exhaustion phase, the organism has expended all resources, tissue damage occurs, and the organism dies. Selye's theory was criticized, as it considered only the pathophysiology of stress and not the cognitive component of stress reactions.

Lazarus and Folkman (1984) developed the theory of psychological stress, which considers the appraisal of a stressful situation as well as the coping mechanisms that occur with stressors. Stress reaction studies have shown that the ways that college students cope with student stress, particularly interpersonal stress, may be a critical factor in determining which students are at risk for developing mental health disorders (Coiro et al., 2017). Whereas earlier theories of stress focused on the physical elements of stress, more recent theories have focused on more holistic theories of stress, including the stress theory by Lazarus and Folkman. Lazarus

and Folkman defined stress as a relationship between individuals and their environment, and psychological stress refers to the relationship with the environment that the person appraises as significant for his or her well-being and in which the demands tax or exceed available coping resources (Lazarus & Folkman, 1984).

Definition and Consequences of Psychological Distress

Psychological distress occurs when an individual perceives that environmental demands tax or exceed his or her adaptive capacity (S. Cohen et al., 1997). Numerous studies have shown a relationship among stress, psychological stress, and mental health disorders. One study by Turner et al. (1995) revealed that measures of cumulative stress burden explained 23% to 50% of the variance in psychological distress and depression symptoms, and the study showed that stress had a substantial impact on risk of psychological distress, depression, and other psychiatric disorders (Turner et al., 1995).

Sources of Stress and Psychological Stress and Consequences of Stress in Medical Training

Studies have shown that rates of stress, depression, and anxiety have increased among undergraduate and graduate college students across the country in recent years (Ratanasiripong et al., 2010). Graduate students in PA programs have already completed an undergraduate education with extensive biological, scientific, and pre-medical courses prior to entering the high-level content courses that can challenge even the most well-prepared students. PA programs are extremely demanding, especially in the didactic phase where students must master an enormous amount of material in the basic sciences, pharmacology, and disease states (Kuhn et al., 2005). During the clinical phase of the curriculum, students are subjected to long hours, stressful patient and preceptor interactions, and constant change as they adapt to diverse clinical settings. They are subjected to frequent testing under stressful, time-constrained conditions, and

may experience lack of sleep which can cause irritability, anger, and decreased ability to handle stress, leading to psychological despair (Fawzy & Hamed, 2017). Students who were previously considered high performing students may endure failed exams and achieve lower grades than they were accustomed to in undergraduate education (Bergmann et al., 2019). They may also have traumatic patient experiences and encounter criticism from professors and clinical preceptors, culminating in stress and psychological distress (Mavor et al., 2014). Documented consequences of stress on medical trainees include alcohol and drug abuse, difficulties with relationships, depression, anxiety, and suicide, as well as academic difficulty, fatigue, burnout, decreased empathy, and poor patient care (Kuhn et al., 2005). More details about these consequences of prolonged stress and psychological distress are discussed next.

Academic Consequences of Stress

Surprisingly, limited studies have been published on the academic consequences of stress in undergraduate students. Although some of the studies are older, the fact remains that stress can affect retention rates and GPA in undergraduate students. Pritchard and Wilson (2003) found that both social and emotional health factors were related to both student performance and retention. In this study, students with better emotional health had higher GPAs as well as less intention of dropping out of college.

Additionally, few studies have been published on the academic consequences of stress in medical education. In the few studies addressing this topic, it was found that high levels of stress in medical school can lead to pervasive underperformance (O'Rourke et al., 2010). Sohail (2013) found that most students had moderate levels of stress and that higher levels of stress had a negative effect on academic performance. Optimal levels of stress can enhance learning, but excess stress can cause physical effects and mental effects, as well as negatively affect learning

in medical school (Sohail, 2013). In a study by Abdulghani (2008), high levels of stress were shown to impair medical student learning.

Stress has also been shown to affect the academic performance of adolescents. Schraml et al. (2012) found that chronic stress has implications for adolescents' academic achievement. In their study, a questionnaire about stress was distributed to 270 high school students at the beginning and end of their high school years. Students who perceived severe stress symptoms at both points in time finished high school with significantly inferior final grades than students who reported stress at one or neither of the points in time. The risk of having heightened stress was increased for adolescents with low self-esteem, those who perceived high demands, and those who self-reported poor health and deficient sleep duration. This suggests that early prevention of chronic stress in students is critical, as it can affect their future health, mental health, and career possibilities (Schraml et al., 2012).

Similar results were found in a small study performed on graduate students. In a study performed on 120 medical students from India, Sohail (2013) found that there was a moderate and significant negative correlation between academic achievement and stress.

Academic performance is influenced by stress in many ways. Stress can have a positive effect by motivating students, pushing them to attain goals and complete their education. Conversely, stress can negatively affect grades, mental health, and physical health. Kumari and Gartia (2012) surveyed 120 randomly selected senior secondary school students, and their study revealed positive association between stress and academic performance. The average participant was 16.5 years old, and an equal number of males and females were enrolled in the study. A validated Stress Inventory was used with a Likert scale of 1 to 5 with 1 being least often and 5 being most often. Highly stressed students performed significantly better academically than

moderately stressed students, and mildly stressed students were the academically weakest group (Kumari & Gartia, 2012). This was a small study with only 120 participants, and it conflicted with other studies that have found a negative correlation between stress and academic achievement. Neither Schraml et al. (2012) nor Kumari and Garcia were focused on college students or health professions students. For some medical students, the transition to medical school is smooth, while others struggle to maintain academic and emotional stability. Students with a history of anxiety or depression and few adequate coping skills are at particular risk for poor reactions to stress (Brennan et al., 2016). There is a gap in the research that invites future research focusing solely on health professions students and incorporating other factors such as personality, resilience, and social supports.

Effects of Stress on Mental Well-Being

Although there is an absence of literature on the influence of stress among health professions students, research suggests high rates of psychological distress among these students (Saeed et al., 2016). In recent studies, 22% to 49% of medical students reported depressive symptoms, with the highest rates among women and minorities (Thompson et al., 2010). Suicide is one of the most devastating consequences of depression and psychological distress. A meta-analysis of the literature published in 2016 discovered the prevalence of suicidal ideations was 11.1% in medical students (Rotenstein et al., 2016). A national study of 90 schools between 2006 and 2011 reported a total of six medical student suicides (Cheng et al., 2014). Data have shown that females attempt suicide at 2 or 3 times the rate of males, but males complete suicide at 4 times the rate of females. Both male and female physicians have a higher risk of suicide than the general population (Moutier et al., 2012). The statistics are of great concern for students who will ultimately treat patients with mental illness during their medical careers. A limitation to all

research on suicidal ideation is that many students may not report this symptom, so there is a high probability the actual numbers may be higher than reported in the literature.

In a 2012 national study of U.S. medical students, 32.4% of the medical students surveyed met the criteria for alcohol abuse (Jackson et al., 2016). In a 1999 study with focus on attitudes about alcohol in allied health and PA students, 47.8% of PA students reported a family history of alcohol problems. Past alcohol use was reported in 88.1% of the allied health students surveyed, past tobacco use by 26.1% of those surveyed, and past year marijuana use by 6.7% (Baldwin et al., 2008). Past-year blackouts were reported by 21.9% of the students, driving after three or more drinks by 49.3%, and attendance at class or at work under the influence of drugs or alcohol by 7.8% (Baldwin et al., 2008). When French medical students were studied, 26% of students reported feeling that binge drinking was a way to deal with increased stress (Gignon et al., 2015). For many students, alcohol consumption and illicit drug use may be a way of coping with a challenging medical curriculum and the stress of clinical rotations (Gignon et al., 2015). In a study comparing U.S. college students with their non-college attending peers, it was found that 18% of the U.S. college students suffered from alcohol-related problems in the past year, and 15% of their non-college peers suffered from significant alcohol related problems (Slutske, 2005). Although these statistics are from different studies, when comparing the studies it seems the medical and allied health students had high percentages of alcohol-related problems.

In one study of more than 1,000 medical students, higher levels of burnout and stress were found to be correlated with a decrease in empathy (Thomas et al., 2007). Depersonalization, defined by a person believing they are observing things from outside their own body, was correlated with lower empathy scores, whereas personal accomplishment was associated with higher empathy scores (Thomas et al., 2007). In another study performed on PA students, as

students progressed throughout didactic training their empathy scores decreased, and the loss of empathy was sustained throughout the clinical year (Mandel & Schweinle, 2012). As students advance through the program, it is likely that stress, burnout, fatigue and focus on the sciences contribute to this decrease in empathy. These future health care providers require more extensive education in empathy and compassion skills before the onus is on them to deliver high-quality, inclusive care, including caring for patients' emotional needs. Studies have shown that medical schools that have implemented curricula to include emotion skills training have shown encouraging results. Resident physicians attending these courses have improved their ability to deliver bad news, specifically developing better responses to emotional cues, and physicians working in oncology attending workshops on communication skills showed improvement in verbal expressions of empathy (Buckman et al., 2011). Research has suggested that increasing minority representation may be protective against the documented decline in empathy seen in medical students (Whitla et al., 2003).

Health care providers continue to experience stress after graduating from their respective programs. Medicine is an extremely stressful career, and mental health issues can be ignited by long work hours, fatigue, and burnout. Physicians with clinical depression are more likely to leave the medical profession, reduce their work hours, or change their specialty (Guille et al., 2017.). Psychological distress can significantly impact patient care. In a study of 123 pediatric residents, it was found that those residents meeting the criteria for depression were more likely to make a medication error than non-depressed residents (Golob et al., 2018).

Student perception of their quality of life can be impacted by medical education because it requires adaptation and lifestyle changes (Tempski et al., 2012). Quality of life has been defined by the World Health Organization (WHO) as "the individual's perception of his position

in life, within the context of culture and system of values where the individual lives in relation to his objectives, expectations, standards and concerns” (WHO, n.d.). In one study, it was shown that quality of teachers; curricula; and healthy lifestyles related to eating habits, sleep, and physical activity modify medical student quality of life as influenced by their medical school experiences. However, students understand this poor quality of life as necessary to and inherent in the process of becoming physicians (Tempski et al., 2012).

Physical Effects of Stress

Sleep disruption and subsequent fatigue is a common consequence of stress among medical students. Studies have indicated that compared with students in other professions, medical and law students tend to experience more stress due to lack of sleep, worry about grades, and lack of time for relaxation (Palatty et al., 2011). A study comparing sleep patterns in medical and law students by Palatty et al. (2011) found that sleep quality and quantity were better among law students compared with medical students. Sixty percent of law students reported waking and feeling refreshed, and only 47.1% of medical students felt refreshed (Palatty et al., 2011). A limitation of the study was that it did not discuss the average number of hours of sleep per night for each profession, which would be interesting to know based on the heavy course loads for both types of educational programs. Not sleeping enough can lead to burnout and decreased work satisfaction (Mazurkiewicz et al., 2012).

Barriers to Seeking Help for Stress and Psychological Distress

There is a stigma associated with mental health issues, and some medical students are afraid to seek help for mental illness or psychological disorders for fear of its having implications on their career (Awad et al., 2019). Some students believe revealing psychological distress is a sign of “weakness,” believing they should be “indestructible” as physicians without

requiring counseling or medications to help their mental health issues (Awad et al., 2019). Others believe that if they reveal mental illness, they may be subject to disciplinary actions, and that other health care providers may find out about their mental health issues (Awad et al., 2019). Students may also not be aware of the resources that are available to them through their institution. Eisenberg et al. (2007) found that 51% of university students surveyed said they would not know where to go for mental health at their university, and 41% were not aware of the free counseling available on campus. Of the students in the study who reported having symptoms of anxiety or depression but had not accessed student mental health services, only 47% said they thought therapy would be beneficial and only 37% believed medications could be helpful (Eisenberg et al., 2007).

Studies Examining Mental Health of Physician Assistant Students

Despite numerous published studies related to the mental health and coping in medical students, little research has examined the mental health issues of PA students. Medical students usually begin graduate education in better health than other non-medical counterparts, but research has shown that half of all medical students exhibit signs of psychological morbidity during their 1st year, with higher rates of depression, anxiety, and alcohol related problems (Chew-Graham et al., 2003). Another study performed in 2012 demonstrated that PA students in Texas experienced higher levels of stress compared with the general population, which can often lead to mental health issues (O'Brien et al., 2012). However, the study did not look at factors that may predispose students to increased stress, which is an important component to include in further investigation. When PA students experience stress, it can affect sleeping and eating habits and academic performance, provoke conflict in the classroom, and lead to pathologic mental health states (Kuhn et al., 2005).

