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From Pipeline to Health Equity: A Case Study of Health Profession Pipeline Students

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FROM PIPELINE TO HEALTH EQUITY: A CASE STUDY OF HEALTH PROFESSION PIPELINE STUDENTS

by

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A DISSERTATION

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DEDICATION

To all racial and ethnic minorities who have suffered the consequences of racism and discrimination.

To my father Josef Tutsch (1939-1994).

To my grandfather Rudolf Tutsch (1882-1941).

To my grandmother Franziska Tutsch, born Beck (1896-1945).

To my students and their families.

To Dr. Rubens Pamies.

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introduced me to health disparities research and the implications of historical trauma. Supporting your research activities in Native American health helped me understand the reason my father passed away from cancer at the young age of 55. An ethnic minority born into WWII and orphaned by the age of six, he endured severe losses and discrimination as he and his family were driven out of their homeland.

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ABSTRACT

From Pipeline to Health Equity:
A Case Study of Health Profession Pipeline Students

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Health equity arises from the social determinants of health. Access to culturally and linguistically competent health services is a major determinant of health. Despite health profession pipeline intervention efforts spanning more than 50 years, diversity in the health professions has not been achieved, and disparities in health among members of minority groups remain prevalent. Health profession pipeline programs came into existence to help grow minority representation among health professionals serving in underserved, disadvantaged, communities, where disparities in health are most prevalent. One underlying assumption was that minority students from underserved communities understand the needs of these communities best and are more likely to return and serve their communities upon graduation from a health profession program. No studies to date have examined characteristics of students who participate in these programs. Little is known about how characteristics of health profession pipeline students inform the theoretical framework from pipeline to health equity. This case

study examined various program evaluation data sources of a health profession pipeline program collected in the summer of 2019 in the Midwest.

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LIST OF ABBREVIATIONS

AAMC	American Association of Medical Colleges
ACEs	Adverse Childhood Experiences
GEMS	Gains in the Education of Mathematics and Science
GAD	Generalized Anxiety Disorder
GPA	Grade Point Average
HCOP	Health Career Opportunities Program
HSTA	Health Sciences and Technology Academy
HPPP	Health Profession Pipeline Program
UG	Undergraduate
URM	Underrepresented Minority
SCT	Social Cognitive Theory
SDOH	Social Determinants of Health

I. INTRODUCTION

Achieving Health Equity by Way of Health Profession Diversity

Health equity arises from the social determinants of health (SDOH) (Braveman & Gruskin, 2003). The major SDOH are comprised of economic stability, education, health and health care, the built environment, and social and community context (Office of Disease Prevention and Health Promotion, 2020). Unequal distribution and access to the major SDOH are tied to socially unjust disparities in health between privileged and disadvantaged members of society (Wilbur, Kirsten et al., 2020). In the United States, mortality and morbidity rates are inversely related to correlates of socioeconomic status (Deaton, 2002). Underrepresented minority (URM) groups, among the most disadvantaged members of society, often experience the greatest burden of health disparities (Centers for Disease Control and Prevention, US Department of Health and Human Services, 2013). From a social cognitive, life-course perspective, the odds of URMs reaching old age healthfully and successfully are often much lower compared to privileged groups. Constrained by a system designed to assure unequal distribution and access to major determinants of health, good health outcomes are hardly a matter of choice. Inequitable access to quality healthcare services is a major determinant of health.

Extensive evidence has demonstrated that members of URM groups do not receive equal treatment when accessing healthcare services (Institute of Medicine, 2003; Nelson, A., 2002; Wilbur, Kirsten et al., 2020). While all health professionals, regardless of race or ethnicity are obligated to care for URMs, URM patients are more likely to see

providers who reflect their own racial and ethnic background and sometimes forgo care when such providers are not available (Institute of Medicine, 2003). Meeting patients' cultural, social, and communication needs through the delivery of culturally and linguistically competent healthcare services by health professionals who are themselves members of URM groups has been linked with improved patient compliance and health outcomes. Moreover, achieving health equity necessitates assuring URM representation throughout the entire health system, including within clinical and administrative leadership, is essential (McCalman, Jongen, & Bainbridge, 2017). Consequently, increasing diversity in the health professions has been a key strategy for achieving health equity among underserved and underrepresented populations.

Despite ongoing efforts, producing a health profession workforce that reflects population demographics has been a challenge. The inadequate supply of health professionals who understand the needs of members of underrepresented communities continues to present as a barrier to achieving health equity. While efforts to diversify the health professions have shown some promise, the biggest increase in the proportion of URMs is seen in entry-level, lower-skill, and often lower paying healthcare jobs often attained through certificate, or two-year training programs (Wilbur, et al., 2020). Essential prerequisites for growing URM representation in advanced health profession programs and ultimately the health profession workforce are URMs successful admission to, and graduation from, health profession programs for which an undergraduate degree is often required. Reasons for not meeting these requirements include lower academic achievement, inability to obtain impressive letters of

recommendation, and lack of the opportunity to shadow health profession professionals (Alonzo et al., 2019; Toretsky, Mutha, & Coffman, 2018). Compared to the majority White population, URM students have both lower high school completion and college enrollment rates (Kim, 2011). Successful admission into college programs often requires both a high school diploma and average or above average grades earned in coursework completed during the high school years.

URM student academic achievement often has little to do with their intellectual capacities. Rather, systemic racism and discrimination in American education have long been at fault (Jones & Hope, 2019). Being perceived as academically inept and the overrepresentation of minority students in special education classrooms are two reasons that URM students fall into the academic achievement gap (Canning, Muenks, Green, & Murphy, 2019; Lewis & Diamond, 2015; Onyeka-Crawford, Patrick, & Chaudhry, 2017). The perception of URMs as academically inept often results in them being placed in a slower paced classroom or even in special education programs (Cavendish, Connor, Gonzalez, Jean-Pierre, & Card, 2020; Kreskow, 2013; Smith, Chester R., 2020). Additionally, these students may not be exposed to essential prerequisite material necessary for success in more advanced coursework and on standardized tests. Gaps in academic achievement directly translate into lower scores in both a student's GPA and standardized test scores, which often are deciding factors in college admissions.

Moreover, applications to health profession (HP) college programs often must be supported by letters of recommendation and references. Commonly, academic advisors

or science instructors serve as recommenders, and personal or professional references. Previous studies have documented that URM students tend to have difficulty obtaining letters of support or references from advisors or instructors unwilling to see their academic potential (Johansson et al., 2020; Zayas & McGuigan, 2006).

Another key element that often makes applicants to health profession programs stand out is evidence of having shadowed health providers or having had the opportunity to participate in experiential learning experiences. In some instances, participation in extracurricular activities, such as involvement in science clubs, or having served in a leadership role, are also desirable components of applicant profiles. URM students are often unable to participate in extracurricular activities. Many tend to have to maintain part, or full-time employment outside of school hours to contribute to their family's household income (Johansson et al., 2020). Commonly, URM students are also expected to help care for younger siblings outside of school (Hafford, 2010; Sy & Romero, 2008). In some instances, URM students become parents themselves during their high school, or college years, further limiting their ability to engage in extracurricular activities. All of these factors can greatly limit URM students' chances of admission to, and successful completion of health profession programs.

Health equity by way of health profession diversity cannot be achieved without extending support to URM students throughout their educational journeys. Increasing the proportion of URM students in health profession programs, and ultimately, the

health profession workforce, requires an understanding of URM students' characteristics and needs.

A Profile of the Underrepresented Minority Student

Definition Across Time

Over the past 50 years, the literature has offered a range of definitions and criteria that characterize URM students. In the early 2000s, the American Association of Medical Colleges (AAMC) shifted its definition following the Supreme Court Decision regarding Grutter v. Bollinger concerning affirmative action in student admissions. While the AAMC continues to uphold its commitment to serving Blacks, Mexican-Americans, Native Americans, and mainland Puerto Ricans, four historically underrepresented racial/ethnic groups, it has since changed its definition for whom it considers as underrepresented in medicine to "those racial and ethnic populations that are underrepresented in the medical profession relative to their numbers in the general public" (AAMC, 2020). However defined, assuring representation of historically underrepresented minority groups among health professionals remains integral to achieving health equity and social justice.

Although racial and ethnic categories still capture historically underrepresented minority groups, in recent years respective demographic categories have included a wider range of students. Changes in population demographics and new waves of immigrants and refugees have contributed to greater within-demographic group differences. For instance, refugee, or immigrant families from Sudan fall into the African

American or Black category, while international students from China or India frequently identify as Asian. In some instances, URM definitions limit Asian to Filipino, Hmong, and Vietnamese (UCSF, n.d.). In other instances, Asian groups are categorized as minorities, but not included in counts aimed at capturing the presence of underrepresented minorities. Distinctions, particularly with regard to Asian groups who are considered overrepresented in higher education, have created great controversy (Ko & Ton, 2020). Mexican-Americans are most commonly captured by identifying as Hispanic, a category that largely includes individuals from Latin America and Spain. Variation in instrumentation for demographic data collection can pose challenges in distinguishing minorities, from underrepresented minorities.

Disadvantaged Standing

Occasionally the terms underrepresented and disadvantaged are used interchangeably when describing URM students. In some instances, disadvantaged student standing is more clearly distinguished by factors such as URM status, first-generation or first in the family, Federal Pell Grant eligibility, and need for English/math remedial coursework (Yue, Rico, Vang, & Giuffrida, 2018). In terms of academic achievement in STEM related coursework, not all disadvantages are equal. Racial and ethnic minority students from socioeconomically disadvantaged backgrounds have been found to have among the largest disadvantage of all demographic groups in both STEM and non-STEM GPA (Whitcomb & Singh, 2020). Students who fall into minority groups that are overrepresented in higher education, or who do not identify as disadvantaged,

may not be as likely to practice in underserved communities, and may not be able to relate to the needs of individuals in underserved communities. With regard to assuring representation of individuals from disadvantaged minority communities in health profession programs a clear distinction may matter.

Equity and Education

Health equity arises from the SDOH and is achieved through the equal distribution of social and economic resources, including access to quality education and health care services among all members of society (Braveman, Paula & Gottlieb, 2014). URM students themselves often are particularly afflicted by inadequate access to education and information resources, and health care services (Fiscella & Kitzman, 2009; Hahn, Truman, & Williams, 2018; Smith, Nsiah-Kumi, Jones, & Pamies, 2009). Born into under resourced environments, many URMs frequently enter school systems academically behind and in poorer health than their privileged peers.

Achievement Gap

Not achieving high school graduation, nor obtaining college qualifications have been among the greatest barriers to growing representation of URM students in higher education settings, including health profession programs (Alexander, Chen, & Grumbach, 2009; Hung et al., 2020; Kim, 2011; Onyeka-Crawford et al., 2017). URM students frequently enter school systems less prepared than their majority counterparts (Dorman, Anthony, Osborne-Fears, & Fischer, 2017). Implications of systemic racism and redlining continue to leave public schools in underserved communities with fewer

resources (Pearcy, 2020). These schools are often staffed by less-experienced teachers who are unfamiliar with minority students' social and cultural needs (Berry, 2004; El Moussaoui, 2017). Teachers' ability to connect and relate to students are fundamental aspects of effective pedagogy, as all classroom interactions have invisible neurobiological, emotional, and social aspects (Olson, 2014).

Implications of Systemic Racism

The pursuit and successful completion of an undergraduate degree are a considerable factor in growing URM enrollment in health profession programs. Both are often hindered by systemic factors deeply rooted in social injustices. Systemic racism continues to infiltrate education (Cabrera, Franklin, & Watson, 2017; Lewis & Diamond, 2015; Lucey & Saguil, 2020).

Previous scholars have long argued that schooling and the school environment are aversive to minority student populations long before the achievement gap manifests (Steele, 1992; Steele, 1997). With respect to academic settings and systemic racism, minority students' emotional and mental wellbeing, and academic achievement, are commonly impaired by stereotype threat. Stereotype threat occurs when individuals of a particular group perceive themselves at risk of conforming to stereotypes commonly associated with a group to which they belong.

Minority students frequently tend to find themselves in anxiety provoking situations. Academic ineptness is a negative stereotype frequently associated with belonging to a racial or ethnic minority group. Although most students experience some

anxiety over being negatively evaluated, minority students not only fear personal embarrassment and failure, but also that they may possibly validate respective negative group stereotypes (Osborne, 2001). Even when holding background factors constant, such as academic preparation, academic achievement has been found to be consistently lower among minority students compared to their White or Asian counterparts (Jensen, 1980; Ramist, Lewis, & McCamley-Jenkins, 1994). Evidence of the negative impact of stereotype threat on URM student performance has been well documented among minorities in pursuit of a health profession education (Bullock et al., 2020; Young-Brice, Dreifuerst, & Buseh, 2018). Systemic inequities and socioeconomic disadvantage have long been linked with disparities in mental health and education achievement (Zajacova & Lawrence, 2018).

Exposure to high stress and anxiety-inducing events often also extend beyond academic settings. Extreme poverty, witnessing violence, malnutrition, and other hazards, all can lead to increased adverse psychological health outcomes (Nelson, et al., 2020; Wheeler, Daire, Barden, & Carlson, 2019), and may further impair minority students' academic performance. Disadvantaged minority students, from underserved communities especially, are disproportionately affected by exposure to violence and other traumas (Patton, Woolley, & Hong, 2012).

Immense Potential Overshadowed by Adversity

Constrained by their socioeconomic disadvantages, many URM students themselves are from under-resourced and underserved communities afflicted

by disparities in health outcomes (Onyeka-Crawford et al., 2017). Born into, and growing up in high stress environments, URMs often are confronted with navigating complex cultural and social systems from birth.

Adverse Childhood Experiences

The disproportionate rate of trauma and adverse childhood experiences (ACEs) among members of disadvantaged communities has gained tremendous attention (Cronholm et al., 2015; Franco, 2018; Larkin, Felitti, & Anda, 2014; Nurius, Green, Logan-Greene, Longhi, & Song, 2016). Prolonged exposure to toxic stress has huge downstream consequences. While the biological and psychological toll are yet to be fully quantified, the connection between ACE exposure and health outcomes, including mental health, have long been well established (Dube, Felitti, Dong, Giles, & Anda, 2003). Exposure to childhood adversity and toxic stress has been of great public health importance. Extreme poverty, witnessing violence, malnutrition, and other hazards all can lead to increased adverse physical and psychological health outcomes (Nelson, et al., 2020), and consequently overshadow URMs cognitive and academic potential.

Cognitive Impact of High Stress Environments

Moreover, prolonged exposure to high-stress environments in the absence of critical coping resources is known to exacerbate symptoms of anxiety (Burton, 2018; Lugo-Candelas et al., 2020; Nurius, Green, Logan-Greene, & Borja, 2015). The latter is notorious for its negative impacts on memory and learning and essential in acquiring

skills and growing one's confidence (self-efficacy) for pursuing higher education and achieving long-term goals (van der Meer et al., 2018).

Anxiety Severity

Anxiety is one of the most prevalent mental illnesses among college age students (American Psychological Association, 2013), with URM college students often disproportionately affected (Eisenberg, Hunt, & Speer, 2013; Johnson, 2020). Examining anxiety severity among URM college students by disadvantaged standing may be of particular significance and interest. Gaining a better understanding of anxiety severity and factors that contribute to URM student anxiety may inform achievement gap intervention efforts.

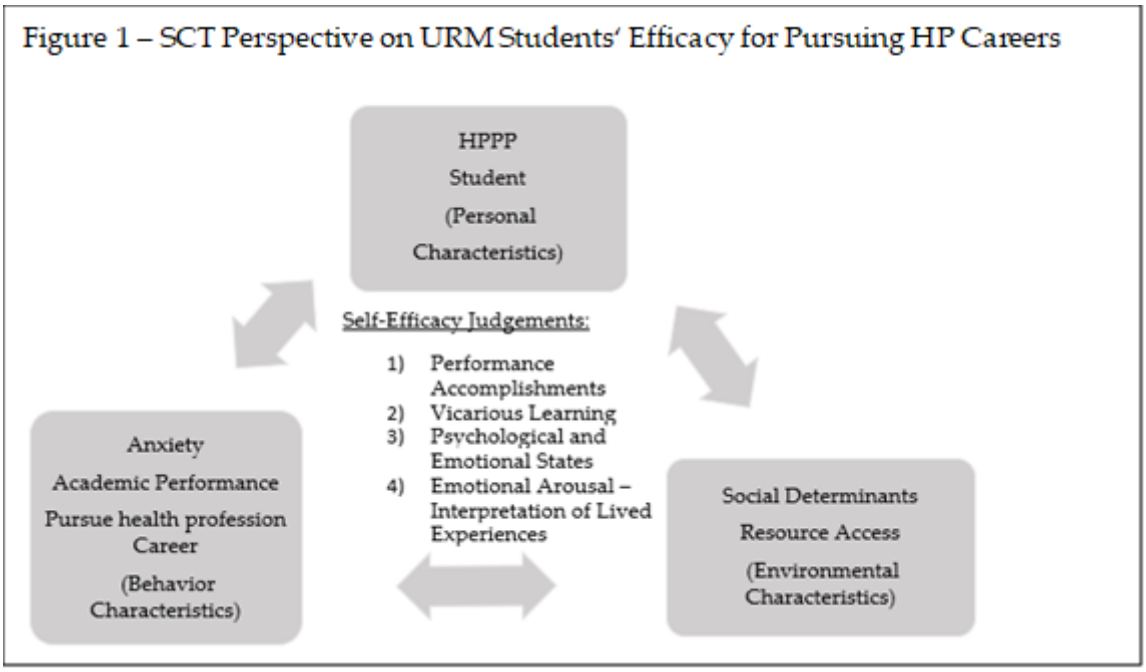
Anxiety may limit URM students 'academic performance and ability to successfully prepare for a career in the health sciences. Increasing URM students' confidence, or levels of self-efficacy, through a social cognitive approach, may positively affect anxiety severity.

A Social Cognitive Approach to Buffering Against URM Students' Anxiety

Social cognitive theory (SCT) posits that one's perceived level of self-efficacy for exercising control over potential threats or life challenges plays a central role in anxiety arousal (Bandura, 1988). According to SCT, environmental factors directly influence an individual's perceived self-efficacy for behavior performance. In other words, URM students' behavior is a function of personal and environmental factors intricately

associated with them. This interaction is demonstrated by a construct known as reciprocal determinism (Figure 1).

Figure 1 – SCT Perspective on URM Students' Efficacy for Pursuing HP Careers



Sources of Self-Efficacy

Both the presence of internal or personal, and external or environmental stimuli, have a direct effect on one's perceived self-efficacy for behavior performance, or confidence for goal attainment. The four main sources of influence, or efficacy judgements are 1) experiencing performance accomplishments, 2) vicarious learning, or observing others, 3) verbal persuasion, or receiving encouragement from others, and 4) psychological and emotional states, or the feelings one experiences based on one's interpretation of lived experiences.

Resource Access & Positive Reinforcement

To buffer against URM students‘ anxiety arousal, the environments through which URM students‘ transition must extend to them adequate resource supports to assist URMs in working through challenges that present. Repeated exposure to disconfirming experiences are necessary for URM students to grow their levels of self-efficacy, and to experience task mastery and positive emotions that come with performance successes. The underlying assumption is that, as URM students’ frequency of mastery experiences increases, their performance related level of anxiety decreases. For nearly 50 years, pipeline programs into health professions have provided URM students a safe learning environment allowing URMs to acquire the necessary skills and confidence for pursuing a health profession career. Enacted in 1972, the Health Careers Opportunity Program (HCOP) was one of the first federally funded pipelines targeting URM students (Testoff & Aronoff, 1983).

