Improvement Strategies for the Design and Implementation of a Half-Day Medical Careers Exploration Program for Young Women

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High quality career exploration programming has the potential to increase student self-efficacy, diversify professions, and address community job fulfillment needs. The purpose of this inquiry to analyze the implementation and design of a brief medical career exploration program for young women in order to improve the program prior to producing a program hosting guide for widespread use. The "I Look Like a Cardiologist" conference is a half-day mentoring and career exploration conference for young women interested in medicine in Western Pennsylvania. The goal of the conference is to increase student knowledge about and enthusiasm for cardiology through lectures, simulations, and mentoring sessions in order to address the underrepresentation of women within the field of cardiology by inspiring the students to more deeply consider a career in the field. Pre-conference, post-conference, and two-month post-conference Likert-scale surveys were administered, and the results analyzed. Additionally, 12 participants were interviewed, and the interviews were transcribed, coded, and analyzed for themes in order to provide further feedback on conference implementation and design. The results of the quantitative and qualitative data analysis led to the creation of a program implementation guide for other medical departments looking to develop brief career exploration programs for their target populations.

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Dedication

This work is dedicated to my oldest daughter, Louisa Frances Rodgers-Genuardi. It is through her patience, compassion, and maturity that I was able to finish this project during the 2020 COVID-19 pandemic.

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1.0 Introduction

1.1 Problem Area

The importance of high-quality career counseling is widely accepted. Effective career counseling can mitigate career achievement barriers for racial and ethnic minorities and students from disadvantaged socioeconomic backgrounds (Jones, 2010). Historically, European and Asian schools have placed a larger emphasis on career development than American schools, however, this changed in 2009 when the Race to the Top federal education grant program began to encourage including career exploration as an explicit part of the curriculum for students as young as middle school (Glessner et al., 2017). Since then, there has been a greater emphasis on developing high quality career exploration programs for students from middle school through their undergraduate years.

Career exploration programs in the United States are frequently rooted in Alfred Bandura's self-efficacy theory and in social cognitive career theory (SCCT) which builds upon self-efficacy theory with an intentional focus on career development (Glessner et al., 2017). Bandura's self-efficacy theory focuses of an individual's understanding of his or her own ability as a result of learning experiences (Lent et al., 2017). SCCT argues that the learning experiences in Bandura's self-efficacy theory not only serve to increase self-efficacy but also help an individual form realistic outcomes expectations which serve as a form of positive reinforcement (Lent et al., 2017). Robinson (2018) simplifies these theories in her assessment of classroom-based career exploration models by writing, "career exploration in the classroom begins with self-knowledge, research, and experiential learning" (p. 21). Because self-efficacy theory and SCCT are the dominant theoretical

frameworks for career exploration, it is unsurprising that many of the career explorations programs reviewed for the purpose of this analysis focus on student career explorations designed to help students master skills, connect with supportive mentors, and build an understanding of college and career programs in order to increase self-efficacy and establish outcomes expectations.

Despite the proliferation of career development programs within health care, comparatively few of these programs' designs and implementations have been rigorously analyzed for efficacy in achieving their stated aims (Ali et al., 2017). Ali et al. (2017) cite Brown and Ryan Krane's (2000) research that shows effective career interventions programs include "(a) written exercises, (b) individualized interpretation and feedback of career inventories, (c) information on the world of work, (d) modeling, and I attention to building support" (p. 59). This shows that while there is no single magic format for optimizing career development programming, programs intended to support students' career exploration and build self-efficacy need to be thoughtfully designed and carefully implemented in order to maximize their impact.

It should be noted that career exploration does not always have to be purely vocational in nature. College-going self-efficacy programs are a form of career exploration programs because of the increasing number of American jobs that require post-secondary education or training. Career counseling, when practiced holistically, should not only addresses career opportunities for students but also the diversity of post-secondary education and training programs available to students (Glessner et al., 2017). Further, because many students change their career plans many times in their late adolescents and young adult years a broad approach to education and career planning may be preferable (Freeman, 2012).

The Association for Career and Technical Education's research shows that students in middle school have experienced sufficient cognitive development in order to engage in career

exploration programming (Robinson, 2018). By beginning career exploration this early, teachers and counselors can offer relevant advice to students regarding course planning and extracurricular activities. For example, a student interested in considering a career in elementary education might be advised to take a high school psychology elective and find an after-school job at an extended school day program. This allows the student to determine if the career is actually a good fit for his or her interests and abilities while also making his or her classroom learning more relevant, potentially increasing the student's motivation.

For students pursuing post-secondary education, formal career exploration continues into the undergraduate years. College students are regularly asked about their career plans by their families, professors, and friends. Edward Freeman, a biology professor at St. John Fisher College, developed a career exploration course for biology majors after noticing the stress his students' faced in not having definite post-graduate plans and their not knowing all of the professions available to them with their degree (Freeman, 2012). Freeman's discussion is particularly notable because career explorations most frequently elicits images of vocational education and confused adolescents, not undergraduate science majors. Freeman is not alone in his concern about career exploration's absence in the college classrooms: Flaherty et al (2019) expressed unease that the majority of courses in higher education do not address related career skills or career paths and advocates conference attendance as a way to increase student networking and self-efficacy in order to develop relevant career skills (Flaherty et al., 2019).

The necessity of effective career exploration programs does not stop in undergraduate institutions. Medical residency attrition rates show that many residents leave their training program because of dissatisfaction with the career that may have been prevented by more effective career counseling and exploration programs (Sweeney et al., 2012).

1.1.1 Social Purpose of Career Exploration

In addition to increasing student self-efficacy and outcomes expectations, high quality career exploration programs can work to address societal struggles. Many such programs exist to encourage girls to pursue careers in science, technology, engineering, and math (STEM) in order to address the gender imbalances in these fields. Similarly, career exploration initiatives, such as Project HOPE, exist to support students from minoritized racial, ethnic, and socioeconomic backgrounds to consider health care careers in order to diversify the field and provide culturally sensitive care to a specific patient population or AHEC's program goals of increasing healthcare access in rural and medically underserved area (Ali et al., 2017; Patel et al., 2017). This paper will analyze the design and implementation of a career exploration program designed to increase self-efficacy in young women interested in medicine while also addressing the public health challenge of the underrepresentation of women in cardiology.

1.2 Problem of Practice

Heart disease is the leading cause of death for American women (Center for Disease Control, 2017). Though often fatal, women are more likely to survive an acute myocardial infarction, or a heart attack, when their physician is also female (Greenwood et al., 2018). Greenwood, Carnahan, and Huang's (2018) research further shows that when a female heart disease patient is treated by a male doctor, her odds of survival increase when the male provider has more female colleagues (p. 8573). Females, however, are severely underrepresented in cardiology. In 2009, a survey undertaken by the American College of Cardiology indicated that

only 12% of general cardiologists and less than 10% of interventional cardiologists identify as female (Sanghavi, 2014). Despite the beneficial health outcomes for women with the presence of female cardiologists, the overwhelming underrepresentation of female physicians in cardiology in the United States is a great concern that must be addressed to better serve the public health needs in the US.

In addition to the underrepresentation of women, cardiology lacks racial and ethnic diversity. The Association of American Medical College's 2010 Diversity in the Physician Workforce report indicates that African American/Black physicians represent 6.3% of all practicing physicians and Hispanic/LatinX physicians were 5.5% of the physician workforce (Castillo-Page, p. 17). Although the overall proportion of people of color in medicine is low, cardiology is less racially and ethnically diverse than the field in general. Black physicians, including those of African-American, Afro-Caribbean, and African dissent, make up only 2% of the field while LatinX physicians comprise only 4% of practicing cardiologists (Kuehn, 2017, p. 615).

Through my private educational consulting practice, I began working in March 2018 with Kathryn (Katie) Berlacher M.D., head of the cardiology fellowship at the University of Pittsburgh Medical Center (UPMC) and an advocate for women in cardiology. We collaborated to develop a half-day mentoring program that we hoped would encourage young women interested in medicine to consider a career in cardiology. The mentoring program was held in October 2019, and while the student participants were engaged during the conference and provided positive verbal feedback, we also wanted to know which aspects of the program were particularly effective and which were ineffective in reaching our stated goals.

My problem of practice stems from the need to understand how to best design and

implement brief medical careers mentoring programs for which the “I Look Like a Cardiologist” conference served as example. Because of my involvement as program coordinator, I had access to all of the relevant data and had the ability to interview past participants. Therefore, this program sought understanding of the ways to optimize design and implementation of similar brief medical careers programs in a variety of contexts. Ultimately, this inquiry led to the production of a program hosting guide that could be used by other medical departments to implement similar programming for their target populations.

2.0 Literature Review

2.1 Defining K-16 Health Sciences Career Exploration Programs

Medical and healthcare career exploration programs are a growing part of the K-16 educational landscape. Because healthcare careers require such specific training and obtaining that training often has strict prerequisite courses and experiences, American health career exploration programs are targeted to students as young as middle school. Further, because selecting an ultimate career in medicine happens as late as the third year of medical school for aspiring physicians, and in the case of physicians who choose to subspecialize, several years into a residency program, the period of career exploration and selection can last over 20 years.

Medical and healthcare career exploration programs take multiple forms, but the shared goal of these programs is to expose students to a career path or career paths that they may have not yet considered and to share information on how to enter that career. The motivating factor behind these programs, however, can be divided into two categories: career self-efficacy development and meeting a public health need.

2.1.1 Career Self-Efficacy Development

Career exploration programs, when effectively implemented, can lead to development of positive self-efficacy and an increased interest in post-secondary education (Glessner et al., 2017). Albert Bandura's self-efficacy theory and social cognitive career theory (SCCT) provides the framework for many career development programs. Self-efficacy is an individual's self-assessed

ability to execute actions in order to achieve a goal and is gained through "(a) mastery experiences, (b) vicarious experiences, (c) verbal persuasion, and (d) physiological and affective states" (Glessner et al., 2017, p. 316).

Social cognitive career theory draws from Bandura's self-efficacy theory in explaining how individuals' career interests evolve as a result of education and experiences. Glessner et al. explain that "according to SCCT…individuals develop career interests during activities in which they experience competency or positive results" (Glessner et al., 2017, p. 316). This means that by helping students to develop relevant skills and by providing positive feedback, their belief in their capability within the field will increase and they may be more likely to elect a career in that field. Self-efficacy theory and SCCT are at the heart of medical and healthcare career exploration programs designed to help students consider a career in healthcare for reasons of personal satisfaction.

Glessner et al. (2017) argued that middle school is the appropriate time to begin career exploration. While 6th-8th grade may seem young to have career focused conversations, by beginning discussions about career possibilities and requirements in middle school, teachers can help guide students in appropriate educational planning. Of course, these conversations and career exploration programs should be completed at a developmentally appropriate level. Robinson (2018), for example, advocated bringing guest speakers into the middle school science classroom in order to demonstrate skills relevant to their career path and the current course material. She gives the examples of a middle school life science course conducting "Grand Rounds" at a simulated hospital guided by local physicians and nurses in order for students to master the types of inquiry required for hospital-based medical practice and to show the attainability of a career in medicine (Robinson, 2018, p. 18). Additionally, Robinson (2018) argued that by connecting

classroom learning to the real world through career exploration activities, students become more motivated to succeed in the classroom which also leads to an increase in self-efficacy.

The other central element of SCCT is outcome expectation (Ali et al., 2017). Career exploration and counseling can lead to students having a greater sense of the likely positive outcomes of educational achievement and skill development. Ali et al. cited Brown and Ryan Krane's 2000 work that shows that health career exploration programs are effective in developing greater student interest in the field when they include "(a) written exercises, (b) individualized interpretation and feedback of career inventories, (c) information on the world of work, (d) modeling, and I attention building support" (Ali et al., 2017, p. 59). By implementing these elements into healthcare career exploration program students showed increased self-efficacy in math, science, and vocational skills related to healthcare careers.

2.1.2 Meeting Public Health Needs

The second driver of medical and health careers exploration programs is to meet public health needs of a community. For example, the 4-H Health Science Exploration Program is offered on the rural Eastern Shore of Maryland and the explicit goal of the program is to "increase the number of local residents who are prepared to fill health care vacancies" in the region (Hutson & Pahlman, 2012).

The American College of Physicians has the overt goal of diversifying the physician population in order to meet the growing diversity of the United States and to optimize cultural sensitivity in treating patients (Banuelos & Afghani, 2016) which has resulted in several pipeline programs targeted at students from groups underrepresented in medicine. For example, the lack of LatinX healthcare providers in rural America is a problem because of rising rate of rural LatinX

immigrants, so there is a need for LatinX medical providers who are culturally and linguistically similar to this population (Ali et al., 2017). In addition to goals of increasing self-efficacy, Project HOPE's healthcare career emphasis is intended to encourage rural LatinX students to consider a career in the medical field (Ali et al., 2017). Similarly, the Summer Pre-med Program at the University of California-Irvine and the West Central Alabama Area Health Education Center programming each have the explicit goal of diversifying the medical field in order to serve specific regions and patient populations (Banuelos & Afghani, 2016; Patel et al., 2017).

2.2 Evidence-Based Health Sciences Career Exploration Program Implementation

Medical and health sciences career exploration programs are most clearly divided by the location of their implementation. These programs occur in the traditional K-16 school setting, through camps and extracurricular programming with a career exploration emphasis, at academic medical centers, and embedded within medical school curricula. Perhaps unsurprisingly, student survey data on program satisfaction in a program that used multiple settings showed a significantly higher ratings for interactive elements of programming compared to classroom-based presentations (Patel et al., 2017).

2.2.1 K-16 School Based Career Exploration Programs

College and career readiness are some of the most frequently stated goals of American K-16 education, so it is unsurprising that healthcare career exploration programs occur within the traditional classroom setting. It should be noted that many American vocational high schools have

a healthcare careers “track.” These programs, however, are not frequently reported on in career exploration literature, likely because students in those programs have already made a career decision and are no longer in the exploration phase of career development. Classroom and school-based healthcare career exploration programs can take place entirely within the context of a classroom or in collaboration with outside programs or agencies.

Classroom based health sciences career exploration programs are designed by school faculty in order to meet the needs of the student population. Robinson (2018) advocates that teachers in middle school science classrooms survey students about their interests in order to bring in relevant experts and guest speakers who can connect the curricular material with the workplace setting. Guest speakers can already be members of the school community, but Robinson advises teachers consider reaching out to experts tailored to the class’s interest through videoconferencing and through connecting with local businesses and organizations such as hospitals, first responders, and by keeping in touch with former students now in relevant careers (2018). The advantage of this type of classroom-based, teacher-led program is that it is low-cost to administer and is immediately responsive to the curricular material and interests of the students.