Personality and Coping Characteristics in Students That Lead to Increased Stress

Several studies have been published analyzing personality characteristics as well as coping styles that may increase stress. Bergmann et al. (2019) analyzed stress in German medical students using the Big Five Model of personality characteristics (conscientiousness, agreeableness, extraversion, neuroticism, and openness to experience) to help analyze what personality factors contributed to increased stress. A high degree of conscientiousness (tendency to be dependable and self-disciplined) may correlate with better performance. However, conscientiousness can also predict stress and may contribute to poor health, and it can later result in compulsiveness in the personality of physicians. Highly conscientious students often prioritize school above leisure and social engagements (Bergmann et al., 2019). Neuroticism, or the tendency to be prone to psychological distress, was attributed to participants not enjoying leisure time, primarily due to perceived guilt about not studying (Bergman et al., 2019; Tyssen et al., 2007).

In another study by Haghghi and Gerber (2019), 207 medical students completed questionnaires such as the Mental Toughness Questionnaire, the Perceived Stress Scale (PSS), the Beck Depression Inventory, and the Maslach Burnout Inventory. The researchers analyzed whether mental toughness moderates the relationship between stress and four predicted mental health outcomes in students. The four outcomes included depressive symptoms, anxiety, burnout, and insomnia. Elevated stress was only associated with higher depressive symptoms among students with low mental toughness scores. The results of this study suggested that mental toughness may be a stress resilience resource to teach to medical students at risk for stress and psychological distress (Haghghi & Gerber, 2019).

A study by Tyssen et al. (2007) investigated mental health issues in 4th-year postgraduate medical residents in Norway. They found that the factors that increased risk for mental health issues in the study were previous mental health problems, higher levels of perceived medical school stress, and wishful thinking. Wishful thinking has been described in the literature as a poor coping strategy, where students say things like, “I wish a miracle would happen” or “I wish I were a stronger person.” Wishful thinking has also been associated with depression (Reidar et al., 2001). Due to the stress encountered by students in PA school, the ARC-PA has addressed standards that each PA program must follow; these standards are outlined in the next section.

Accreditation Review Commission for Physician Assistants

The ARC-PA requires PA programs to provide academic and mental health services to all PA students. The ARC-PA is the accrediting body which oversees PA education within the United States and ensures that all accredited PA programs comply with the standards defined by the accrediting agency (Luke, n.d.-a). Standard A1.04 states that “the sponsoring institution must provide academic support and student services to PA students that are equivalent to these services provided to other comparable students of the institution.” This includes access to health and mental health services (Luke, n.d.-c). Standard A2.05 states that faculty must “provide timely access and/or referral of students to services addressing personal issues that may impact their progress in the PA Program.” These standards imply that faculty can identify, counsel, refer or remediate students with learning disorders or other mental health conditions included in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5). DSM-5 is the resource used in medicine to define and classify mental health disorders (Jones & Williams, 2014). However, faculty of PA programs must also follow the ARC-PA Standard A3.09, which states that “faculty must not participate in health care for students in the program, except in an emergency” (Jones &

Williams, 2014). Unfortunately, there are no established curricular guidelines outlining measures to help students manage stress and psychological disorders within PA programs. Many medical schools have assembled curricular changes to address student psychological distress; however, there is a dearth of information regarding similar evolution within PA education (Childers et al., 2012).

Curricular Changes to Decrease Stress and Improve Quality of Life

Several curricular changes in medical education have been implemented and reported in the literature to help medical students decrease stress, improve mental well-being and quality of life, and cope with stress. Some have focused on screening, identifying, and treating students at risk for stress-related mental health issues, and others have focused on curricular changes to decrease stress.

Initiatives have been developed to help improve medical student mental well-being by providing increased screening for mental health disorders and increasing access to mental health providers (Slavin et al., 2014). The University of Hawaii School of Medicine launched an initiative with focus on 3rd-year medical students to expand counseling services throughout the medical school and teach faculty and students how to identify risk factors for depression. Faculty were trained on how to effectively communicate with depressed students. Evaluation of the program revealed that there was a decrease in depressive symptoms and suicidal ideations among the 3rd-year medical students who participated in the study (Thompson et al., 2010). Some limitations to the study were that it had a small sample size and was conducted at only one institution, which limited external validity. Only 3rd-year medical students participated, whereas many of the national studies show that rates of anxiety, ADHD, and depression start to develop in the 1st year of medical school, peak in the 3rd year of medical school, and decline in the 4th

year (Thompson et al., 2010). More data could be elicited by studying students over the entire 4 years, as it is possible some decreased stress and depression could be due to the decreased demands when transitioning from the 3rd to 4th year of the curriculum. In this particular study, it is difficult to tell if the decreased stress found in the 3rd-year students came entirely from the interventions to decrease stress and depression in the study, or if the natural progression through medical school had some effect on the decrease in stress (Thompson et al., 2010).

Another program focused on screening, assessing, and referring medical students for potential mental health issues. This program at the University of California San Diego School of Medicine developed a confidential, online screening tool for all medical students, residents, and physicians in their health system. The form used was a widely used validated depression survey called the Patient Health Questionnaire (PHQ-9). If any participant scored high for depression, a university employed counselor would send an email to the participant offering help either online or in person. The participants could choose if they wanted to receive any form of help. There were 29 lectures embedded in the curriculum over the course of a year that focused on educating students, residents, and physicians on topics such as suicide, depression, and physician burnout. Of all medical personnel screened, 48 of 2,860 were found to have moderate to high suicide risk. Of those 48, only 11 accepted a referral for further treatment (Moutier et al., 2012). Of the participants who came for a face-to-face meeting with a counselor, 71% said they would not have done so without having participated in the online screening program (Moutier et al., 2012). This study had excellent intentions and the structure of the program was thoughtfully designed, relying on the ease and convenience of online screening. However, only a small number accepted the initial online invitation for screening, and a small number received mental health counseling.

The program will need to gather more data over several years to determine the true impact of the intervention.

Other medical schools have implemented wellness programs as well as mind-body electives to help improve quality of life among medical students and decrease stress. The Vanderbilt School of Medicine developed a 4-year longitudinal study that identified stressful events in medical school such as board exams, long clinical rotation hours and stressors in the personal lives of students. The program focused on three core goals: mentoring and advising of medical students, student leadership, and personal psychological growth (Drolet & Rodgers, 2010). The objectives of the program were to maximize student health, happiness, and academic potential by organizing wellness events and mentoring. The events consisted of meditation, exercise programs, writing workshops, study breaks, festivals, study skills sessions, and peer-to-peer sessions. Changes were made to the physical organization of the campus, and community spaces were created for students to spend time with other members of the medical school community. Healthy food options were made available, and exercise equipment was incorporated into the facility. Limited data were collected, but it was found that 97% of the 1st-year class participated in the events. In a Likert-type survey, leadership and small group programs were rated 4.32 to 4.53 (on a Likert scale of 5, 5 indicates most satisfied), with these numbers correlating to most satisfied (Drolet & Rodgers, 2010). However, the interventions remain in the pilot stage, and no data were collected on the effect on mental illness and burnout, two of the most important factors that need to be analyzed to determine the success of a wellness intervention. The data only analyzed student participation rates and written and verbal feedback from the students related to their feelings on the program. The program sounds promising; however, more data are needed to analyze if the interventions effectively decrease stress.

Another institution focused on initiating a wellness elective and studied the effect of a mind-body elective aimed to attract medical students with high levels of anxiety. With meditation and physical activity, it was found that anxiety levels in the study group declined during the course and were measured and sustained to the same level as non-enrolled students for 3 months post-program completion (Finkelstein et al., 2007).

Several medical schools have prioritized proactively implementing curricular changes to decrease stress instead of retroactively addressing newly developed mental health issues. In these studies, students identified the amount of material, detail of material, and competition in academic performance as the biggest stressors (Slavin et al., 2014). These medical schools designed curricular changes to directly modify these stressors. One change made was were reducing contact hours in the 1st 2 years of the curriculum to allow students to participate in longitudinal electives and learning communities in areas they were passionate about, such as underserved population health and global health. They were able to do this with other students and faculty who shared the same passions. Additionally, resilience and mindfulness program were designed, focusing on energy management, stress reduction, optimism, and character strengths. Anatomy was identified as the most difficult course in the medical school curriculum, so to offset the associated stress, the course position in the curriculum and the grading schema were duly adjusted. The traditional grading system levels of honors, near honors, pass, and fail were modified to a pass/fail grading system. The results were positive, with significantly lower levels of stress, depression, and anxiety symptoms, and higher levels of community cohesion in wellness program participants compared with those who preceded the implementation (Slavin et al., 2014). Other studies uncovered similar results when investigating a pass/fail grading system (Bloodgood et al., 2009). Bloodgood et al. (2009) reported that when compared with traditional

grading, pass/fail classes resulted in a significant increase in student well-being during each of the three semesters of medical school compared to the graded class, greater satisfaction with medical education quality, and heightened personal life satisfaction during first three semesters of medical school. The traditionally graded and pass/fail classes showed no significant differences in performance in the 1st- and 2nd-year curriculum, clinical rotations, scores on the United States Medical Licensing Exam (USMLE) Step 1 and Step 2 exams, or success in residency (Bloodgood et al., 2009). These curricular changes are examples of how important mental health and well-being are to health professions students. These are especially important for URM minority students in medical school who individually experience a more negative learning environment, receive less social support, are subject to discrimination and racial harassment, demonstrate poorer performance on standardized exams, and are ultimately less likely to remain in medical school when compared to their non-minority peers (Noori et al., n.d.).

Definition of Underrepresented Students

Since 2003, the AAMC has defined underrepresented medical students as “those racial and ethnic populations that are underrepresented in the medical profession relative to their numbers in the general population.” In STEM fields, URM students include Black, Hispanic or Latino/Latina, American Indian, and Alaskan Native (Estrada et al., 2016). Prior to 2003, the definition included Black, American Indian (American Indians, Alaskan Native, Native Hawaiian), Mexican American, and Puerto Rican students (AAMC, n.d.-j). The AAMC recognizes that the established underrepresented ethnic groups are constantly in flux and the classification changes based on the shifts in the overall population (AAMC, n.d.-j).

PAEA defines URM status in two different ways. The first is URM status, and the second is Underrepresented (UR) minority in medicine status. URM status is those who identified as

Hispanic, a single non-White race, or a non-White race in combination with a White race. URMs are contrasted against non-Hispanic, single-race White respondents. Under PAEA guidelines, underrepresented races are limited to American Indian, Alaskan Native, Black or Black, Native Hawaiian or other Pacific Islander (PAEA, 2019). PAEA further narrows the URM definition to UR minorities in medicine, defined by the AAMC as “those racial and ethnic populations that are underrepresented in the medical profession relative to their numbers in the general population.” In PAEA’s definition, non-Hispanic, single-race Asian and biracial Asian/White individuals are not classified as UR minorities in medicine (PAEA, 2019).

The PA profession was founded to send highly trained, primary care providers to underserved areas in the United States. The profession has grown substantially over the last 50 years and is a thriving industry with considerable estimated future growth, but diversity within the industry has not blossomed in tandem. The profession is predominantly female, and approximately 86% of PAs are non-Hispanic White (PAEA, 2019). It has been reported that the proportion of URM PAs has declined over the past 3 decades. The number of Black PAs declined from 9.5% in 1980 to 7.8% in 2007. The American Indian population of PAs remained stable at around 0.5%. The percentage of the PA workforce that is Hispanic or Latino increased from 5.4% to 8.2% over this same time period, and although it reached a peak of 10.1% in 2005, it decreased to 8.2% in 2007 (DiBaise et al., 2015). In addition, although medical student enrollment has increased 29.3% between 2002 and 2017, Black, Hispanic, and American Indian or Alaskan Native students of both sexes were underrepresented in medical school, with a significant trend toward decreased representation from Black female students between 2002 and 2012 (Lett et al., 2019). This is a concern to the national PA organizations, as minorities are more likely to practice in underserved areas and serve minority populations. Increasing diversity

in the PA workforce is a key component to ensuring equitable access to health care and decreasing health care disparities (Yuen, 2019). There is an abundance of research that explains why the PA and the medical professions are lacking URM students, yet few significant changes have occurred based on these findings (Henry, 2006). URM students are somehow being lost in the pipeline for PA school, and research must now focus on educational factors that may benefit underserved students and increase diversity in enrollment. The PAEA has tried to address the lack of diversity in PA education and has developed a plan which is explained next.