Following the Civil Rights Movement the installment of pipeline programs to support and encourage URM students‘ pursuit of higher education were intended to serve as a key intervention strategy for increasing URMs students’ level of self-efficacy and confidence (Testoff & Aronoff, 1983). While no single pipeline experience can undo implications of systemic racism, numerous pipeline programs to date have extended critical resources and interventions that have helped URM students grow their levels of self-efficacy and experience success in pursuing health profession careers.

The Role of Health Profession Pipeline Programs: Unveiling Hidden Strengths

For nearly half a century, health profession pipeline programs (HPPP), at times also referred to as pathway programs, have created opportunities for URM students to realize their own strengths. Comprehensive HPPP intervention approaches commonly include academic enrichment, and strategies for growing URM students' social and cultural capital for pursuing health profession training programs. HPPPs have served as an important vehicle for increasing the number of URM students in heath careers (Smith, et al., 2009; Taylor et al., 2019). HPPPs play a vital role in helping address gaps in educational attainment, commonly associated with income, race, ethnicity, and gender (Reader, Gruttadauria, King, & Atamturktur, 2019; Smith, et al., 2009). Past and present HPPPs have targeted students across all levels of education from pre-K through the college years (Katz, Barbosa-Leiker, & Benavides-Vaello, 2016). Through academic community partnerships, HPPPs are driven by a range of mission specific strategies to help achieve health profession diversity and health equity. Proven strategies employed by HPPPs have focused on increasing student awareness and interest in health careers, providing academic enrichment, and preparing students for successful admission to health profession programs (Lacy, McCann, Miller, Solomon, & Reuben, 2012).

Pre-K Through College Level Strategies

Major strategies aimed at pre-K through the high school years are often designed for schoolteachers. Enhancing teachers' self-efficacy for teaching science, technology, engineering, and math (STEM) concepts commonly involves engaging teachers in

professional development through workshops, and offering classroom resources along with teaching strategies (Barnard et al., 2020; DeCoito & Myszkal, 2018; Koomen, Kahn, Atchison, & Wild, 2018; Lotter et al., 2018). Some teacher level interventions are focused on enhancing teachers' leadership and advocacy capacities for bringing about equity in access to science education in their local community school systems (Avendano, Renteria, Kwon, & Hamdan, 2019).

Around the middle school years HPPPs generally begin to take a more comprehensive and structured intervention approach. In addition to enrichment that takes place throughout the school year, some models include extended summer camps aimed at preparing students for successful college matriculation. Along with enrichment in science, math, and language arts, offerings include preparation for taking standardized tests for college admission. College tours, career counseling, and in some instances, mentoring by health professionals are also offered (Wrensford, Stewart, & Hurley, 2019). The Gains in the Education of Mathematics and Science (GEMS) program links middle and high school students to "near peer mentors" who engage in laboratory experiments over the summer months (Brown, et al., 2020). Presenting successful role models with whom URM students are able to identify is a proven and powerful intervention strategy.

At the high school level, HPPPs increasingly introduce students to clinical, laboratory, or community settings, engaging students in hands-on and shadowing experiences in the health professions. At times experiential learning experiences are

combined with opportunities for earning advanced placement credits throughout the high school years. In some instances experiential learning experiences are offered alongside academic enrichment throughout the school years. The Health Sciences and Technology Academy (HSTA), for instance, offers a structured four-year curriculum, enrolling students in the 9th grade. A rigorous program with a 26-year track record, HSTA fosters both academic and social competences through yearlong after school activities and yearly summer camps on a variety of college campuses. HSTA scholars are engaged in community based research projects that allow them to develop both their scientific inquiry and leadership competences. Among other things, HSTA graduates benefit from substantial in-state tuition waivers (Chester et al., 2020). The more coordinated and tailored the approach, the more likely an intervention is to take hold and leave a lasting impact on students.

At the undergraduate (UG) level, HPPPs more commonly immerse students in research activities over an extended period of time during the summer months (Howell, Wahl, Ryan, Gandour-Edwards, & Green, 2019; Taylor et al., 2019). Other forms of enrichment at the UG level also include professional opportunities, such as career exploration through shadowing and hands-on clinical experiences. Additionally, UG level interventions often also link students with mentors, fostering their social and cultural capital. Perhaps among the most well-renowned and comprehensive in its approach, is the Health Career Opportunity Program (HCOP). HCOP assists and supports students from disadvantaged backgrounds in entering "a health profession

through the development of academies that will support and guide them through the educational pipeline"(HRSA, 2018).

Each of the strategy levels outlined ultimately serves to help fill opportunity gaps, and to extend to URM students much needed information resources and supports. Since inception of HPPPs, billions of dollars have been invested in growing URM representation in the health professions, yet efficacy of HPPPs is not readily evident (Brown, DeCorse-Johnson, Irving-Ray, & Wu, 2005). Despite efforts spanning more than half a century, disparities in health exist alongside repeated calls for diversity initiatives (Institute of Medicine, 2003). The scope and extent of previous HPPP evaluation efforts remains limited.

Previous HPPP evaluation studies have assessed the self-efficacy of K-12 teachers in teaching science concepts, and/or have assessed students' perceived science-, or research self-efficacy for engaging and understanding science concepts (Ali, Brown, & Loh, 2017; Salto, Riggs, De Leon, Casiano, & De Leon, 2014). At the high school level, the Aspiring Doctors Program has examined URM students' level of self-efficacy to pursue careers in the healthcare field before and upon completion of the program (Roche, Manzi, Ndubuizu, & Baker, 2020). A review of academic health science centers and public school partnerships found that providing academic and instructional enrichment to URM students has among the greatest potential for improving URM student outcomes (Patterson & Carline, 2006). Measures of success of HPPP effectiveness beyond the high school years often center around high school and college graduation rates, and matriculation into health profession training programs (Roche et al., 2020).

The Dilemma

Despite HPPP intervention efforts that span more than five decades, URMs are largely absent in the health professions. Diversity in the health professions is a prerequisite to achieving health equity. URMs are more likely to serve in underserved communities where disparities in health are prevalent. URMs who themselves are from disadvantaged backgrounds are better able to relate to the needs of URM populations. Implications of systemic racism have long denied URM students equal access to quality schools and educational environments where they can flourish and achieve their full potential. Denied opportunities and inadequate access to information resources and other supports have left URM students at an academic disadvantage for pursuing a health profession education.

URM students themselves are often affected by disparities in health outcomes. Among other things, previous studies have well documented the connection between ACEs or exposure to toxic stress, and increased risk for development of chronic disease. Generalized anxiety disorder (GAD) is among the most common chronic conditions disproportionately affecting URM populations. Both ACEs and rates of anxiety are more prevalent among URMs in underserved communities. Traumatic events and anxiety are known to impair memory and learning. Combined, the two can further affect URM students' confidence for academic achievement. HPPPs have long been tasked with growing URM students' confidence, or efficacy for pursuing a health profession education. No studies to date have examined characteristics of URM students who

participate in HPPPs. It is not known what proportion of URMs who participate in HPPPs identifies are disadvantaged, or to what extent these students are affected by ACEs. No HPPP evaluation studies to date have assessed anxiety severity among this student population.

A Case Study of Health Profession Pipeline Students

This case study examines evaluation data collected from a cohort of 88 URM students who participated in a six-week HPPP in the summer of 2019 at an academic medical center in the Midwest. Since inception in 2006 this site's program has reached more than 1,200 students at this site.

Program Description

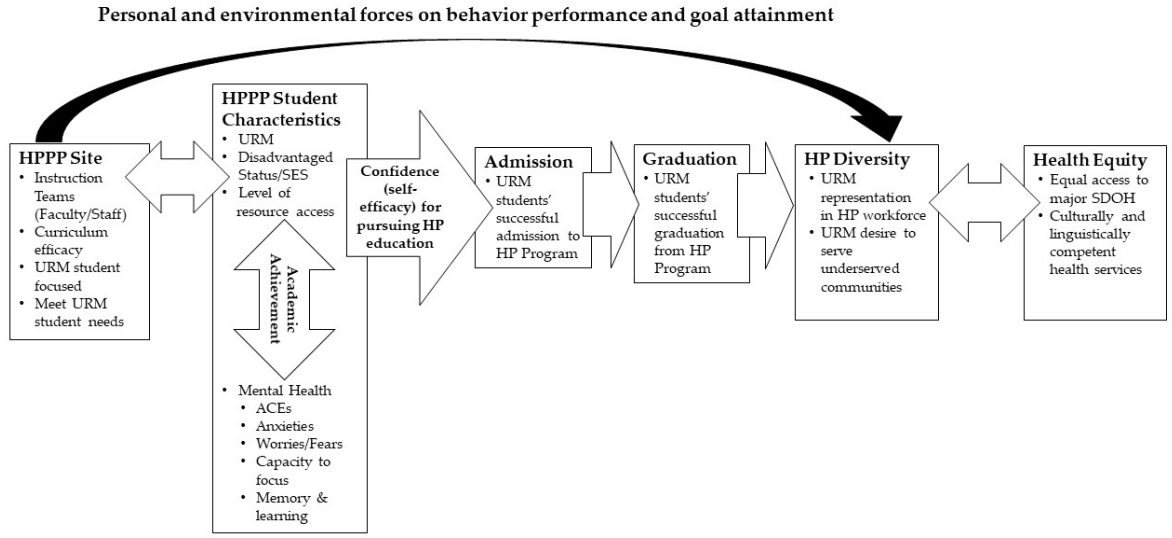
This HPPP site is one of 12 privately funded programs located in academic medical centers in the United States. Since inception in the late 80s, at the national level, this HPPP has provided a supportive learning environment and access to information resources to more than 31,000 undergraduate students across the nation. The primary target group includes first and second year college and university students, including community college students, interested in pursuing a career in the health professions. Eligibility criteria for participation includes students who, 1) identify with a group that is racially/ethnically underrepresented in the health professions; 2) come from economically or educationally disadvantaged backgrounds; or 3) have demonstrated an interest in issues affecting underserved populations.

Core curricular components offered through this site consist of academic enrichment in the sciences, including biomedical, physics, chemistry, and clinical prevention and population health. Other elements include weekly journal clubs, as well as a range of wellness and social activities, and health profession speakers and panel discussions. Throughout their time in the program, participants receive daily one-on-one support and mentorship from health profession students. The close relationships that develop often lead to lifelong friendships and a peer support system that extends well beyond students' time in the program.

Overarching Aim

The overarching aim of this study is to enhance our currently limited understanding of how characteristics of URM students inform the overall theoretical framework from health profession pipeline to health equity (Figure 2.)

Figure 2- Tutsch Conceptual Framework Health Profession Pipeline to Health Equity



Statement of Significance

Increasing diversity in the health professions is an essential strategy for addressing health disparities and achieving health equity (Institute of Medicine, 2003; Kelly, 2015; Smith, S. G. et al., 2009). HPPPs target URMs from disadvantaged backgrounds and underserved communities burdened by health disparities. HPPPs aim to help grow the representation of URM students in the health professions by bolstering their perceived self-efficacy (confidence) for gaining successful admission into health profession schools (Gardner, 2018).

Social Cognitive Theory (SCT) posits that higher levels of efficacy are a strong predictor for goal attainment and increased confidence for task performance (Bandura, 1988; Schunk & DiBenedetto, 2020). Moreover, increased levels of self-efficacy and confidence are associated with decreases in anxiety severity (Bandura, 1988; Schunk & DiBenedetto, 2020). Although existing literature does not discuss personal characteristics of HPPP participants, studies have found that URM students are disproportionately affected by symptoms of anxiety (Eisenberg et al., 2013; Johnson, 2020). No existing HPPP evaluation efforts have explored the impact of URMs' participation in HPPPs on URMs levels of self-efficacy and anxiety severity. This dissertation aims to address these existing gaps through a case study and examination of 2019 evaluation data sources (Table 1) collected through a HPPP site in the Midwest, by determining students'

personal characteristics and assessing changes in their levels of anxiety and self-efficacy from pre to post participation in the program.

Research Questions

Guided by social cognitive theory, this study examines several aspects of HPPP evaluation data sources (Table 1) through a case study mixed methods design. This dissertation proposes to increase our currently limited knowledge of characteristics of URM students who participate in HPPPs. This research intends to inform and refine outreach and recruitment efforts, application review and participant selection processes, curricular content and design, and best practices for members of instruction teams to emphasize and connect with URM students.

Table 1 – Data Sources

	Topic	Data Source	Methodology
Chapter 2	Participant Personal Characteristics	2019 Application Demographics 2019 Midpoint Reflection	AAMC Portal Microsoft Office Forms
Chapter 3	Impact Anxiety Pre to Post Participation	2019 Pre and Post Assessment	Microsoft Office Forms
Chapter 4	Impact Self-Efficacy for Pursuing health profession Education Pre to Post Participation	2019 Pre and Post Assessment	Microsoft Office Forms

Chapter Overview

The next three chapters of this dissertation analyze data of minority student characteristics collected before, during, and upon conclusion of a six-week HPPP in the Midwest in the summer of 2019. Chapter 2 examines and summarizes demographic data collected as part of students' application for participation, as well as self-reflection responses collected at midpoint. Chapter 3 assesses the anxiety severity of students collected at the beginning and upon conclusion of the program. Differences in anxiety severity are examined based on students' self-identified disadvantaged status. Chapter 4 investigates students' level of confidence (self-efficacy) for pursuing a health profession education both before, and upon conclusion of the program. Differences in students' perceived level of confidence (self-efficacy) are examined based on students' self-identified disadvantaged status. Additionally, factors influencing students' confidence (self-efficacy) for pursuing a health profession education are assessed. Lastly, the relationship between HPPP students' self-reported level of confidence (self-efficacy) for pursuing a health profession education, their disadvantaged status, and their predicted anxiety severity scores at time of pre-assessment are explored. The research questions for each chapter are outlined in Table 2.

Table 2 - Research Questions	
	Research Questions
Overarching	How do characteristics of students inform the overall theoretical framework from HPPP to health equity?
Chapter 2	
	1. What are personal characteristics of HPPP students?
	2. How prevalent are ACEs among HPPP students?
	3. What are HPPP students' greatest worries (anxieties/fears)?
Chapter 3	1. Is there a difference between HPPP students' mean anxiety scores from pre to post HPPP participation?
	2. Is there a difference at pre- or post-assessment between HPPP students' mean anxiety scores depending on whether HPPP students self-identified as disadvantaged?
	3. Are HPPP students' self-reported disadvantaged status and ACE scores a predictor for their self-reported anxiety levels at time of pre-assessment?
Chapter 4	1. What level of confidence (self-efficacy) for pursuing a health profession education do HPPP students report pre and post participation?
	2. How does HPPP students' self-reported level of confidence for pursuing a health profession education differ at pre or post participation depending on whether they identified as disadvantaged?
	3. What factors do HPPP students report as influences on their level of confidence for pursuing a health profession education?
	4. Does the relationship between HPPP students' self-reported level of confidence for pursuing a health profession education and predicted anxiety severity score at time of pre-assessment depend on their disadvantaged status?

Chapter 5 synthesizes and provides a discussion of findings outlined in chapters 2, 3, and 4. A brief summary of limitations and strengths of the research will be presented in addition to recommendations for future research.

Terminology

The following four chapters present different terminology when referring to different groups of students, or literature in which different racial and ethnic students, or population sub-groups are discussed. For the purpose of this dissertation, historically underrepresented minority students, or URMs, include African Americans, Mexican Americans, Native Americans, and mainland Puerto-Ricans. The term "minorities" will be used more broadly to capture members of other underrepresented groups, including minority subgroups that exist within major racial or ethnic categories as well as women.

II. A SOCIAL COGNITIVE PERSPECTIVE OF COLLEGE STUDENTS IN THE HEALTH PROFESSION PIPELINE

ABSTRACT

For nearly half a century, health profession pipeline programs (HPPPs) have been tasked with helping close the academic achievement gap and preparing minority college students for successful matriculation into health science programs. Despite HPPP intervention efforts, racial and ethnic diversity in health professions has not been achieved. This case study sought to increase the currently limited knowledge of characteristics of students who participate in HPPPs. Among other things, an increased understanding of characteristics of students who participate in HPPPs can help inform outreach and recruitment efforts, eligibility criteria, and curriculum design. Using a mixed methods approach, this study examined both quantitative and qualitative HPPP evaluation data collected during the summer of 2019 at an academic medical center in the Midwest. Data sources represented responses from 88 minority student participants from colleges across the United States. Guided by social cognitive theory (SCT), qualitative data were coded against three SCT domains. Identity Exploration: The most prevalent theme within the behavior domain was students' desire to pursue a career in the health professions (52). Relatively few references regarding students' interest in serving underserved communities or populations (14) were identified. The top theme within the person dimension was resilience (113). Above all, students described themselves as resilient young people who have identified their calling in life. Contrary

to existing literature of college-age students, impostor (22) syndrome did not appear to be a frequent theme within the person dimension. Educational disadvantage (40) was found to be the most prevalent theme within the environment dimension. Less than half the cohort identified as disadvantaged. ACEs: Significant differences in the total number of adverse childhood experiences (ACEs) were found between students who identified as disadvantaged, and their peers who did not identify as disadvantaged. Greatest Worries: Within the behavior dimension students' top responses fell under the theme performance disruption (112). Students most commonly expressed concerns about their sense of belonging (30) within the person dimension. Fears of losing a loved one (37) ranked highest among themes identified within the environment dimension.

HPPPs designed as academic enrichment interventions should focus their efforts on students who identify as socioeconomically and/or educationally disadvantaged. Students from a socioeconomically disadvantaged background often are members of underrepresented communities most affected by health disparities. This group of students has been found to return and serve underrepresented communities. HPPP curricula design and implementation should take into consideration characteristics unique to this group of students. Leveraging students' stressors as strengths instead of deficits, can profoundly affect students' resilience and self-efficacy as it relates to a successful career trajectory. But first, instruction teams must be aware of the unique characteristics of minority college students.

INTRODUCTION

Growing the proportion of minority students in health profession programs, and subsequently in the professions themselves, has long been a strategy for achieving health equity (Institute of Medicine, 2003; Kelly, 2015). The dynamic interplay between minority students and the social and environmental circumstances and conditions where they live, influence minority students' ability to experience academic success, graduate, and pursue a health profession career. From a social cognitive perspective, increasing diversity in the health professions has not been an easy task.

Understanding minority students and their social and environmental circumstances could help HPPPs tailor their programming and outreach strategy to be more successful. However, aside from general demographic information, little is known about characteristics of minority students who participate in HPPPs. No previous studies have examined characteristics of minority students who participate in HPPPs through a social cognitive lens. None have assessed the prevalence of ACEs, or anxieties commonly shared among minority students. The focus of this study was on better understanding HPPP participant characteristics to help inform HPPP outreach and recruitment efforts, to further tailor HPPP curricula to match minority student needs, and to improve HPPP faculty and staff's ability to relate to minority student needs.