Similar to Robinson’s guest speaker driven career exploration plan for middle school students, Edward Freeman, a biology professor at Saint John Fisher College in Rochester, New York, developed an entire course for junior undergraduate science majors in order to explore a variety of science-related career opportunities including health care (Freeman, 2012). The course was designed for biology majors and included clearly articulated learning outcomes and assignments that forced students to reflect on their interests, explore career tracks such as health care, research, or industry, investigate post-graduate education requirements, and plan post-graduate career and education plans (Freeman, 2012). The course was sensitive to the post-

graduate planning needs of undergraduate students in a specific nature while also being flexible enough to allow students to explore multiple options through research, interviewing and shadowing professionals, and structured reflection in order to meet their goals. Notably, the aim of this course is not necessarily to increase students' interest in health careers, but to provide students the opportunity to explore multiple fields and the breadth of applicability makes it a desirable model for a classroom setting with learners with diverse goals.

K-16 schools can also collaborate with outside agencies in developing relevant health career exploration programs. Area Health Education Centers (AHEC) were established by Congress in 1972 to address the lack of healthcare access in rural and underserved communities. AHEC includes educational programming to encourage health career exploration for target populations and to encourage these students to stay in rural practice. These programs are financially supported by the Health Resources and Services Administration (Patel et al., 2017). The West Central Alabama AHEC (WCAAHEC) developed a program for rural and underrepresented minority high school students to encourage them to pursue a career in rural health care and to develop a potential pipeline of healthcare professionals to serve in Alabama's "Black Belt" (Patel et al., 2017). WCAAHEC programming included the Dixie AHEC Scholars Program, a school-based enrichment programs for high school students. Within the confines of their school day, students attended 45-50-minute classes in which they watched a video, listened to a PowerPoint lecture, and engaged in an activity to explore a health career. Students attended seven sessions with one each on pharmacy, dentistry, public health, nursing, medicine, nutrition, geriatrics, and college and career readiness and financial aid, and sessions for pre- and post-test assessment of course material (Patel et al., 2017). Students who participated in the Dixie AHEC Scholars program demonstrated gains in knowledge and interest in specific health-care careers.

Similar to Dixie AHEC Scholars, Project Hope also included school based components for its math and science self-efficacy development programs (Ali et al., 2017). The advantage of collaborative programs between schools and outside organizations is ease of administration. Program developers and directors do not have identify extra-curricular times and program locations that work for their target population, schools can offer a richer curriculum without adding to the already enormous responsibilities of K-12 teachers and administrators, and students do not have to secure transportation to a program location or decide between program participation and after school activities or employment.

2.2.2 Camp and Extra-Curricular Based Career Exploration Programs

Meaningful learning occurs both inside and outside of the classroom, so it is unsurprising that many health sciences career exploration programs are located outside of confines of the traditional school day. In addition to administering the Dixie AHEC Scholars within schools, the WCAAHEC runs the Dixie Health Career Never-Ending Road to Discovering (NERD) Health Careers Summer Enrichment program (Patel et al., 2017). NERD is a 3-day health career exploration for high school students interested in health careers. The program includes exposure to health careers, academic support for improved high school performance, and community service opportunities, all of which could help in the development of self-efficacy and be useful in the post-secondary school application process. A similar program to the NERD program is Broadening Access to Science Education (BASE) Camp at Fairfield University which brings young women from Bridgeport, Connecticut to campus in order to learn about research, complete career explorations and receive college admissions counseling in a two-week summer program (Phelan et al., 2017). Students in both BASE Camp and NERD reported an increase in career knowledge,

post-secondary planning, and skill development (Patel et al., 2017; Phelan et al., 2017).

Similar to the classroom and organizational partnerships found in the school-based health careers exploration program, the 4-H of Maryland's Eastern Shore in collaboration with a local health education non-profit runs an annual 3-day summer program at a hospital focused a specific theme such as "heart and lungs" (Hutson & Pahlman, 2012). Students in the 4-H program are given tours of the hospital, participate in hands-on learning activities including learning about medical equipment. Students then attend at least eight follow up sessions during the following school year with guest presenters in health careers (Hutson & Pahlman, 2012). Hutson and Pahlman (2012) reported an increase in students' knowledge of and enthusiasm for health sciences careers. Notably, Hutson and Pahlman's most interesting suggestion for the administration of a summer program is to ensure that the youth remain involved after the main program ends, in their case, through regular follow up sessions (Hutson & Pahlman, 2012).

2.2.3 Hospital Based and Medical Center Based Career Exploration Programs

Hospitals, particularly academic medical centers with a joint healthcare and education mission, also host health careers exploration programs. Unsurprisingly because of the education and public health missions of many academic medical centers, most of these programs are motivated by meeting the public health needs of their community or diversifying the physician and other healthcare employee workforce. Hospital-based programs are the most diverse in their goals and methods because of the lack of classroom or scheduling considerations and the diversity of their goals.

The Summer Pre-med Program at University of California Irvine School of Medicine is a collaboration between three departments, the Department of Urology, the Center for Future Health

Professionals, and the Latino Medical Student Association, in hosting an outreach program for academically accomplished high school students from diverse backgrounds (Banuelos & Afghani, 2016). In order to participate, applicants completed an application process that included both academic transcript submissions, essays, and letters of recommendation. Atypical of many health careers exploration programs, the program was residential with a $2500 fee to participate in 2014 (Banuelos & Afghani, 2016). While many of the students in attendance had the fee waived due to their families' socioeconomic circumstances, the willingness of some parents and students to pay such a high price tag shows the enthusiasm for such programming. Students at the Summer Pre-med Program interacted with academic medical faculty who presented about their careers and taught medical skills such as splinting. Banuelos and Afghani (2016) studied the participation of students underrepresented in medicine in the program over a three-year period and found that participating helped confirm these students' commitment to a career in healthcare.

The Reach One Each One (ROEO) program at Morehouse University and Emory University Schools of Medicine's surgical departments is more typical of most of the hospital-based career exploration programs. ROEO primarily targeted African-American high school girls in the Atlanta-area as a way to encourage students from backgrounds underrepresented in the health sciences to pursue a career in that field (Danner et al., 2017). The students attended hospital-based sessions to learn about surgery and the process of medical school admission and completion through lectures and meetings with volunteer faculty mentors. The organizers of ROEO were primarily concerned with increasing healthcare career interest and their long-term data shows and through following up with the participants two and three years later via telephone survey, the reported impact of the program was staggering. 100% of the participants enrolled in college, 87.5% pursuing a health science major, and 66.7% declaring a pre-medical concentration, all of which

surpasses similar achievements across the Atlanta Public School's graduate data (Danner et al., 2017, p. 612).

A similar program to ROEO, called "Doctors of Tomorrow," was run through the University of Michigan Medical School and partners first-year medical students with high school students from Cass Technical High School, a school with a majority population of students from backgrounds underrepresented in medicine. Notably, "Doctors of Tomorrow" included some sessions taking place on the high school campus, making it a hybrid hospital-based and school-based program. The program included seminars, shadowing, and nine structured mentoring sessions. Sandhu, Flagler, Prabhu, and Ross (2018) conducted research on this program through interviewing the high school student protégés. Sandhu et al. (2018) found the mentoring was particularly impactful on the high school students' educational planning and goal settings. All of the students who participated in "Doctors of Tomorrow" commented positively about their mentors' effect on them, specifically noting that they "felt empowered from having access to [*Doctors of Tomorrow*] peers, medical students and faculty, who not only wanted them to succeed, but gave them resources and tools to do it" (p. 2054).

A final program that is worth discussing is the SAGES Mini Med School in Nashville which is a pipeline program developed by James Rosser MD as a way to address the problem of declining numbers of general surgeons in the United States. While the emphasis of the program is on Stealth Learning, a technique championed by Rosser which emphasizes learning through video games, pop culture references, and simulations, it also included a significant mentoring component. SAGES Mini Med School proved highly effective with 83.6% of the 61 high school student participants reported an increase in their interest in general surgery (Rosser et al., 2018, p. 4236).

2.2.4 Medical School Based Career Exploration Programs

Because of increasing awareness that third year clerkships do not lead to specialty selection (Sweeney et al., 2012) the Association of American Medical College has encourage medical schools to implement career planning programming and developed a model program called Careers in Medicine (CiM) that medical colleges are encouraged to adapt. Most CiM events are student run and include lecture series on specialties and career planning, specialty "speed dating" and specialty fairs, and lectures that help students transmission to residency (Sweeney et al., 2012). Vanderbilt University adapted the CiM curriculum for their students with the result of a greater number of their graduates reporting feeling satisfied with their career counseling and ultimate career decision (Sweeney et al., 2012). Similarly, East Tennessee State University's Quillen College of Medicine developed a required career exploration (CE) course which exposes students to various medical specialties. The course is administered over three years and includes lectures, panel discussions, individual advisor sessions. Students reported relatively high levels of satisfaction with the program as a form of career counseling (Olive et al., 2016).

Residency program selection is not a problem unique to the United States. In order to address the lack of knowledge about and interest in several medical specialties, students at Dalhousie University in Canada developed a 2-week intensive elective clerkship called PREP in which students are exposed to ten specialties in advance of selecting which type of residency to pursue for their post-graduate medical education. Students in PREP attend half day sessions that include practicing relevant procedural skills, panel discussions about the field, and information sessions (Haupt et al., 2019; Smyth et al., 2019). Research on the program by Haupt et al. (2019) and Smyth et al. (2019) found that participation in PREP increased students' understanding of and interest in the fields of radiation oncology and anesthesiology respectively.

2.3 Health Sciences Career Exploration Program Design and Evaluation

The health sciences career exploration programs mentioned in the previous section were all analyzed by researchers and deemed successful as a result of rigorous program evaluation. Health sciences career exploration programs were evaluated in ways that were appropriate to each intervention, but by far the most common evaluation method was the administration of 5-point Likert-scale surveys to program participants.

2.3.1 Likert-Scale Surveys

Because many of the health careers interventions focused on increasing student self-efficacy and knowledge, researchers most often evaluated the health science career exploration programs using Likert-scale style surveys. Likert-scale surveys were used to assess program satisfaction for students in the WCAAHEC programs, (Patel et al., 2017), Career Explorations at East Tennessee State Quillen College of Medicine (Olive et al., 2016), and Vanderbilt University School of Medicine (Sweeney et al., 2012). As one of the goals of these programs was to improve career selection self-efficacy, asking students to rate the degree to which they felt the activities in these programs helped build that on a quantitative scale allows researchers to understand the success of the program design.

At the University of California-Irvine's Summer Pre-med Program, students also completed five-point scale surveys to assess each of the conference activities (Banuelos & Afghani, 2016). Surveys included demographic information to allow researchers to more fully understand the impact of program design for diverse groups. Responses from students from backgrounds underrepresented in medicine including racial and ethnic minorities and students

from families who qualified for a program fee waiver were analyzed and the responses showed that these students had a positive experience in the program and the program confirmed their interest in medicine (Banuelos & Afghani, 2016). Banuelos and Afghani's (2016) research shows the utility in using survey data to understand specific segments of your target population.

In several programs, students were given the same or similar Likert-scale surveys before and after completing a health career exploration program in order to assess the efficacy of program design. Students in the 4-H Health Science Exploration program completed pre- and post- program surveys of their self-assessed familiarity with health careers, the requisite training for specific health careers, and their interest in pursuing health careers (Hutson & Pahlman, 2012). Similarly, students in Edward Freeman's course at St. John Fisher College completed pre- and post-course Likert scale surveys about their self-assessed knowledge of relevant course material such as graduate school admissions requirements and job search protocol in order to evaluate the impact of the curriculum on students (Freeman, 2012). Finally, students in the PREP program at Dalhousie University were given pre- and post-program Likert-scale surveys about their interest in the various specialties and their self-assessed knowledge about the specialties both before and after participating in PREP (Haupt et al., 2019; Smyth et al., 2019).

Likert scale surveys were also used by programs in order to demonstrate the ways in which the design of health careers exploration programs impacted student thinking. The SAGES Mini-Med School program required participants to complete pre- and post- surveys both about interest in a career in medicine and in what factors were important to students when selecting a career (Rosser et al., 2018). The results showed students developing an understanding of the tenacity required to pursue a career in medicine while also showing their belief that they can achieve a medical career (Rosser et al., 2018). Similarly, Project HOPE used a 5-point Likert scale survey

to asses changes in student self-efficacy in math, science, and career planning in order to demonstrate program the efficacy of program design (Ali et al., 2017).

2.3.2 Other Quantitative Data Collection

Two programs included non-survey quantitative data in order to assess program design. First, students in the Dixie AHEC Scholars school-based program were given pre- and post- tests via Survey Monkey in order to assess student learning about health careers through 25 true/false questions. Testing results showed statistically insignificant gains in knowledge (Patel et al., 2017, p. 4). Second, the Reach One Each One program followed up with students two to three years after completing the program via telephone call to learn the students' college enrollment statuses, academic majors, and career plans (Danner et al., 2017). This type of longitudinal research is only attainable, however, several years after program competition.

2.3.3 Qualitative Evaluation

Qualitative evaluation methods were far less popular than quantitative methods. In both the WCAAHEC programs and the Summer Pre-med Program at University of California-Irvine, in addition to other evaluation methods, students were given open-ended surveys about their experience in the program and responses were analyzed for relevant themes (Banuelos & Afghani, 2016; Patel et al., 2017).

The "Doctors of Tomorrow" program was the only program that included interviews as part of evaluating program design. The program's faculty leaders developed an interview protocol for semi-structured participant interviews that were administered at the students' high school.

Sandhu et al. (2018) describe choosing interviews as an evaluation method for their ability to gather relevant data while still allowing for flexibility in the students' expressions of their experiences. Interviews were professionally transcribed and anonymized. Sandhu et al. (2018) then coded the interview transcripts in order to identify themes and subthemes.

2.4 "I Look Like a Cardiologist"

The "I Look Like a Cardiologist" program was designed by Dr. Kathryn Berlacher, director of the cardiovascular disease fellowship at the University of Pittsburgh Medical Center (UPMC), and me to address the underrepresentation of women in cardiology through a half-day mentoring conference. The program was funded by a small grant from the Pennsylvania Chapter of the American College of Cardiology. After targeted outreach to local high school science faculty, we received 67 complete applications from female students and accepted 41 young women into the program.