Physician Assistant Education Association Diversity Goals

The PA profession lacks significant presence of URM students in the workforce, and among students and faculty in PA educational programs nationwide. In response, the PAEA began diversity and inclusion initiatives in 2017 with a 5-year implementation plan. The first goal in the strategic plan for PAEA was to increase diversity initiatives. The goals of the initiative were to

1) enhance learning experiences for all students, 2) forge new career opportunities for students that are historically underrepresented in medicine, and 3) improve health outcomes for patients by increasing the number of diverse health care providers to better relate to minority patients. (Coplan & Fleming, 2019)

Included in the initiatives was a call for research to explore factors impacting diversity within the profession. Previous research has uncovered that increasing diversity in the workforce results in culturally competent care, expands health care access to underserved populations, promotes research in areas of societal need, and helps create policy makers who lobby for the needs of the underserved (J. J. Cohen et al., 2002). However, barriers to recruitment and enrollment of URM students remain.

Barriers to Underrepresented Recruitment and Enrollment

A common theme in the literature is the barriers to recruitment and enrollment in medical programs for URM students. The most common barriers are lack of financial resources, lack of minority faculty and mentors, poor academic preparation, and non-holistic admission processes. Non-holistic admissions process means that admissions officers consider only empirical data such as grade point average (GPA) and Graduate Record Exam (GRE) scores for PA school and GPA and Medical College Admission Test (MCAT) scores for medical school, rather than looking at the entire person. Student experiences, cultural diversity, and student attributes must be considered in order for the admissions process to be presumed holistic (AAMC, n.d.-f). Each of these barriers will be discussed in further detail.

Lack of Financial Resources As a Barrier for Underrepresented Minority Students

Financial struggle can be a serious obstacle when deliberating graduate education like PA school. Minority students have higher rates of poverty, less accessible educational resources, and less educational opportunity to succeed in high school and college (Baugh et al., 2019). White and URM students alike encounter financial hardship, but the literature focuses on this as a causative factor for minority students shying away from health care professions, and in some cases not completing graduate education (Baugh et al., 2019). Policy efforts to improve physician workforce diversity are inhibited by rising student debt (Greysen et al., 2011). The average price of PA education is \$91,630 at private institutions, \$88,687 for out-of-state public tuition, and \$50,289 for in-state public tuition according to the 2018 PAEA Program Report (PAEA, 2019). Most of the new PA programs across the country are housed in private institutions, where the price of education is prohibitive. According to the 2018 PAEA program survey, 68.7% of PA schools are private (PAEA, 2019). For URM students the price tag of

undergraduate education plus graduate studies is an untenable impediment to careers in medicine due to overwhelming student loan debt (Baugh et al., 2019). The potential burden of educational debt has been identified as the primary reason high-achieving children from disadvantaged backgrounds choose not to pursue college or medical school (Baugh et al., 2019).

Financial aid other than loans has become less procurable for students. Many undergraduate scholarships are merit based instead of need based, magnifying the implausibility for disadvantaged students to qualify (Heller & Marin, 2002). Many students must be gainfully employed while attending graduate programs to provide for their basic needs such as food, clothing, and housing. Students who work full-time and carry a full academic course load tend to achieve lower grades, fail courses, and display higher rates of attrition (Baugh et al., 2019). In fact, at many PA programs the students are strongly discouraged from engaging in outside employment, as the academic workload is far too intensive to favorably sustain external responsibilities (Kubin, 2011). On average, students are in classes 30 hours per week and engage in self-directed learning up to an additional 30 hours. Studies have shown that working more than 15 hours per week is detrimental to schooling and can affect how students perform in school (Baugh et al., 2019). Debt for those who are already in a lower socioeconomic group can be a reason not to pursue medical school due to fear of further increased debt (Baugh et al., 2019).

Academic Barriers for Underrepresented Minority Students

Many students enter college with hopes of studying science, technology, engineering or math (STEM) fields. However, once they take introductory science courses, they often abandon this goal and choose a different path, and less than 40% of students who begin college in science majors complete a degree in STEM fields (Linnenbrink-Garcia et al., 2018). One reason is due to the bulk of secondary school students failing to achieve proficiency in math and science, and

teachers lacking adequate subject matter knowledge (Kuenzi, n.d.). Large numbers of urban schools with higher percentages of URM students typically lack resources such as proper funding, experienced teachers, and computer training (Baugh et al., 2019). Schools with a high percentage of minority students offer less demanding science and math courses to prepare them for college (May & Chubin, 2003). Students unprepared for a rigorous science curriculum struggle with a heavy science course load once they get to college. Advanced Placement (AP) STEM-based course work in high school and competitive SAT scores help enhance persistence to graduation in STEM field majors; however, minority students often do not have access to AP classes and cannot afford SAT prep classes (Ehrenberg, 2010).

When URM students are enrolled in college and want to pursue medical school or PA school, most of them major in a biology. According to the PAEA student survey, 43.1% of students who matriculate in PA school majored in biology in college (PAEA, 2019). Both persistence to graduation in a biology major and college grades were strongly associated with high school achievement measures (Villarejo et al., 2008). Graduates in biology had statistically higher high school GPAs and math SAT scores than those who left biology (Villarejo et al., 2008). In a qualitative study on URM students in the University of California premedical curriculum, five overarching themes were revealed. The five themes were feeling unprepared for the rigorous premed curriculum, negative social interactions, racism, competing obligations, and unwelcoming and isolating campus climate (Uwaezuoke, n.d.). Studies have also shown that supplemental instruction for URM science majors in difficult undergraduate courses has had a significant effect on persistence of URM students in science majors (Rath et al., 2007).

In addition, research has shown that less than half of Hispanic high school graduates qualify to enroll in a 4-year institution immediately following graduation, and 68% are much

more likely to attend a community college than White graduates (Crisp et al., 2009). Talamantes et al. (2014) found that students who went to community college prior to attending a 4-year institution, then subsequently went to medical school, reported that they were more likely to work in underserved areas and care for minority populations. However, students who attended community college first were also less likely to be accepted into medical school than students who started at 4-year institutions. Students must possess or be close to earning a bachelor's degree prior to applying to a Master of Science in Physician Assistant program.

Chemistry has been found to be another academic barrier for URM students applying to medical programs. At Stanford University, URM students who dropped out of the premedical curriculum were surveyed to determine why their attrition rate was higher than that of their White counterparts. It was found that most of the students who lost interest in becoming a physician were affected by a negative experience in either chemistry or organic chemistry. Several students described chemistry as a “weed out” course, indicating a perception that chemistry is essential to succeed in medical school. Students who did poorly were often advised against continuing in a pre-medical track (Barr et al., 2008). Some strategies to circumvent this decreased interest in premedical majors are to move chemistry further into the curriculum, utilize graduate assistants as academic support, adopt smaller class sizes, and reconsider chemistry as a requirement for medical school. Advisors should also consider taking a different approach to students who may be decelerating in chemistry. Instead of discouraging a student to leave the premed curriculum, advisors could acknowledge that chemistry is a globally challenging course and provide academic support services to struggling students. Again, a limitation to this study was that it was only performed at one institution, Stanford University (Barr et al., 2008).

The GRE is another academic barrier for URM students applying to PA school. Minority groups historically score lower on standardized testing like the GRE despite increased enrollment in STEM programs among minority populations (Bleske-Rechek & Browne, 2014). Some but not all PA programs require candidates to submit GRE scores on their application. In a study by Yuen and Honda (2019), URMs, older individuals, and men who did not have GRE scores had lower rates of matriculation into PA programs compared with students who took the GRE (Yuen, 2019). When GRE and GPA were controlled for, their odds of matriculating into a PA program increased, indicating that standardized testing requirements such as the GRE may be a barrier for URM students. Score inconsistency has been attributed to students of higher socioeconomic status having access to tutors and review courses, and the luxury of affording multiple attempts for maximum outcome. The GRE has been shown to be biased in some studies, reflecting demographic characteristics rather than intellectual ability (Coplan & Fleming, 2019).

Attrition is another barrier for URM students once they are in PA school. The 2016 PAEA program report revealed that there were lower graduation rates for Hispanic students (92.8%), Native Hawaiian or Pacific Islander (91.3%), and Black students (85.1%), compared to White students (95.2%) (Coplan & Fleming, 2019).

Barriers to Recruitment to Medical Programs for Underrepresented Minority Students

The applicant pool for PA school is extremely competitive. Many of the programs across the country have stringent criteria to qualify for an interview. According to the PAEA Program Report (2019), the average science GPA of entering 1st-year PA students was 3.5; the average patient care experience hours was over 3,000; and the average GRE scores for verbal, math, and analytical were above the 50th percentile (PAEA, 2019). When high standards among all applicants are the norm in the admissions process, it can lead to a lack of diversity within

programs. One study concentrating on recruiting URM students into PA programs revealed that wealthier White students surpass minimum admissions criteria and dominate coveted program seats from highly competitive pools (DiBaise et al., 2015). Unconscious bias and the phenomenon of “similarity attracts” can precipitate a homogenous student body, and research has shown a negative correlation between the number of White faculty on admissions committees and the number of accepted URM students (Coplan & Fleming, 2019).

Lack of Minority Faculty and Lack of Program Diversity As a Barrier for Underrepresented Minority Students

According to the PAEA program survey, there is a lack of diversity among PA faculty. PA programs are proliferating, especially over the last decade, but they struggle to fill faculty positions. In January 2019, when nearly one third of all PA programs reported faculty position vacancies, there were more than 40 job listings on the PAEA website, with programs hoping to fill those positions (Coplan & Fleming, 2019). The most common reason for the vacancies was lack of qualified candidates (PAEA, 2018b). PAEA statistics reveal low numbers of minority faculty members. PAEA statistics show that 89.2% of faculty are White, implying difficulty in recruiting URM faculty (PAEA, 2019). In 2017, 4.4% of PA program faculty were Hispanic or Latino, 3.5% were Black, and 0.3% were American Indian or Alaskan Native (PAEA, 2019). Studies have shown that minority students do not seek admission into programs lacking diversity in the student body and faculty. One study of 67 PA programs found that 52% reported that not having minority faculty was a barrier to recruiting minority students (Yuen, 2019). In another study, Black and Hispanic students revealed that they consider campus and surrounding community diversity before committing to an institution, in order to feel integrated and socially engaged within the campus environment (Cho et al., 2008). In addition, research has shown that

being a minority faculty member in PA education leads to increased faculty attrition due to lack of institutional support, gaps in mentorship, and lack of social support (LeLacheur et al., 2019).

Strategies Implemented for Recruiting and Retaining Underrepresented Students

Researchers have explored different programs that have been developed in medical programs to recruit and retain URM students. One program, designed by Vela et al. (2010), was developed at the University of Chicago Pritzker School of Medicine and required all matriculants to attend a health disparities course which began prior to orientation and lasted 8 weeks into the first semester. The course included lectures; focus groups; and visits to community clinics, emergency departments, and hospitals. Topics discussed included Medicare, Medicaid, health disparities, race, culture, health literacy, health policy, and use of interpreters for language barriers. Of the 112 students who participated in the course, 100% of the participants from the 2007 cohort and 96% of the students from the 2008 cohort responded to the pre and post survey. Seventy-three percent of the URM students compared to 42% of the non-URM students reported that their knowledge gained in the course influenced their decision to attend this medical school. Forty-six percent felt interested in the health disparities curriculum, and 44% felt it was important that the curriculum shaped the school's reputation for valuing learning about health disparities (Vela et al., 2010). In addition, enrollment of URM students increased from 12% in 2005 to 22% in 2007 (Vela et al., 2010). Based on this study, it is clear the health disparities curriculum had some effect on the increase in enrollment; however, there are likely other factors that contributed as well. The University of Chicago also started other initiatives to improve the diversity climate at the university, such as partnering with the Minority Affairs Office and the Student National Medical Association with strong presence on recruitment days. These factors

were not controlled for in this study, so it is difficult to tell if the increase in enrollment was due to the intervention or if other factors were also instrumental.