This case study was guided by social cognitive theory (SCT), which posits that behavior or self-efficacy for behavior performance and goal attainment depend on aspects of the environment through which persons transition, recognizing three distinct dimensions: 1) behavior, 2) person, and 3) environment. Various sources of 2019 HPPP

evaluation data collected at an academic health center in the Midwest were examined. The overarching aim of this study was to better understand characteristics common to students who participated. The objectives of this study were 1) to investigate characteristics of HPPP students from an SCT perspective, 2) to assess the prevalence of adverse childhood experiences (ACEs) among HPPP students, and 3) to enhance the understanding of anxieties (worries/fears) commonly shared among HPPP students.

It was hypothesized that students identify with a group that is racially and/or ethnically underrepresented in the health professions, that they come from an educationally disadvantaged background, and that they demonstrate an interest in issues affecting underserved populations. For objective 2, the prevalence or level by which students may be affected by ACEs were described based on whether students identified as disadvantaged or not. In addition, it was hypothesized that students' greatest worries (anxieties/fears) were associated with historical trauma and racism, impostor syndrome (person), and related performance disruption.

METHODS

Study design and sample

This evaluation study was designated exempt by the [redacted] Institutional Review Board (IRB).

The study site is one of twelve academic medical centers that annually hosts a six-week HPPP offering academic enrichment and interprofessional career exploration activities targeting first and second year college students. Altogether, the sample

consisted of 88 undergraduate students who participated in the HPPP in the summer of 2019 at an academic medical center in the Midwest. Participation in program evaluation activities was, however, voluntary and this resulted in different sample sizes across the objectives. Using a mixed methods approach, this case study drew from multiple data sources.

Data Collection

Objective 1: To investigate student characteristics, 1) demographic information collected as part of students' application for participation in the HPPP were examined, and 2) responses collected from students following an in-class identity exploration activity were analyzed. In weeks one and two of participation in the HPPP, students were engaged in a brief, two-to-five-minute identity exploration exercise. Following a short demonstration by program staff, this exercise involved pairs of students repeatedly posing each other the question: "Thank you, please tell me who you are." Peers captured each other's responses on a sticky note, which they then gifted each other upon conclusion of the exercise. In week three, after students had time to internalize the identity exploration exercise, they were invited to participate in a reflective writing activity sent in an evaluation survey via Microsoft Office Forms to students' preferred e-mail address. In this activity, students were presented with the following open-ended question: *Thank you, please tell us who you are*, along with the writing prompt "*Without concerning yourself with punctuation or grammar, please take a few minutes to free-write about who you are, or what makes you, you."* (Appendix I).

Objective 2: In week three of their participation in the HPPP, students viewed a documentary film on ending the cycle of traumatic childhood events. A panel discussion on the biology of stress and the science of hope followed the screening. To better understand the level by which students may be affected by adverse experiences or past traumatic events, students were given the option to complete an ACE assessment (Appendix II) and submit, via program evaluation surveys, their ACE score, reflecting the total number of common adverse childhood events (0 – 10) the student had experienced. The ACEs survey, a 10-item instrument, is a common measure of toxic stress exposure that assesses a range of adverse childhood traumatic events, including abuse, neglect, and household dysfunction.

Objective 3: In week 3, we asked the students to respond to the question *"What are some of your greatest worries, or fears?"* (Appendix III). Students' reported their anxieties (worries/fears) via a Microsoft Forms questionnaire.

Data Analysis

Objective 1: Descriptive statistics, including frequencies and percentages for categorical variables and mean, standard deviation, and range for continuing variables, were tabulated for students' demographic characteristics using SAS version 9.4 (SAS Institute Cary, NC.) Missing cases were excluded from analysis. Variables included age at time of program start, gender, race, ethnicity, birth country, disadvantaged status (Appendix IV), and family household income.

Student responses to the open-ended question "Thank you, please tell us who you are" were analyzed using QSR International's NVivo 12 (NVivo qualitative data analysis software; QSR International Pty Ltd. Version 12, 2018). Using a blended inductive/deductive approach, we coded data against the three SCT theoretical dimensions: 1) behavior, 2) person, and 3) environment.

A preliminary review of the literature of minority student characteristics and draft conceptual model provided a framework and menu of potential sub-nodes, also commonly referred to as sub-themes, of interest. Three doctoral students from the fields of health practice, medical education, and health promotion and disease prevention research, with expertise in qualitative data analysis, were involved in the development of a codebook, coding, and interpretation of findings. Two independent coders reviewed all responses with the three overarching SCT dimensions in mind. Coders collaborated on establishing consensus of codebook development and emergent themes.

A coding summary by code query report was utilized to assist with identifying and resolving disagreements. Coding summary documents were exchanged by e-mail between the coders, which allowed for independent review and placing in-text comments. Coders met via Zoom utilizing screen sharing utility as needed.

Objective 2: The means and distribution of students' ACE scores in relationship to their disadvantaged status was examined. An independent samples *t*-test was used to evaluate the differences.

Objective 3: Responses to the open-ended question "What are your greatest worries, or fears" were analyzed against the three SCT theoretical dimensions (behavior,

person, and environment) using QSR International's NVivo 12 (NVivo qualitative data analysis software; QSR International Pty Ltd. Version 12, 2018). Using a blended inductive/deductive approach, we coded data the same way that is described in objective 1.

RESULTS

Objective 1: Student Characteristics

Demographics

The study sample included 88 students between the ages of 18 and 21, representing colleges, including community colleges, and universities from across the United States. In 2019, the site's cohort consisted of students interested in pursuing medicine, dentistry, nursing, public health, and physician assistant health profession careers. Data for student characteristics are shown in Table 3.

Table 3 - Demographic characteristics of students (2019 cohort N=88)		
	Mean	Range
Age (n=88)	19.7	18 – 21
GPA (n=88)	3.39	2.25-4.0
	N	%
Gender (n=88)		
Female	66	75
Male	22	25
Race (n=88)		
American Indian or Alaska Native	1	1.1
Asian	20	22.7
Black	32	36.4
Other	3	3.4
White	6	6.8
Two + Races	2	2.3
Hispanic (n=88)		
Non-Hispanic	65	73.9
Hispanic	23	26.1
Birth Country (n=88)		
US-Born	71	80.7
Foreign-Born	17	19.3
Disadvantaged (n=88)		
No	48	54.5
Yes	40	45.5
Family Income (n=88)		
$0-$9,999	0	0.0
$10,000-$19,999	16	18.2
$20,000-$29,999	9	10.2
$30,000-$39,999	19	21.6
$40,000-$49,999	13	14.8
$50,000-$74,999	13	14.8
$75,000-$99,999	7	8.0
$100,000-$249,999	10	11.4
$250,000+	1	1.1

The cohort consisted of a diverse group of students from different racial /ethnic backgrounds and was predominantly female. Altogether 23 (26.1%) identified as Hispanic, representing a wide range of ethnicities from across Latin America and Spain. The sample included 80.7% (79/88) US-born, and 19.3% (17/88) foreign-born students. The sub-sample of foreign-born students included students from Latin America, the continent of Africa, and the Middle East.

Based on self-report, less than half, 45.5% (40/88), identified as disadvantaged, while 54.6% (48/88) did not identify as disadvantaged. A total of 69.3% (61/88) of students reported that they do not contribute to their family's household income, while 30.7% (27/88) reportedly did contribute. Nearly two thirds, or 64.8% (57/88) of students reported a combined family income of less than $50,000 per year. The sample mean grade point average was 3.39 on a 4.0 scale, with a range from 2.25 to 4.0.

Identity Exploration

Students' open-ended responses to "Thank you, please tell us who you are" were coded against subthemes under the three SCT dimensions previously mentioned. A summary of findings is presented in Table 4.

Table 4 - Student Identity Dimensions (2019 cohort, n=84)

Rank	Reference Count	Inter-Rater Agreement	Theme	Illustrative Quote
Behavior Dimension - Demonstrates an interest in issues affecting underserved populations.				
1	52	95.58%	Desire pursue health profession	*"However, I am more than just what my parents went through. Looking on a smaller scale, I am a struggling pre-med student. I enjoy having a vision of one day becoming a physician and that's something that pushed me through the day […]."*
2	37	97.79%	Sense of responsibility	*There are many people who believe that I will get where I want to be and letting them down as well as myself would crush me.*
3	14	97.44%	Interest underserved	*"I seek to be at a point where I can touch many lives in Haiti and provide a sense of hope for many."*
4	10	99.23%	Working	*"[…] Ran out of money, leaving me having to work 3 jobs on top of school to pay bills"*
Person Dimension - Identifies with a group that is racially/ethnically underrepresented in the health professions.				
1	113	84.67%	Resilience	*"I think the experiences I've been through make me who I am now, such as flying alone to the United States by myself when I was 13 years old, or attend a high school that I was one of the only minority"*
2	83	90.01%	Passion	*"Right now, being in this program, I've come to understand that this is what I'm called to do in life."*
3	75	98.32%	Racially/ ethnically	*"I am proud to say that I am Hispanic."*

			under-represented	
4	38	99.35%	Spiritual	*"I am also a Catholic. Morning and night, I try to take time for some prayer because since I was little and until now, my parents are always encouraging me to pray, to pray for our family and to pray for successful studies."*
5	23	96.91%	Immigrant	*"I am part Indian and part Nepalese. I have been in America for almost 4 years. I am happy. I used to miss my home at times, but I have learned to make this place my new home."*
6	22	96.64%	Impostor	*"I am enough even when it doesn't seem that way in my own eyes."*
Environmental Factors - Comes from an economically or educationally disadvantaged background.				
1	40	96.52%	Educationally Disadvantaged	*"I am the child of two people who did not make it out of high school. I am a first-generation student who has come from disadvantage but won't let that discourage me from making a difference and accomplishing my dream."*
2	23	89.62%	Trauma	*"I was born in Baghdad, Iraq and I moved to Egypt at the age of 7 due to the severe death threats my family and I experienced."*
3	21	96.79%	Discrimination	*"I am a Muslim woman ready to save the lives of those who underestimated and doubted her."*

4	20	92.38%	Economically disadvantaged	*"I want to make my mom proud first and foremost with my education, it is sad to see my mom constantly bring herself down because she didn't have the same opportunity to go to school."*
5	14	97.03%	Family Support	*"My family is very important to me and without them I am nothing."*

Behavior Dimension

Based on rank order of reference counts, within the behavior dimension we identified students most frequently described themselves as individuals with 1) a desire to pursue a health profession, 2) a sense of responsibility for their family, 3) an interest in issues that affect underserved populations, and 4) employed, or working either within, or outside the home (Appendix V).

Person Dimension

Based on rank order of individual reference counts, within the person dimension we identified students most frequently described themselves as 1) resilient, 2) passionate and 3) belonging to groups that are racially/ethnically underrepresented in the health professions. Students also identified as 4) spiritual or religious, sharing spirituality or religious practices that are a part of who they are. Many students also identified as 5) immigrants to the United States. Some voiced identification as 6) impostors at times (Appendix VI).

Environment Dimension

Based on rank order of individual reference counts, within the environment dimension students most frequently identified as having 1) educational disadvantage. Several shared 2) traumatic experiences, and 3) discrimination they have experienced. Students also described examples of how their identity was shaped by 4) economic disadvantage and 5) the support they received from family (Appendix VII).

Objective 2: ACE Prevalence

For the 67 students who chose to share their total ACE score, we calculated a mean ACE score of 2.6 (Table 5), indicating that on average students experienced 2-3 adverse childhood events. A mean ACE score of 3.6 was calculated for students who identified as disadvantaged, while a mean ACE score of 1.7 was calculated for students who did not identify as disadvantaged. At the alpha=.05 level of significance, this difference was statistically significant (t (67) =-3.22, p=.002).

Table 5 - Students' ACE Score by Disadvantaged Status (2019 cohort N=67)		
	Mean (SD)	Range
ACE Score (n=67)	2.6 (2.1)	0 - 9
Disadvantaged (n=33)	3.58	0-9
Not Disadvantaged (n=34)	1.74	0-8
ACE Score	Disadvantaged	Not Disadvantaged
0	3	12
1	8	6
2	3	7
3	4	4
4	3	2
5	2	1
6	3	1
7	5	0
8	1	1
9	1	0
10	0	0

Objective 3: Greatest Worries/Fears

Through an inductive/deductive approach to qualitative data analysis, subthemes were organized under the three SCT dimensions 1) behavior, 2) person, and 3) environment (Table 6). Students' open-ended responses to "What are some of your greatest worries or fears" were then coded against these dimensions.

Table 6 - Student Worry Dimensions (2019 cohort, N=84)

Rank	Count	Inter-Rater Agreement	Theme	Illustrative Quote
Behavior Dimension – Describes fears or worries associated with performance disruption.				
1	112	92.29%	Performance Disruption	*"My greatest worry is not being accepted into medical school which would mean I would not be able to do the one thing that I want to do the most in life. I constantly think about this every day and I feel like this is a source of a lot of my anxiety and fears."*
2	40	92.83%	Sense of Responsibility	*"My greatest fear is failing and letting my family down"*
3	22	98.27%	Career Decision	*"I am scared that along the way I might regret what I chose to do"*
Person Dimension – Describes fears or worries associated with impostor syndrome.				
1	30	99.54%	Sense of Belonging	*"My greatest fear is to be identified by standards before identifying me by my story, my obstacles, my journey"*
2	22	95.51%	Impostor	*"That those whom doubted me were right and that I never was good or smart enough to make it.*
3	22	99.29%	Mental Health	*"One of my greatest worries/fears is ending my own life before fulfilling my life's purpose. Mental health and suicidality have been aspects of my life that I have struggled with on and off but have been perseverant in!"*
Environment Dimension – Describes fears or worries associated with historical trauma and racism.				
1	37	92.15%	Loss of Loved One	*"losing the loved one and depression"*
2	24	97.31%	Discrimination	*"I am afraid to face obstacles that come with being a minority."*
3	15	98.36%	Lack Financial	*"Another worry is having the financial means to continue my education in professional school."*

Behavior Dimension

Based on rank order of individual reference counts, within the behavior dimension we found that students reported that anxieties/fears are most often associated with 1) performance disruptive thoughts, 2) stressors related to responsibilities or expectations others may have of them, and 3) anxieties/fears around making a career decision (Appendix III).

Person Dimension

Based on rank order of individual reference counts, within the person dimension we found that students reported anxieties/fears are most often associated with 1) impostor syndrome, 2) mental health, and 3) a sense of responsibility for meeting familial expectations (Appendix IX).

Environment Dimension

Based on rank order of individual reference counts, within the environment dimension we found that students reported anxieties/fears are most often associated with anticipation of 1) separation from, or loss of a loved one, 2) experiencing discrimination, and 3) not having the financial means to pursue an education, or having personal needs met (Appendix X).

DISCUSSION

Through systematic analyses of quantitative and qualitative data sources, this study produced a profile of characteristics of a cohort of college students who participated in a comprehensive six-week HPPP in the Midwest. The novelty of this study relates to the lack of existing data regarding personal characteristics of minority students participating in HPPPs. Mixed methods studies examining the characteristics of students in HPPPs are largely absent from the literature.

Personal Characteristics

Demographics

The summary demographics profile generated through this research revealed some notable characteristic differences among the cohort of students. Among the most surprising findings in terms of demographics was that more than half of participants did not identify as disadvantaged, and that about one fifth was foreign born. Neither of these factors are commonly found or mentioned in studies involving or describing minority college student populations. When mentioned in the literature, minority students tend to be referred to as disadvantaged (Osborne, 2001; Whitcomb & Singh, 2020).

Identity Exploration

Though students did demonstrate an interest in issues affecting underserved populations, students' desire to pursue a health profession, and concerns about letting

family members down, emerged as more prevalent themes. In many instances students explained the immense sacrifices their parents made by leaving their home countries for a better life in the United States. Most of the students reported that their parents want them to succeed and achieve the American dream as future health professionals. However, in some instances it was not clear whether students were given a choice in the matter. Though most any college student experiences some form of pressure or stress around academic performance, the stakes of foreign-born minority students who participate in HPPPs, or students from immigrant or refugee families may be unique due to the immense sacrifices some may have made.

Students who did describe a desire or interest in issues affecting underserved populations commonly reflected on wanting to go back to their country of origin to improve conditions. Others expressed their desire to serve underserved communities through excitement and general enthusiasm for wanting to change the world for the better. Although not a focus of this study, these findings led the research team to wonder if notable differences in themes exist by students' self-identified disadvantaged status, U.S. vs. foreign-born, or by differences in race or ethnicity among minority groups represented in HPPP cohorts. A better understanding of such differences in HPPP participant characteristics could help inform curriculum content, or more broadly refine program mission statements, goals, or objectives different HPPPs wish to achieve.

Students took great pride in their racial and ethnic identities and described themselves as overcomers of adversity. The students perceived the many life challenges that they have had to navigate as evidence of their ability to persevere, and an indication

of the high levels of resilience they have attained over the years. The literature often features minority college students with a deficit informed framework (Kim & Hargrove, 2013) commonly tied to some form of academic gap, such a lacking science, or research self-efficacy. Participation in this six-week HPPP may have been the first time in the students' lives that they were invited to fully embrace their unique selves, including their racial and ethnic identities, in an academic setting.

Imposter syndrome, generally a frequent phenomenon among college students, in particular among first generation college students (Peteet, Montgomery, & Weekes, 2015), did not rank among the most prevalent themes. This finding may in part have had to do with timing, and that these data were collected at a time at which students were fully immersed in HPPP enrichment and intervention programming. By week 3, most students were accustomed to the campus, their schedules, each other, and members of the HPPP support staff. Confidence and calm may have quieted the inner critic. In and of itself, this may be among one of the most notable findings of this evaluation study.

In line with previous studies of minority college students, spirituality was an important aspect of students' perceived identities (Herndon, 2003; Kim & Hargrove, 2013). Students indicated their faith belief and engaging in regular spiritual practices are what help them overcome life's most challenging times. Alongside spirituality, students ascribed their ability to persevere and overcome to the support and strength extended by members of their family and friends. These findings are concurrent with previous studies of factors that help explain minority college students' academic success (Herndon, 2003; Kim & Hargrove, 2013).

ACE Prevalence

Measures of ACE exposure and anxiety severity may be of particular interest when it comes to intervention efforts directed at increasing the representation of minority students in health profession programs. Differentiation by minority students 'disadvantaged status in assessing ACE exposure and anxiety severity may be pivotal pertaining to efforts aimed at intervening with academic achievement gaps among minority student populations.

Quantitative analysis of ACE scores revealed significant differences in the prevalence of ACEs between disadvantaged and non-disadvantaged students. In agreement with previous studies, ACE prevalence rates tended to be higher among disadvantaged minority students, or individuals from and within underserved communities (Cronholm et al., 2015; Franco, 2018; Larkin et al., 2014; Nurius et al., 2016). This finding raises a bigger question regarding the mental health of minority students who participate in HPPPs. For instance, generalized anxiety disorders are particularly prevalent among minority college students and individuals affected by trauma (Eisenberg et al., 2013; Johnson, 2020). Minorities from disadvantaged communities often are disproportionately burdened by higher ACEs and other traumatic experiences (Cronholm et al., 2015; Franco, 2018; Larkin et al., 2014; Nurius, et al., 2016) .