The students and 28 cardiovascular disease fellows and faculty members spent five hours together on a Saturday morning on the UPMC Montefiore Campus. Activities included a mini-lecture on why one physician chose a career in cardiology, group discussions about the societal impact of heart disease, a presentation on college and medical school admission, simulations on challenges faced by female physicians, and lunch in 1:1 or 2:1 meetings with paired mentors. The full conference schedule can be found in Figure 2.1. Student participants and their parents were alerted to the fact that students would be surveyed before and after the conference with an anonymous paper survey and would be expected to complete an anonymous survey emailed to them two months after the conference. An analysis of that survey data will be included in this

inquiry.

Immediate informal feedback from the students was overwhelmingly positive. Students verbally expressed their enthusiasm for the program to Dr. Berlacher and me upon leaving the conference and in emails over the following week. In addition, the faculty and fellows who served as mentors reported a renewed commitment to mentoring and reinvigoration of their passion for cardiology. This inquiry will be conducted with the aim of understanding which elements of the program were effective and which were ineffective in order to improve "I Look Like a Cardiologist" program implementation in the future.

Time	Event
7:30-8:15	Registration and Introductions
8:15-8:35	Mini-lecture: "Cardiology 101"
8:35-8:50	One physician's personal journey: "Why I chose a career in cardiology?"
8:50-9:30	Small group discussions led by faculty: Cardiology in the Community
9:30-10:15	Just Like You Panel: What does it mean to be African-American/LGBT/a parent AND a cardiologist?
10:15-10:35	Break
10:35-11:15	Mini-lecture: Stress free college and medical school admission
11:15-11:50	Collaborative problem-solving simulation led by faculty
11:50-12:30	Meetings with paired mentors
12:30-1:00	Final thoughts and networking opportunity

Figure 1 "I Look Like a Cardiologist" Program Schedule

3.0 Methods

3.1 Inquiry Questions

This inquiry was guided by the following question:

1. What are improvement strategies for the design of a half-day medical career exploration program for young women?
2. What are the improvement strategies for the implementation of a half-day medical career exploration program for young women?

3.2 Inquiry Design

The design of this inquiry was a secondary analysis of existing program evaluation data collected as part of the regular program implementation of the “I Look Like a Cardiologist” conference. In addition, structured participant interviews provided additional data about the design and implementation of this half-day medical career exploration program for young women.

3.3 Setting

The University of Pittsburgh Medical Center (UPMC) is the largest employer in the Commonwealth of Pennsylvania. The non-profit hospital network includes 40 academic, community, and specialty hospitals, primarily located in western and central Pennsylvania. The

UPMC campuses in the Oakland neighborhood of Pittsburgh, which includes Presbyterian, Montefiore, and Magee-Women's Hospitals, are the academic heart of the center and the location of most post-residency medical specialty training and academic medical research. The Heart and Vascular Institute (HVI) at UPMC includes the departments of cardiology, cardiovascular surgery, and vascular surgery.

The University of Pittsburgh Medical Center's Department of Cardiology is a unique environment that provided the appropriate context for this program. Despite the underrepresentation of women in cardiology nationally, four of the past five chief cardiovascular disease fellows at UPMC have been women and the current program director is a woman. Over the past five years, almost half of all of the cardiovascular disease fellows have been women. Additionally, the department has several prominent female physicians and male physicians who are dedicated to seriously addressing the gender imbalances in their field. Because women are not underrepresented in this particular setting and the institutional culture includes a deep commitment to gender and racial and ethnic diversity in cardiology, mentoring, and community outreach through a program called C.O.A.C.H. (Community Outreach and Cardiovascular Health), the context was ideal for hosting programming to address the dearth of females in cardiology.

My inquiry focused on the results of the October 19, 2019 "I Look Like a Cardiologist" conference. In August 2019, program information was both emailed and mailed to science faculty, guidance officers, and gifted and talented coordinators at 72 public and private high schools within a one-hour drive of the UPMC Oakland campus. School faculty were asked to hang the program flier in their classrooms or offices and encourage students to apply. The conference application was designed to identify a pattern of academic excellence and to be culturally sensitive to the needs

and experience of students from diverse socioeconomic and cultural backgrounds. 67 complete applications from female students were received, and 41 girls were admitted to the program.

The “I Look Like a Cardiologist” conference was held in a conference room on the UPMC-Montefiore campus on a Saturday morning. There was no fee for the students to attend and costs including refreshments and student parking vouchers were paid for with a grant from the Pennsylvania Chapter of the American College of Cardiology. Conference programming included panel discussions, issue simulations, an introductory cardiology lecture, college and medical school admissions seminars, and 1:1 or 2:1 lunches with paired faculty mentors.

3.4 Participants

On October 19, 2019, 41 high school girls from western Pennsylvania attended the “I Look Like a Cardiologist” conference on the UPMC Oakland campus. The student participants attended urban public (8 students), suburban high schools (25), and private high schools (8 students).

The application required students to submit their academic transcripts, relevant standardized test scores, and to complete three brief essays, one of which required students to describe their relevant personal backgrounds and identities. The question wording was as follows:

> We are interested in bringing together a diverse group of young people from backgrounds underrepresented in medicine including female students, racial and ethnic minority students, LGBTQIA+ students, first generation college students, or students from a disadvantaged socioeconomic background. In a few short paragraphs, introduce yourself and tell us about your unique background or identity.

The responses to this question showed that of the 41 admitted female students, nine identified as being from racial or ethnic backgrounds underrepresented in medicine, eight identified as having immigrated to the United States, four self-identified as being members of the LGBTQIA+ community, five identified as being from a disadvantaged socioeconomic background, and two indicated that they would be first-generation college students. Table 1 illustrates the background of the student participants.

Table 1 Self-Identified Demographic Characteristics of Female Students Participating in the October 19, 2019 "I Look Like a Cardiologist" Conference

Self-Identified Background	Number of Students
African-American/Black	6
LatinX/Hispanic	2
Native American	1
Will be a first-generation college student	2
LGBTQIA+ identity	4
Disadvantage Socioeconomic Background/Free & Reduced Lunch	5
Immigrant to United States	8

Table 2 Type of School Attending for Female Students Participating in the October 19, 2019 "I Look Like a Cardiologist" Conference

Type of School	Number of Students
Urban public school	8
Suburban public school	25
Private school	8

3.5 Instrumentation

3.5.1 Survey Data

The Conference included an existing protocol for gathering data pre-conference, post-conference, and two-months post-conference. The survey questions and Liker-scale format were adapted from three existing survey protocols. They were 1) the survey protocol given to Canadian medical students in a half-day medical specialty exploration program (PREP) in radiation oncology, anesthesia, pathology, cardiology, ophthalmology, endocrinology, and general internal medicine, 2) the survey given to East Tennessee State Quillen College of Medicine students after participating in the career explorations program, and 3) the survey given to participants in the Summer Pre-Med Program at UC-Irvine (Banuelos & Afghani, 2016; Haupt et al., 2019; Olive et al., 2016; Smyth et al., 2019). Each survey was anonymous and no demographic data, with the exception of gender identity, was collected.

The survey protocol is found in Appendix A. Forty-five distinct data points were collected. Part A of the survey which included nine items was administered three times: pre-, post- and two-months post-conference. Part A questions 1-7 asked students to rate their interest in and knowledge of cardiology and medical school admission and was adapted from the PREP participant survey

"understanding of anesthesiology" and "skills assessment" survey questions (Smyth et al., 2019). Part A question 8 asked students about mentoring and was adapted from the Career Exploration participant survey administered to Quillen College of Medicine students (Olive et al., 2016). Part A question 9 asked students about their level of interest in a career in medicine and was adapted from Summer Pre-Med Program participant survey (Banuelos & Afghani, 2016).

Part B of the survey included six items and was administered twice: post- and two-months post-conference. All six survey items were adapted from the PREP program surveys given to medical students after they had completed the PREP program (Smyth et al., 2019). Part B asked students to rate the effectiveness of each element of the program design and implementation including the mini-lectures, group discussions, and mentoring sessions. Part C of the survey included six items and was administered once: two-months post-conference. All six survey items were adapted from the Career Exploration at Quillen College of Medicine program surveys given to medical students after they had completed the program (Olive et al., 2016). The Career Exploration surveys asked respondents how useful different elements of the Career Exploration program were in connecting with the participants' career planning and other academic activities. In order to frame the questions in a more tangible way for the needs of adolescents, the questions in Part C asked respondents how often in the period after the conference they were engaged with different conference materials and topics in their academic work, extracurricular life, and career and educational planning.

3.5.2 Interviews

The purpose of the interviews was to understand the perspective of student participants several months after having participated in the half-day conference. The interviews transcended

the survey data to provide rich, in-depth understanding of the students' perspectives of the conference and led to the ability to triangulate learning from the conference surveys. The interview protocol (Appendix C) was adapted entirely from the interview protocol designed to evaluate the "Doctors of Tomorrow" program (Sandhu et al., 2018).

3.6 Data Collection

3.6.1 Pre- and Post-Conference Survey Data

Students completed the pre- and post-conference surveys with a pen and paper on the day of the conference. After completing conference registration in which all of the student participants signed in with a conference coordinator and received the conference materials, students were directed to assigned table groups that included other student participants and faculty and fellow mentors. Prior to the conference formally beginning, Dr. Kathryn Berlacher directed all of the students to take the pre-conference survey out of their folders. Students had 5 minutes to complete the pre-conference survey. Students then placed their completed survey in the middle of their table face down in a pile and they were collected by a faculty mentor. The post-conference survey followed the same procedure, but completion occurred at 12:30, after the lunch meeting with faculty mentors had largely concluded and prior to students' gathering for the conference closing and networking with other fellow and faculty mentors whom had not been assigned as their mentor. I kept all of the completed pre- and post-conference surveys in my home office locked in a secure location and entered the data into a Microsoft Excel spreadsheet.

3.6.2 Two-Month Post-Conference Survey Data

Two months after the “I Look Like a Cardiologist” conference, all participants were emailed a link to the two-month post-conference survey. Students had been informed at the conference that they would receive this email with a link to the survey and assured that their responses would be anonymous, that the survey would take no-longer than 10 minutes, and that they would be able to complete it on mobile devices. The survey was hosted on the Qualtrics platform which was chosen for its relative security, ease of use for the respondents, and its being supported on the University of Pittsburgh platform. 28 out of 41unique responses (68% response rate) were received from student participants.

3.6.3 Interviews

Students were informed prior to and on the day of the conference that the coordinators were interested in conducting interviews with student participants a few months after the conference in order to learn how to improve the program. Some students voluntarily indicated their interest in being interviewed to the program coordinators. However, all students were sent an email asking if they would like to participate, and if so, instructions on how to schedule an interview. The recruitment email can be found in Appendix D. The email was sent from my University of Pittsburgh email address. The interview process included informed consent.

Interviews occurred over videoconferencing software including Zoom and FaceTime in order to maximize ease and flexibility for both the student participants and their parents. Students selected interview times through the website SignUpGenius. All students who participated in the interview process had videoconferencing software available to them, but a traditional telephone

call could have been used instead. Interviews were designed to last no-longer than 30-minutes. All interviews were recorded through QuickTime screen capture and the recordings were stored securely in Box. A professional transcription service was employed to transcribe all interviews and transcripts were anonymized through coded identification numbers.

An informed consent script was read prior to the beginning of the interview to the participant and either read or emailed to the participant's parent if the participant was under the age of 18 (Appendix B). Interviews participants were asked to give verbal consent prior to participation and parents of interview participants under the age of 18 were also asked to give verbal or email consent for their child's participation. These consents were recorded with the remainder of the interview or stored in a coded and secured file. Interviews were recorded, and the contents were anonymized, transcribed, and coded and stored in Box, where only I have access.

3.7 Data Analysis

Data analysis consisted of descriptive statistics of the survey parts A, B, and C. Part A of the survey was administered three times and included nine items. Part A asked students to rate their self-assessed knowledge of and interest in cardiology on a Likert-style scale where 1 = poor and 5 = excellent. Part B of the survey was administered twice and includes six items and asked students to rate their experience of different elements of the program design and implementation on a Likert-style scale of 1-5 where 1 = poor and 5 = excellent. Part C of the survey was administered one time and included six` items which asked students how often in the two-months following the conference they were able to relate conference material to their academic lives and college and career planning. Students were asked to rank their engagement with each program item

on a Likert-style scale where 1 = never and 5 = 5+ times. In total 45 data points were collected.

For the analysis, I only used complete survey data. While 41 students participated in the program, not all students filled out every item on every survey. Only surveys in which the students answered all of the questions were considered for this inquiry. Further analysis could include key tests to compare and contrast mean scores over time.

A grounded theory approach was used to guide the interview coding and thematic analysis of the design and implementation. Content and face validity were assured as the interview protocol (Appendix C) exclusively focused on the student experience of the design and implementation of the program. The interview protocol did not ask students to reflect on anything they had not experienced directly, nor did it ask students to predict future behavior.

The interview process also had a high degree of reliability. I am the only person who conducted and analyzed the interviews. The interview participants all volunteered to be interviewed and they had gotten to know me in the role of program coordinator through their application process, in-person on the day of the conference, and through my sending monthly follow-up emails with information on free summer programs and relevant scholarships for program participants. However, because I am not the program director, nor do I have any formal appointment with the University of Pittsburgh Medical Center or any institution, students could feel free to express their honest feedback in the interviews. Additionally, I have worked with adolescents in a professional capacity as a high school teacher and educational consultant for over ten years, and this professional experience allowed me to be sensitive to the nuances of adolescent speech and to be able to authentically give voice to the participants in the interview analysis.

4.0 Findings

The findings presented in this chapter were derived from three rounds of survey data collected from 41 female high school students who attended the "I Look Like a Cardiologist" Conference. Part A of the survey contained nine items. These nine items were included on all three administrations of the survey. Part B of the survey contained six items. These six items were included on the post-conference and two-month post-conference survey administration only. Part C of the survey contained six items which were only asked on the two-month post-conference survey administration. In total, the survey data comprised of 45 total data points.

Twelve of the 41 students also participated in follow up interviews which were audio recorded. Interview data resulted in 128 minutes of recorded audio with each interview ranging from 7 to 16 minutes. Through the methods outlined in Chapter 3, I sought to understand the ways in which half-day medical careers exploration programs for high school-aged girls could be improved in implementation and design in order to increase the participants' interest in medical careers.