Another method of recruiting and retaining URM students is described in an article about Historically Black Colleges and Universities (HBCUs) that used statistics and a literature review to describe the success of minority students in their curriculum. Compared with institutions across the country, of the top 10 institutions graduating 20 or more Black applicants to United States medical schools, four of the institutions were HBCUs (Gasman & Nguyen, n.d.). The authors discussed how students are “weeded out” during the early undergraduate science curriculum programs. However, at HBCUs, students are encouraged to succeed and are supported early on. Students who struggle academically are identified early and a plan is implemented to address any deficiencies. HBCUs have smaller class sizes, low faculty to student ratios, summer programs, and supplemental learning to bridge gaps in poor math and science preparation (Gasman & Nguyen, n.d.). Students at HBCUs feel integrated into the culture of the institution, are encouraged to succeed, and are supported by mentors and academic resources to be successful in the program.

The University of Toledo College of Medicine Chapter of the Student National Medical Association and the College of Medicine’s admissions office designed an initiative to increase the number of URM students at the school (Rumala & Cason, 2007). The admissions committee developed a multiple-phase strategy tracking potential students through matriculation and creating a personalized experience. A second-look weekend program was created for candidates to help them feel valued. In addition, the committee developed a retention initiative, hosting quarterly dinners for minority students and networking with faculty, students, and the community. A big brother, big sister program was implemented to guide and establish a support

network for minority students. Initial data revealed that 100% of enrolled students rated the program as being excellent, and some stated that the initiative was “crucial” in their decision process. One said it was the main reason for attending the university (Rumala & Cason, 2007). The limitation to these data is that they were preliminary, and the program needs to be studied longitudinally to analyze the admission statistics. It does seem like a realistic program to try to increase program diversity.

Another study by Guevara et al. (2013) evaluated 124 medical schools in the United States for presence of minority faculty development programs. Of the 124 schools, 29% or 36 schools, operated minority faculty development programs initiated between 1968 and 2010. The percentage of URM faculty at U.S. medical schools displayed modest increase from 2000 to 2010. However, the presence of a minority faculty development program targeting URM faculty was not associated with greater URM faculty representation, recruitment, or promotion (Guevara et al., 2013). Medical schools with more developed, sustained programs for 5 years or more exhibited far more favorable outcomes. Programs at HBCUs also had superior outcomes with regard to minority recruitment, representation, and promotion, likely due to the supportive culture and favorable campus climate toward URM faculty (Guevara et al., 2013).

Holistic review during the medical school admissions process is defined as a flexible and individualized way of assessing an applicant’s capabilities by not just considering metrics and numbers such as GPA and standardized testing (MCAT) scores, but by also balancing individual experiences and attributes and how the individual may contribute as a medical student or physician (AAMC, n.d.-e). Nearly all medical schools reported using some elements of holistic review in a 2013 survey administered as part of the Urban Universities for Health Partnership (AAMC, n.d.-f). In a study by Ballejos et al. (2015), it was found that admission rates of URM

can be increased without compromising admission standards by increasing the weight of non-cognitive criteria over cognitive criteria. The non-cognitive criteria used in the study were diversity, communication skills, suitability for a career in medicine, and letters of recommendation (Ballejos et al., 2015). This study showed that challenging conventional admissions processes can help diversify the health care workforce (Ballejos et al., 2015). Diverse composition of admissions committees is essential to ensure that admissions practices incorporate diversity of thought, perspectives, background, and experiences (Coplan & Fleming, 2019).

Theoretical Framework

This study focused on constructs of stress in PA students and how length of program impacts student stress. The guiding theoretical framework is based on the Transactional Theory of Stress and Coping by two well-known psychologists and researchers, Richard Lazarus and Susan Folkman. They co-authored a book in 1984 entitled *Stress, Appraisal and Coping*, which details their Transactional Model of Stress and Coping Theory. Lazarus, one of the most influential psychologists in his field, intricately studied stress and coping (Berkeley University of California, 2002). Folkman is an American psychologist and researcher known internationally for her theoretical and empirical contributions to the field of stress and coping (UCSF Osher Center for Integrative Medicine, n.d.).

Their theory demonstrates that stress is perceived as the relationship between a person and their environment, subjectively influenced by cognitive appraisal of the environment. In this study, the environment was measured by program length. Differences in program length can affect stress levels due to a condensed and intense curriculum (Bell, 2017). For some, when situational stimuli are recognized as threatening or challenging, coping strategies emerge to manage emotions or address the stressor itself. Others may be faced with the same stimuli and be

completely unaffected. Coping processes have variable potential outcomes with corresponding emotions. If the stressor is favorable or resolved, positive emotions result; however, if the outcome is unfavorable or unresolved, negative emotions may ensue (Lazarus & Folkman, 1984). This theory explains stress as the interaction between the student and their environment as well as demographic factors and characteristics that may affect how a student reacts to stress. This study focused on the first part of the theory, the interaction of a person and their environment.

Lazarus and Folkman identified two categories of antecedents which directly influence how people analyze and cope with stressful situations. The first category relates to the characteristics of the person and the second category focuses on the characteristics of the situation (Lazarus & Folkman, 1984). In higher education, stress is predisposed by situational variables and demographic characteristics of students, a concept which comfortably aligns with the framework built by Lazarus and Folkman. PA students are also at high risk of having increased stress (O'Brien et al., 2012). Some situational variables discussed in the literature causing stress in PA students are sleep deprivation due to the intense curriculum, curriculum overload due to the amount of material that must be covered in a short amount of time, and frequent testing (Kuhn et al., 2005). Demographic variables which may affect the amount of stress a student experiences are gender and race. Race is of interest in this study due to the lack of URM students in PA schools across the country. URM students have been found to have increased stress in medical school. In a study by Dyrbye, Thomas, Huschka, et al. (2006b), it was found that minority medical students had lower scores in personal accomplishments, lower quality of life scores, and were more likely to have experienced illness in the past 12 months. In a study by Macauley et al. (2018) examining anxiety in health professions students, women were

found to have higher mean anxiety levels than males. These demographic characteristics are variables included in the design of this study because I am particularly interested in the relationship between length of program and stress in URM students.

Conclusions

There is a tremendous amount of stress in PA school, a documented lack of diversity in the PA profession, and no standardization of program length in PA education. No studies have been performed to date examining the association of PA program length with quality of life, mental well-being, and physical well-being. In addition, no studies have looked at the association of length of program with quality of life, mental well-being, and physical well-being in URM students. Studies have shown there are numerous adverse effects of stress such as depression, anxiety, suicide, poor academic performance, lack of empathy, and poor patient care (Mosley et al., 1994). It has also been made clear that URM students face many barriers to going enrolling in and completing medical programs, such as non-holistic admissions processes, lack of financial resources, poor academic preparation, and lack of minority faculty (Odom et al., 2007). Length of program in PA school does not seem to affect PANCE pass rates; however, more studies need to be done to examine the effect of length of program on stress (Colletti et al., 2016).

Researchers have presented many potential curricular modifications that can be implemented to attract more minority students, decrease stress, and promote well-being in students, and to help successfully recruit and retain URM students. Pass/fail grading systems, wellness programs, mindfulness experiences, and thoughtful scheduling and structuring of the curriculum can help decrease stress (Slavin et al., 2014). Underserved medicine electives, strong academic support, mentoring programs, second-look experiences for minority students interviewing at schools, and minority student organizations can help increase the number of minority students in health care

(Vick et al., 2018). Curricular change can have a positive effect on reducing stress, improving well-being in medical fields, and increasing retention in URM students, and length of program needs to be studied to see what curricular change can promote the most well-being and the least stress in students.

CHAPTER 3

METHODS

This chapter will outline the design and methodology of my research study. I will present my research questions and the data set used for analysis, including the original survey instrument and sample information. I will also present the independent, dependent, and control variables in this study; method of analysis; and potential limitations.

Research Questions

1. What is the relationship between physician assistant program length and students' quality of life, mental well-being, emotional well-being, and physical well-being?
2. What is the relationship between physician assistant program length and students' confidence to be able to handle their personal problems?
3. What is the relationship between physician assistant program length and quality of life, mental well-being, emotional well-being, and physical well-being among underrepresented minority in medicine students?
4. What is the relationship between physician assistant program length and students' confidence to be able to handle their personal problems in underrepresented minority in medicine students?

Survey Instruments

The survey instrument used in this study was the PAEA End of Program survey (EOPS). PAEA is the only national organization representing PA educational programs in the United States. All accredited PA programs in the United States are members of PAEA. At the time the EOPS was administered, there were 212 accredited PA programs eligible to complete the survey. PAEA (n.d.-a) described its work in this way:

PAEA provides services for applicants to PA programs, students and faculty, and they work to ensure quality PA education through the development and distribution of educational services and products geared towards meeting the emerging needs of PA programs, the profession and the health care industry.

The PAEA established presence in PA education in 1972 and began collecting data via the EOPS in 2016. PAEA has a research department responsible for administering surveys and compiling statistics on students at matriculation into their PA program and at the end of their program. The surveys are administered annually, data are collected, and the results are published the following year (PAEA, n.d.). The matriculating student survey collects data at the beginning of the program, and the EOPS collects data at graduation. This study used only the EOPS. EOPS compiles data from graduating PA students about school experiences, post-graduate plans, future research, and enrichment of PA education. The EOPS items are an amalgamation of AAMC's Medical School Graduation Questionnaire and Higher Education Research Institute's (HERI) College Senior Survey (PAEA, 2019). EOPS is distributed annually to all 212 of the accredited PA programs across the country, and program directors are asked to distribute the survey via email. Non-accredited programs are not included in the survey. The data are used by PA educators to provide high-quality education for their students, benchmarking against other PA programs, to ensure compliance with accreditation standards, and to provide a data source for published scholarly work (PAEA, n.d.).

The EOPS was chosen to measure stress levels toward the end of PA education as students approach graduation. As stated in the literature review, students experience stress in the didactic and clinical phase due to rigorous courses and difficult patient experiences. Brazeau et al. (2014) found that medical students start their education in better mental health than other

college graduates, but half show signs of psychological morbidity in their 1st year. El-Masry et al. (2013) found that the transition from didactic to clinical is a time of significant stress for medical students and can often lead to student burnout. In a study by Tseng et al. (2011), it was found that medical students are exposed to complex stressors during their clinical rotations.

Several measures of perceived stress are employed in the PAEA EOPS. The PSS, developed by Sheldon Cohen in 1988, is the most widely used psychological instrument for measuring the perception of stress (S. Cohen, 1994). It was based on Lazarus's theory of stress appraisal (Lazarus & Folkman, 1984). This scale measures the degree to which a person considers events in their life to be stressful (S. Cohen, 1994). The instrument was initially designed for participants with a middle school educational level or higher, with simple questions regarding thoughts or feelings about life stressors over the past month. This instrument uses a 5-point scale where 0 is equal to never feeling a certain way and 4 is equal to having certain feelings very often. A study by Roberti et al. (2006) examined psychometrics of the PSS due to increased stress conditions in college students. The study found that the PSS is a reliable and valid self-reported measure of perceived stress within a non-clinical sample of U.S. undergraduate college students.

The other stress measure used in the PAEA EOPS was taken from the AAMC's Matriculating Student Questionnaire's section on well-being. The instrument was developed from a Quality of Life scale which included items from the Linear Analogue Self-Assessment Scale (LASA-6). The LASA measures quality of life, mental well-being, physical well-being, emotional well-being, level of social activity, and spiritual well-being. The Cronbach's alpha on the Quality of Life scale in the AAMC's survey has consistently been 0.9 in 2017, 2018, and

2019 and is therefore a reliable measure (AAMC, n.d.-i). The Cronbach's alpha on the PSS used in the AAMC survey was consistently 0.8 in 2017, 2018, and 2019 (AAMC, n.d.-i).