Greatest Worries/Fears

Thematic findings regarding participants' greatest worries, or fears, to some extent mirrored themes identified in connection with identity exploration data collected.

A large proportion of respondents described fears and worries regarding their successful admission to health profession school. Many of the students again expressed concern, or a fear of letting their family down. Within the behavior domain, we specifically identified career decision as a theme. A considerable number of students feared making the wrong career decision. The reemergence of students' strong sense of responsibility, alongside career decision, led us to question whether some of the HPPP participants may be in pursuit of a health profession career due to family expectations.

Conversely, high expectations that parents and families place on students may well be an important factor in their having successfully arrived in college programs. Previous studies have documented the importance of family supports among minority students' in pursuit of a health profession education (Johansson et al., 2020). Despite education systems and educators who may not have seen these students' potential, students most likely had a strong family support network helping them see through and overcome performance disrupting and anxiety provoking thought processes.

While students realized their own strengths, they feared others might perceive adversities associated with their lived experiences as a weakness or impose judgment on them. Several expressed fears of declining mental health as part of their pursuit of a health profession education, and all the stressors that come with financing their academic journeys all while sustaining their livelihoods.

Implications of historical trauma and racism emerged as students described fears of losing a loved one, and anxieties tied to discrimination they have experienced, or the

barriers they anticipate having to overcome in their pursuit of higher education as members of minority communities.

Limitations

This summary of minority student characteristics may not be representative of all HPPP college student populations. The study relied exclusively on secondary data sources that originated from surveys or forms that rely on measures of self-report. For instance, while students were provided guidelines based on which they reported their disadvantaged standing, responses seemed arbitrary. Site leadership remarked that more privileged students with higher family incomes at times perceived themselves as disadvantaged, whereas some of the students with a large number of family members and much lower annual household incomes did not self-identify as disadvantaged. Merely one Native American student was included in the study population. This student may or may not have participated in one or more aspects of program evaluation activities outlined in this study.

HPPPs came into existence more than 50 years ago to help grow minority representation among health professionals serving in underserved, disadvantaged, communities. One underlying assumption was that minority students from underserved communities are more likely to return and serve their communities upon graduation from a health profession program. The absence of detailed demographic characteristics of HPPP student participants in published studies over the years, makes it impossible to know whether HPPPs reach their intended target populations.

Strengths

As the first of its kind, this case study examined student characteristics of a diverse sample of minority college students in pipeline programs in pursuit of careers in the health professions employing a mixed methods approach. This study achieved good interrater reliability (Kappa=0.69) across emergent themes included in final analysis.

Implications for Practice

A prerequisite for effective educational interventions is that the learner feels respected and understood. HPPP instruction teams and staff in academic medical center settings may not be familiar or aware of pervasive implications of systemic racism, and the academic trajectories of minority students. Participation in HPPPs brings with it many firsts for both minority student participants and members of HPPP instruction teams. For minority students, a six-week summer immersion may be their first time away from family and friends, and the communities that they call home. Setting foot onto an academic health science center and interacting with state of the art technologies and well-renowned faculty is a first for most. Conversely, members of HPPP instruction teams may never have had the opportunity to teach or engage with diverse undergraduate student groups. Elemental aspects of preparing for a successful program includes assuring that members of instruction teams familiarize themselves with characteristics and needs unique to minority college students. For instance, leveraging minority students' stressors as strengths instead of deficits, can profoundly affect

students' resilience and self-efficacy as it relates to a successful career trajectory (Taylor et al., 2019). A concrete understanding of HPPP student characteristics informs outreach and recruitment priorities, and better equips HPPP instruction teams to tailor HPPP curricula to the needs of students from diverse backgrounds.

If achieving health equity is dependent upon growing a health profession workforce that is able to identify with the needs of individuals in disadvantaged communities, then we must assure disadvantaged minority student representation in the pipeline. If health profession diversity is dependent upon minority students 'successful admission to, and graduation from, health profession programs, then interventions must consider underlying factors that may play into minority students' academic achievement gap.

III. AN EXAMINATION OF ANXIETY PRE AND POST PARTICIPATION IN A SIX-WEEK HEALTH PROFESSION PIPELINE PROGRAM FOR MINORITY COLLEGE STUDENTS

ABSTRACT

For more than 50 years, health profession pipeline programs have facilitated the learning and growth of minority college students. Minority students are often disproportionately impacted by anxiety. Anxiety is known to interrupt cognitive processes involved in memory and learning, yet no studies to date have investigated anxiety severity of students who participate in HPPPs. This study examined anxiety severity scores of a diverse sample of 88 first and second year college students who participated in a six-week health profession pipeline program at an academic medical center in the Midwest. Paired samples *t*-tests were employed to assess pre and post generalized anxiety severity scores by students' disadvantaged status as via surveys sent via Microsoft Office Forms. Significant differences in students' anxiety severity based on their disadvantaged status were found at time of pre-assessment. By the end of the program, disadvantaged minority students' mean anxiety severity scores declined to similar levels found among students who did not identify as disadvantaged. Participation in health profession pipeline programs may be of greater benefit to minority students who identify as disadvantaged. Anxiety severity scores declined at

double the rate among students who identified as disadvantaged, compared to students who did not identify as disadvantaged.

INTRODUCTION

A key strategy for achieving health equity in underserved and disadvantaged communities is growing a health profession workforce that can identify with the needs of members of these communities (Jackson & Garcia, 2014). Traditionally, this strategy has translated into efforts to grow the presence of minority students in higher education or health profession programs (Goode & Landefeld, 2018).

Health Profession Pipeline Programs (HPPPs) have served as a primary vehicle and key intervention for growing health profession diversity and increasing the representation of minority students in health profession programs. Spanning more than five decades, past and present efforts of HPPPs have employed a wide range of strategies targeting students from kindergarten through the college years (Katz et al., 2016). Proven strategies employed by HPPPs have focused on increasing student awareness and interest in health careers, providing academic enrichment, and preparing students for successful admission to health profession programs (Lacy et al., 2012).

Anxiety is among the most prevalent mental illnesses among college age students (American Psychological Association, 2013) with minority college students often disproportionately affected (Eisenberg et al., 2013; Johnson, 2020). Anxiety is known to have negative impacts on memory and learning, and therefore a prerequisite for acquiring and retaining information, and for pursuing higher education (van der Meer et al., 2018). While limited data are available regarding adverse childhood experience (ACE) prevalence among college age students, it is estimated that 1 in 10

children nationally has experienced three or more ACEs (Sacks & Murphey, 2018). To date, no studies have examined to what extent minority college students who participate in HPPPs may be affected by anxiety or ACEs. Understanding the extent by which minority students are affected by anxiety and ACEs may help inform HPPP curricular interventions aimed at increasing academic achievement among minority students in pursuit of health profession careers.

Research efforts have focused on evaluating curricula, faculty, and staff involvement in delivering curricula, and on pipeline students themselves. This study sought to contribute to the literature and to increase the currently limited knowledge regarding ACEs prevalence and anxiety severity among minority college students who participate in HPPPs. This quasi-experimental study examined 2019 HPPP evaluation data collected at an academic health science center in the Midwest. The overarching aim of this study was to better understand the extent to which minority students who participate in HPPPs may be affected by anxiety and ACEs. The objectives of this study were to 1) examine the difference between students‘ mean anxiety scores from pre-to post-participation, 2) investigate if there is a difference at pre- or post-assessment between students‘ mean anxiety scores depending on whether students identified as disadvantaged, and 3) determine whether or not students‘ disadvantaged status and ACE scores are a predictor for their anxiety severity at time of pre-assessment.

METHODS

Setting and Sample

This quasi-experimental study was based on program evaluation data collected as part of a six-week HPPP at an academic medical center in the Midwest. The site annually hosts a racially and ethnically diverse group of first and second year college students from across the United States. The study sample consisted of 88 students interested in pursuing medicine, dentistry, nursing, physician assistant, and public health profession careers. Participation in program evaluation activities was voluntary, thus, resulting in different sample sizes across objectives.

Data Collection

Students' demographic data were drawn from their application for participation in the program and were reported in Chapter 2. Guidelines used for students' self-identification of disadvantaged status can be found in Appendix IV.

To examine the difference and means in students' anxiety scores from pre to post participation, students were presented with the generalized anxiety disorder screener, GAD-7, a validated brief measure for assessing generalized anxiety disorder as part of surveys sent via Microsoft Office Forms (Spitzer, Kroenke, Williams, & Löwe, 2006). The GAD-7 is a 7-item anxiety scale found to have good reliability, as well as criterion, construct, factorial, and procedural validity (Spitzer et al., 2006). The GAD-7 measures anxiety severity on a linear scale from 0 to 21.

Students were asked to rate how often specific problems related to anxiety have affected them over the last 2 weeks on a scale from 0 (not at all) to 3 (nearly every day). The total GAD-7 score is calculated by summing the scores of each item. An anxiety severity score of 0 to 4 indicates minimal anxiety severity, 5 to 9 indicates mild anxiety severity, 10 to 14 indicates moderate severity, and a score of 15 to 21 indicates severe anxiety severity. Surveys including the GAD-7 anxiety scale were sent on the first and last day of the program to students' preferred e-mail addresses.

A detailed description of how ACE data were collected is presented in Chapter 2 of this dissertation.

Data Analysis

A complete description of how demographic variables were analyzed is provided in Chapter 2.

To examine differences in students' mean anxiety scores from pre to post participation, a paired samples *t*-test was run. A chi-square test was employed to verify that attrition did not bias results of this analysis. To do this we examined the odds of students' disadvantaged status influencing their completion of the post assessment. Differences based on whether students self-identified as disadvantaged were investigated using independent groups *t*-tests. A *t*-test on pre-assessment anxiety severity scores was also performed to examine whether attrition biased the results due to non-completers being more anxious or more disadvantaged.

To examine the effect of students' disadvantaged status and ACE score on their respective anxiety severity score at time of pre-assessment, a correlation matrix was generated prior to performing a linear regression model. Bi-variate relationships between predictors and the outcome were assessed first, along with the normality of the outcome variable. Outliers were retained for a complete picture of the entire study population. A square root transformation was performed for GAD-7 pre-assessment scores to correct skewness.

This study was designated exempt by the [redacted]) Institutional Review Board (IRB).

RESULTS

Demographics

Summary demographic information of study participants has been reported in chapter 2. All 88 program participants completed the pre-assessment, and 62 also completed the post assessment, resulting in 62 matched pairs.

Objective 1. Using a paired (n=62) *t*-test at the alpha = .05 level of confidence, sufficient evidence exists to conclude there is a significant difference (p=.0172) in students' self-identified anxiety scores from pre to post participation in the six-week HPPP. At time of pre-assessment, students' mean anxiety score was 5.06, compared to 3.81 at time of post-assessment (Figure 3, Table 7).

Objective 2.1**.** Using an independent groups *t*-test at the alpha = .05 level of confidence, there is sufficient evidence to conclude that there is a significant difference

(*p*=.0163) in students' mean anxiety scores at time of pre-assessment between students who identified as disadvantaged, and those who did not identify as disadvantaged. The mean anxiety score at time of pre-assessment for students who did not identify as disadvantaged was 4.31, whereas the mean anxiety score among students who identified as disadvantaged at time of pre-assessment was 5.95 (Table 8).

Figure 3 – Histogram of GAD-7 Change

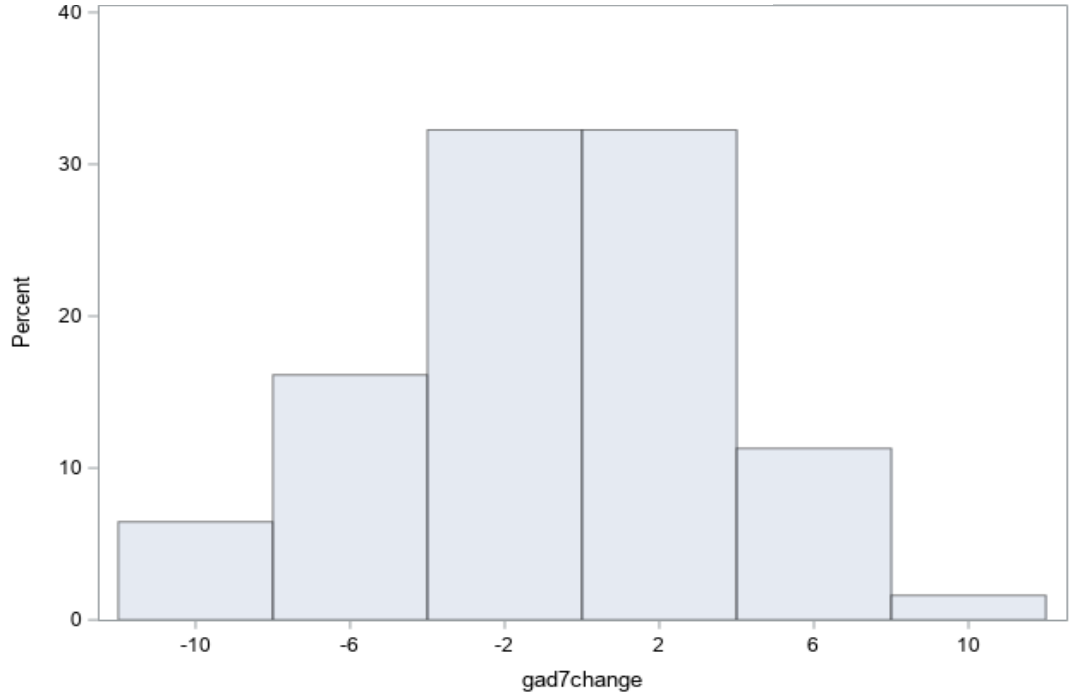


Table 7 - Descriptive Statistics GAD-7						
	N	Mean (SD)	Min.	Max	Skew	Kurtosis
GAD-7 Pre	88	5.06 (4.50)	0	19	1.11	0.92
GAD-7 Post	62	3.81 (4.31)	0	19	1.88	3.82
GAD-7 Change	62	-1.42 (4.56)	-12	10	-0.15	0.17

Table 8 -Students' GAD7-Pre Anxiety Severity Scores by Disadvantaged Status (2019 cohort, N=88)		
	Mean (SD)	Range
GAD-7 Pre (n=88)	5.06 (4.5)	0 – 19
Disadvantaged (n=40)	5.95 (4.3)	0-19
Not Disadvantaged (n=48)	4.31 (4.6)	0-17
GAD-7 Pre	Disadvantaged	Not Disadvantaged
0	1	12
1	4	5
2	5	2
3	6	4
4	3	8
5	2	3
6	2	3
7	4	2
8	2	3
9	2	1
10	2	1
11	3	1
12	1	0
13	1	0
14	0	0
15	1	0
16	0	0
17	1	2
18	0	0
19	0	1
20	0	0
21	0	0

Objective 2.2. At the alpha = .05 level of confidence, there is not sufficient evidence to conclude that there is a significant difference (p=.4914) in students' mean anxiety scores at time of post-assessment between students who identified as disadvantaged and those who did not identify as disadvantaged. The mean anxiety

score among students who did not identify as disadvantaged at time of post-assessment was 3.44, whereas the mean anxiety score for students who identified as disadvantaged at time of post-assessment was 4.20 (Table 9).

Table 9 - Students' GAD7-Post Anxiety Severity Scores by Disadvantaged Status (2019 cohort, N=62)

	Mean (SD)	Range
GAD-7 Post (n=62)	3.81 (4.31)	0-19
Disadvantaged (n=30)	4.2 (4.65)	0-19
Not Disadvantaged (n=32)	3.44 (4.02)	0-19
GAD-7 Pre	Disadvantaged	Not Disadvantaged
0	7	7
1	3	4
2	4	5
3	2	4
4	4	4
5	3	3
6	1	1
7	1	1
8	0	1
9	0	0
10	1	0
11	1	0
12	1	0
13	1	1
14	0	0
15	0	0
16	0	0
17	0	0
18	0	0
19	1	1
20	0	0
21	0	0

Objective 3. A significant relationship between students' ACE and anxiety severity scores at time of pre-assessment (p=.19) was not found. Therefore, a linear regression model was not run.

DISCUSSION

This study examined the extent to which students who participate in HPPPs may be affected by anxiety severity and ACEs. It was guided by the following hypotheses: (1) Students' anxiety severity scores are significantly reduced from pre- to post-participation in the six-week HPPP. (2) There is a significant difference in mean anxiety severity scores at time of pre- and post-assessment depending on whether students identified as disadvantaged. (3) Students' disadvantaged status and ACE scores are a predictor for their anxiety severity scores at time of pre-assessment.

Students' combined overall mean anxiety severity scores shifted from clinically mild to minimal between the time of pre- and post-assessment. While a significant difference in mean anxiety severity scores was found at time of pre-assessment depending on whether students identified as disadvantaged, no significant differences were found at time of post-assessment. Because correlation analyses revealed no relationship between students' ACE and anxiety severity scores at time of pre-assessment, a linear regression analysis was not performed.

Although students' combined overall mean anxiety severity score fell into the range of clinically mild, significant differences found depending on students' disadvantaged status at time of pre-assessment are notable. The previous study of the same cohort, discussed in Chapter 2, had also found a significant difference in students' ACE scores depending on students' disadvantaged status. Together these findings appear to align with previous studies that have found higher rates of anxiety and

trauma among disadvantaged minority populations in underserved communities (Burton, 2018; Lugo-Candelas et al., 2020; Nurius, et al., 2015; Patton et al., 2012). Findings of the present study raise the question whether minority students' disadvantaged standing affects their respective level of academic achievement, or degree attainment, differentially.

Consideration of minority students' disadvantaged standing may be unique to HPPPs. Studies of college age student populations commonly differentiate findings by majority White, and racial and ethnic minority student groups. Differentiation of minority college students by disadvantaged standing is less common. More common is the discernment between college students' low-income, or first generation standing, compared to the entire college student population.

Historically underrepresented minority college students have typically been overrepresented among low-income, first generation college students. Overall, the minority student sample included in this study may be different in terms of demographics compared to the proportion of minority college students in general.

Without regard to demographic factors, all students who participated in this six-week HPPP yielded significantly lower anxiety severity scores at time of post-assessment. Although causation cannot be established in the absence of a control group and due to other limitations that come with a quasi-experimental study design, participation in the program may have been a factor. By the end of the program, mean anxiety severity scores among minority students who identified as disadvantaged

declined to similar levels found among the students who did not identify as disadvantaged.

Limitations

This study had several limitations. The quasi-experimental study design does not allow for making inferences about causality, or that students' participation in the six-week HPPP impacted changes in anxiety severity. The study also exclusively relied on self-report. For instance, while guidelines were provided to help program applicants decide whether they should identify as disadvantaged, they may or may not have read, and/or agreed with the parameters that were provided. With respect to disadvantaged standing, a subjective measurement, program leadership did note that some students from large families with low household incomes did not identify as disadvantaged, whereas students from higher income families with fewer members in household did identify as disadvantaged. Participant responses may also be prone to social desirability and reporting bias cannot be ruled out.

The current study reflects responses collected from one HPPP student cohort. Study participants were not randomly selected and findings may not be generalizable to minority student populations participating in similar HPPPs at other sites across the United States. Some might argue the sample does not adequately represent characteristics of minority communities historically most affected by health disparities, which commonly also experience higher rates of anxiety and ACEs as contributing factors. For instance, while Native American communities experience significant

disparities in health, only 1 Native American student was included in the sample of students who participated. Moreover, 54% of the sample did not identify as disadvantaged, and greater than 20% of the sample reported household incomes above the national average.