4.1 Student Self-Assessed Knowledge about Medical School and Cardiology and their Self-Assessed Access to Mentors Increased as a Result of Program Attendance

Program participants were asked the same nine survey questions about their self-assessed knowledge of medical school admissions, the field of cardiology, their access to mentors, and their interest in attending medical school immediately before the conference, at the end of the

conference, and two-months after the conference. All questions were presented with a 5-point Likert scale. For the eight questions which asked about self-assessed knowledge and self-assessed access to mentors answers ranged from Poor (1) to Excellent (5). For the question which asked about self-assessed interest in attending medical school, answers ranged from No Interest (1) to Definitely Interested (5).

Only complete surveys were used in this analysis resulting in 40 individual responses for the pre-conference administration, 29 individual responses for the post-conference administration, and 27 individual responses for the two-month post-conference administration. While 40 students completed the post-conference survey, 11 students completed the survey prior to finishing their mentor meeting and left that question blank thereby leading to our omitting their responses entirely. All students were contacted by email to complete the two-month post-conference survey via Qualtrics. Twenty-seven complete responses were collected.

4.1.1 Overall Increase in Student Self-Assessed Knowledge about Cardiology and the Impact of Cardiovascular Disease

The pre-, post-, and two-month post-conference survey data indicated that students increased their self-assessed knowledge about cardiology and cardiology-related public health (Figure 4.1). When asked to rate their understanding of what a cardiologist does on a 5-point Likert scale in which 1=Poor and 5=Excellent, students gave an average response of 2.92 in the pre-conference survey, 4.03 immediately post-conference, and 4.22 when surveyed two-months later. These data show a 30.81% increase from pre-conference to two-months post-conference. Students' self-assessed understanding of how heart disease affects the community followed similar patterns with averages 2.82 pre-conference, 3.9 immediately post-conference, and 4.22 two-months later.

These data show a 33.18% increase from pre-conference to two-months post-conference. Students reported the most improvement in their understanding when asked about the different types of cardiology. Prior to the conference, students' average self-assessed understanding was 2.05, which increased to 3.52 post-conference, and continued to increase to 3.96 two-months post-conference. These data show a 48.23% change in self-assessed understanding from pre-conference to two-months post-conference.

Finally, students reported a significant average increase in their self-assessed ability to create healthy change in their home communities from pre- to post-conference; however the average score slightly decreased from the post- to two-months post-conference. Specifically, students' self-assessed ability to influence healthy changes averaged 2.9 pre-conference, 4.0 post-conference, and 3.96 two-months post-conference. However, the slight decrease two-months post-conference still reflects overall growth in self-assessed ability with a pre-conference to two-months post-conference improvement of 26.77%.

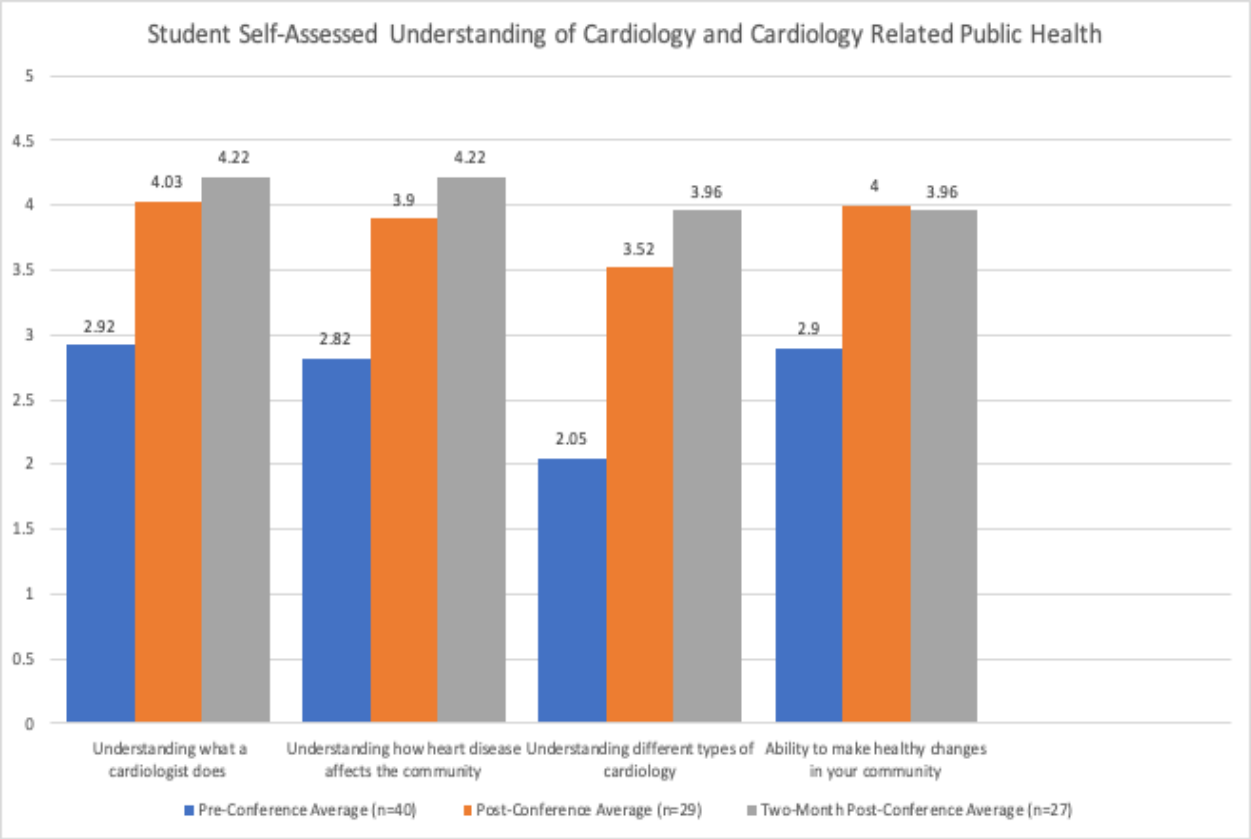

Figure 2 Student Self-Assessed Understanding of Cardiology and Cardiology Related Public Health
1=Poor, 5=Excellent

4.1.2 Students Self-Assessed Knowledge of the Medical School Admissions Process and Resources for Students Interested in Medicine Increased Significantly

The survey data shows that students reported the most growth in their understanding of medical school admissions and the resources available to young women interested in medicine (Figure 4.2). Prior to the conference, students' self-assessed understanding of medical school admissions averaged 2.1 on a 5-point Likert scale in which 1=Poor and 5=Excellent. Immediately after the conference, students' average rating increased to 3.9 and continued to increase to 4.22 two-months post-conference. These data show a 50.24% increase from pre-conference to two-

months post-conference.

Survey data revealed similar increases in self-assessed knowledge of the resources available to young women interested in medicine. Students' self-assessment averaged 2.1 pre-conference, rising to 3.55 immediately post-conference, and rising more to 4.22 two-months post-conference. These data also show a 50.24% increase from pre-conference to two-months post-conference.

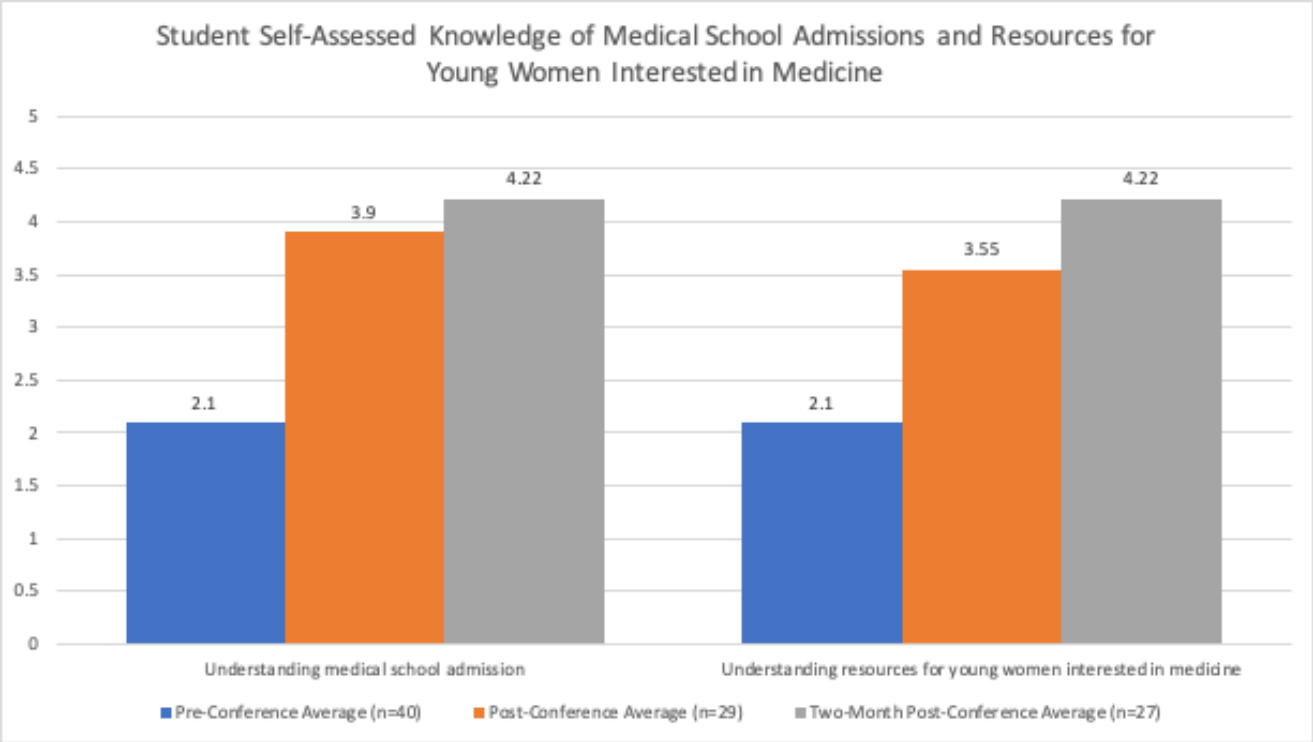

Figure 3 Student Self-Assessed Knowledge of Medical School Admissions and Resources for Young Women Interested in Medicine
1=Poor, 5=Excellent

4.1.3 Long-Term Increase in Student Self-Assessed Access to Mentors, but Slight Decline in Access After Two-Months had Passed

Immediately following the conference students reported an increase in their willingness to reach out to potential mentors; however these increases declined slightly when the students were surveyed two-months after the conference (Figure 4.3). Pre-conference, students' average assessment of their willingness to reach out to potential mentors was 3.69 on a 5-point Likert scale in which 1=Poor and 5=Excellent. This figure increased to an average of 4.17 immediately post-conference, but then decreased to 4.07 two-months following the conference. Overall, from pre-conference to two-months post-conference, students' self-assessed willingness to reach out to potential mentors increased 9.34%.

Greater average gains were demonstrated in students' self-assessed access to medical role models similar to them. Prior to the conference, students' self-assessed access to mentors like them averaged 2.77 and grew to an average of 4.03 immediately post-conference before falling a tenth of a point to 3.93 two-months post-conference. Despite the two-month post-conference decline, students' self-assessed access to medical role models similar to them increased by 29.52% from pre-conference to two-months post-conference.

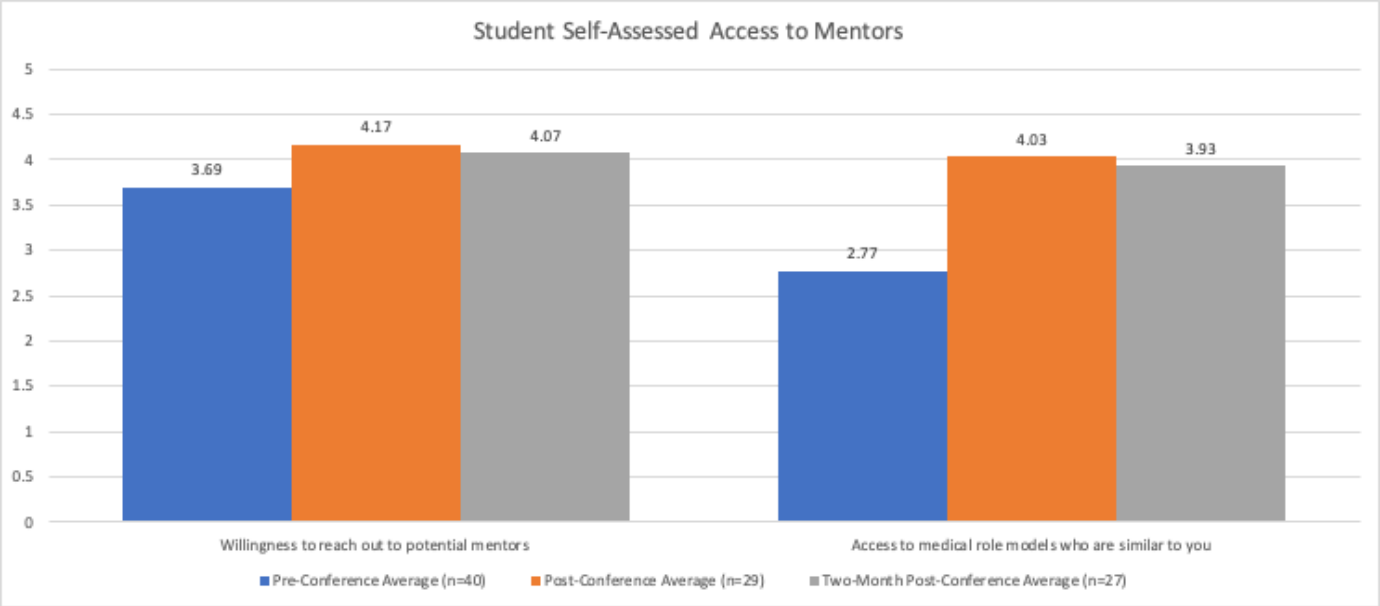

Figure 4 Student Self-Assessed Access to Mentors
1=Poor, 5=Excellent

Short-Term Decline in Student Self-Assessed Interest in Medical School Followed by Longer Term Slight Increase in Medical School Interest

Students average self-reported interest in attending medical school decreased 4.52% from 4.39 to 4.2 on a 5-point Likert scale in which 1=No Interest and 5=Definitely interested from pre-conference to immediately post-conference. However, when surveyed two-months post-conference, students' average interest in attending medical school was 4.56, 3.73% higher than the pre-conference average (Figure 4.4).