Sample

This study uses secondary retrospective data collected by the PAEA. The EOPS was emailed to all program directors of accredited PA programs at the beginning of the month during which the specific PA program was graduating. When the survey was administered, there were 212 accredited PA programs eligible to participate in the EOPS. Program directors were asked to forward an electronic survey link to eligible students and were asked to encourage the students to participate. Program directors were also asked to provide a head count of graduating students to calculate program and national response rates. The PAEA research committee sent reminder emails to programs and made follow-up phone calls to try to achieve program response rates above 80%. Programs that achieved a response rate of 80% or above were entered into a drawing for a \$250 gift card and a complimentary registration to the PAEA 2019 education forum (PAEA, 2019).

After removing duplicate cases, the EOPS received a total of 3,233 unique responses from 142 programs (70% of all eligible programs). Based on eligible programs' reports of graduating cohorts on the 2018 PAEA Annual Program Survey (N = 9,202 graduating students), the overall response rate among graduating students was estimated at 35.1%. Twenty-nine programs (20.4% of all responding programs) achieved an 80% student response rate (PAEA, 2019). PAEA does not use formal psychometric testing to establish validity and reliability of their surveys. However, they have a volunteer research vision advancement committee that is composed of a panel of experts who review the surveys on a regular basis (PAEA, 2019). In

addition, the stress questions are derived from the PSS, which has been peer reviewed and has been shown to be valid as discussed in the previous paragraph (S. Cohen, 1994).

The demographics of graduating students responding to the survey are explained below.

Gender

Most of the students in the sample were female (76.8%); 22.9% were male; and 0.3% responded as other, which included transgender, non-binary, and I prefer not to answer. These numbers are similar to the percentages of practicing PAs, where 68% are female (NCCPA, n.d.-a).

Age

The age range in the sample was 22 to 64 with a mean of 27.56 years old. Most of the sample, (83.1%) was between the ages of 22 and 30 years old.

Race

In terms of race, 86.3% of respondents were White, 0.4% Native Hawaiian or Pacific Islander, 4% Black, 10.6% Asian, and 1.4% American Indian or Alaskan Native.

Ethnicity

Of graduating students, 92.3% reported not Hispanic, Latino, or Spanish origin. 7.7% of graduating students reported being of Hispanic, Latino, or Spanish origin.

Definition of Underrepresented Status

In PAEA's survey, URM status is defined by those who identified as Hispanic, a single non-White race, or a non-White race in combination with a White race. URM's are contrasted against non-Hispanic, single-race White respondents. Respondents who did not self-identify their race or ethnicity were excluded from my study (PAEA, 2019).

PAEA further narrows the URM definition to “underrepresented (UR) in medicine,” defined by the Association of Medical Colleges as those racial and ethnic populations that are underrepresented in the medical profession relative to their numbers in the general population” (AAMC, n.d.-j). In PAEA’s definition, non-Hispanic, single-race Asian, and biracial Asian/White individuals are not classified as UR in medicine. For this study I have chosen to use UR minorities in medicine because it is more representative of true underrepresented status, especially in health care fields. I categorized underrepresented status as a dichotomous variable. Zero was coded as non-UR minority in medicine status, and 1 was categorized as UR minority in medicine status. The literature discussed the need for a more diverse workforce to practice in underserved areas and provide culturally competent health care (Coplan & Fleming, 2019). This is the reason UR minority in medicine status was included in this study.

Underrepresented Minority Status vs. Non-Underrepresented Minority Status

The non-URM status was 84.4% and the URM status was 15.6%.

Underrepresented Minority in Medicine vs. Non-Underrepresented Minority in Medicine Status

The non-UR minority in medicine status was 2,805 out of 3,162 or 88.7%, and the UR minority in medicine population was 356 or 11.3% were reported as UR minorities in medicine.

Marital Status

Most respondents were single, at 69.5%. Married respondents composed 27.1% of the sample, 1.5% were divorced, 1.4% were in a domestic partnership, 0.5% were separated but still legally married, 0.1% were widowed, and 0% were in a civil union.

Geographic Origins

Students from the Northeast composed 30.3% of survey respondents. Students from the Midwest composed 25% of respondents, 30.0% of students were from the South, and 14.7% were from the West.

Variables

The variables chosen in this study were based on the literature review and theoretical framework.

Independent Variable

The independent variable in the study was program length. The shortest program was 24 months and the longest was 35 months. The mean was 26.7 months. Programs 24 months in length comprised 29.6% of the sample, and programs 27 months in length comprised 29.7% of the sample. Programs ranging in length from 30 to 35 months comprised only 14.7% of the sample.

Table 1***Total Program Length (Months)***

Program length in months	Percentage of sample
24	29.4%
25	2.7%
26	11.1%
27	29.7%
28	10.6%
29	1.5%
30	7.7%
31	1.5%
32	1.2%
33	3.9%
35	0.5%

Dependent Variables

The dependent variables used in this study were overall quality of life, mental well-being, emotional well-being, overall physical well-being, and confidence in ability to handle personal problems. These variables were chosen because of the extensive research discussed in the literature review with evidence that stress can affect quality of life, mental well-being, emotional well-being, and physical well-being. In addition, the theoretical framework of Stress and Coping discusses how coping processes can produce an outcome which can be appraised as favorable, unfavorable, or unresolved (Lazarus & Folkman, 1984). This was the reason I chose the variable assessing students' confidence in their ability to handle personal problems. PA school is

recognized as a stressful environment, and stressful environments often have a negative effect on academic performance, physical health, and psychological well-being of the student. Students who are well-prepared to handle stress and have good social support have an advantage in coping (Sherina et al., 2004). Overall quality of life, mental well-being, emotional well-being, and physical well-being were all measured on an 11-point Likert scale. The question about the student's ability to handle their personal problems was rated on a 5-point Likert scale (PAEA, 2019).

Definition of Quality of Life

Quality of life was measured on an 11-point-Likert scale, where the graduating student was asked to select the number that describes their feelings during the past week. Zero represents as bad as it can be and 10 represents as good as it can be. This is based on one question measuring the student's feelings about their quality of life. All well-being questions have the same scale and all asked how the student felt in the past week. The mean score was 8.94, and 85.6% of the students rated their quality of life between a 7 and a 10.

Definition of Mental Well-Being

Mental well-being was measured on an 11-point-Likert scale based on their feelings in the past week. The mean score was 8.52, and 76.8% of the students rated their mental well-being between a 7 and a 10.

Definition of Emotional Well-Being

Emotional well-being was measured on an 11-point Likert scale based on how they were feeling in the past week. The mean score was 8.37, and 73.9% of the students rated their emotional well-being between a 7 and a 10.

Definition of Physical Well-Being

Physical well-being was measured on an 11-point-Likert scale based on how they were feeling in the past week. The mean score was 8.25, and 70.6% of the students rated their physical well-being between a 7 and a 10.

Definition of Feeling Confident in Their Ability to Handle Problems

The survey instrument asks the student to describe their feelings of how confident they are in their ability to handle problems and was measured on a 5-point-Likert scale. The question asks the student to indicate how he or she felt or thought a certain way during the past 30 days, with 1 being almost never confident in their ability to handle their problems and 5 indicating they were very often confident in their ability to handle their problems. This is based on one question measuring the student's feelings about their confidence in their ability to handle problems. The mean score was 3.95, and 74.2% of the students rated their confidence in ability to handle personal problems as a 4 or 5, corresponding to fairly often and very often, respectively.

Control Variables

The control variables in this study are age, gender, race, and PA school debt because they are all variables that can affect the amount of stress students have in PA school.

Age

Age can affect stress levels in different ways and may also guide non-traditional students to shorter programs. Bowie and Carr (2013) found that accelerated nursing programs attracted older, male students. In a study by Austin and Lockmiller (2016), it was found that non-traditional students did not necessarily experience more stress than traditional college students; they just experienced stress in different ways. Traditional or younger students had more stress

related to fitting into social roles, becoming independent, and being away from home, and they became frustrated with school easily. Older, non-traditional college students had more stress related to family roles and trying to connect with classmates. They were also found to have anxiety related to tests and school.

Age was coded as a continuous ordinal variable.

Gender

Gender may affect the amount of stress students experience. In a study by Tyssen et al. (2007), female medical students were found to have a higher level of stress.

Gender was a dichotomous variable. Zero was used to represent males, 1 was used to represent females, and a listwise deletion was performed to eliminate other responses which comprised 0.3% of the sample.

Underrepresented Minority in Medicine Status

In a study of mental well-being in 1st-year medical students, it was found that Black students and female medical students were at higher risk for depressive symptoms and anxiety than their White and male counterparts (Hardeman et al., 2015). This variable was dichotomous with 0 representing non-UR minority in medicine status and 1 representing UR minority in medicine status.

Physician Assistant School Debt

Student debt has been shown to be a reason that URM students do not pursue careers in medicine (Baugh et al., 2019). In addition, medical students have reported that student debt was a source of stress for them (Sohail, 2013). The amount of PA school debt was coded as an ordinal variable with 0 representing no debt from PA school, 1 representing PA school debt less

than \$49,000, 2 representing PA school debt between \$50,000 and \$99,999, and 3 representing PA school debt > \$100,000.

Analytical Methods

Quantitative analysis was used to analyze the data. Multiple regression analysis was chosen as the analytical method for this study. Multiple regression is one type of complex associational statistical method (Leech, 2014). The purpose of multiple regression is to predict an interval (or scale) dependent variable from a combination of several interval/scale and/or dichotomous independent/predictor variables.

The analysis determined if quality of life, mental well-being, emotional well-being, physical well-being, and confidence in ability to handle problems can be predicted by length of program, age, gender, PA school debt, and UR minority in medicine status. In addition, the research questions examined if quality of life, mental well-being, emotional well-being, physical well-being, and confidence in ability to handle problems can be predicted by length of program among racially underrepresented students.

Prior to running the multiple regression analysis, correlations were run among predictor variables to see if the predictor variables are correlated. If there were high correlations among predictor variables, it would have been likely that there could have been a problem with multicollinearity which occurs if there are high intercorrelations among the predictor variables (Leech, 2014). If this occurred, one of the predictors would be removed from the model or would be combined with another, and then the model would be run again. Correlations > 0.5 were considered highly correlated. When correlations were run on the predictor variables, there were strong correlations between several of the dependent variables ranging between .6 and .9; however, each of the dependent variables was run in separate regressions. It is not surprising the

dependent variables had strong correlations with each other because they are all stress measures, and students with higher scores on quality of life measures would also have higher scores on mental and emotional well-being. The other control variables, age, gender, PA school debt, and UR minority in medicine status, were not strongly correlated with each other and did not have to be removed from the models.

Table 2

Correlations Table (Independent Variable and Control Variables)

	Program Length	Age	Gender	PA School Debt	URM in Medicine
Program Length	1	-.015	.012	.034	.037
Age	-.015	1	-.226	.066	.110
Gender	.012	-.226	1	-.020	-.029
PA School Debt	.034	.066	-.020	1	.037
URM in Medicine	.037	.110	-.029	.066	1

Table 3

Correlations Table (Dependent Variables)

	Mental Well-Being	Quality of Life	Emotional Well-Being	Physical Well-Being	Confidence in Ability to Handle Problems
Mental Well-Being	1	.811*	.907*	.608*	.361
Quality of Life	.811*	1	.777*	.659*	.311
Emotional Well-Being	.907*	.777*	1	.726*	.373
Physical Well-Being	.688*	.659*	.726*	1	.277
Confidence in Ability to Handle Problems	.361	.311	.373	.277	1

Note. * indicates strong correlations $r > .5$

The assumptions of multiple linear regression are that the relationship between each of the predictor variables and the dependent variable is linear and that the error, or residual, is normally distributed and uncorrelated with the predictors (Leech, 2014).

The research questions were addressed using multiple regression analysis. Multiple models were run. The first step was to determine if there was a correlation between length of program and each of the dependent variables. Descriptive statistics were analyzed. Then the models were run separately with each of the dependent variables along with the control variables (age, gender, PA school debt, UR minority in medicine status) and independent variable (length of program) to see if there was a significant influence on the length of program and the dependent variables.

Multiple regression allows one to determine the overall variance of the model and the relative contribution of each of the predictors to the total variance explained. In this study, the goal was to analyze how much of the variation in quality of life, mental well-being, emotional well-being, physical well-being, and confidence in ability to handle problems could be explained by length of program, age, gender, PA school debt, and UR minority in medicine status.