Strengths

Strengths of this study include a good sample size (n=88). This study is the first of its kind examining anxiety severity and ACE scores among a sample of minority college students who participated in a HPPP. Overall, the sample consisted of a diverse sample of students from colleges and universities from across the United States.

Implications

This study contributes to the literature in several important ways. The finding that minority students' anxiety severity scores no longer differentiated significantly upon conclusion of participation in six-week HPPP may be an indication of HPPPs efficacy in enhancing participants' mental health and wellbeing. Findings may also suggest that disadvantaged minority students benefit more from participation than their non-disadvantaged counterparts. HPPPs whose primary aim is academic enrichment should prioritize disadvantaged minority students in their admission practices.

Among the most surprising findings was that more than half of student participants did not identify as disadvantaged. This finding in and of itself may pose a conflict with HPPPs overarching mission to bring about health equity. If achieving health equity is dependent upon growing a health profession workforce that can identify

with the needs of individuals in disadvantaged communities, then we must assure disadvantaged student representation in the pipeline. HPPP sites might want to revisit their respective outreach and recruitment strategy, and admission review criteria to assure more representation of disadvantaged minority students.

Conclusions and Future Directions

HPPPs have been in existence for more than half a century, yet little momentum has been gained in significantly increasing minority representation in health profession programs and the health profession workforce. Meanwhile, rates of disparities in health continue to disproportionately affect members of minority communities.

To better understand the extent by which students who participate in HPPPs are affected by anxiety and ACEs, further studies are needed and should take into consideration demographic factors, including HPPP participants' race, ACEs and ethnicity. HPPP samples top-heavy in the proportion of non-disadvantaged students may distort findings. Specifically examining the relationship between students' disadvantaged status, anxiety severity scores, and students' grade point average, may yield additional important insights.

IV. AN EXAMINATION OF MINORITY COLLEGE STUDENTS' CONFIDENCE FOR PURSUING A HEALTH PROFESSION EDUCATION

ABSTRACT

For more than 50 years health profession pipeline programs (HPPPs) have been tasked with growing the confidence of minority students to pursue a health profession education. Few studies to date have examined minority students' self-efficacy, or confidence for pursuing a health profession education. Due to implications of systemic racism and discrimination, and resulting structural disadvantages in education settings, underrepresented minority students, in particular, are most commonly affected by low levels of confidence for experiencing academic success (Carter, 2006). In addition to measuring minority students' level of confidence, this quasi-experimental mixed methods study also explored feedback students provided regarding factors that influence their confidence for pursuing a health profession education. To do this, paired samples *t*-tests were employed to assess self-reported pre and post levels of confidence by students' disadvantaged status. Significant differences in students' level of confidence for pursuing a health profession education based on students' disadvantaged status were found at time of pre-assessment. Upon program completion, the mean levels of confidence among students who identified as disadvantaged grew close to the same level of students who did not identify as disadvantaged. Findings revealed no apparent relationship between anxiety severity among students who identified as disadvantaged

and their level of confidence for pursuing a health profession education, and a negative relationship between anxiety severity and confidence among students who did not identify as disadvantaged.

INTRODUCTION

A culturally competent health profession workforce holds the promise to not only enhance the quality of health services, but also for research agendas to include minority communities (Cohen, Gabriel, & Terrell, 2002). Consequently, strategies for increasing diversity in the health professions have been aimed at recruiting minority students with the underlying assumption that they can better identify with the needs of minorities and disadvantaged communities (Jackson & Garcia, 2014). However, the presence of minorities in health profession programs and higher education settings remains scarce (Institute of Medicine, 2003; Smith, Sonya G., Nsiah-Kumi, Jones, & Pamies, 2009).

Increasing the number of minority students in the health professions has been a challenge. From entering schools academically behind, to trailing behind, the odds of successfully graduating high school and pursuing a college education are much lower among minority student populations (Dorman et al., 2017; Hung et al., 2020; Kim, 2011). Participation in severely underfunded school systems and exposure to various forms of discrimination and racial inequality often leave deep imprints on minority students' lives and academic trajectories (Lewis & Diamond, 2015). The cumulative effects of exposure to aversive school environments not only tend to leave minority students

academically behind, but also ultimately affect minority students' level of self-efficacy, or confidence for pursuing higher education.

For nearly half a century, health profession pipeline programs (HPPP), at times also referred to as pathway programs, have created opportunities for minority students to realize their own strengths and grow their confidence for experiencing academic success. Comprehensive HPPP intervention approaches commonly include academic enrichment, and strategies for growing minority students' social and cultural capital for pursuing health profession training programs. HPPPs have been intended to serve as an important vehicle for increasing the number of minority students in health careers (Smith, et al., 2009; Taylor et al., 2019), and have played a vital role in helping address gaps in educational attainment, commonly associated with income, race, ethnicity, and gender (Reader et al., 2019; Smith, et al., 2009).

Although a number of studies have examined students' level of academic self-confidence, academic self-efficacy, including research self-efficacy, for pursuing STEM careers (Salto et al., 2014; Santiago & Einarson, 1998), no studies have specifically examined minority students' confidence for pursuing a health profession education pre and post participation in a HPPP. Moreover, relatively little is known about factors that influence minority students' confidence for pursuing a health profession program post HPPP participation. Thus, this study sought to examine the confidence levels of HPPP participants, and factors that may affect their confidence for pursuing a health profession education.

Guided by social cognitive theory, this quasi-experimental mixed methods study examined 2019 HPPP evaluation data collected at an academic medical center in the Midwest. The objectives of this study were to 1) examine the difference between students‘ mean confidence scores from pre to post participation in the HPPP, 2) to explore the difference at pre- and post-assessment between students‘ mean confidence scores depending on whether students identified as disadvantaged, and 3) to examine factors that the HPPP participants reported as influences on their levels of confidence for pursuing a graduate health profession education. Building on the previous study presented in Chapter 3, where an association between HPPP participants‘ level of confidence for pursuing a health profession education and anxiety severity at time of pre-assessment was found, 4) this study also examined the relationship between HPPP students’ self-reported level of confidence for pursuing a health profession education and anxiety severity score at time of pre-assessment by students’ disadvantaged status. An explanation of the GAD-7 anxiety severity screener can be found in Chapter 3 of this dissertation.

METHODS

Setting and Sample

This HPPP, one of 12 sites funded nationally, is a free six-week summer academic enrichment program focused on improving access to information and resources for college students interested in pursuing a career in the health professions.

Since initial inception in 1989, the program has reached more than 31,000 students from colleges and universities across the United States.

This quasi-experimental study was based on program evaluation data collected as part of a six-week HPPP at an academic medical center in the Midwest. The site annually hosts a racially and ethnically diverse group of approximately 90 first and second year college students from across the United States. The sample consisted of 88 minority students interested in pursuing medicine, dentistry, nursing, physician assistant, and public health profession careers.

Selection Criteria

A culture of health and health equity arises from the equal distribution and access to major determinants of health. Under the auspices of bringing about a culture of health and health equity, the program targets first and second year college students who: 1) identify with groups that are racially/ethnically underrepresented in the health professions, 2) come from an economically or educationally disadvantaged background, and/or 3) have demonstrated an interest in issues affecting underserved populations. Students must have a minimum grade point average (GPA) of 2.5, and be U.S. citizens, permanent residents, or individuals granted deferred action for childhood arrivals (DACA). Required supporting documentation include a personal statement, and one letter of recommendation.

Program Components

This HPPP offers comprehensive curricular enrichment in the basic and social sciences, hands-on clinical, population health field experiences, job shadowing, as well as a lineup of diverse health profession speakers. Highlights of the program include a public health focused community needs assessment that takes students into different area zip codes learn about SDOH, and in particular, the health determinants of the built environment. Core curricular activities are delivered during weekdays, totaling around 35 to 40 hours of instruction, including hands-on activities, per week.

Curricular components are aimed at increasing students' confidence, or self-efficacy, for pursuing a health profession education. Coined by Bandura (1977), self-efficacy is a construct that refers to personal and cognitive factors or processes involved in acquiring knowledge required for successful completion of a health profession education. . Self-efficacy beliefs, in short, translate into students' perceived level of confidence for attaining a health profession education. Students' perceived ability in attaining future outcomes is strengthened by four sources of self-efficacy.

Consistent with Bandura's four sources of self-efficacy, performance accomplishments, vicarious experiences, or self-modeling, verbal persuasion, and physiological and emotional states (Bandura, 2005), this HPPP provides students with numerous opportunities for experiencing success and performance accomplishments through hands-on clinical and job shadowing experiences. Among other things, students develop their leadership and critical thinking skills by conducting a community needs

assessment, or field study. Learning teams sharpen their presentation skills and present their findings to faculty and peers upon conclusion of the six-week program.

A line-up of diverse faculty and staff share their journeys into the health professions, and how they learned to navigate challenges along the way. Students are inspired and encouraged by all members of the instruction team throughout the duration of the program. Each student is assigned to a learning community led by health profession students who also serve as near peer mentors who offer their support and encouragement.

Students are repeatedly immersed in experiences and moments that awake positive emotions and psychological states. All participants are encouraged to engage in regularly scheduled wellness activities and social events. The program aims to graduate confident and courageous change makers ready to pursue their goals and dreams.

Data Collection

Students' demographic data were drawn from their application for participation in the program. Guidelines used for students' self-identification of disadvantaged status can be found in Appendix IV.

To examine the difference and means in students' level of confidence for pursuing a health profession education from pre to post participation, students were presented a simple 5 point Likert scale question (Appendix XI): "At this moment, how confident do you feel regarding your ability (skill specific) to pursue a graduate education in the health profession of your choice?" Response options ranged from

extremely confident, to extremely not confident, slightly modified from an instrument that was used for assessing minority students' science self-efficacy (Robnett, Chemers, & Zurbriggen, 2015). Surveys were sent via Microsoft Office Forms on the first and last day of the program to students' preferred e-mail addresses. Anxiety severity was assessed using the validated GAD-7 anxiety screener, included in the same pre and post assessment survey. A complete description of data collection methods for the GAD-7 can be found in Chapter 3.

As part of a reflection activity participants completed a survey in their sixth week of the program where they were presented with an open-ended question (Appendix XII), asking them what factors influence their level of confidence for pursuing a health profession education should they choose to do so. A writing prompt encouraged them to reflect on both positive and negative influences in their life, or thoughts they might have regarding their pursuit of a health profession education. The prompt encouraged students to share about things that make them believe that they can pursue a health profession education, as well as share beliefs that might cause them to have doubts.

Data Analysis

Descriptive statistics, including frequencies and percentages for categorical variables and mean, standard deviation, and range for continuing variables, were tabulated for students' demographic characteristics using SAS version 9.4 (SAS Institute Cary, NC.). Demographic variables included age at time of program start, gender, race,

ethnicity, birth country, disadvantaged status (Appendix IV), and family household income**.** Univariate analyses were performed to examine frequency distributions and mean summary scores when appropriate.

To examine differences in students' mean level of confidence from pre to post participation, categorical Likert response options were coded into a linear scale, and a paired samples *t*-test was run. The five point Likert scale was recoded as follows: Low confidence became -2, somewhat not confident -1, neutral 0, somewhat confident 1, and extremely confident 2.

Differences in confidence levels based on whether students self-identified as disadvantaged were investigated using independent groups *t*-tests. A chi-square test was employed to verify that attrition did not bias results of this analysis, by comparing the odds of students' disadvantaged status influencing their completing the post assessment. A *t*-test on pre-assessment confidence levels was also performed to further examine whether attrition biased results, by comparing completers to non-completers.

A linear regression analysis was performed to examine the relationship between HPPP students' self-reported level of confidence for pursuing a health profession education and predicted anxiety severity score at time of pre-assessment by students' disadvantaged status. Self-reported level of confidence was centered at the neutral position to aid in the interpretation of the intercept. Dummy codes were used to represent disadvantaged versus non-disadvantaged students. One model was performed with these two variables as main effects, and one model was

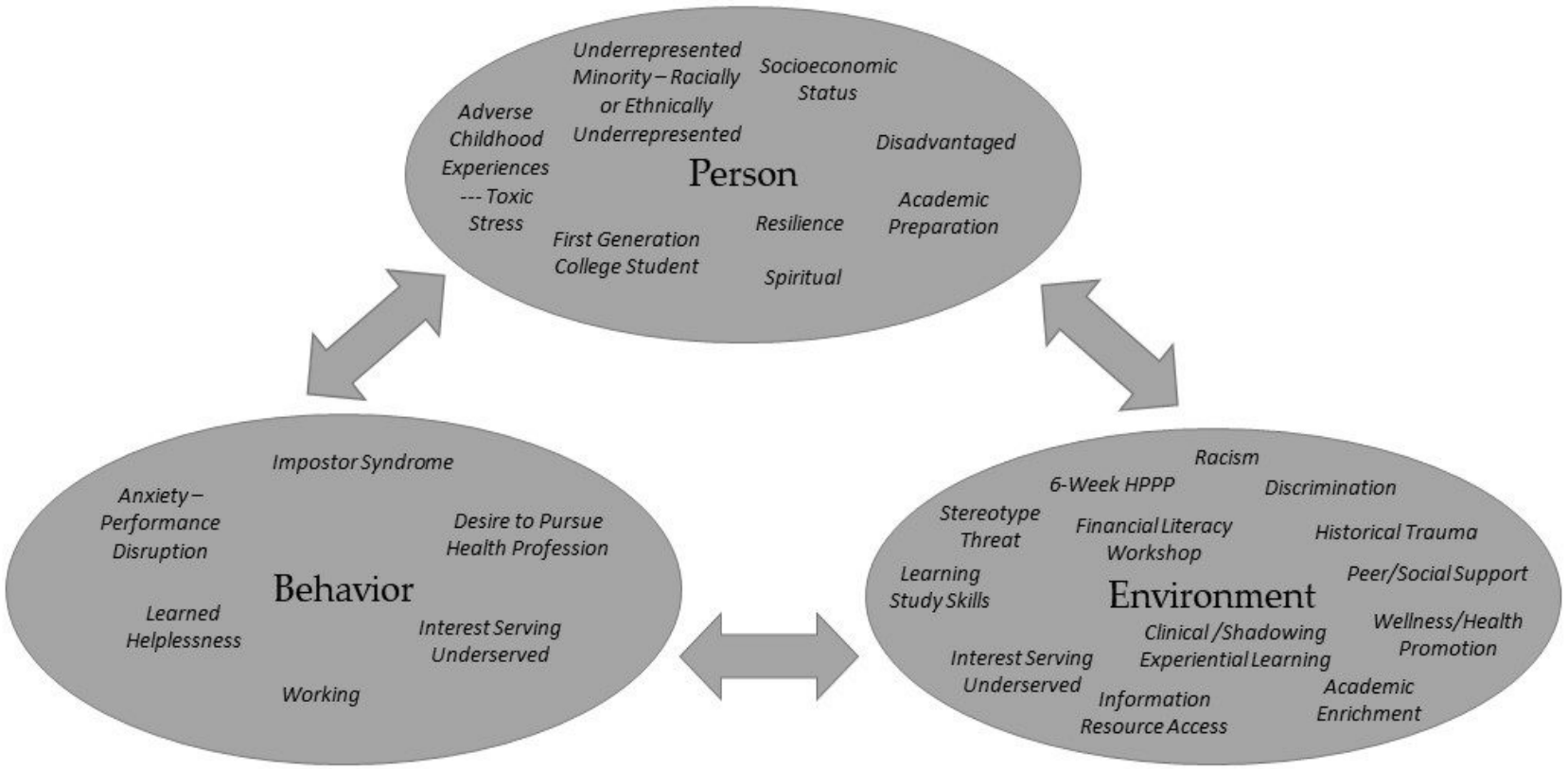
performed including the interaction between confidence for pursuing a health professions education and students' self-identified disadvantaged status. Prior to the regression analyses anxiety severity at time of pre-assessment was square root transformed due to non-normality. Model predicted values were back-transformed to the original scale for creating predicted value plots.

The open-ended question "At this moment, how confident do you feel regarding your ability (skill specific) to pursue the health profession education of your choice" was analyzed using QSR International's NVivo 12 (NVivo qualitative data analysis software; QSR International Pty Ltd. Version 12, 2018). Using a blended inductive/deductive approach, data were coded against the three SCT theoretical constructs: 1) behavior, 2) person, and 3) environment.

A preliminary review of the literature of minority student characteristics provided a menu of potential sub-nodes, also commonly referred to as sub-themes, of interest. These were organized into the three SCT theoretical constructs within the HPPP context (Figure 4).

Qualitative data were analyzed by three doctoral students with expertise in qualitative data analysis. All three contributed to the development of a codebook, coding, and interpretation of findings. Two independent coders reviewed and coded all responses with the three overarching SCT constructs in mind: 1) person, 2) behavior, and 3) environment. Coders collaborated on establishing consensus of codebook development and emergent themes.

Figure 4 – Minority Student Characteristics Organized into SCT Constructs within HPPP Context



A coding summary by code query report was utilized to assist with identifying and resolving disagreements. Coding summary documents were exchanged by e-mail between the coders, which allowed for independent review and placing in-text comments. Coders met via Zoom utilizing screen sharing utility as needed.

A linear regression analysis was performed to examine the relationship between HPPP students' self-reported level of confidence for pursuing a health profession education and predicted anxiety severity score at time of pre-assessment by students' disadvantaged status. Self-reported level of confidence was centered at the neutral position to aid in the interpretation of the intercept. Dummy codes were used to represent students who identified as disadvantaged versus students who did not identify as disadvantaged. One model was performed with these two variables as main effects, and one model was performed including the interaction between confidence for pursuing a health professions education and students' self-identified disadvantaged status. Prior to the regression analyses anxiety severity at time of pre-assessment was square root transformed due to non-normality. Model predicted values were back-transformed to the original scale for creating predicted value plots.

Because participation in program evaluation activities was voluntary, this study yielded different sample sizes across objectives. This evaluation study was designated exempt by the [redacted] Institutional Review Board (IRB).

RESULTS

Participant Demographic Characteristics

Participant demographic information was summarized and presented in Table 3 in Chapter 2.

Confidence Pre and Post Participation

Using a paired (n=62) *t*-test at the alpha = .05 level of confidence, there is sufficient evidence to conclude that there is a significant difference ($p<.0001$) in students' level of confidence to pursue a health profession education pre and post participation in the six-week HPPP. At time of pre-assessment, students' mean level of confidence for pursuing a health profession education was 4.06 (N=88), compared to 4.72 (N=62) at time of post-assessment (Figure 5, Table 10).