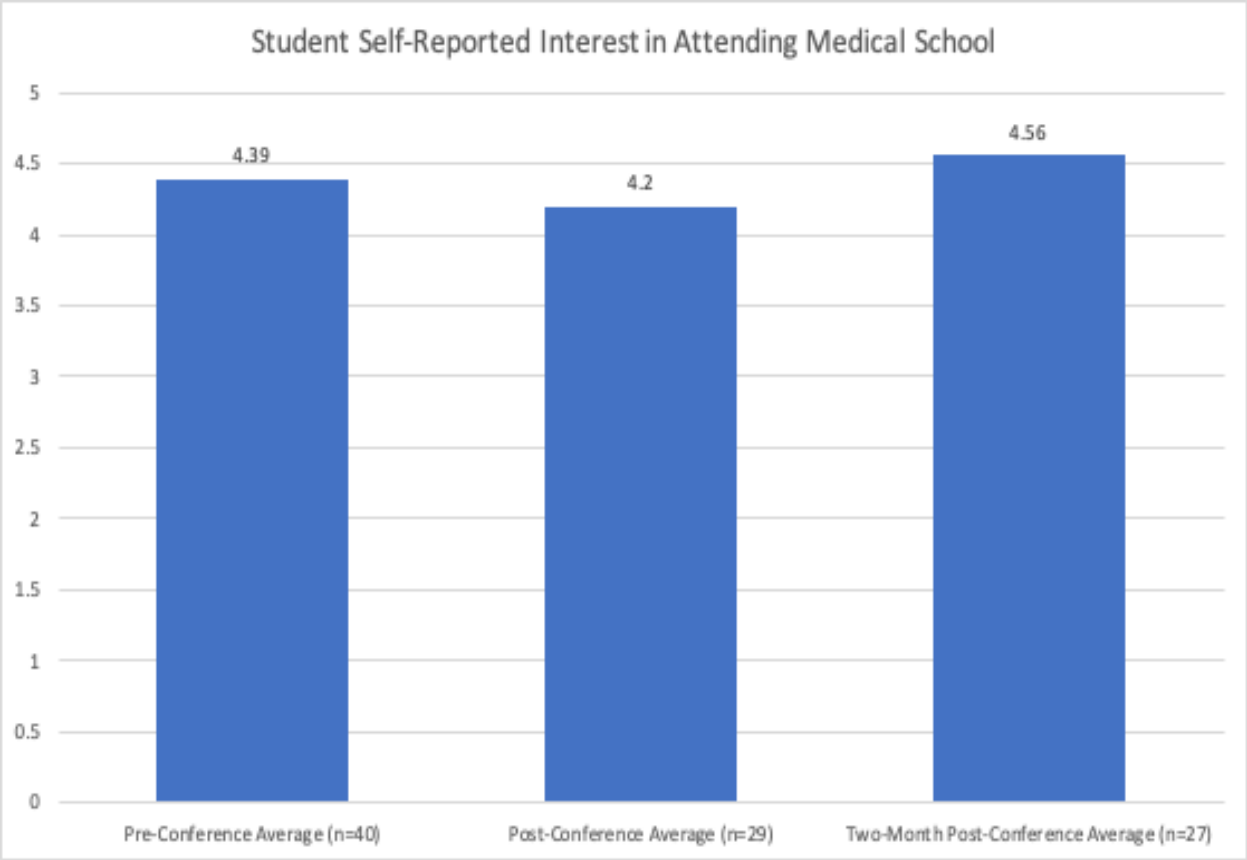

Figure 5 Student Self-Reported Interest in Attending Medical School
1=No Interest, 5=Definitely Interested

4.2 Participants Reported a Positive Experience with the Existing Program Design and Implementation

Students were surveyed immediately at the conclusion of the conference and two-months later about their perception of the effectiveness of various conference activities. Additionally, students were asked to rate their overall conference experience. While all of the conference activities received an average rating between 4 (Above Average) and 5 (Excellent) in both the post-conference survey and the two-month post-conference survey, all of the average activity ratings declined during the two-month period. Despite each activity's average rating declining, the

students reported overall satisfaction with the program increased from the post-conference to the two-month post-conference survey administration. Data for each question is presented and discussed in the following sections.

4.2.1 Students Reported Above Average Effectiveness of Mini-Lectures and Presentations

Over the course of the half-day program, students listened to three presentations. Two were mini-lectures that focused on 1) the basics of cardiology and 2) a personal narrative of why one physician chose to enter cardiology and the steps she took from high school to being a practicing physician. The third presentation was a question and answer session on college and medical school admissions. When asked to rate the effectiveness of these presentations, students assigned the mini-lectures an average effectiveness score of 4.45 immediately post-conference on a 5-point Likert scale of 1=Poor and 5=Excellent. Two-months post-conference, however, the students' average rating of the mini-lectures' effectiveness dropped to 4.26 which is a 4.46% decrease. Similarly, when surveyed immediately after the conference, students gave the presentation on college and medical school admission a 4.62 average effectiveness rating; however, this decreased to 4.37 two-months later. These data show a 5.72% decrease (Figure 4.5).

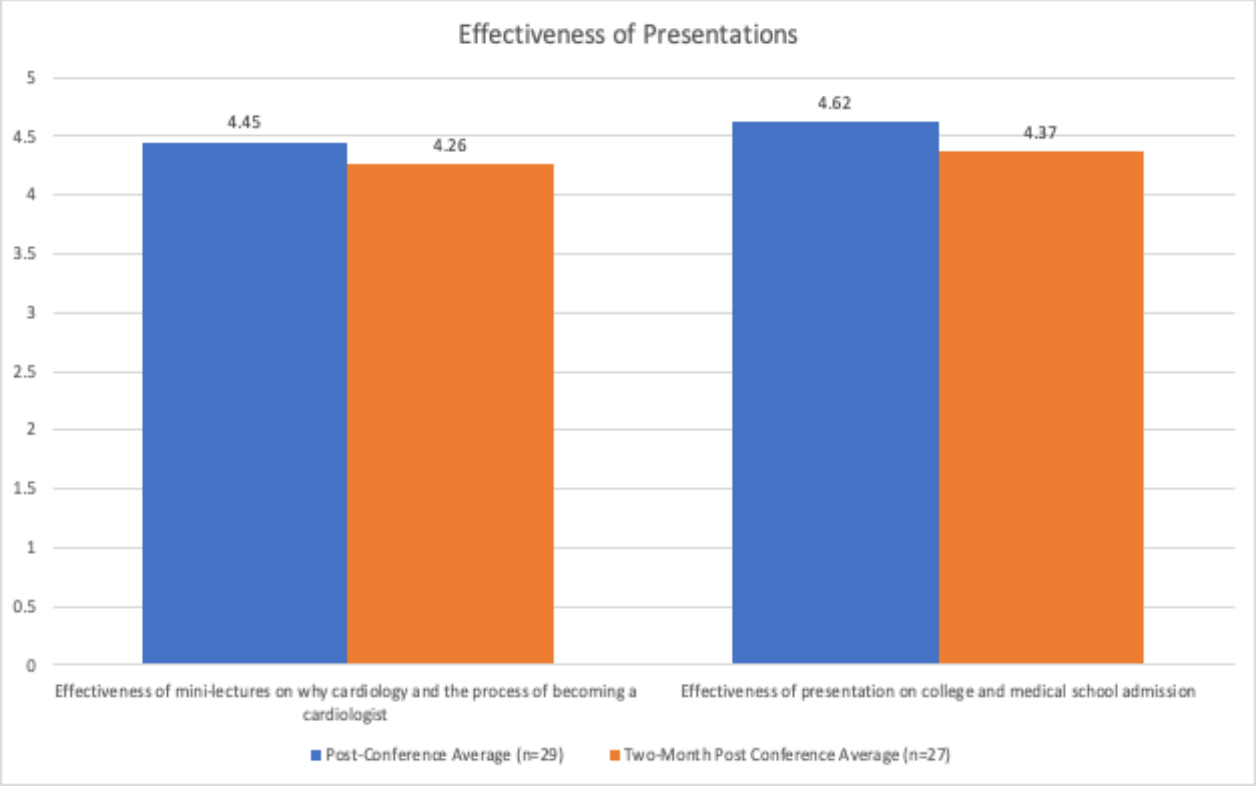

Figure 6 Effectiveness of Presentations
1=Poor, 5=Excellent

4.2.2 Students Gave Highest Ratings to the Effectiveness of Table Discussions with Faculty Mentors, Especially about Diversity and Equity Issues

Both immediately post-conference and two-months post-conference, students gave high marks to the effectiveness of the small-group table discussions led by the faculty mentors (Figure 4.6). Table discussion topics included the ways that heart disease affects the community in Western Pennsylvania, ways that the students could design interventions for healthy change in their communities, and the specific challenges faced by women and people of color in medicine and cardiology more specifically. Students' average rating of the table discussion effectiveness was 4.52 immediately post-conference and 4.41 two-months post-conference which was a 4.76%

decrease in average rating.

Students gave the highest ratings to the specific discussion of equity issues in cardiology immediately post-conference and two-months post-conference. Post-conference, students average rating of the effectiveness of the equity discussion was 4.66, which slightly declined to a rating of 4.48 two-months later. Not only did this activity receive the highest effectiveness rating for both post-conference and two-months post conference, but also the slight decline in average effectiveness rating (4.02%) was the lowest decline out of all of the activities about which the students were surveyed.

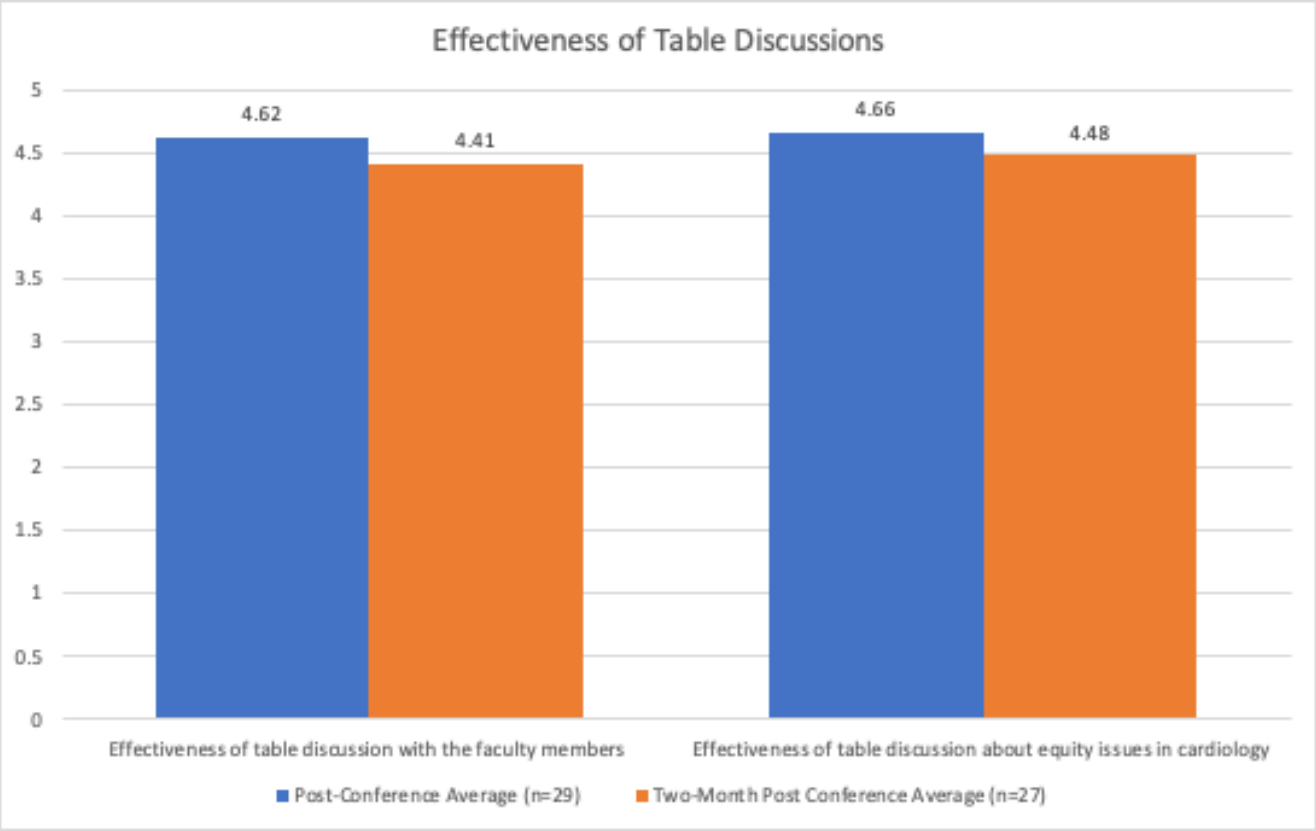

Figure 7 Effectiveness of Table Discussions
1=Poor, 5=Excellent

4.2.3 Students Gave the Lowest Average Effectiveness Ratings to Meeting with Their Assigned Mentor

Students gave the lowest average effectiveness rating to the meetings with their mentor both immediately post-conference and two-months post-conference (Figure 4.7). At the conclusion of the conference, students' average rating of the effectiveness of their assigned mentor meeting was 4.34 on a 5-point Likert scale. Two-months later, the average rating dropped 5.6% to 4.11. This change is particularly interesting because during the follow-up interviews, which will be discussed in section 4.4, the students all were eager to discuss their mentoring experience and almost all of them described the mentoring meeting as their most meaningful conference experience.