Limitations

The study had several limitations. There were missing data in the PAEA survey due to some students not responding to the survey and some programs not responding to the survey, limiting representation of the sample. Since a proportion of the UR minority in medicine students did not complete the survey, this could skew the results. Unfortunately, there is no way of knowing which students did not complete the survey. In addition, 76 students had to be deleted from the dataset because they did not answer the question which determined whether they were UR minorities in medicine. As stated above, the response rate on the EOPS was only 35.1% of

graduating PA students (PAEA, 2019). This is much lower than the goal of 80% response rate set by PAEA. The target of 80% response rate comes from federally funded research projects and is the percentage associated with generalizability of a survey's results (Hendra & Hill, 2019).

As a secondary researcher, I did not participate in the data collection process, which is a weakness to the study. In addition, I have no way of knowing if there was a difference in the way students interpreted the Likert scales and questions related to stress and well-being. Some of the survey questions asked respondents to tell how they felt in the past week, and others asked how they felt in the past month; therefore, the answers may only be indicative of how the students were feeling at one point in time, and not over the entire course of the PA program, which is another limitation. In addition, the survey instrument was not one I developed on my own; it was a secondary data set and survey developed by the PAEA. When using a survey instrument developed by someone else, one must write research questions based on the data available, not based on questions that may best fit the interests of the researcher.

There were variables discussed in my literature review which were not found in the PAEA survey. I would have liked to use other variables in my study, such as personality characteristics and coping measures; however, I was limited by the data I had available.

CHAPTER 4

RESULTS

The purpose of this research was to determine if PA program length affects quality of life, mental well-being, emotional well-being, physical well-being, and confidence in the ability to handle personal problems in PA students, including those underrepresented in the field. This chapter will concentrate on the results of the analysis that was outlined in Chapter 3. I will review each research question and the analysis performed to answer each question. I will describe the results and summarize the findings.

This study used a dataset from the PAEA EOPS. The data were collected from the cohort of PA students graduating in 2018. The original sample contained 3,233 participants. Seventy-six participants were deleted prior to running the analysis because these participants were missing their UR minority in medicine vs non-UR minority in medicine status. Listwise deletions were run on the other missing variables, yielding a final sample of 3,104 participants.

Regression Results

My first research question was: What is the relationship between physician assistant program length and students' quality of life, mental well-being, emotional well-being, and physical well-being?

The third question was: What is the relationship between physician assistant program length and quality of life, mental well-being, emotional well-being, and physical well-being among underrepresented minority in medicine students? To answer these questions multiple regression was performed.

What Is the Relationship Between Physician Assistant Program Length and Quality of Life With All Students?

Multiple regression was conducted to determine if program length predicts quality of life while controlling for age, gender, and PA school debt with the entire PA student sample. A p-value equal to or $< .05$ was used to determine statistical significance in all regressions. This combination of variables significantly predicted quality of life $F(4,3105) = 6.989, p < .001$. The adjusted R^2 value was .004, indicating that .4% of the variance in quality of life was explained by the model. The finding indicates that although the model was statistically significant, the cumulative effect of program length, age at graduation, gender, and PA school debt on quality of life scores was very small. The independent variable, program length, was not associated with quality of life scores when controlling for age, gender, and debt. The only statistically significant variable in the regression was age at graduation. Every 1-year increase in student age was associated with a .030-point decrease in quality of life score. Quality of life was measured on an 11-point-Likert scale, where 0 represents as bad as it can be and 10 represents as good as it can be. The other control variables, gender and PA school debt, were not statistically significant.

Table 4***Relationship Between Physician Assistant Program Length and Quality of Life in All Students***

Variables	Beta	Std. Error	Sig.
Program length (Independent variable)	-.008	.012	.510
Age at graduation (control variable)	-.030	.007	.000**
Gender (control variable)	-.020	.072	.784
PA school debt (control variable)	-.042	.025	.091

Note. *P < .05

**P < .01

What Is the Relationship Between Physician Assistant Program Length and Quality of Life While Controlling for the Variable Underrepresented Minority in Medicine Students?

Multiple regression was conducted to determine if program length predicts quality of life while controlling for age, gender, PA school debt, and for the variable UR minority in medicine status. This combination of variables significantly predicted quality of life $F(5,3065) = 6.374$, $p < .001$. The adjusted R^2 value was .005, indicating that 0.5% of the variance in quality of life was explained by the model. This finding indicates that although the model was statistically significant, the cumulative effect of program length, age at graduation, gender, PA school debt, and UR minority in medicine status on quality of life scores was very small. The independent variable, program length, was not associated with quality of life scores when controlling for age, gender, PA school debt, and for the variable UR minority in medicine. The only statistically significant control variables in the regression was age at graduation. Every 1-year increase in student age was associated with a 0.031-point decrease in quality of life score. The other control

variables, gender, PA school debt, and UR minority in medicine status, were not statistically significant.

Table 5

Relationship Between Physician Assistant Program Length and Quality of Life While Controlling for the Variable Underrepresented Minority in Medicine

Variable	Beta	Std. Error	Sig.
Program length (IV)	-.009	.012	.442
Age at graduation (control variable)	-.031	.007	.000**
Gender (control variable)	-.002	.072	.983
PA school debt (control variable)	-.047	.025	.058
URM in medicine status	-.103	.095	.278

Note. *P < .05

** P < .01

What is the Relationship Between Physician Assistant Program Length and Mental Well-Being in All Students?

Multiple regression was conducted to determine if program length predicts mental well-being while controlling for age, gender, and PA school debt with the entire PA student sample. This combination of variables significantly predicted mental well-being $F(4,3105) = 4.065$, $p < .003$. The adjusted R^2 value was .004, indicating that 0.4% of the variance in mental well-being was explained by the model. This finding indicates that although the model was statistically significant, the cumulative effect of program length, age at graduation, gender, and PA school debt on mental well-being was very small. The independent variable, program length, was not associated with mental well-being scores while controlling for age, gender, and PA school debt.

The control variables, age at graduation, gender, and PA school debt predicted mental well-being. Mental well-being was measured on an 11-point-Likert scale, where 0 represents as bad as it can be and 10 represents as good as it can be. Being male was associated with a .231 decrease in mental well-being score. Each incremental increase in student debt was associated with a .072 decrease in mental well-being score. Age was not statistically significant.

Table 6

Relationship Between Physician Assistant Program Length and Mental Well-Being in All Students

Variable	Beta	Std. Error	Sig.
Program length	-.015	.014	.294
Age at graduation	-.011	.008	.153
Gender	-.231	.084	.006**
PA school debt	-.072	.029	.012*

Note. *P < .05
**P < .01

What Is the Relationship Between Physician Assistant Program Length and Mental Well-Being While Controlling for the Variable Underrepresented Minority in Medicine Students?

Multiple regression was conducted to determine if program length predicts mental well-being while controlling for age, gender, PA school debt, and for the variable UR minority in medicine. This combination of variables significantly predicted mental well-being $F(5,3065) = 4.066, p < .001$. The adjusted R^2 value was .005, indicating that 0.5% of the variance in mental well-being was explained by the model. This finding indicates that although the model was statistically significant, the cumulative effect of program length, age at graduation, gender, and

PA school debt on mental well-being was very small. Program length was not associated with mental well-being when controlling for age, gender, PA school debt, and for the variable UR minority in medicine. The only statistically significant variables in the regression were gender and PA school debt. Being male was associated with a .260 decrease in mental well-being score. Mental well-being was measured on an 11-point-Likert scale, where 0 represents as bad as it can be and 10 represents as good as it can be. Each incremental increase in student debt was associated with a .072 decrease in mental well-being score. The other control variables, age at graduation and UR minority in medicine status, were not statistically significant.

Table 7

Relationship Between Physician Assistant Program Length and Mental Well-Being While Controlling for the Variable Underrepresented Minority in Medicine

Variable	Beta	Std. Error	Sig.
Program length (IV)	-.019	.014	.176
Age at graduation (control variable)	-.013	.008	.084
Gender (control variable)	-.260	.083	.002**
PA school debt (control variable)	-.072	.029	.013*
URM in medicine Status	.115	.110	.296

Note. *P < .05

**P < .01

What Is the Relationship Between Physician Assistant Program Length and Emotional Well-Being in All Students?

Multiple regression was conducted to determine if length of program predicts emotional well-being while controlling for age, gender, and PA school debt with the entire PA student sample. This combination of variables significantly predicted emotional well-being $F(4,3102) =$

5.912, $p < .000.$, with gender, age at graduation, and PA school debt contributing to the prediction. The adjusted R^2 value was .006, indicating that 0.6% of the variance in emotional well-being was explained by the model. This finding indicated that although the model was statistically significant, the cumulative effect of program length, age at graduation, gender and PA school debt on emotional well-being scores was very small. Program length was not associated with emotional well-being when controlling for age, gender, and PA school debt. Every 1-year increase in student age was associated with a .018-point decrease in emotional well-being. Emotional well-being was measured on an 11-point-Likert scale, where 0 represents as bad as it can be and 10 represents as good as it can be. Being male was associated with a .289 decrease in emotional well-being score. Each incremental increase in student debt was associated with a .077 decrease in emotional well-being score.

Table 8

Relationship Between Physician Assistant Program Length and Emotional Well-Being in All Students

Variable	Beta	Std. Error	Sig.
Program length	-.022	.015	.123
Age at graduation	-.018	.008	.022*
Gender	-.289	.086	.001**
PA school debt	-.077	.030	.010*

Note. * $P < .05$

** $P < .01$

What Is the Relationship Between Physician Assistant Program Length and Emotional Well-Being While Controlling for the Variable Underrepresented Minority in Medicine Students?

Multiple regression was conducted to determine if gender, age, PA school debt, and program length were associated with emotional well-being while controlling for the variable UR minority in medicine. This combination of variables significantly predicted emotional well-being $F(5,3062) = 5.834, p < .001$. The adjusted R^2 value was .008, indicating that 0.8% of the variance in emotional well-being was explained by the model. This finding indicated that although the model was statistically significant, the cumulative effect of program length, age at graduation, gender, PA school debt, and UR minority in medicine status on emotional well-being was very small. The independent variable, program length, did not predict emotional well-being. Emotional well-being was measured on an 11-point-Likert scale, where 0 represents as bad as it can be and 10 represents as good as it can be. The control variables age at graduation, gender and PA school debt, also predicted emotional well-being. Every 1-year increase in student's age was associated with a .021-point decrease in emotional well-being score. Being male was associated with a .312-point decrease in emotional well-being. Each incremental increase in PA student debt was associated with a .078 decrease in emotional well-being score. UR minority in medicine status was the only variable that was not statistically significant in predicting emotional well-being.

Table 9***Relationship Between Physician Assistant Program Length and Emotional Well-Being While Controlling for the Variable Underrepresented Minority in Medicine***

Variable	Beta	Std. Error	Sig.
Program length	-.028	.015	.057
Age at graduation	-.021	.008	.008**
Gender	-.312	.086	.000**
PA school debt	-.078	.030	.009**
URM in medicine status	.133	.113	.238

Note. *P < .05

**P < .01

What Is the Relationship Between Physician Assistant Program Length and Physical Well-Being in All Students?

Multiple regression was conducted to determine if length of program predicted physical well-being while controlling for age, gender, and PA school debt. This combination of variables significantly predicted physical well-being $F(4,3104) = 9.087, p < .001$. The adjusted R^2 value was .010, indicating that 1% of the variance in physical well-being was explained by the model. This finding indicates that although the model was statistically significant, the cumulative effect of program length, age at graduation, gender, PA school debt, and UR minority in medicine status on physical well-being scores was very small. The independent variable, program length, did not predict physical well-being. Physical well-being was measured on an 11-point-Likert scale, where 0 represents as bad as it can be and 10 represents as good as it can be. Age at graduation and PA school debt significantly predicted physical well-being. Every 1-year increase in student age was associated with a .036 decrease in physical well-being. Each incremental

increase in student debt was associated with a .091 decrease in physical well-being score. Gender was not statistically significant.

Table 10

Relationship Between Physician Assistant Program Length and Physical Well-Being in All Students

Variable	Beta	Std. Error	Sig.
Program length	-.025	.015	.092
Age at graduation	-.036	.008	.000**
Gender	-.162	.083	.059
PA school debt	-.091	.030	.002**

Note. *P < .05

**P < .01

What Is the Relationship Between Physician Assistant Program Length and Physical Well-Being While Controlling for the Variable Underrepresented Minority in Medicine Students?