Figure 5 – Change in Confidence for Pursuing Health Profession Career

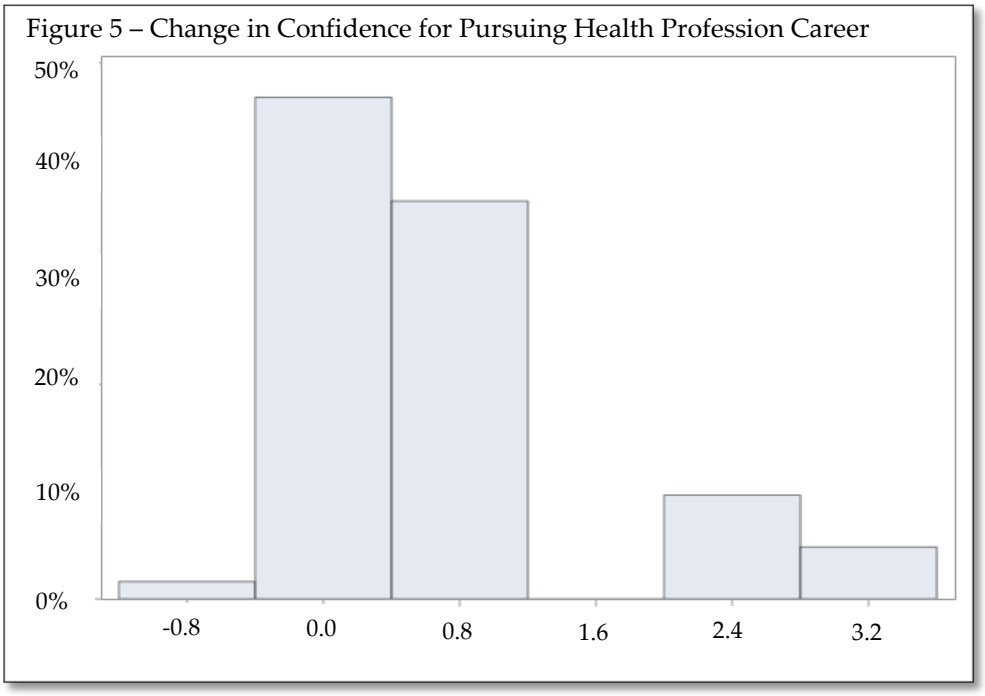


Table 10 - Descriptive Statistics Confidence Pursue Health Profession Education						
	N	Mean (SD)	Min.	Max	Skew	Kurtosis
HP-Conf Pre	88	4.08 (0.96)	1	5	-1.11	0.82
HP-Conf Post	62	4.73 (0.48)	3	5	-1.48	1.20
HP-Conf Change	62	0.69 (0.86)	-1	3	0.97	0.72

Confidence Pre Participation by Disadvantaged Status

Using an independent groups *t*-test at the alpha = .05 level of confidence, there is sufficient evidence to conclude that there is a significant difference (p=.04) in students' mean level of confidence at time of pre-assessment between students who identified as disadvantaged, and those who did not identify as disadvantaged. The mean level of confidence among students who did not identify as disadvantaged at time of pre-assessment was 4.27 (N=48), whereas the mean level of confidence at time of pre-assessment was 3.85 (N=40) among students who identified as disadvantaged.

Confidence Post Participation by Disadvantaged Status

At the alpha = .05 level of confidence, there is not sufficient evidence to conclude that there is a significant difference (p=.15) in students' mean level of confidence at time of post-assessment between students who identified as disadvantaged and those who did not identify as disadvantaged. The mean level of confidence at time of post-assessment was 4.81 (N=32) among students who did not identify as disadvantaged,

whereas the mean level of confidence at time of post-assessment was 4.63 (N=30) among students who identified as disadvantaged.

Factors Influencing Students' Level of Confidence

Factors influencing students' confidence for pursuing an education in the health professions were coded into the three SCT dimensions, 1) person, 2) behavior, and 3) environment. Themes are presented in the order of frequency by which they were coded, starting with the most frequently occurring theme. Individual reference counts are shown in Table 11.

Table 11 - Factors Influencing Students' Level of Confidence (2019 cohort, n=74)

Rank	Count	Inter-Rater Agreement	Theme	Illustrative Quote
Behavior Dimension – Related to performance disruptive anxiety.				
1	7	94.77%	Performance Disruption	*"I am extremely confident in my potential at times but there is always someone who makes me question myself and because I hear it so often it terrifies me to wonder if they are right."*
Person Dimension – Related to impostor syndrome.				
1	96	96.74%	Motivations	*"The need for an increase of diversity in the healthcare field. It is important for other people who look like me to know that it is possible if you put forth the effort."*
2	38	94.77%	Concerns	*"I am nervous about the application process and getting into graduate school."*
3	17	96.74%	Impostor	*"Am I enough -- as an applicant."*
Environment Dimension – Related to first in the family standing and disadvantaged background.				
1	33	92.65%	6-Week HPPP	*"I feel confident in pursuing a graduate health professions education because the people and experiences I've had as [part of 6-Week HPPP] and motivated me."*
2	28	97.54%	Economic Disadvantage	*"Finances are really my biggest factors since I don't qualify for aid and I don't want to pull out a bunch of loans."*
3	23	91.89%	Educational Disadvantage	*"My GPA is what lowers my confidence. "*

Behavior Dimension

Performance Anxiety. Within the behavior dimension students most frequently described fears or anxieties related to performance anxiety as factors influencing their level of confidence for pursuing a health profession education. One student stated, *"I did struggle academically my first year of college due to issues in my personal life. Although there is an upward trend in my academics, I am anxious over that factor holding me back."* Other students also expressed concerns regarding their level of *"self-esteem about grades"*, and *"money and the admission process"* making *"them question whether or not [they] can."* One student indicated, *"I am extremely confident in my potential at times, but there is always someone who makes me question myself, and because I hear it so often it terrifies me to wonder if they are right."*

Person Dimension

Motivations. The most prominent theme within the person dimension was motivations students revealed as factors that influence their level of confidence for pursuing a health profession education. Motivations described often captured the significant role of family and peer support. Some specifically stated, *"my mother"*, while others mentioned *"God"*, *"Family"*, and *"Friends"* as important influences. One shared *"something that makes me believe I will accomplish all my goals and dreams is thinking of my grandpa and my parents that one day I would make them proud for who I am and who I have become."* Another explained *"the support from my family and friends gives me the push to keep going."* Several mentioned personal aspects such as *"good characteristics (responsible, hard-working, teamwork, discipline) would help me to reach my goals"*, *"good morals, and I am*

ethical", "*compassion*", and "*my dedication to the dental field makes me believe that I can succeed as a health professional.*" Respondents also shared about experiential learning experiences that have helped them gain confidence. For instance, one stated, "*I spend several hours volunteering in a dental outreach program, and also did dental anthropology research*", another shared, "*what's on my side is my [ability] to network and get to know people [whom I can] shadow, [for whom] I can volunteer or [with whom] I can do research with.*" Many students cited their why, passions, and feeling needed, as positive influences on their confidence. Examples include "*my mom, and knowing that underserved communities need me in the health field*", "*passion of helping people and giving back to my community makes me believe in me*", and "*my passion and calling make me believe I will.*"

Specific aspects of participation in the program also emerged as positive influences. Comments included "*Experiences I have had as part of this program motivated me*", "*When our RA shared about his journey I was able to relate to it because my gpa isn't outstanding, but his suggestions made me believe there is still an opportunity for me if I push myself hard enough.*" One shared "*the people I have come across [in this program] have influenced my confidence level and where I see myself.*" Another student was particularly motivated by a discussion that better explained holistic admission processes, realizing that "*they look at the overall applicant.*" Some acknowledged they "*have all the information [they] need to succeed, but [that they] need to work on their discipline and work ethic*", while others stated "*I'm confident because I have my will and work ethic.*" Although the financial burden of pursuing a health profession education seems daunting for many, students were motivated by the idea of obtaining an "*education that no one can take from [them]*",

and *"knowing that it is important for other people who look like [them] that it is possible to achieve [an education] if you put forth the effort."* Another shared, *"What influences me is the desire to help others and make a difference in the world."*

Concerns. While many students listed their family and friends as strong positive influences on their level of confidence, some shared concerns regarding the *"lack of familial support and understanding"*, commonly along with *"financial"* concerns. A few also shared concerns that they are *"unsure if this [pursuing a health profession] is the life [they] want."* Some had mixed feelings. Despite confidence that, *"[they] want to go to medical school, [...] that little part of [them] doesn't know if [they] will make it in."* Among other things students also expressed concerns regarding their level of *"commitment"*, their *"GPA"*, and performance on standardized tests, such as the *"MCAT."* Others also expressed concerns about identifying mentors who can *"help [them] get to where [they] want to be."* Impostor. Although less prominent, the voice of impostor presented as an influential factor affecting students' level of confidence for pursuing a health profession education. Students expressed concerns they have about "[their] insecurities", and how at times "[they are] their biggest critic, feeling like [they] don't believe in [themselves] as others do."

Environment Dimension

HPPP Participation. Students mentioned several aspects related to their participation in the program as factors that helped improve their confidence for pursuing a health profession education. Having near peer guest speakers, has helped

one *"more aware of the qualities [they] have to offer",* realizing that they are enough. Another shared that *"with [their] experience from [participation] in the program [they] will gradually increase [their] academic skills, and be in a great position to take on a health profession education after graduation [with their undergraduate degree]."* Another stated *"I feel confident in pursuing a health professions education because the people and experiences I've had as [part of participating in this HPPP] motivated me."* One stated, *"I believe the experiences that I have had [at this summer program] have allowed me to become more determined and confident. I struggled trying to figure out what health profession I wanted to pursue, and I believe this has been my biggest stressor. However, participation in this program has made me feel more secure. Knowing for sure that I want to become a physician assistant rather than a medical doctor makes me feel motivated, [knowing] what pathway to follow. I know exactly what I am dedicating my life to."* Yet others mentioned *"the job shadowing experience", "the people [they] have come across*", and *"the reassurance [they] received from near peers"* who served as their mentors. Several mentioned their time with *"the dental school, and the teaching assistants explaining the dental school setup."* Many mentioned the positive influence of *"the connections [they] have made"*, and how *"[they] now have a lot of people to go to when [they] need help, knowing [their] peers will be there for them every step of the way."* One said, *"I believe I will because this program has allowed me to fall in love with the health professions."*

Economic Disadvantage. Many of the students perceived money and finances among the *"biggest factors"*, indicating that *"[their] confidence to pursue a health profession is deterred by [their] financial means."* Some more specifically shared about *the "financial*

status of [their] family, as well as [their] parents' living situation", and *"lack of familial support and understanding."*

Educational Disadvantage. Students frequently mentioned concerns about their "GPA, and academic struggles [they] experienced in [their] first year of college." Several shared about "[their] GPA being on the lower end", and being unsure about "taking the MCAT."

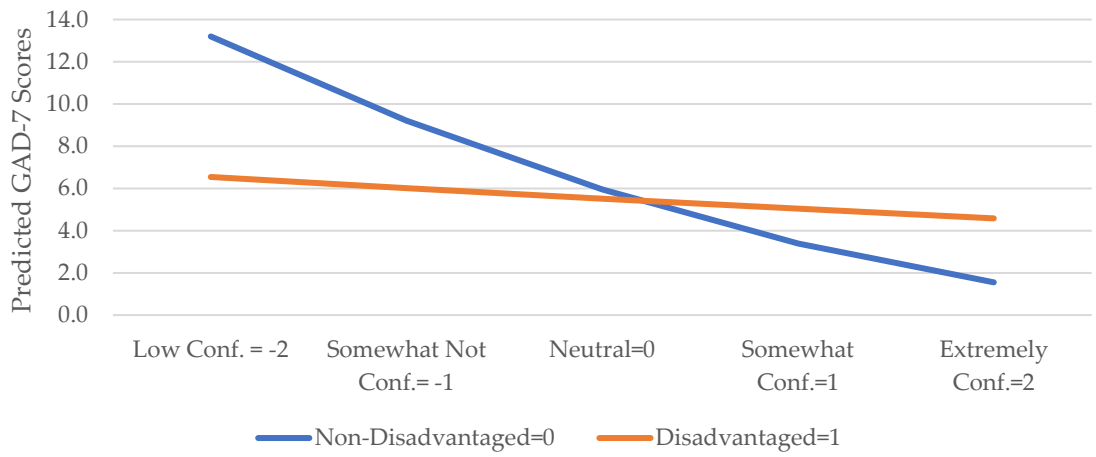
Anxiety Severity Depending on Level of Confidence and Disadvantaged Status

Linear regression analysis revealed a negative relationship between students' anxiety severity score at time of pre-assessment and their level of confidence for pursuing a health profession education. As students' confidence increased, their anxiety severity scores decreased (β=-0.36, p=.004). Identifying as disadvantaged was associated with a marginally significant increase in anxiety scores (β=0.43, p=.068). Students who did not identify as disadvantaged, and whose perceived level of efficacy for pursuing a health profession education was neutral at time of pre-assessment, had an anxiety severity score of 4.6. Despite high levels of confidence for pursuing a health profession, students who identified as disadvantaged also had higher levels of anxiety at time of pre-assessment.

In a second regression model, which included the interaction term, a significant interaction was found between disadvantaged status and students' confidence for pursuing a health profession education (β=0.49, p=.041). It was found that higher levels of confidence were associated with lower anxiety severity scores at time of pre-

assessment (rho= -.404, *p*=.004) among students who did not identify as disadvantaged. No apparent relationship was found between students' level of confidence (rho=-0.05, *p*=.768) and anxiety severity scores at time of pre-assessment among students who identified as disadvantaged (Figure 6). Students' disadvantaged status presents as an effect modifier of the effect of students' perceived confidence for pursuing a health profession education on anxiety severity.

Figure 6 - Interaction Plot, Confidence and Disadvantaged Status on GAD7-Pre (N=88)



DISCUSSION

This study sought to enhance the currently limited knowledge regarding first and second year minority college students' confidence for pursuing an education in the health professions pre and post participation in a HPPP. Collectively, students' mean levels of confidence increased significantly following participation in the six-week program. Significant differences between students who identified as disadvantaged vs.

students who did not identify as disadvantaged were found at program start. Upon program completion, mean levels of confidence among students who identified as disadvantaged grew close to the same to that of students who did not identify as disadvantaged. Findings revealed no apparent relationship between anxiety severity of students who identified as disadvantaged and their level of confidence for pursuing a health profession education, while a negative relationship between anxiety severity and confidence was found for students who did not identify as disadvantaged.

Upon examination of factors influencing students' confidence for pursuing a health profession education, the research team was surprised by the relatively small number of students who described factors related to performance disruptive anxiety and impostor syndrome. Anxiety is among the most prevalent mental health disorders among college-age students, with minority student groups typically experiencing higher rates (American Psychological Association, 2013; Johnson, 2020; Lipson, Zhou, Wagner III, Beck, & Eisenberg, 2016).

Similarly, impostor syndrome is a commonly cited characteristic, particularly among first generation minority college students (Le, 2019). These open-ended responses were collected as part of a final reflection exercise completed just before conclusion of the program. One potential reason for the few number of students who expressed concerns associated with anxiety and impostor syndrome could be attributed to students' overall increases in confidence. Increased confidence, however, may or may not be attributable to students having participated in the program. Another factor that

may play a role is that the majority of program participants did not identify as disadvantaged, and that most students may not be first in their family to pursue a college education.

An overwhelming majority of respondents described factors that motivate them to pursue a health professions education. Similar to Herndon's findings in 2003, students cited their spirituality and involvement in spiritual practices, as well as steadfast support of family and other social networks, as major sources of strength and motivation for moving forward and pursuing their goals (Herndon, 2003).

In a few instances, students indicated a lack of support from family due to concerns over the cost of pursuing a health profession education. Financing a health profession education is a well-known barrier among minority students, as many commonly come from families with fewer financial assets compared to their White counterparts (Johansson et al., 2020; Sullivan, 2004).

Several students attributed interactive hands on experiences as positive influences on their confidence. Numerous studies involving minority students have noted the benefits of active-learning pedagogy on student performance (Freeman et al., 2014; Haak, HilleRisLambers, Pitre, & Freeman, 2011; Theobald et al., 2020). Previous scholars have described how a chilly classroom climate, and large college auditoriums can undermine students' academic abilities, disproportionately affecting minority students frequently affected by feelings of social isolation, low confidence, and stereotype threat (Nguyen & Ryan, 2008; Steele & Aronson, 1995; Steele, 1997).

The one-on-one attention this HPPP is able to provide through near peer mentoring and in-class support of learning community teams may be of particular benefit to minority students. Participation in an HPPP may be the first time in minority students' academic journeys that they realize their own potential. Immersion in hands-on learning along with positive support and encouragement can help grow students' self-efficacy, or confidence for pursuing a health profession education.

Hands-on learning and support offered by near peer mentors with whom HPPP participants are able to relate have the potential to facilitate an even greater impact on students' confidence. Near peer mentorship and presentations by minority health profession students and health professionals were named as important influences for their increased confidence. Realizing that people like them have achieved great academic and career success by overcoming repeated failure and navigating complex cultural and social challenges seemed paramount based on the responses students provided.

Several students who were unsure about pursuing a health profession, indicated participation in the HPPP helped confirm their decision to go after a career in the health sciences. The HPPPs interdisciplinary focus, and students' ability to explore and learn about a range of careers in the health professions helped some to decide to switch their focus from medicine to public health, or to pursue a dual degree program. This finding supports scholarly discussions suggesting a movement away from health profession pipeline programs, to health profession pathway programs (Collier Jr, 2019). Some of the

students emphasized the calm and confidence they felt having been able to confirm their decision for pursuing a career in the health sciences.

Program staff and presenters frequently reminded the students that an important success of the program includes students realizing that pursuing a career in the health professions is not for them. Giving students permission to change their mind gives them the freedom to decide what is right for them and their future selves. Students for whom confidence levels may have dropped from pre- to post-assessment could be seen as a positive reflection of the HPPPs effectiveness.

A particularly novel finding of this study was that the impact of students' level of confidence on anxiety severity was dependent upon their disadvantaged status. Students who identified as disadvantaged, and who entered the program with high levels of confidence for pursuing a health profession education, also scored higher on anxiety severity. This finding is contrary to Bandura's assertion that increased levels of self-efficacy, or confidence for goal attainment, are commonly negatively associated with anxiety severity (Bandura, 1988).

Bandura's theory did hold true for HPPP participants who did not identify as disadvantaged, for whom this study was able to confirm a negative relationship between anxiety severity and confidence for pursuing a health profession education. This finding raises the question whether Bandura's theoretical framework was built on studies that were representative of disadvantaged minority students. A well-known problem in research is the underrepresentation of minorities in study populations.

Study Limitations

The current study reflects responses collected from one HPPP minority student cohort. Critical limitations of this study include the absence of a control group. Without a comparison group, conclusions regarding the impact of the HPPP on students' level of confidence for pursuing a health profession education cannot be made with any amount of certainty. The study also relied exclusively on self-report, including students' disadvantaged status, and perceived level of confidence for pursuing a health profession education. Because this study utilized secondary data sources, it was not possible to exercise control over timing of data collection, or at what time point specific questions were asked, excluding for pre-, and post-data.

Study Strengths

Few studies of comprehensive health profession pipeline interventions have previously assessed undergraduate minority students' confidence for pursuing a health profession education. This quasi-experimental mixed methods study contributes to the body of literature regarding characteristics of students who participate in HPPPs that have not previously been captured as part of evaluation studies.