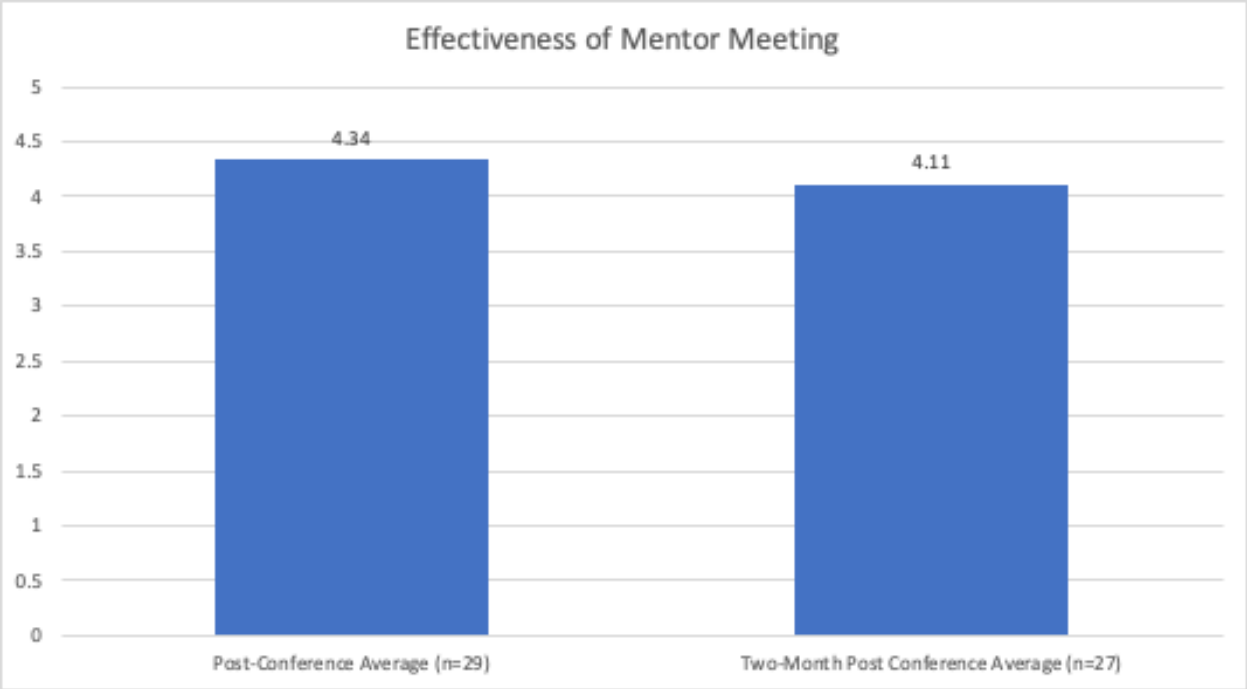

Figure 8 Effectiveness of Mentor Meeting
1=Poor, 1=Excellent

4.2.4 Students Reported High Levels of Overall Satisfaction with the Conference

Despite declines in average effectiveness rating of each activity from post-conference to two-months post-conference, students' overall satisfaction with their "I Look Like a Cardiologist" experience increased over time. Immediately post-conference, students average rating of their experience on a 5-point Likert scale was 4.45, which increased 6.12% over two-months to an average rating of 4.74 (Figure 4.8).

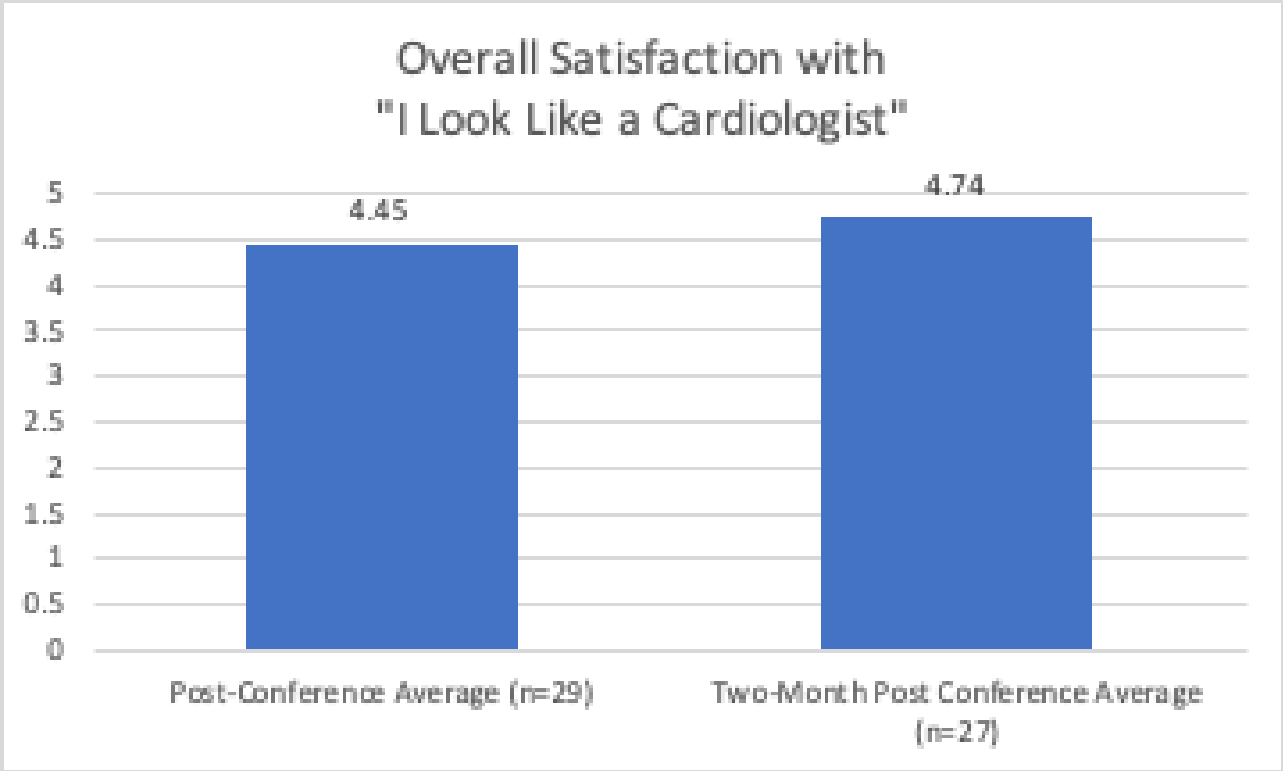

Figure 9 Overall Satisfaction with "I Look Like a Cardiologist"
1=Poor, 5=Excellent

4.3 Students Engaged in Limited Conference Follow Up

While students reported an overall positive experience participating in “I Look Like a Cardiologist” and gave high marks for the effectiveness of the activities both immediately post-conference and when surveyed again two-months later, student follow up with the conference materials and suggested actions was limited. Students were asked how often they engaged in six activities related to conference materials in the two-months after the conference. Results from this survey can be seen in Table 3.

Table 3 Student Self-Reported Post-Conference Engagement

How often have you…?[1]	Never (1)	Once (2)	Twice (3)	3-4 Times (4)	5+ Times (5)	Two-Month Post-Conference Average*
Spent time deeply considering or planning for a career in medicine including looking a pre-med websites, studying for standardized tests, talking with medical professionals about their careers, or other initial pre-health activities?	0	5	4	9	9	**3.81**
Explored summer programs and internships related to pre-health careers?	3	7	6	7	4	**3.07**
Been able to connect something discussed at ILLC with your current schoolwork?	4	8	7	7	1	**2.74**
Engaged in pre-health related community service?	12	8	3	0	4	**2.11**
Been in contact with another member of ILLC (other mentor, peer, program coordinator) over email for advice about academic and career development?	20	4	1	1	1	**1.48**
Been in contact with your assigned mentor over email?	21	6	0	0	0	**1.22**

4.3.1 Students Spent the Greatest Amount of Conference Follow Up Completing Independent Research and Preparing for College Applications

Students used their experience at the conference to support the college application and summer planning activities that are typical to highly-motivated high school students. Specifically, the activity on which the students self-reported spending the most time was “considering or

planning for career in medicine including looking at pre-med websites, studying for standardized tests, talking with medical professionals about their lives, or other initial pre-health activities." All students reported spending some time on this type of planning with 18 of the 27 respondents engaging in this activity three or more times.

Further, most students spent time researching and applying to summer programs for students interested in pre-health careers. All students except three reported exploring summer programs and internships, and 17 of the 27 respondents engaged in this research two or more times. Notably, this survey was completed in December which is earlier than most students typically begin their summer activity planning. When students were interviewed in April, all of the students reported exploring the recommended summer program offerings before these programs were cancelled as a result of the COVID-19 pandemic.

4.3.2 Students Moderately Connected Conference Material to Their Academic and Extra-Curricular Lives in a Moderate Way

Most students were able to connect the "I Look Like a Cardiologist" program material to their academic courses and extracurricular engagement at least once in the two-months following the conference. When asked about their experience connecting the program material to their current coursework, 23 out of the 27 respondents reported being able to do so at least once and eight students reported being able to connect program material to their academics three or more times.

More than half of the student respondents were able to connect the conference material to their extracurricular life through engaging in pre-health-related community service at least once. Fifteen out of the 27 respondents reported engaging in pre-health-related community service in the

two-months following the conference with seven students participating two or more times. Twelve students did not engage in any pre-health-related community service in the two-months following the conference.

4.3.3 The Majority of Students Did Not Maintain Contact with Their Assigned Mentors or with Other Member of the "I Look Like A Cardiologist" Community

Students did not maintain contact with their assigned mentor or other program mentors or participants. Interestingly, students reported maintaining more contact with people who were not their assigned mentor than with their assigned mentor. Twenty students reported not being in contact with any member of the "I Look Like a Cardiologist" community in the two-months following the conference and seven reported some contact. Four students reported being in contact over email with a member of the "I Look Like a Cardiologist" community once and one student each reported being in contact with someone twice, 3-4 times, and 5+ times. Of the 27 two-month post-conference survey respondents, 21 students reported no contact over email with their assigned mentor. The six remaining students all report being in contact with their mentor only one time.

4.4 Interviews with Participants Confirm the Survey Data with One Notable Exception

Twelve students were interviewed six months after the program about their experience at the conference. The data collected during the participant interviews reinforces many of the survey findings with one notable exception: the impact of mentoring on the students. The sections below highlight the most significant interview findings as they relate to the survey data.

4.4.1 Students Highlighted the Importance of the Mentor Meeting During the Interviews

All 12 of the interview participants mentioned the positive impact that the conference mentors had on their program experience. Further, ten of the students who were interviewed identified meeting the program mentors as the most positive aspect of their experience. This finding contrasts the survey data in which students gave the lowest average effectiveness ratings to their mentor meeting both immediately post-conference and two-months post-conference.

Enjoyment of the mentor experience remained important to students even when the student could not recall a specific piece of advice or conversation element from her mentor meeting. Students described their mentor meetings as personal, inspirational, and useful. One student explained:

> [The most influential part of the conference was] the last thing that we did where we got split up into groups and it was one adult and then one or two kids. I liked that best because it was very personalized, and it was very... I got to talk to one other person and one other kid and that was really nice because I felt it just narrowed sort of my focus in terms of who I was paying attention to down and it made it a bit easier to talk about myself.

This student was not unique in her thinking about the advantages of the individualized meeting as another student explained that the one-on-one nature of the mentor meeting allowed her to feel less shy than she did in the large group or table group setting, therefore leading to her feeling free to be able to ask specific questions. A third student also emphasized that the conversational tone of the mentoring session, compared with the formal nature of the other elements of the program was important to her. The interviewees positive experience in meeting directly with mentors contrasts the survey data in which the survey respondents rated their meeting

with their mentor as the least effective element of the conference both immediately after the conference and when asked again two-months later.

4.4.2 Students Benefitted from Having Mentors from Diverse Backgrounds

The survey data showed that some of the greatest gains were made in student self-assessed access to medical mentors who are like them. This finding was confirmed in the interview responses as students shared the importance of having mentors from diverse personal and professional backgrounds. The student participants were diverse in multiple ways and several mentioned racial and ethnic diversity among the mentors as important to their experience. One student, who identified as Nigerian-American in her interview, summed up the importance of having diverse mentors when she said:

> I just loved meeting black doctors. I had never met one before.

Further, students were eager to share that they loved speaking to mentors from diverse professional backgrounds including having mentors representing different stages on the physician journey. One student reflected:

> I really enjoyed the group sessions where we sat at the table and we talked to different mentors and we just interacted... So, I had med students at my table, but I also had the head of the cardiology department at my table. So, it was really awesome to hear the difference in their experiences.

In addition to the above quoted student's excitement about speaking to both physicians-in-training and highly accomplished division heads, another student mentioned that they felt that it was easier to start conversations with some of the trainees because they were closer in age to the student participants. In addition, having diverse mentors also led to students' having such a

positive experience in their discussions of equity issues in medicine which is discussed below in section 4.4.4.

4.4.3 Students Did Not Reach Out to Mentors Because They Did Not Know How to Do So

At the end of the conference, I encouraged the students to maintain contact with their mentor, but the survey data revealed that very few students did. As discussed in section 4.3.3, 21 out of the 27 two-month post-conference survey respondents reported that they had not been in contact with their mentor at all despite the fact that the students indicated in the survey data an increase in their willingness to reach out to potential mentors after having attended the conference (section 4.1.3). The disconnect on the students' self-assessed willingness to contact a potential mentor and their positive experience with their mentor on conference day with the lack of actual contact that occurred was explained in the interview data.

When asked about post-conference contact with mentors, many of the students discussed feeling willing to do so, but not knowing exactly how to continue that relationship. One student clarified:

> So, I always wanted to reach out to the mentors that I got their contact information, but I never knew how to reach out to them. So, I never ended up reaching out to anyone because I didn't know what to start off with.

A second student explained:

> As of right now, I only have my separate mentor's email, but I really haven't reached out because I don't know how to reach out, if that makes sense. Because I

> feel like I'm still at the stage where I'm trying to figure things out, and there's not specific questions that I have. It's more of me asking myself if I can do it. It's more self-inflicted, but I would reach out if I did.

Other students shared that they attempted to contact their mentor but had written down the incorrect email address or had exchanged a single follow up "thank you" email following the conference but then ceased communication.

4.4.4 The Discussions of Diversity and Equity Issues were Memorable and Important to the Students' Experience

All of the students interviewed were eager to discuss the scenarios about the challenges facing women and underrepresented racial and ethnic groups in medicine which corresponds to the survey data that showed the highest average effectiveness rating for the discussion of equity issues both immediately after and two-months after the conference. Several of the students described being surprised that perpetuated sexism and racism still exist in this way in a clinical setting. One student summarized her thinking about this experience:

> The way that [the scenarios] were constructed, how there are so many different cases where it could definitely come up, right? They weren't sort of obscure situations that were thought up, they were very sort of basic situations. Situations in which people, the patient wasn't addressing the person who was leading the, I don't know what you'd call it, examination or something, because she was a woman. It was sort of these very small things, which sort of made me realize how this sort of perpetuated sexism is just... can be very small in terms of how it appears in professional careers.

Another student described the scenarios and related discussions as “eye opening” because of “how sheltered we are in the school system right now.”

Rather than being discouraged by discussing these scenarios, the students indicated that hearing from physicians who had experienced or witnessed professional discrimination helped to normalize these experiences and gave them the context to depersonalize these slights. One student shared:

> When we were talking at our tables, one of the doctors was saying how people would mistake her as the nurse or they would ask a male doctor to come in. And I know I’m going to face that, but just as long as I get to help people, it won’t affect me as much.