Multiple regression was conducted to determine if program length predicts physical well-being while controlling for gender, age, PA school debt, program length, and for the variable UR minority in medicine. This combination of variables significantly predicted physical well-being $F(5,3064) = 7.811, p < .001$. The adjusted R^2 value was .011, indicating that 1.1% of the variance in physical well-being was explained by the model. This finding indicates that although the model was statistically significant, the cumulative effect of program length, age at graduation, gender, PA school debt, and UR minority in medicine status on physical well-being scores was very small. The independent variable, program length, significantly predicted physical well-being. Every month increase in program length was associated with a .029 decrease in physical

well-being score. Physical well-being was measured on an 11-point-Likert scale, where 0 represents as bad as it can be and 10 represents as good as it can be. The control variables gender, age at graduation, and PA school debt were all statistically significant in predicting physical well-being. Every 1-year increase in student age was associated with a .037-point decrease in physical well-being score. Being male was associated with a .172 decrease in physical well-being score. Each incremental increase in student debt was associated with a .095 decrease in physical well-being score. UR minority in medicine status was the only variable that was not statistically significant in predicting physical well-being.

Table 11

Relationship Between Physician Assistant Program Length and Physical Well-Being While Controlling for the Variable Underrepresented Minority in Medicine

Variable	Beta	Std. Error	Sig.
Program length	-.029	.015	.048*
Age at graduation	-.037	.008	.000*
Gender	-.172	.086	.046*
PA school debt	-.095	.030	.001**
URM in medicine status	.071	.113	.528

Note. *P < .05

**P < .01

The second research question was:

What is the relationship between physician assistant program length and students' confidence to be able to handle their personal problems?

The fourth question was:

What is the relationship between physician assistant program length and students' confidence to be able to handle their personal problems in underrepresented minority in medicine students? These questions are addressed next.

What Is the Relationship Between Physician Assistant Program Length and Confidence in Ability to Handle Personal Problems in All Students?

Multiple regression was conducted to determine if program length predicts confidence in ability to handle personal problems while controlling for gender, age, and PA school debt. This combination of variables was not statistically significant in predicting confidence in the ability to handle problems $F(4,3103) = .507, p < .731$. The independent variable, length of program, did not predict confidence in ability to handle personal problems. None of the control variables (age at graduation, gender, or PA school debt) was significant in predicting confidence in ability to handle personal problems.

What Is the Relationship Between Physician Assistant Program Length and Confidence in Ability to Handle Personal Problems While Controlling for the Variable Underrepresented Minority in Medicine?

Multiple regression was conducted to determine if program length predicts confidence in ability to handle personal problems while controlling for gender, age, PA school debt, and the variable UR minority in medicine. This combination of variables was not significant in predicting confidence in the ability to handle problems $F(5,3063) = .509, p < .769$. The independent variable, program length, did not predict confidence in ability to handle personal problems. None of the control variables in the model was significant (age at graduation, gender, PA school debt, or UR minority in medicine status) in predicting confidence in ability to handle personal problems.

Chapter Summary

The only model where the independent variable, program length, was statistically significant was when multiple regression was conducted to determine if program length predicts physical well-being while controlling for gender, age at graduation, PA school debt, and UR minority in medicine status.

All the models were statistically significant when multiple regression was conducted to determine program length predicts quality of life, mental well-being, emotional well-being, and physical well-being while controlling for gender, age at graduation, and PA school debt in the entire PA student sample, as well as when controlling for the variable UR minority in medicine. However, in each regression run while controlling for the variable UR minority in medicine vs. non-UR minority in medicine, this variable was not statistically significant.

The model run to determine if PA program length predicts confidence in the ability to handle personal problems while controlling for gender, age, and PA school debt in the entire PA sample showed results that were not statistically significant. The same model run while also controlling for the variable UR minority in medicine also produced results that were not statistically significant. In chapter five, I will discuss the conclusions, limitations, and suggestions for further research.

CHAPTER 5

CONCLUSIONS

The purpose of this research was to determine if PA program length predicts quality of life, mental well-being, emotional well-being, physical well-being, and confidence in ability to handle personal problems in graduating PA students, including those underrepresented in the field. This chapter provides a summary of the findings as well as an interpretation of the results. In addition, I will discuss implications for future practice, recommendations for future research, and limitations of the study.

Research Questions

My research questions were:

1. What is the relationship between physician program length and students' quality of life, mental well-being, emotional well-being, and physical well-being?
2. What is the relationship between physician assistant program length and students' confidence to be able to handle their personal problems?
3. What is the relationship between physician assistant program length and quality of life, mental well-being, emotional well-being, and physical well-being among underrepresented minority in medicine students?
4. What is the relationship between physician assistant program length and students' confidence to be able to handle their personal problems in underrepresented minority in medicine students?

Summary of Findings

What Is the Relationship Between Physician Assistant Program Length and Quality of Life With All Students and While Controlling for Underrepresented Minority in Medicine Students?

The regressions were run first with all PA students and then while controlling for UR minority in medicine status to determine if there was a relationship between PA program length and quality of life while controlling for age, gender, and PA school debt. Both models predicted quality of life; however, the effect was small. Program length was not associated with quality of life in either model. Age at graduation was the only statistically significant variable in both models, suggesting that every 1-year increase in student age was associated with a small decrease in quality of life score. Gender and PA school debt were not statistically significant in either regression. In the model where I controlled for UR minority in medicine status, this variable was not significant.

These findings are consistent with the literature on older students. In a study examining perceived stress levels of medical students, it was found that older students had higher perceived stress and were at higher risk for entering a vicious cycle of stress and poor academic performance (Kötter et al., 2017). Often, older graduate students have more difficulty adjusting to returning to the classroom, as opposed to younger students who typically progress directly from undergraduate to graduate programs. The literature has also revealed that older medical students have lack of certainty about their academic abilities (Kick et al., 2000). Older students

are more likely to be married and have other responsibilities such as children or elderly parents to care for. Older students must balance school with their other priorities, which can lead to less time to study and increased stress (Kick et al., 2000). In addition, older students are more likely to have encountered a stressful life event such as a divorce, loss of a loved one, or a major illness, which has been shown to influence student distress (Dyrbye, Thomas, Huntington, et al., 2006a). UR minority in medicine status was not statistically significant.

Although both regressions were statistically significant, the effect was small. This suggests that there are other variables not controlled for in this study that may have more of influence on quality of life. Other variables that may influence quality of life scores include personality traits, social supports, and coping skills. Curricular characteristics such as problem-based vs lecture-based learning, and program characteristics such as number of vacation weeks and credit hours may also influence quality of life but were not included in this study.

What Is the Relationship Between Physician Assistant Program Length and Mental Well-Being in All Students and While Controlling for Underrepresented Minority in Medicine Students?

The independent variable, program length, was not associated with mental well-being scores while controlling for age, gender, and PA school debt with all students or with UR minority in medicine students. However, the control variables, age at graduation, gender, PA school debt, and UR minority in medicine status, predicted mental well-being in both models, which suggests that student demographics are important factors influencing how students experience PA school. Male gender was associated with a small decrease in mental well-being score in all students and when controlling for the variable UR minority in medicine. One recent study found that male students experience more perceived stress than females while in PA school

(Frias & Yuen, 2019). In a study about worry and gender differences in medical students, it was found that men had higher levels of worry than women, and the authors hypothesized this was due to increased representation of women in medical school (Miller et al., 2013). Recent research indicates that men and women perform equally academically in medical school; however, when medical students experience stress, female medical students are more likely than male medical students to seek counseling services (Miller et al., 2013). Female students may have higher mental well-being scores because they are more likely to address their stress and mental-health issues by seeking counseling. Based on the findings in my study, it is possible that because most PA students are female, and it may be stressful for males to be the minority among large cohorts of women. There are studies that have discussed the “female advantage,” the phenomenon of women achieving high grades and higher graduation rates than men in fields dominated by women (Alon & Gelbgiser, 2011).

Large increases in student debt were associated with small decreases in mental well-being scores in all students and when controlling for the variable UR minority in medicine. A recent study with medical students showed that medical student debt levels were significantly negatively associated with mental well-being and academic outcomes (Pisaniello et al., 2019).

Overall, the models were significant, but the effect of program length, age, gender, and PA school debt and on mental well-being was small, indicating that there are other variables not in this study that may have more of an effect on mental well-being. Age at graduation was not significant in either model. UR minority in medicine status was not statistically significant.

What Is the Relationship Between Physician Assistant Program Length and Emotional Well-Being in All Students and When Controlling for Underrepresented Minority in Medicine Students?

The independent variable, program length, did not predict emotional well-being in all students or when controlling for the variable UR minority in medicine. In both models, the control variables were statistically significant in predicting emotional well-being. Every 1-year increase in student age, male gender, and large increases in debt were associated with a small decrease in emotional well-being. UR minority in medicine status was the only variable that was not statistically significant.

Although the models were significant, the effect of program length, age, gender, and PA school debt on emotional well-being was small. This is likely because there are other variables not analyzed in this study that have been shown in the literature to influence emotional well-being, such as personality, social supports, coping skills, learning climate, previous history of mental health disorders, and curricular factors (Dyrbye, Power, et al., 2010). The variable UR minority in medicine status was not statistically significant. The literature also supports this finding that some UR minority in medicine students may have higher emotional well-being scores. One possible explanation for higher well-being scores in some marginalized students is because they have become more resilient than their non-UR minority in medicine peers due to undergoing significant professional and educational challenges prior to matriculation (Dyrbye, Power, et al., 2010).

What Is the Relationship Between Physician Assistant Program Length and Physical Well-Being in All Students?

The independent variable, program length, significantly predicted physical well-being while controlling for UR minority in medicine students but did not predict physical well-being in all students. Every additional month increase in program length was associated with a small decrease in physical well-being while controlling for UR minority in medicine status.

The other control variables of gender, age at graduation, and PA school debt significantly predicted physical well-being in all students and when controlling for the variable UR minority in medicine. Every 1-year increase in student age was associated with a small decrease in physical well-being score in both models. Men had slightly lower physical well-being scores when controlling for UR minority in medicine, but gender was not statistically significant in the model run on all students. Large increases in debt were associated with a small decrease in physical well-being score in both models. Overall, the model was significant, but the effect of program length, age, gender, and PA school debt on physical well-being was small. This suggests that there are other variables not included in this study that may have more of an effect on physical well-being, such as previous history of chronic medical conditions and the amount of physical activity students partake in. University students with chronic diseases have been shown to have lower health-related quality of life scores (Gazibara et al., 2018). In addition, medical students who participate in aerobic exercise and/or strength training consistent with Center for Disease Control (CDC) guidelines are less likely to experience burnout and have higher quality of life scores (Dyrbye et al., 2017). Chronic diseases have the potential to affect energy levels. Students with consistently higher energy levels are likely to sustain the rigor of academic programs in better physical health. In a study analyzing the relationship between exercise and well-being scores in medical students, exercise was shown to be related to higher well-being scores and improvements in self-reported sleep patterns (Worobetz et al., 2020). UR minority status was not statistically significant.

What Is the Relationship Between Physician Assistant Program Length and Confidence in Ability to Handle Personal Problems in All Students and While Controlling for Underrepresented Minority in Medicine Students?

The independent variable, program length, did not predict confidence in ability to handle personal problems in all students or while controlling for the variable UR minority in medicine. None of the control variables was significant (age at graduation, gender, or PA school debt) in predicting confidence in ability to handle personal problems. There are other factors that may affect confidence in ability to handle problems, such as personality traits and coping mechanisms which are variables that were not addressed in this study. How students respond to stress and cope with stressful situations often determines if they progress to anxiety and depression. Some factors found in the literature that can affect how students respond to stress include self-efficacy, optimism, joy, and resilient coping (Heinen et al., 2017). In one study, it was observed that the amount of perceived stress in medical students was buffered by joy, optimism, and self-efficacy and also determined the levels of anxiety and depression (Heinen et al., 2017). In another study which focused on PA students, it was found that 68.6% of PA students used negative coping strategies such as distraction, venting, self-blame, denial, substance abuse, and behavioral disengagement (O'Brien et al., 2012). None of these factors was addressed in this study, which may be why these regressions were not statistically significant.