Conclusions and Future Directions

Although not a focus of this study, it would be worthwhile to examine factors affecting students 'confidence for pursuing a health professions education both before, and upon conclusion of a HPPP, and to examine thematic differences, and how differences compare against quantitative findings. Moreover, future studies may also

want to examine how themes identified might differ by participant's disadvantaged status. Although the present study found that all participants increased their levels of confidence for pursuing a health profession education, one might conclude that students who identify as disadvantaged harvest greater benefits from participation. Students who did not identify as disadvantaged may have entered the program highly motivated, and with greater confidence, than their disadvantaged counterparts. Significant differences in students' confidence at time of pre-assessment warrant a closer look at HPPP participant profiles, which may have changed since initiation of pipeline programs implemented to support minority students more than half a century ago.

V. DISCUSSION

Summary

For more than half a century HPPPs have been tasked with addressing health disparities among members of disadvantaged communities by helping grow diversity in the health professions (Smith, et al., 2009; Wilbur, et al., 2020). The underlying premise of achieving health profession diversity is the belief that health professionals who belong to minority groups affected by disparities in health, are better able to relate to the needs of minorities and the communities in which they live (Bouye, McCleary, & Williams, 2016). Although some progress has been made in increasing diversity in the health professions, sufficient representation of URM students from URM population subgroups, including African and Native Americans, who to this day experience among the greatest burden of health disparities, has not been achieved (Salsberg et al., 2021).

Gaps in academic achievement have been cited as the primary reason for the underrepresentation of URMs in health profession programs, and ultimately the health profession workforce (Odom, Morgan Roberts, Johnson, & Cooper, 2007; Smith, et al., 2009). Minority students from communities most affected by disparities in health are also impacted by various aspects of socioeconomic disadvantage and implications of social injustice (Wilbur, et al., 2020). Gaps in academic achievement among individuals from communities of color are the direct result of systemic racism and discrimination in American education (Jones & Hope, 2019).

HPPP intervention efforts have employed a range of strategies targeting K-College students previously discussed in chapter 1. These have included science, as well as cultural, and social enrichment, in addition to mentoring, and in some instances financial assistance.

Previous HPPP evaluation efforts have focused on measuring efficacy of HPPP curricula and respective increases in academic performance among HPPP participants (Alexander et al., 2009; Taylor et al., 2019). The literature offers limited information regarding HPPP participant characteristics, or the personal and environmental factors involved in HPPP participants' pursuit of a health profession education. Using a mixed methods approach, this case study examined various data sources of personal characteristics collected from a diverse sample of minority students who participated in a six-week HPPP in the Midwest in the summer of 2019.

Guided by SCT, the overarching objective of this dissertation was to examine how HPPP participant characteristics may inform the theoretical framework from pipeline to health equity. To achieve this objective, three studies were developed to investigate HPPP students' 1) personal characteristics, 2) anxiety severity, as well as 3) confidence for pursuing a health profession education pre and post participation in the program.

Personal Characteristics

Among our most surprising findings was that 48, or nearly 55% of HPPP participants did not identify as disadvantaged, and more than 20% came from families

with a household income greater than the national median. About one fifth of the student population sampled was foreign born. Previous studies describing minority college student populations commonly refer to minority student groups as disadvantaged (Osborne, 2001; Whitcomb & Singh, 2020). Minority students from socioeconomically disadvantaged backgrounds have been found to have among the largest disadvantage of all groups in both STEM and non-STEM GPA (Whitcomb & Singh, 2020). Considering the original intent of HPPPs, this finding might suggest that high-achieving students who are not from a financially or educationally disadvantaged background are overrepresented in pipeline programs targeting minority students from financially or educationally disadvantaged communities.

At 36%, Blacks made up the largest proportion of HPPP participants, followed by Hispanics, who made up 26% of the cohort. While most minority student groups, including Blacks and Hispanics, were well represented, only one participant identified as American Indian, or Alaska Native (Table 3, Chapter 2). This finding is of particular concern as Native American communities experience the greatest disparities in health (Brockie, Heinzelmann, & Gill, 2013). Although tracking the breakdown of participants by race and ethnicity may provide some understanding of the prevalence and type of disparities in health experienced by the respective groups, present reporting practices have introduced a formidable ethical dilemma.

A Formidable Ethical Dilemma

Up until the early 2000s, historically URM groups included Blacks, Mexican-Americans, Native Americans, and mainland Puerto Ricans. These four minority groups have suffered immense losses since before the founding of the United States and to this day endure the consequences of systemic racism. Systems established, largely by White American men, have left these four minority groups disproportionately affected by generational poverty. While implications of historical trauma and disparities in health have had a devastating impact on URM communities, these groups continue to grow increasingly resilient and strong in the face of adversity.

HPPPs were first installed following declaration of the War on Poverty in the mid-1960s, and with these four historically underrepresented groups in mind. The population demographics of the United States have unquestionably changed due to globalization and the influx of new groups of immigrants and refugees from around the world over the past 60 years. However, the practice of collapsing these more recent waves of immigrant and refugee groups into some of the same racial and ethnic categories previously designated to account for the needs of historically URM groups from within the United States, has further deepened their wounds. Left out and overlooked for centuries, this shift in demographic reporting began washing out the actual counts of those to whom this land once belonged, and those who labored and whose lives were sacrificed in the process of helping Whites achieve what is often referred to as the American dream.

Disadvantaged Standing

Findings suggest that students who identify as disadvantaged may receive greater benefit from participation in an HPPP. Students who did not identify as disadvantaged arrived with overall lower levels of anxiety and greater levels of confidence for pursuing a health profession education.

The cohorts' overall mean anxiety score decreased by 1.25 points from 5.06 to 3.81 and the cohorts' mean confidence score increased from 4.08 to 4.73 from time of pre- to post-assessment. We identified significant differences for both anxiety severity (p=.0163) and confidence for pursuing a health profession education (p=.04) at time of pre-assessment between HPPP participants who identified as disadvantaged and those who did not identify as disadvantaged.

By the time of post-assessment, differences by disadvantaged standing for anxiety severity (p=.4914) and confidence for pursuing a health profession education (p=.15) were no longer significant. HPPP participants who did not identify as disadvantaged arrived at the program with lower levels of anxiety severity and greater confidence for pursuing a health profession education. By the time of post-assessment, anxiety severity and confidence scores of HPPP participants who identified as disadvantaged grew close to the same of HPPP participants who did not identify as disadvantaged. Thus, an indication that students who identify as disadvantaged, through participation in a six-week HPPP, can reach nearly the same levels of self-

efficacy and confidence for pursuing a health profession education as that of students who do not identify as disadvantaged.

Similar to previous studies that have found ACE prevalence rates to be higher among disadvantaged minority students, or individuals from within underserved communities (Cronholm et al., 2015; Franco, 2018; Larkin et al., 2014; Nurius, et al., 2016) we found statistically significant differences (t (65) =-3.22, p=.002) between students who identified as disadvantaged and students who did not identify as disadvantaged (Chapter 2, Table 5). As previously mentioned in Chapter 3, prolonged exposure to high stress environments and trauma can have negative impacts on memory and learning. This finding may be all the more reason for why HPPPs, whose primary purpose is academic enrichment, should reserve seats for students from disadvantaged backgrounds, whose academic trajectories are commonly most affected by gaps in academic achievement (Whitcomb & Singh, 2020). Increased representation of students from disadvantaged backgrounds in HPPPs may warrant further investigation into efficacy of curricula presented.

Our regression analyses discussed in Chapter 4 revealed that students' self-identified disadvantaged status presented as an effect modifier of the effect of students' perceived confidence for pursuing a health profession education on anxiety severity. According to Bandura's self-efficacy conception of anxiety, individuals' anxiety severity decreases as one's confidence, or level of self-efficacy for goal attainment, increases (Bandura, 1988). While a negative relationship was found between anxiety severity, and

students' confidence for pursuing a health profession education among students who did not identify as disadvantaged, no relationship was found among students who identified as disadvantaged. Students who identified as disadvantaged had both higher anxiety severity and higher levels of confidence for pursuing a health profession education. With respect to programming, HPPPs may consider further integrating mental health and wellness promotion into HPPP curricula alongside efforts aimed at growing the representation of URM students from communities often disproportionately affected by anxiety.

Students from disadvantaged backgrounds often have fewer resources to help them cope and navigate challenges, or perceived threats that commonly contribute to anxiety severity (Evans & Kim, 2013). In the absence of coping resources, students from disadvantaged backgrounds may have acquired higher levels of resilience that students from more privileged backgrounds may not have had to acquire as part of their upbringing. Students from disadvantaged backgrounds may have learned that they can overcome obstacles and repeated setbacks that they are presented with, all while their biology has adapted, or gotten used to, a constant state of allostatic overload. Such resilience may uniquely position HPPP participants who identify as disadvantaged for becoming health professionals serving underserved communities, and serve as further justification for prioritizing disadvantaged students in admission decisions.

As part of quantitative data analyses, the research team consistently identified significant differences by HPPP participants' disadvantaged standing. This led the

research team to wonder how themes identified as part of qualitative data analyses may have differed based on students' disadvantaged standing. Had the team organized qualitative findings based on whether students identified as disadvantaged, the research team expects they may have arrived with a different rank order of prevalent themes. For instance, while most all HPPP participants described challenging life experiences through which they have acquired increased levels of resilience, the research team wonders, if for instance, students who identified as disadvantaged comprise a greater number of students who also indicated spirituality is an important part of who they are. Previous studies have well documented the essential role of spirituality in minority students' academic success and academic persistence (Hernandez & Lopez, 2004; McIntosh, 2012; Wood & Hilton, 2012). In the absence of control over one's life circumstances, the belief in a higher power often becomes essential for survival. Understanding HPPP participants' unique needs based on their disadvantaged standing can further inform curricular contents, such as assuring adequate time in students' schedules for engaging in spiritual practices.

Among other things, HPPP participants who identified as disadvantaged may be overrepresented in the number of students who described fears or worries about losing a loved one. Implications of historical trauma and racism are known contributors to disparities in health, especially among historically URM populations (Ahmed, Mohammed, & Williams, 2007; Williams & Mohammed, 2013; Williams, Neighbors, & Jackson, 2003). Rates of premature death, chronic disease, and disability are often much higher among URM population groups (Bauer, Briss, Goodman, & Bowman, 2014;

Braveman, et al., 2011). The underlying assumption that minority students from disadvantaged communities are better able to relate to the needs and common experiences among members of their community seems valid and important.

Mixed Methods Perspective

Across the entire cohort, students on average scored within the mild or minimal range for anxiety severity. While students described having fears or worries related to performance disruption, these most often included worries regarding their being accepted into health profession programs or fears about letting family members down if they were not able to get into a health profession school. Despite these worries, students overall high levels of confidence for pursuing a health profession education were captured in both quantitative and qualitative data. Based on quantitative findings, students indicated they are somewhat to extremely confident regarding their ability to pursue a health profession education. Qualitative findings suggest that students are indeed highly confident regarding their ability to pursue a health profession education. Desire to pursue a health profession ranked highest in terms of reference counts within the behavior dimension. Some aspects of our qualitative findings, such as fear of losing a loved one, discrimination, and lacking financial resources, may also help explain various degrees of anxiety severity among students in the cohort. Nearly all of the students discussed life experiences that have made them strong or confident that they can overcome obstacles. Students explained that participation in the program helped them find their passion and solidified their decision to pursue a health profession education,

which may have been reflected in the slightly higher level of students' perceived confidence upon conclusion of the program.

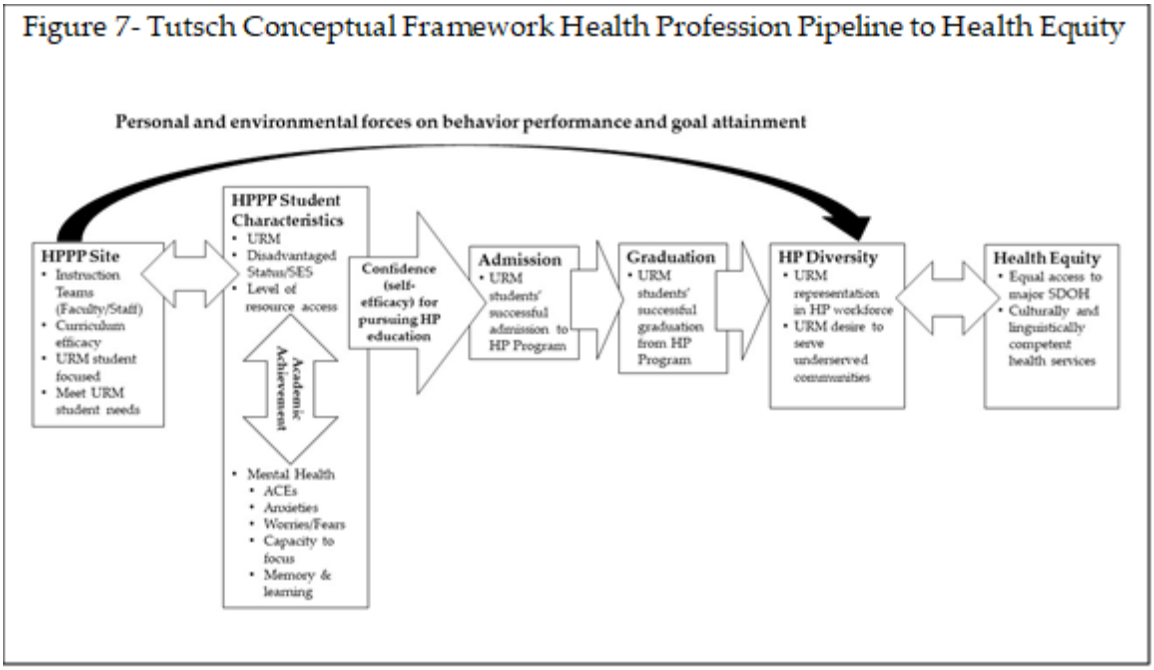
Tutsch Theoretical Framework Revisited

The Tutsch Theoretical Framework first introduced in Chapter 1 acknowledges personal and environmental forces that often play into students' pursuit of a health profession education from pipeline to health equity (Figure 7). With respect to URMs or minority students from disadvantaged backgrounds, groups that have historically fallen into the HPPP priority target population, their pursuit of a health profession education often presents an array of academic, cultural, and social barriers. Acknowledging each of these students' unique individual life journeys and circumstances is a critical first step in ensuring students a meaningful HPPP experience. The HPPP experience involves both HPPP participants and site-specific instruction teams.

HPPP site-specific instruction teams housed within academic medical centers are often comprised of faculty whose own life trajectories are much different from that of minority student populations, and historically URM groups. Faculty and staff themselves may have never attended public school systems within the United States, instead they may have had the privilege of attending private school systems or having been home schooled. Thus, the life trajectories of URMs from underserved communities may be altogether foreign to members of HPPP instruction teams. Beyond differences between faculty and HPPP participants' walks of life, faculty at academic medical centers often are experts in their respective areas of research. Teaching may only

comprise a small portion of their time and generally does not involve undergraduate, or community college student populations.

Figure 7- Tutsch Conceptual Framework Health Profession Pipeline to Health Equity



Based on findings of this dissertation, an increased presence of minority students from disadvantaged backgrounds in HPPPs may require curricular adaptations and pedagogical training among members of HPPP instruction teams. These individuals may or may not be familiar with the social, emotional, and academic needs of students from less privileged backgrounds. Conversely, HPPPs may consider preparing HPPP participants in advance of program start. Connecting students with their respective learning community leads or near peer mentors prior to their arrival on campus, and engaging with students through video conferencing or other communication mediums all are effective means of strengthening students' sense of belonging.

Members of HPPP instruction teams should harness students' motivations and passions, and employ a strengths' based approach, rather than a deficit focused

approach. When engaging with minority students, faculty and staff should acknowledge how much these students have already achieved and overcome in their short lifetimes. Leveraging minority students' stressors as strengths instead of deficits, can profoundly affect students' resilience and self-efficacy as it relates to a successful career trajectory (Taylor et al., 2019).

If achieving health equity is dependent upon growing a health profession workforce that is able to identify with the needs of individuals in disadvantaged communities, then HPPPs must assure disadvantaged minority student representation in the pipeline. Assuring minority students from disadvantaged backgrounds are well-represented in HPPPs, and ultimately, academic health science programs and the health professions in large part depend on targeted outreach and recruitment efforts, the applicant pool such efforts produce, and admission decisions made by site specific review committees.

HPPP leadership should be clear about their desired HPPP applicant characteristics, and their respective demographic profiles. There may be a mismatch in the characteristics of students presently participating in HPPPs, compared to the characteristics of students who have historically been desired participants in HPPPs. If the ultimate goal of achieving health equity by way of increasing the representation of URMs from underserved communities no longer holds true, then HPPPs, and the academic medical centers within which they are housed, should consider revising their

mission statements. In the end HPPP participant characteristics should reflect the outcome HPPPs are hoping to achieve.

A first step in this process may be to seek consensus and clarity on outcome expectations. If the desired outcome is to achieve health equity in underserved communities, HPPPs may want to include geographic boundaries. Achieving health equity in underserved communities across the United States may involve a different student applicant pool than achieving health equity in communities around the globe. Analysis of HPPP participants' open-ended responses involved in this dissertation (Table 4, Chapter 2) almost exclusively described students' desire to return and serve underserved communities in their countries of origin.

Minority students from disadvantaged backgrounds who transition through HPPPs often need resources and support leading up to their successful matriculation into, as well as throughout their time in health profession training programs. Once graduated, the likelihood that diverse health professionals will serve disadvantaged communities much depends on the availability of competitive jobs with benefits, including tuition remission. Their continued desire to serve underserved communities may be hampered by their need to start repaying student loans, and/or by the absence of clinics or healthcare organizations.

Limitations

The findings of this case study come with several important limitations. The nature of the study did not allow the research team to randomize participants, or to

assign a control group. Without a comparison group, conclusions regarding the impact of the HPPP on students' anxiety severity, and level of confidence for pursuing a health profession education, cannot be made with any amount of certainty. This study relied exclusively on secondary data sources that originated from surveys that involved reliance on self-report. With the exception of data that was collected at the start, and upon conclusion of the program, timing of collection of various other sources included in the analysis may have affected students' responses. For instance, data of factors affecting students' level of confidence for pursuing a health profession education were collected in week six, near the end of their time in the program, when students were fully immersed in the intervention and highly motivated. Students who participated in the program arrived at the program with overall high levels of confidence, and mild to minimal clinical anxiety severity. The overrepresentation of students who did not identify as disadvantaged may have influenced overall high levels of confidence, and low levels of anxiety. There was just one student who identified as Native American or Alaska Native. This student may or may not have participated in one or more aspects of program evaluation.

Strengths

The first of its kind, this case study summarizes personal characteristics of a diverse sample of students who participated in a six-week HPPP in the Midwest. Using a mixed-methods approach we examined various program evaluation data sources, and created a profile of HPPP students' self-described identity, perceived fears and factors

that affect their level of confidence for pursuing a health profession education. This study contributes to the body of literature an enhanced understanding of characteristics of undergraduate students in pursuit of careers in the health professions. Moreover, our findings suggest that students who identify as disadvantaged may receive greater benefit from participation in the six-week HPPP compared to students who do not identify as disadvantaged. Students who identified as disadvantaged entered the program with greater anxiety severity, and lower levels of confidence for pursuing a health profession education. By the time of post assessment their anxiety severity scores dropped more than double that of students who did not identify as disadvantaged, and their levels of confidence grew to nearly the same as their more privileged peers.