Another student reflected:

> [The discussion] was more of a confirmation than anything because I was already aware of a lot of the struggles that women go through, especially in a career like medicine. A line of work, field as medicine where females are less represented, specifically minority females. So, it was not just informative as it was confirming that this is indeed a really big deal and it’s happening a lot more often than maybe I realized it was. I was like even the people sitting at my table had firsthand experienced it.

The students reported looking to their mentors for guidance about ways to handle these situations professionally and appropriately. One student noted she loved hearing the way that mentors from different stages of professional training would respond to each situation allowing her to see an “evolution” in thinking and techniques based on professional experience. Another student shared that she, as a young woman of color, was particularly inspired by a Black female

medical student's reflections in this activity further emphasizing the importance of having diverse mentors which was discussed in section 4.4.2.

4.4.5 Students Gained a Stronger Understanding on the Process of Becoming a Physician as a Result of Attending the Conference

Interview data showed that students developed a better understanding of residency and fellowship stages of the physician journey. This finding reinforces the increase in students self-assessed understanding of the medical school admissions process from the survey data.

Prior to attending the conference, students' knowledge of the process of becoming a physician was haphazard and often characterized by misinformation. One student reflected:

> I watched a lot of medical shows growing up, so I knew [that you had to complete a residency], but I wasn't exactly sure because obviously TV is different from real life. But I just knew that there was a residency after med school and that to go to a fellowship, and yeah, I didn't really know much besides what TV said.

Other students similarly expressed that they knew more about residency than fellowship, while others shared that they knew that these steps existed but were unclear about what is accomplished in each stage.

One of the most common misconceptions that the students had about the physician journey was that in order to attend medical school, a prospective physician has to be a "pre-med" or a biology major. Pre-med, however, is not a major, but a series of courses required by the American Association of Medical Colleges. Successful medical school applicants major in a variety of fields as discovered by one of our participants who shared:

> [My mentor] told me about her journey going into cardiology and how it was not what I would've expected at all. She didn't go into med school straight after college, and she had majored in something regarding gender studies rather than anything medicine related.

Another student shared her surprise that future physicians can major in a variety of fields. Over the course of the interview process, five other participants mentioned the fact that students interested in medical school could major in anything provided they fulfill their requirements as either the most surprising or most important thing that they learned at the conference.

In addition, the above-quoted student mentioned that her mentor did not enter medical school straight from college. Another student also discussed her mentor's gap year and the challenges inherent to the medical school application process when she commented that she was surprised

> That many people take a gap year either to work on their resume or themselves before either applying or they have applied and they didn't get admitted. So that normalizes the process of not getting admitted the first time.

4.4.6 Students Used the Resources Provided at the Conference for Help Finding a Summer Program or Other Extracurricular Experience Related to Their Interest in Health Care

Survey data showed that 24 of the 27 of the respondents to the two-month post-conference survey explored the recommended summer programs and internships discussed at the conference and all respondents spent time intentionally planning their pre-medical journey. Interview data revealed that students were connecting their conference learnings with their pre-medical

explorations, for example, one student explained:

> Based on my attendance, I've actually looked for resources, supplementary ... what are they called? Resources for SATs, ACTs. Although I'm a sophomore, after attending "I Look Like a Cardiologist," I was able to find different free resources for helping me to prepare. Because I actually was going to put that off until junior year, but after attending this, I knew. I was like, why don't I start practicing now? So I was able to look at different resources.

During the interview process, six of the 12 students interviewed reported that they had applied to at least one of the summer programs that was recommend at the program and another four had said they were considering applying for the recommended programs. However, all of these students indicated that their plans for the summer changed as a result of the COVID-19 pandemic's shutting down these programs.

4.4.7 Students Excitement about a Career in Medicine Increased as a Result of Conference Attendance

All of the students who were interviewed were still considering a career in health care and many described program participation as confirming or strengthening their resolve to pursue a career in medicine. This finding reflects the survey responses in which interest in medical school attendance increased as a result of having attended the conference and students overall high levels of satisfaction with the conference.

More important than merely increasing interest and enthusiasm, interview data shows that students increased their medical career self-efficacy as a result of the program. One student described her increase in medical career self-efficacy as a result of the conference by reflecting:

> I think overall the conference made becoming a doctor or a cardiologist specifically a much more achievable goal and gave me a lot more confidence in pursuing this career.

Ultimately, one student showed that many of the goals of the program were achieved when she shared:

> I knew [becoming a physician] was really hard and I still get scared talking about it because I feel like it's out of reach, but going to [the program], it made it all in perspective and so I think I can do it now. I'm ready for the battle.

4.5 Summary of Findings

The findings from the survey data and interview analysis show that while the "I Look Like a Cardiologist" program was successful in achieving many of its goals there is still room for improvement. Students self-assessed knowledge of cardiology and cardiology-related public health increased over the three survey administrations, however survey data shows that students perceive that there is room to make the presentations on these topics more effective. Student self-assessed access to mentors increased and interview data revealed the importance of mentoring to the students, however student follow up with mentors was almost nonexistent. Finally, the high average survey ratings that students gave to the discussion of diversity and equity combined with their eagerness to discuss diversity issues in the interview points to the necessity of an increased emphasis on these topics. In Chapter 5, I will discuss the significance of these findings and make recommendations for the improvement of the design and implementation of a half-day medical careers exploration program for young women.

5.0 Conclusion

The purpose of this inquiry was to identify improvement strategies for the implementation and design of a half-day medical career exploration program for young women. The mixed methods study approach used survey data combined with brief participant interviews from the October 2019 “I Look Like a Cardiologist” conference at the University of Pittsburgh Medical Center’s main campus in Oakland. Data analysis of the survey results revealed the average response and the percentage change from before the conference, immediately after the conference, and two months after the conference. Inductive coding and additional code mapping techniques were applied to the interview data leading to the interview results providing more depth to the survey data. Three major themes emerged which will be discussed in the major findings section below.

The conceptual framework of this study was guided by four main concepts supported by the literature discussed in Chapter 2. First, young adults benefit from thoughtful career exploration experiences outside of the academic classroom. Second, participation in career exploration programs can increase student self-efficacy in those careers. Third, the impact of career exploration programs on students can be evaluated in order to be improved. Finally, a well-run career exploration program can increase professional diversity in a field. These concepts led to the adaptation of the assessment tools used in this inquiry from similar inquiries at East Tennessee State University Quillen College of Medicine, the Doctors of Tomorrow program at the University of Michigan, and the PREP program at Dalhousie University in Canada.

This final chapter synthesizes the findings of this inquiry with supporting scholarship and practitioner knowledge from my work as an independent educational consultant focused on college

and graduate school admission. This chapter begins with a discussion of major findings within the context of current literature on medical career exploration programs and is followed by seven recommendations for practice. It concludes with a discussion of the limitations of this study, suggestions for further research, and an explanation of my demonstration of practice.

5.1 Discussion of Major Findings

Three dominant themes emerged based on the analysis of the qualitative and quantitative dat. First, the importance of breaking down the steps to becoming a physician beginning with connecting to the student's current lives. Second, the necessity of having conversations about diversity and equity play a central role in the program design. Third, the power of high-quality mentoring for long impact. Unsurprisingly, all three of these themes relate to the literature on self-efficacy.

Sharma and Romas (2012) identified four major strategies to building self-efficacy: (1) "break down complex behavior into practical and doable small steps," (2) "use a demonstration from credible role models," (3) "use persuasion and reassurance," and (4) "reduce stress" (p. 183). In addition, Sharma and Romas identify "self-efficacy in overcoming impediments" as a central construct of social cognitive theory (2012, p. 183). These strategies and constructs reflect what was successful about the "I Look Like a Cardiologist" conference and help to point the way towards necessary program improvements.

5.1.1 Break Down the Physician Journey Starting with the Students' Lives Now

Sharma and Romas (2012) cite the importance of breaking down steps into manageable tasks as central to building self-efficacy. The findings for this inquiry support this idea and can be expanded to include meeting the students "where they are now" in order to maximize program efficacy. During the interviews, several students talked about their mentors being "relatable" because of their relative youth. Further, students were eager to share the ways in which they were already able to connect the program material to their current academic and personal pursuits. These results led me to believe that it is important to validate the ways in which the students' current experience is preparing them for a career in medicine as a complement to explaining the steps that a person must take from high school through post-graduate medical training.

My findings confirm the conclusions of a study of another successful medical career exploration program. The "Doctors of Tomorrow" program at the University of Michigan, which serves high school students primarily from racial and ethnic backgrounds underrepresented in medicine, uses near-peer mentoring from first year medical students to focus on the mentee's current academic and personal struggles, extracurricular opportunities, and later, the college application processes (Sandhu et al., 2018). By helping students to navigate their present lives while also inspiring them to consider a career in medicine, students may be more likely to continue on the challenging medical career trajectory.

Students come to career exploration programs like "I Look Like a Cardiologist" for advice on how to reach their ultimate career goal. But, there is value to validating students' current academic endeavors and their extracurricular pursuits as a vital part of the physician journey. Seven out of 12 interviewed students were able to connect the program material to specific academic classes and nine out of 12 of the students could make a connection with their

extracurricular activities, so program material does not need to be significantly altered to make these connections. Students attending a medical careers exploration program are already on the physician career path and acknowledging this can maximize gains in student medical career self-efficacy.

5.1.2 Discuss Physician Diversity and Equity

Building self-efficacy in overcoming obstacles is an essential part of social cognitive theory (Sharma & Romas, 2012) and for students from gender, racial, or ethnic backgrounds historically underrepresented in medicine, the obstacles to becoming a physician can be particularly daunting. The challenges facing underrepresented students interested in medicine inspired the "Doctors of Tomorrow" (Sandhu et al., 2018) and Project HOPE (Ali et al., 2017) programs. Studies of other successful medical career exploration programs for underrepresented student groups confirm the value of discussing physician equity issues and modeling physician diversity. For example, when interviewed after having completed the "Doctors of Tomorrow" program, participants had a greater sense of the barriers facing would-be physicians from underrepresented racial, ethnic, and gender groups. Ali et al. (2017) also found that medical career self-efficacy increased among LatinX youth when the Project HOPE curriculum added an emphasis on overcoming racial and ethnic achievement barriers.

The findings for this inquiry confirm Sandhu et al. (2018) and Ali et al.'s (2017) conclusions that, despite the students' increased awareness of the challenges facing would-be physicians from groups underrepresented in medicine as a result of completing a health careers exploration program, students' medical careers self-efficacy increased.

The interview and survey results from this inquiry followed similar patterns. Students gave the highest average rating to the efficacy of the discussion about diversity, and many students were eager to talk about the diversity of the mentors and their conversations about gender and racial equity issues. Two students shared that their conversations about the challenges facing female physicians revealed that when they face gender discrimination in the future, it will be because of systemic problems, not their own ability. One student when discussing issues of diversity, discrimination, and prejudice shared that in school she feels very "sheltered" from these realities of the workplace. By making such conversations central to career exploration for young women, their self-efficacy can grow through both "reducing stress" related to the anticipation of future discrimination and through "persuasion and reassurance" (Sharma & Romas, 2012, p. 183). Hearing successful professional women describe the ways in which they have overcome prejudice and receiving their mentors' encouragement that the students have the power to transcend and fight discrimination can help students to emotionally prepare for these obstacles and provide them with strategies in combatting sexism based on the experiences of their mentors.

5.1.3 Harness the Power of Mentoring

The value of role models is also central to the development of self-efficacy (Sharma & Romas, 2012). The Florida CHOICES program showed the impact of even very brief group mentoring (Glessner et al., 2017). Sandhu et al. (2018) note that although the mentoring "interactions may not initially have appeared to be important, the UriM [underrepresented in medicine] students came to recognize that their continued success stood to gain from a network of meaningful relationships" (p. 2055).

All 12 students interviewed for this inquiry shared the positive impact of interactions with their paired mentor. Students described their experience with mentors with words such as "personal," 'honest," and "helpful." Students describe feeling a strong connection with their mentor because of shared background or because of the encouragement that they received. Students also described feeling comfortable asking questions during 1:1 or 2:1 mentoring sessions and were excited about sharing some of the practical and personalized advice that they were given during these meetings such as encouragement to pursue a college major of interest or ways to continue nonacademic passions. Findings from this inquiry demonstrate that making the mentoring experience a central part of program design and leads to students' maximizing gains in self-efficacy.

Finally, modeling professional diversity is important through having physicians from diverse personal and professional backgrounds serve as mentors. Seven of the 12 students interviewed shared that hearing diverse perspectives through table-group discussions was one of the most influential parts of "I Look Like a Cardiologist." The frequency with which interview participants cited diversity among the mentors, combined with the survey data that showed a 29.52% increase in average student self-assessed access to mentors like them underscores the intertwined importance of thoughtful mentoring with modeling and discussing diversity and equity.

5.1.4 Summary of Major Findings

The findings of this inquiry confirm and expand upon the findings of other studies on medical career exploration programs. The student participants benefit from having mentors who can help them navigate the educational and extracurricular options for college-bound high

schoolers and who can model resilience in overcoming professional challenges related to sexism in school or the workplace. Further, student self-efficacy increases when honest conversations about workplace prejudice is thoughtfully included in medical career exploration programming.

5.2 Implications for Practice

Based on the findings from this inquiry, I offer seven recommendations for future half-day medical career explorations programs for young women. My recommendations are divided into suggestions for program design and suggestions for program implementation.

5.2.1 Recommendations for the Design of a Half-Day Medical Careers Exploration Program for Young Women

5.2.1.1 Recommendation #1: Devote Time for Discussions about Choosing a College and Career during Table Group Meetings

At the "I Look Like a Cardiologist" conference, students heard from a variety of adult mentors about why they chose a career in cardiology. While the survey data demonstrates that students found these discussions effective, the interview responses show that many students are not only struggling with what career to pursue, but also the process for considering different careers. For example, one student shared that she felt reassured when her mentor explained that she never felt a lifelong drive to become a physician or received a supernatural sign that medicine was the career for her.

Normalizing the rational part of career choice is important, especially for aspiring

physicians. Medicine, similar to both teaching and the clergy, is often described as “a calling” in ways that being an investment banker or cosmetologist are not. However, this student’s mentor, Amy, reassured her that a person can make a rational choice to become a physician without a metaphysical intervention or divine experience. Demystifying the process of career selection within a table group setting will allow students to learn about the techniques that the mentors used in their professional discernment. Such exposure may give them skills to make similar choices themselves. This conservation should be scheduled after the introductory presentation about why a physician chose his or her field to allow participants an opportunity to ask questions and gain further insight in a smaller setting.