What Do These Findings Add to the Literature?

There have been very few studies related to PA program length in the literature. Yet understanding the implications of program length is important to PA education because program length is not standardized, and each program develops its own curriculum with a different duration, including variations in the number of didactic weeks, clinical weeks, and vacation

weeks. Medical education is standardized across the United States, but PA education has never required a uniform number of months to completion. One study which analyzed the relationship between PA program length and PANCE pass rates found no statistically significant difference in PANCE pass rates between programs of different lengths (Colletti et al., 2016). To date there have been no studies examining the relationship between PA program length and stress measures in students.

The study I performed has suggested that there is a statistically significant relationship between PA program length and one stress measure, with shorter programs having a statistically significant positive influence on physical well-being while controlling for the variable UR minority in medicine status.

These findings suggest that shorter PA programs can have a small but significant positive impact on physical well-being while controlling for UR minority in medicine status. This could be because longer programs may contribute to more physical exhaustion and cumulative stress, and longer clinical rotations can cause increased exposure to stressful preceptor interactions and stressful patient interactions, which can ultimately lead to burnout. Students in longer programs ultimately accrue more debt from food, transportation, and tuition cost, which can lead to more financial worry (Colletti et al., 2016). It is possible that certain clinical rotations may not be appealing to some students, increasing stress levels in longer programs. This could be true in shorter programs as well, because cramming more material into a shorter, more intense period of time could cause physical exhaustion and stress; however, in this particular study, students in shorter programs were shown to have better scores for physical well-being while controlling for UR minority in medicine status. This finding was surprising because in the few studies related to medical school program length, students and faculty reported more stress and physical

exhaustion with condensed 3-year medical school programs, and subsequently these 3-year programs reverted to the traditional 4-year curriculum (Schwartz et al., 2018). It is also important to note that 83.5% of PA programs in the sample were 24 to 28 months in length, while only 14.8% of the PA programs in the sample had lengths of 30 to 35 months. This could skew the results because in general the average well-being scores were high, and the differences in well-being scores small. The control variables, age, gender, and the amount of PA school debt, were statistically significant in many of the models, suggesting that PA school experience may vary among students in programs of different lengths because of demographic factors. Future studies can help elucidate if programs of varying lengths attract different types of students. Future studies analyzing program length and optimal effects on student well-being are needed due to conflicting findings in the literature.

In addition, higher increments of PA school debt were associated with lower mental well-being scores in all students and while controlling for UR minority in medicine students, lower emotional well-being scores in all students and while controlling for UR minority in medicine students, and lower physical well-being scores in all students and while controlling for UR minority in medicine students. As stated previously, studies by Tran et al. (2018) and Pisaniello et al. (2019) have linked health profession student debt with increased stress. Higher PA school debt was associated with lower well-being scores in all students as well as UR minority in medicine students, which is an important consideration for PA programs trying to accept and retain UR minority in medicine students. This is especially important in private institutions where the cost of PA education is higher (PAEA, 2019). In the study by Colletti et al. (2016) which analyzed the effect of program length on PANCE pass rates, the authors discussed that longer program lengths could raise costs for PA programs and students due to higher overall

living expenses and the increasing cost of clinical rotations; however, the focus of the study was on PANCE pass rates, not student debt. A future study investigating whether there is a relationship between PA program length and the amount of student debt would be important to help the PA community understand if program design impacts student debt. The price of PA education is on average \$48,000 for in-state tuition; \$84,000 for non-resident tuition at public institutions; and close to \$89,000 for private institutions, where most PA programs are housed (PAEA, 2019). Based on my study, it may be helpful for PA programs to focus on lowering tuition costs to promote student well-being and make PA education more affordable for all students, but especially the UR minority in medicine students.

It was surprising to see that men had lower scores for mental well-being and emotional well-being in all students and while controlling for UR minority in medicine, and physical well-being while controlling for UR minority in medicine. This may be because only the sample was disproportionately female, with 76.8% women and only 22.9% men (PAEA, 2019). These numbers are close to the percentages of women and men practicing in the United States. According to the 2019 Statistical Profile of Certified PAs, 69.3% of practicing PAs are female and 30.7% are male (NCCPA, 2020). These findings of increased stress in men should be addressed by PA programs by developing strategies to decrease the gender disparity in PA education. More research is needed to analyze why men have more stress in PA education. Recruitment should focus on high school and college students, with peer mentoring programs focused on encouraging men to apply to PA school. It may be helpful to have male PAs who are practicing medicine establish shadowing opportunities to introduce males to the profession and encourage males to apply to PA school. In addition, programs should incorporate mindfulness programs into the curriculum to help students learn how to manage stress. Programs should also

normalize counseling for students who are stressed, focus on teaching students and faculty to recognize the signs and symptoms of stress, and encourage referral to mental-health providers for treatment. Lastly, programs should focus on curricular changes to decrease stress for all students; these changes could include pass/fail grading, adequate time between exams to study, and allowing for students to choose electives which interest them.

Implications for Future Practice

Shorter programs also had statistically significant higher physical well-being scores when controlling for UR minority in medicine students. When designing the length of the PA curriculum, the effects of stress measures on PA students should be considered, given that program length is not associated with PANCE pass rates and the possibility that longer program lengths could increase the price of PA education (Colletti et al., 2016). The transactional theory of stress by Lazarus and Folkman applies here because longer length of a program can cause slight but significant decreased physical well-being. Lazarus and Folkman's theory states that stress is influenced by an interaction between an individual and their environment. The environment in my study was PA program settings. Given Lazarus and Folkman's theory, program length was investigated as one important environmental component within the context of PA programs. The theory also states that the situation is appraised by a person, and the person assesses whether they have the appropriate resources to deal with the stress or if they perceive a lack of resources. In my study, the resources that may influence how a student manages their stress were related to their demographic factors which in this study were age, gender, student debt, and UR minority in medicine status. These were the resources investigated in this study, but they are not all the resources that affect stress management. The results of this study are aligned with this theoretical framework because program length was statistically significant in

the following instances: emotional well-being when controlling for UR minority in medicine, and physical well-being in all students and when controlling for UR minority in medicine. Demographic factors were also shown to be statistically significant in all regressions, suggesting that individual demographic characteristics also contribute to stress levels. The theory also addresses the use of emotion-based or problem-based coping strategies which were not addressed in this study.

This study showed a negative relationship between increasing amounts of PA school debt and mental, emotional, and physical well-being scores. Longer programs cause students to spend more money on housing, food, transportation, and gas to commute to clinical sites. Shorter programs can graduate students at a faster rate, allowing students to enter the workforce and start to pay back their debt. Shorter programs may be enticing for UR minority in medicine students to maximize their earnings by taking a shorter route to the workforce. PA programs should focus on decreasing operating costs to lower student tuition and promote student well-being. For example, fewer weeks of clinical rotations could help lower tuition costs because many PA programs must pay for clinical sites. Data from the 2019 PAEA Program Report states that 48.3% of PA programs must pay for some or all their clinical rotation sites. This number more than doubled from 2013–2014 where only 22.3% of PA programs reported paying for clinical sites (PAEA, 2019). Lower tuition costs may also help to decrease the racial and gender disparities among PA students.

Future Research

Future research should include a longitudinal study where data are collected on a regular basis to determine if stress changes throughout the PA program. This dissertation only analyzed stress at one point in the program, which is a limitation to the study. A longitudinal study could

assess student stress at multiple points throughout PA school to see if stress levels change throughout the program and to determine where the stress levels are highest. Critical points in PA school are the beginning when students are adjusting to graduate school, during final exam weeks of the didactic phase, at the start of clinical rotations, and at graduation when students are trying to secure jobs and pass their boards. Having these data could help PA educators focus on designing the curriculum to help decrease stress around the most stressful parts of the curriculum or add mindfulness activities at critical points to help students cope with stress.

There is a role for qualitative research related to stress and program length in PA school. It would be interesting to interview students at programs of different lengths and analyze patterns of stress, curricular causes of stress, and the relationship between having more breaks and a longer curriculum versus fewer breaks and a shorter curriculum. Qualitative research could also be performed to see if there are areas of the curriculum UR minority in medicine vs. non-UR minorities in medicine students find most stressful, and how this differs between programs of different lengths. Qualitative research could also explain the differences in well-being scores associated with gender and help explain why males have lower well-being scores. Further, qualitative research could explain how student debt influences experience and stress levels in PA school.

The Transactional Theory of Stress by Lazarus and Folkman explains stress as an interaction between a person and their environment and discusses that a person's experience of stress is a system of appraisal, response, and adaptation. This dissertation only focused on the first part of the theory. The second part of this theory focuses on coping skills to manage stress, and there is a lack of research on coping strategies used by PA students (O'Brien et al., 2012). Future research should focus on the different types of coping mechanisms students use to

manage stress. The Transactional Theory of Stress and Coping states that students typically use either emotion-based coping or problem-based coping. Future studies could analyze if there are differences between UR minority in medicine and non-UR minority in medicine students in the coping techniques used, and if the type of coping mechanism used is negatively or positively associated with well-being scores. There is robust literature that suggests that URMs in PA programs may enter programs with different experiences and may encounter different stressors while enrolled. Having qualitative research may allow program administrators to better understand their unique experiences and develop more effective support systems and resources. Learning healthy coping techniques as PA students can help them when they encounter stressful situations as licensed PAs.

In addition, it would also be important to examine the number of didactic weeks, clinical weeks, and vacation weeks in programs of different lengths to see if these factors influence stress levels. This study only looked at the number of program months; however, PA programs have varying numbers of didactic, clinical, and vacation weeks. A study focused on the ideal number of weeks of each component of the PA program could help programs structure their curriculum to promote optimal well-being.

In the future, a similar study can be performed controlling for race. A limitation to this study was the response rate of the survey, which was only 35.1% for graduating PA students. This was much lower than the goal of the 80% response rate from the PAEA (PAEA, 2019). In the existing responses, there were missing data. Unfortunately, 76 students did not respond to the variable UR minority in medicine status and had to be deleted from the sample. If a proportion of the UR minority in medicine students did not complete the survey or did not answer all the questions, this could skew the results. Unfortunately, there is no way of knowing which students

did not complete the survey, and which students did not answer the question pertaining to UR minority in medicine status. The variable UR minority in medicine was not statistically significant in any of the regressions. This was a small sample of students, and the regressions did not control for each individual population of UR minority in medicine students. I did have access to this data and could have controlled for race; however, due to the small sample size, I chose to use the variable UR minority in medicine which included Latino, Black, and American Indian students together.

Future research could include conducting the same study and analyzing each population of UR minority in medicine students separately, specifically Latinos, Black students, and American Indian students. Research in PA education has shown that Black students have lower graduation rates (85%) than White students (95%) and Hispanic students (92.8%). In addition, 37% of White students are accepted into PA programs, while only 16.5% of Black students are accepted into PA programs. Only 4.6% of PA faculty are Hispanic, only 4.7% are Black, and only 0.5% are American Indian or Alaskan Native, which suggests that underrepresented populations face more obstacles during PA school have fewer mentors, and may face challenges during the admissions process (Coplan & Fleming, 2019).

Finally, future research could be done to determine if program length influences job proficiency. The literature shows no difference in PANCE pass rates in relation to program length, but future research can analyze whether program length has an influence on job performance.

Conclusions

This study did show small but statistically significant correlation between program length and physical well-being while controlling for UR minority in medicine status. These findings

were consistent with Lazarus and Folkman's Transactional Theory of Stress that says stress is the interaction between a student and their environment, and demographic factors were shown to be risk factors influencing stress levels as well. Older age, male gender, and having higher levels of PA school debt were associated with lower mental, emotional, and physical well-being scores. Shorter program lengths should be considered for optimal physical well-being. The price of PA school should be considered, especially at private institutions, to decrease stress and create more financial accessibility for UR minority in medicine students. In addition, all students, but especially men, should be encouraged to be screened for stress as well as offered services to help manage stress. The AAPA, the PAEA, and state PA societies should initiate or continue efforts to increase representation of male and UR minority in medicine students through mentoring and shadowing programs to help decrease gender and racial disparities in PA educational programs and in the profession.

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