Conclusions

Findings of this dissertation suggest that students who identify as disadvantaged receive greater benefit from participation in HPPPs than students who do not identify as disadvantaged. Given the scarcity of HPPPs that provide academic enrichment and support at the undergraduate level, might consider reserving seats for minority students who identify as disadvantaged, and/or applicants with lower grade point average.

To know to what extent URMs are represented in HPPP programs, HPPPs must assure accurate demographic tracking practices. Because disparities in health are greatest among historically URM populations in the United States, HPPPs should prioritize admission of URMs, and enhance their outreach and recruitment efforts to include URM students.

Beyond ensuring URM participation in HPPPs, HPPPs may want to evaluate the effectiveness of curricula and instruction teams in meeting the academic, social, and cultural needs of URMs and disadvantaged student groups. Access to quality, culturally and linguistically competent health services is one of several major determinants of health. Achieving health equity requires an interdisciplinary public health approach. Integration of cross cutting public health competencies into HPPP curricula, as well as the promotion of public health certificate and dual degree programs among HPPP participants are important strategies for helping bringing about a culture of health and health equity in underserved communities.

Future Directions

Whether HPPP participants who identified as disadvantaged are more likely to pursue a career in the health professions, serving underserved communities, deserves further investigation through rigorous and robust studies. In addition to studies of HPPP alumni and their career trajectories, studies of health profession staff of federally qualified health centers may provide important insights into who is serving the underserved. Better understanding of the characteristics of health professionals already working to help achieve health equity may inform how HPPPs and academic health science programs revise their outreach and recruitment strategy, eligibility and admission criteria, curricula, and scope of resource supports.

National Program Office Recommendations

In light of HPPPs' original intent, findings suggest that high-achieving students who are not from financially or educationally disadvantaged backgrounds are overrepresented in pipeline programs targeting students from educationally or economically disadvantaged backgrounds with an interest in issues affecting underserved populations. Members of historically URM communities to date continue to experience among the greatest burden of health disparities in the United States. Recent studies have found that, despite some gains, URMs, including Blacks, Hispanics, and Native Americans, continue to be underrepresented in the health profession workforce. The program office may want to revisit, or further refine, eligibility criteria for participation based on these findings.

With respect to the 12 sites involved in the HPPP investigated as part of this dissertation, a systematic investigation of characteristics of HPPP participants across all sites, as well as curricular offerings and characteristics of faculty and staff involved in programming, is recommended. To better understand what program components or site characteristics may make different sites particularly attractive to historically URM students, could inform best practices across all of the sites. Conversely, a systematic investigation might reveal undesirable features, or approaches to program delivery, that do not meet the social or cultural needs of some groups including students from disadvantaged backgrounds. A qualitative comparative analysis of these factors across all of the sites could inform and support the program's current effort to move from pipeline, to pathways to health equity.

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APPENDICES

Appendix I: Thank you, please tell us who you are.

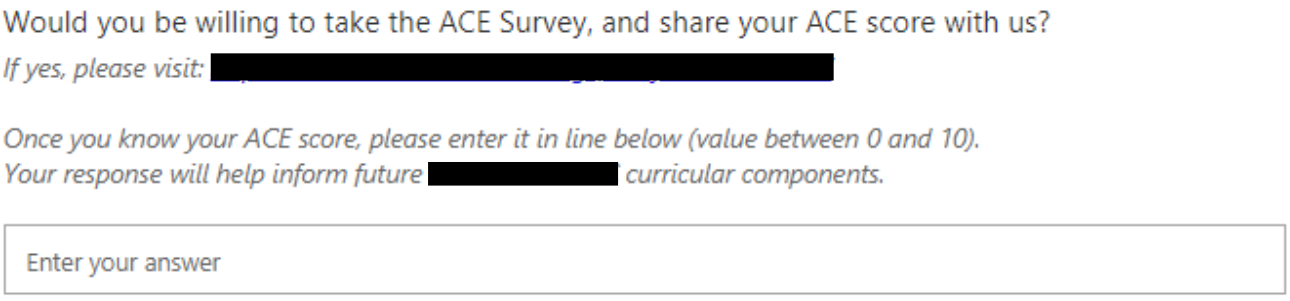
Thank you, please tell us who you are. *

Without concerning yourself with punctuation or grammar, please take a few minutes to free-write about who you are, or what makes you, you.

"We are the sum of everything we have lived." ~Resilience Screening

Enter your answer

Appendix II: Would you be willing to take the ACE Survey, and share your ACE score with us?



Appendix III: What are some of your greatest worries, or fears?

What are some of your greatest worries, or fears? *

Hint, you may consider adding/expanding on the fears you listed on your Scholar Identity Board.

Enter your answer

Appendix IV: Disadvantaged versus Not

Do you consider your community of residence, financial status, or educational experience to be disadvantaged?

Guidelines for Responding:
The following definitions/questions may help you answer the question "Do you consider your community of residence, financial status, or educational experience to be disadvantaged?

Underserved: Do you believe, based on your own experiences or the experiences of family and friends, that the area in which you grew up was inadequately vs. adequately served by the available health care professionals? Were there enough physicians, nurses, hospitals, clinics, and other health care service providers?

Financial: Has your *immediate family*[1] received aid from any of the following *federal, state, or local assistance programs*[2]

- Public assistance benefit programs to aid Families with Dependent Children (AFDC or ADC);
- Unemployment compensation;
- Food stamps;
- Supplemental Security Income (SSI);
- Medicaid;
- Housing assistance;
- or other federal, state, or local financial assistance programs.

Educational: Are you the first generation to attend college, or come from a school district with limited availability to educational resources (books, materials, lack of college preparatory courses), with a majority of students receiving free or reduced lunch, or a rural or urban school district, which was under-funded?

Footnotes:
1 Immediate family is broadly defined as "spouse, parent, child, sibling, mother or father-in-law, son or daughter-in-law, or sister or brother-in-law, including step and adoptive relationships."

2 Federal, State and Local Assistance Programs: These programs are specifically defined as "Means-Tested Programs" under which the individual, family, or household income and assets must be below specified thresholds. The sponsoring agencies then provide cash and non-cash assistance to eligible individuals, families, or households.

Followed by prompt: In the space below, briefly explain why you consider your community of residence, financial status, or educational experience to be disadvantaged.

Appendix V: Identity Exploration; Behavioral Factors

Desire to pursue a health profession. Within the behavior dimension students most often described themselves as emerging health professionals, *"a future dentist"*, or *"physician assistant."* One stated, *"As a physician assistant, I believe I will be able to help transform lives and still be a part of my family."* Pride filled voices emerged between the lines of *"I am a pre-dental"*, *"a CNA"*, *"a pre-med, and a neuroscience major"*, with some students already immersed in a health profession, and others describing how they are on their way. One stated, *"I am a pre-med student who is dedicated to the journey. I'm someone who has encountered many obstacles in my life, but I have overcome them. […] it makes me happy to think that I can be a healthcare professional."*

Sense of responsibility. Students expressed a sense of responsibility for adhering to family values, describing expectations and feelings of obligation to support and care for family members. In several instances, this theme also captured a change maker identity needed to help bring about health equity and social justice. For example, *"I am a man who has seen a lot and have been blessed with a lot, so I have the power to help those in need who never had what I have. I have the responsibility and honor to stand for those who are weak and speak for those with no voice.* "Another stated, *"I am a young lady determined to make a change in my family for generations to come."*

Interest in issues affecting underserved populations. As students described themselves, they demonstrated an interest in issues affecting underserved populations. Shaped by their own, or immediate family's experiences, one student explained, *"My parents came from extremely impoverished areas, lack of education, but vast potential. That opportunity not only humbled and helped me appreciate all that I have but also invigorated me to help the land of my ancestors. I seek to be at a point where I can touch many lives in Haiti and provide a sense of hope for many."* Students' desire and commitment to give back to their communities, or people like them, was evident. Another stated, *"I am motivated by my experiences because I want to be the person that I always wished that I had to advocate for me."*

Work commitments. Many of the students identified as a role in which they serve, or a title that they hold. One shared that they *"have a strong connection with children,* [and that they] *are a childcare provider."* Several others stated that they are *"an employee"*, or more specifically *"a CNA*." Another explained the experience of her and her sibling being abandoned by a parent, *"leaving [them] to work 3 jobs on top of school to pay bills."*

Appendix VI: Identity Exploration; Personal Factors

Resilience. The top ranking subtheme within the person dimension was resilience. A large proportion of students described personal characteristics of life experiences that revealed what exceptional overcomers of difficult life circumstances they are. Students fully realize that their collective life experiences are their strength. One explained "I am a first-generation student who has come from disadvantage but won't let that discourage me from making a difference and accomplishing my dream." Another convincingly stated, *"I am resilient and ready to conquer and overcome every obstacle thrown at me."*

Passion. Passion quickly became among the most common personal characteristics we identified as a theme. Students have an exceptional self-awareness of their why, and their life mission. One respectfully stated, *"I am my mission."* Another explained that they are *"most passionate about bringing light to those who are in a dark room*." Many others shared about how much they "*enjoy reading and writing and [their] love [for] music"* or that they are "*a baker", "a foodie", "a traveler", "a violinist" or "a cat lover."*

Racially/ethnically underserved. Students frequently referred to themselves as *"Latina/Chicana"*, *"Hispanic"*, *"bilingual"*, *"Mexican"*, *"African"*, *"an African American man"*, or *"an African American woman*." Students' race and ethnicity are important aspects of who they are. Some more specifically stated that they are *"part Indian and part Nepalese"*, others identified as *"Hmong"*, or a *"curly haired natural enthusiast Black woman."*

Spiritual. Students' faith beliefs are essential aspects of themselves. One identified as *"a Christian who often falls short and struggles with [their] path with God."* Another stated that *"[their] faith in God keeps [them] going."* Many others identified as *"Catholic"*, *"a member of* [name removed] *Baptist Church"*, *"a child of God"*, *"a servant"*, *"a believer."*

Immigrant. Several students shared about their immigration status and experiences that shaped who they are. Many immigrated to the United States at a young age. One shared how *"at the age of 10, [they] immigrated to the United States after experiencing severe poverty without [their] father*." Another identified as a *"child of immigrants from Haiti."* While some have spent the majority of their youth in the United States, others indicated that they *"have been in America for almost 4 years."*

Impostor. The voice of impostor emerged at times when students detailed experiences that left them feeling less than. For instance, one pointed out that living in the US has affected their self-confidence and left them feeling *"not good enough."* Another expressed *"I am someone who thinks about their GPA being not good enough, I am someone who thinks that I am not smart."*

Appendix VIII: Greatest Worries/Fears; Behavioral Factors

Performance Disruption. Within the behavior dimension, students most frequently expressed fears or anxieties related to performance disruption, such as fear of failing, lack of academic performance, and fears around their ability to achieve goals. Fears seemed to be rooted in lack of self-confidence, or efficacy for behavior performance. One student stated, *"Some of my greatest fear or worries is not accomplishing what I aspire to, or failing."* Several others shared they are worried about *"not being able to get into medical school"*, *"dental school"*, or that they *"won't be successful."* Another student said, *"I am scared that I won't reach my full potential."* With regard to academics, several students specifically mentioned they are scared, or worried about *"tests"*, and *"test scores."*

Sense of Responsibility. Students expressed a sense of responsibility for adhering to family values and fulfilling expectations their family have of them. One shared *"My family has a lot of hope in me and I definitely do not want to disappoint them after what they have been through."* Some also expressed a sense of responsibility for their *siblings "ensuring that my younger sister gets educated too."* Others expressed great concern for assuring they contribute to society. One student said, *"I fear not making a change in this world"*, another, *"not leaving a positive mark on this world."*

Career Decision. A considerable number of students shared about their concerns for making the right career decision. Students indicated they have self-doubts at times, worrying they *"may not know as much as [they] want to know about [their] career choice"*, and whether *"it is the right one for [them]."* Concerns and worry about the future, and the time commitment associated with pursuing a health profession education. One explained, *"I think right now my greatest worry or fear is making the wrong decision about my future. I know that I can be successful in medical school, but I don't know if I want to be in school for that long. I am also really considering going to PA school because I think that might be a better fit for me. But it sometimes feels like that is "the easy route." I will have to keep on informing myself about both careers and understand what I really want for myself.*

Appendix IX: Greatest Worries/Fears; Personal Factors

Impostor. Within the person dimension, the voice of impostor was most prominent. Students described feeling as if they do not belong, or as if they do not deserve having come as far as they have. One specifically shared their fear about *"Not being enough to pursue a career in the medical field"*, others more generally stated concerns they have about "not being enough." One expressed worry that their *"peers, or staff may think [they] are not intelligent enough."* Some understand that likely *"all people have those fears" and* shared that they are *"slowly [working through their fears] by understanding that [they are] enough and capable."*

Mental Health. Some students expressed worries or concerns they have about their mental health, and mental illness. One shared that *"Mental health and suicidality have been aspects of my life that I have struggled with on and off but have been perseverant in!* "Another explained, *"My greatest worry is not being accepted into medical school which would mean I would not be able to do the one thing that I want to do the most in life. I constantly think about this every day and I feel like this is a source of a lot of my anxiety and fears."* One student shared about the impact stress has on them, *"When I stress, I have a tendency to play the "what if" game and spiral into worrying about possibilities that aren't even my reality. I need to focus on learning how to not stress myself out when things don't come easily and find an outlet to relieve my stress."* Others are concerned specifically about workload, *"worried that [they]'ll overwork [themselves] and have suicidal thoughts."*

Sense of Belonging**.** Several students expressed anxieties they have about fitting in, *"making a bad impression"*, *"being judged"*, *"outcasted"*, *"put down"*, and that they fear *"rejection from others." "My biggest fear has always been to not be someone who is "enough" or someone who is hated or disliked by many others."*

Appendix VII: Identity Exploration; Environmental Factors

Educationally Disadvantaged. The most prevalent subtheme within the environment dimension was educationally disadvantaged. A large proportion of students identified as a *"first generation"*, or first in their family to pursue a college education. Students expressed their gratitude for opportunities that have been presented to them. One stated *"being a first generation student I am nothing but humbled by the things I learn."* Another shared *"growing up, I didn't have many role models to look up to who possessed a background or ethnicity similar to mine. Neither of my parents graduated from high school, so it was hard to picture myself completing school and continuing toward a bachelor's degree."*

Trauma. Traumatic experiences have had an impact on and shaped the lives and personal characteristics of students. One recalled escaping death threats, *"at the age of 10, I moved to the United States after experiencing severe poverty without my father."* Another shared *"I have had so many setbacks in life that everything I do I question. I always tend to be anxious being around people and I think that is due to the number of school shootings I have experienced living in Iraq and especially living through war."* A third explained *"Running from a country where we suffered from religious persecution and discrimination, we were grateful to be able to live with my aunt for the time being."* Some shared about other forms of traumatic childhood events, such as having experienced abuse and neglect.

Discrimination. Another prominent sub-theme within the environment dimension was discrimination. Students frequently mentioned they are being misjudged based on the color of their skin, or speech. One stated *"I am more than just my outside color and have more inner depth than people first perceive."* Another shared *"I am an African woman who is beautiful and educated. I know how to speak standardized English, but also know who I am and what I want to accomplish in life."* Some also expressed fear of being shamed or stigmatized by their disadvantaged background. One student shared *"I am a person still afraid of the stigma that goes along with coming from a low-income home and the social services attached with that."* The voice of discrimination also came through for students whose family immigrated to the United States. One first generation American student indicated *"I am someone who wants my parents to be respected in our culture"*, another explained *"I am a first generation American but at the same time I don't feel like I'm American since a good majority of this country is pinned against giving rights to what I identify as: a woman, a latinx, a daughter of immigrants."*

Economically Disadvantaged. We identified a number of ways in which students' economic disadvantage influence their identity, their health, and wellbeing. One student shared *"I sometimes wished I had a different childhood like some children with a healthier environment, yet I have learned so much and it shaped me to who I am today. I went through hard times to come out on top."* Students frequently emphasized their pride in their parents and family, and how despite their limited access to resources, they did their best raising their children. *One stated "My parents came from extremely impoverished areas, lack of education, but vast potential", another said "I am someone from humble family beginnings*

coming from a persevering family." Another student shared *"I am a 20 year old Nigerian woman raised by two immigrant parents who want nothing, but the best for me and my siblings. They try their best to provide and support the five of us on an okay income."*

Family Support. The support of siblings, parents, and other family members are integral aspects of students' identity and support system. One plainly stated *"My family is very important to me and without them I am nothing."* Others identified as *"the son of two caring parents", "a daughter to parents that love me and I am blessed to have grown up with their unwavering love", a daughter. I love my family more than anything. I have one older sister who is also pursuing dentistry.* […] *She is an amazing role model that I have always looked up to. I am who I am because of my parents.* […]*They make me who I am. They have supported me through every exam, every failure, every hardship."*

Appendix X: Greatest Worries/Fears; Environmental Factors

Loss of Loved One. Several students expressed fears around their "parents getting sick." One specifically stated, "I fear death, especially for my parents. Health issues constantly arise, and I would hate for them to leave this earth without making them completely proud." Losing a loved one, and running against time, was a fear many students shared. *"The greatest fear I have is losing my mother. I don't want to let her down trying to reach the goals I have for myself. I want to provide for after I become successful in whatever I do. I fear life is short and messed up so anything can happen to my mother or myself."* Others more generally stated they fear *"losing valuable people in [their] life."* Several have experienced the loss of a loved one. One explained, *"After my dad passed, my fears have really grown because all of the hard work I have done has been in hopes that I could be in a better economic status than them and hopefully take care of them when they're older. At times I feel there's no point if they won't be there to celebrate with me, however, I go back to examine perspectives and realize that yes, while they may not live to see me grow into old age, they have been there for when I graduated, when I traveled, and for when I grew up and that's what matters."*

Discrimination. In several instances students shared about discrimination and negative prejudices, they have experienced. One explained that they have been *"humiliated or ignored for something [they] felt they were correct about."* Another shared that they are *"scared that [their] sister will never get the freedom she deserves."* Others mentioned they are *"worried that [their] speech disability will limit their capabilities"*, or that they will be judged for speaking their *"idiom."* One explained, *"I'm not sure if I will be good enough in today's society. I am afraid to face obstacles that come with being a minority."*

Lack Financial. Students expressed great concerns regarding their ability to afford college, and whether they would *"be able to [re]pay [their] college loans."* Some specifically expressed concerns they have about continuing their education post baccalaureate, "*Another worry is having the financial means to continue my education in professional school."* Others more generally expressed their worry about *"being able to provide"*, and *"not having financial stability." "I fear that I will not be able to succeed in the future and not being able to take care of my family."*

Appendix XI: Confidence for Pursuing Health Profession Education

At this moment, how confident do you feel regarding you ability (skill specific) to pursue a graduate education in the health profession of your choice? *

- Extremely confident
- Somewhat confident
- Neutral
- Somewhat not confident
- Extremely not confident

Appendix XII: Factors Influencing Confidence for Pursuing Health Profession Education

At this moment in time, what factors influence your level of confidence to pursue a graduate health professions education should you choose to do so? *

Factors include both positive and negative influences in your life, or thoughts you might have regarding the pursuit of a graduate health professions education.
In other words:
What makes you believe you will? What makes you believe you might not?

Enter your answer