Further, understanding the process of choosing a college was also something that many of the interview participants mentioned. In my professional work as an independent educational consultant, I know that the college selection process for highly accomplished high school students can be emotionally all-consuming and extremely stressful. Over the course of the interviews, five students discussed the ways that meeting with their mentor or other table mentors impacted their college search. This included being inspired to consider a college that they had previously not considered because a mentor was an alum, becoming interested in the University of Pittsburgh as a result of being on campus for the conference, and hearing about the importance of pre-medical advising. This shows that a career exploration program staffed by many young professional mentors provides the opportunity to share with students not only where the mentors went to college, but also the practical tips on why they chose these institutions or things they wish they had known while making this decision. I believe this interaction with mentors should occur after the college admissions advice lecture.

5.2.1.2 Recommendation #2: Clarify the Process of Becoming a Physician by Breaking Down the Steps a Student Should Take from High School through Practice

In the existing program, mentors shared their stage of medical training, such as being a medical student, resident, fellow, or superfellow, or practice such as being junior faculty, senior faculty, or administration, in conversations with the participants. However, the exact stages and the requirements for advancement from college to medical school to internship to residency to fellowship and subspecialty fellowship to practice were never made explicit. Students' self-reported knowledge of medical school admissions did increase 50.24% from pre- to two-months post-conference, and they gave above average effectiveness ratings for the college admissions presentation (4.45 post-conference, 4.26 two-months post-conference). However, when asked about their knowledge of residency and fellowship in the interviews, 11 out of the 12 students described having limited or no knowledge prior to the program and a better sense of these training stages after participation In addition, it is important to discuss situations in which there are multiple ways in order to complete a requirement such as taking a gap or research year or military-affiliated programming, as two students shared that hearing about these options were among the most important things that they learned at the conference.

As students interested in medicine head into the college application process, it is critical to provide both accurate information in order for them to make the best decisions for their career path and to reassure students that the journey is doable when broken down into manageable steps. During the interviews, eight students discussed the significant time commitment for the process of becoming a physician, but report feeling reassured that the time investment was worthwhile and that they were capable of completing the physician journey. By devoting specific time in the program to clarifying these steps instead of allowing it to occur in a haphazard way, the program

can universalize knowledge while increasing self-efficacy. This information should be included in the introductory presentations and it should be provided in a handout in the materials that are provided to students.

5.2.1.3 Recommendation #3: Intentionally Recruit Mentors with Diverse Personal and Professional Background

Both the survey and interview data showed that the student participants at "I Look Like a Cardiologist" benefitted from the diversity of the physicians who served as mentors. Students reported a 29.52% increase from pre-conference to two-months post-conference in their access to medical role models who are like them. As previously discussed, the UPMC HVI is notable for its gender, racial, ethnic, and sexuality orientation diversity which led to mentor diversity at our program without intentionally recruiting for representation from specific populations. However, if a medical center wants to host a program similar to this one, but lacks UPMC HVI's diversity, it is necessary for the program directors to intentionally recruit mentors from diverse backgrounds.

Because the program is designed to serve young women, ensuring that the majority of the mentors are female-identifying is important. This does not mean, however, that all mentors have to be female—male providers aware of and committed to rectifying the unique struggles of female physicians could be ideal mentors. One student specifically mentioned that she liked hearing both female and male physicians speak about the challenges facing women in medicine and interviewed students described their mentoring experiences equally positively regardless of the gender of their mentor. Further, two of the students who had the most positive mentor experiences that included post-conference follow-up (discussed in Recommendation #6) had male mentors. However, all of the participants should have the opportunity to speak with female physicians either at table groups or one-on-one. Seven out of the 12 students interviewed shared the importance of physician mentor

diversity to the program and one student shared her impression of speaking with our mentors by saying:

> I think that there was a really good diverse group of people there. So, I could really hear from people who had actually had struggles. And so many times I just hear from doctors who are just the rich white guys. So being able to hear from some women and the struggles they had faced definitely helped.

Finally, especially if part of program design includes breaking down the stages on the physician journey and clarify the expectations and responsibilities at each stage as suggested in Recommendation #2, having individuals currently living those roles will allows students to ask clarifying questions.

5.2.2 Recommendations for the Implementation of a Half-Day Medical Careers Exploration Program for Young Women

5.2.2.1 Recommendation #4: Frame Introductory Presentation and Public Health Discussions around the Students' Current Experience

During our existing program, various mentors discussed their professional commitment to scientific research, volunteering at a health clinic for the underserved, working collaboratively with other departments, and public health leadership and advocacy. Many of the students in their program admissions essays wrote about their current passions for participating in science fairs (research), volunteering (medical service), doing athletics (teamwork), and leadership (advocacy). Further, during the interview process, several of the students mentioned that their mentors encouraged them to pursue their passions both in the classroom and in their extracurricular engagement. By framing the introductory lecture in a way that directly resonates with the students'

current passions, student enthusiasm and excitement about a career in medicine is likely to increase without meaningfully changing program content while also reinforcing the idea that the students are already on the physician journey.

A logical way to connect to the students' current academic experience is for the introductory presenter to familiarize him or herself with a typical high school biology curriculum. This will help ground their presentation in information to which the student may have already been exposed or will be soon exposed. The survey data collected for this inquiry reveals that some overlap already exists between conference material and high school curricula. 23 out of 27 survey respondents reported being able to connect conference material to their academic classes at least once in the two months following the conference. Eight out of the 27 students indicated that they were able to connect conference material to their curricula three or more times. Student interviews confirmed that there was power in these connections. Seven out of twelve interview participants were able to describe specific ways in which program material related to their academic coursework. Notably, three interview participants were excited to share the ways that they were able to act as classroom leaders during cardiology-related units in science class as a result of attending "I Look Like a Cardiologist." Being able to connect the program material to their current curricula reinforced the impact of the conference for these students and allowed them to build their academic self-efficacy through a natural leadership opportunity, For example, one student shared:

> While we were doing the pig's heart [dissection in science class], we were able to lead a little bit. Not too much, because our teacher had to be there. So we were able to point out the different parts of the heart to the other students. And it was kind of cool, it was like I got to be a teacher.

By encouraging the introductory presenter to familiarize him or herself with what a high school biology class typical covers, students will benefit from longer term academic engagement.

Similarly, some of the time in the table group public health discussions should be used to brainstorm specific ways each student can connect their learnings to their current pursuits. The two-month post-conference survey only asked about students' ability to connect conference material to community service, and 15 out of 27 respondents responded that they were able to do so at least one time in the two-month period. However, the interview protocol asked if students had been able to connect conference material to their extracurricular pursuits more broadly, and nine out of 12 interview participants could identify a specific way in which they were able to connect the material to their passions. These connections included community service activities, and students also shared connections with included science research activities, leadership and advocacy related to school health policies, career exploration clubs, and in a part-time job setting. This shows that making these connections across a variety of activities is possible and with the table mentor's encouragement, all students could leave the program with a plan for how to connect program material to their extracurricular passions. This would allow students to see short term impact of their experience while also building self-efficacy through a related leadership experience related to medical careers.

5.2.2.2 Recommendation #5: Spend at Least an Hour on the Scenarios for Women in Medicine

At the October 2019 "I Look Like a Cardiologist" conference, the collaborative problem-solving discussion of challenging scenarios for women and people from backgrounds underrepresented in medicine took place over the course of 35 minutes. However, the students' enthusiasm for this experience as demonstrated in interviews (all 12 interviewees wanted to discuss

this experience) and students' high ratings of this activity's effectiveness (4.66 average rating post-conference and 4.48 two-months post-conference) indicates that more time should be devoted to it. The time increase will allow students and mentors fully address each of the scenarios, share their experiences, ask questions, and develop strategies for how to confront workplace prejudice.

Finally, beyond just working through the sample scenarios provided, encouraging table mentors to share their own experiences with prejudice in the workplace should be encouraged. Hearing mentors' personal experience was particularly powerful for the students. One student was surprised that "people at my table had first-hand experienced [gender discrimination]." Another student shared that: "Being able to hear from some women about the struggles that they faced definitely helped." Four more students describe the women in medicine simulations as "eye-opening" or "surprising." Increasing the time allotted for this activity would mean a greater amount of sharing of personal experiences, time to process and ask questions for the students. And discussion time devoted to how to respond when a person is the target of discriminatory behavior or how to be an effective ally for others.

5.2.2.3 Recommendation #6: Provide Structure for the Student-Mentor Follow-Up

The survey data showed that very few of the student participants of the "I Look Like a Cardiologist" conference contacted their mentor after the program. During the interview process, several of the students shared that while they felt comfortable contacting their assigned mentor in theory, they did not know how to do so in reality, therefore, it is essential to provide structure for the ongoing mentor relationship. First, a handout needs to be provided to the students at the conference that includes all of the mentors' names and email addresses to allow ease for contact as one student shared that she was unable to contact her mentor because she had written her email address down incorrectly.

Second, a menu of possible ways for the student to follow up with their mentor should be provided. Three of the students who were interviewed maintained a relationship with their assigned mentor or another program mentor in a significant way, and that experience had a strong impact on them. These ongoing relationships show the possibilities for the continuation of the mentor-mentee relationship. One student had several phone calls with her assigned mentor in order to get her mentor's help designing a science research project. Another student arranged for her mentor, who is the Chief of Cardiology, to speak to her high school biology class. Both of these options could be suggested to the students and mentors. Finally, the student with the best mentor experience, "it is awesome" in her words, spent an entire day shadowing her mentor and learning more about cardiology in a clinical setting. This is a great option for ongoing mentor relationships, but because the culture and regulations around student shadowing vary widely among health systems, only list this as an option if it is realistic within the context of the host medical center. This list should also be provided to mentors because no student reported their mentors initiating follow up contact.

5.2.3 Other Recommendations

5.2.3.1 Recommendation #7: Academic Medical Centers Interested in Educational Outreach and Equity Should Maintain a List of Local Summer Programs and Internships

An in-person program can only reach a small number of regional high school students interested in medicine. I recommend that medical centers develop a list of local opportunities for high school students to explore pre-health careers and distribute it to local guidance counselors and high school science teachers. I believe this kind of outreach could attract a far greater number of students. Within the context of an established program, the education coordinator could contact

the same high school teachers and guidance counselors who were sent application recruitment materials and provide them with an updated spreadsheet of these programs annually. Our students indicated that one of the most significant ways that they engaged with the conference material directly was through reviewing the list of summer program and internship opportunities that we provided. When surveyed two-months after the conference, 89% of respondents had explored these opportunities at least once and 41% of students had reviewed the list three or more times.

The survey data is consistent with the interview results in which ten out of the 12 students interviewed either applied to or considered applying to the recommended summer programs prior to the COVID-19 pandemic's shutting them down. This shows that students interested in medical careers want to pursue health care summer programs and internships, and they may not know about the wealth of opportunities available to them without attending a program. This resource should be included in the program materials, but there is no reason that this information could not be more widely disseminated by sending it to the high school faculty members who were originally contacted for the student recruitment process. Further, maintaining and distributing a list like this can be done without hosting a conference if doing so supports the educational outreach goals of the medical department or health system.

5.3 Limitations

The limitations to this inquiry relate to its being a single case study. First, the data were derived from 41 individual participants who attended one six-hour program. Although these findings can support the improvement of many medical career exploration programs, the small sample size is a limitation. Dr. Berlacher and I plan to run the "I Look Like a Cardiologist" program

again with changes made based on this research. We will continue to collect and analyze survey and interview data in order to maximize the effectiveness of this program. In the next iteration of "I Look Like a Cardiologist," a greater number of students will be interviewed in order to add more perspectives to the data.

A second limitation is related to interview timing. Interviews for this inquiry occurred six months after the program, which may have led to students' inaccurately remembering their experience. In the future, interviews should occur three to four months after the students complete the program, which will allow for some time to have passed in order to assess long term effectiveness and follow-up, while still being recent in the students' memories.

5.4 Future Research

Dr. Berlacher's and I plan to disseminate a program hosting guide (see section 5.5 and Appendix H) in order for other academic medical centers to run their own program based on our design. Other academic medical centers may have a different medical specialty focus, anesthesiology or pediatrics for example, or a different target population such as Black and LatinX students or first-generation college students. The program directors at future administrations and adaptations of our program protocol can add to our data in order to determine if the design and implementation of this half-day medical career exploration program has a greater impact on specific demographic groups.

Second, the 2020 COVID-19 pandemic has led to Dr. Berlacher and my considering how we are going to offer this program next. We are considering an online program via 4 90-minute virtual sessions. While a teleconferencing model would lose some of the intimacy and energy that

characterized our in-person conference, it offers cost and geographic reach benefits that might make it an attractive alternative for some medical centers and students. Studying the relative effectiveness of the same program content implemented virtually will be essential in optimizing program efficacy.

5.5 Demonstration of Practice

As a demonstration of practice, I have created a program hosting handbook for a half-day medical career exploration program (Appendix H). The handbook explains the protocol that Dr. Berlacher and I used in designing the "I Look Like a Cardiologist" program with adjustments made based on the recommendation discussed in section 5.2. The handbook will be disseminated in electronic form to medical departments that have already expressed interested in hosting a similar program and to the Pennsylvania Chapter of the American College of Cardiology which provided funding for our program. In addition, Dr. Berlacher and I hope to present our program and the related findings at either a conference or through videoconferencing in the coming year. Interested medical departments will be made aware of the existence of the handbook and it will be sent to them upon request.

5.6 Conclusion

Overall, the data demonstrated that the "I Look Like a Cardiologist" program was a successful model for a half-day medical careers exploration program for young women. This

inquiry revealed the importance of relating to the students' current lives, making diversity and equity discussions central to the program experience, and encouraging meaningful and lasting mentoring. However, by making changes based on the above recommendations to the program hosting handbook, the program impact will be improved significantly, and the amended protocol can be disseminated to potential hosts. Because of the COVID-19 pandemic, the date of the next in-person hosting of the "I Look Like a Cardiologist" program at UPMC is uncertain, however I look forward to working with physicians both in Pittsburgh and across the country to adapt this program in order to begin the process of building a pipeline for the next generation of female physicians.

Appendix A Health Science Careers Exploration Survey Protocol

Part A: Administered 3 times, pre-conference, post-conference, 2-months post-conference

		Poor (1)	Needs Improvement (2)	Average (3)	Above Average (4)	Excellent (5)
1	How would you rate your current understanding of what a cardiologist does?					
2	How would you rate your current understanding of the ways that heart disease affects the community?					
3	How would you rate your current understanding of the process of applying to medical school?					
4	How would you rate your current understanding of the different types of cardiology?					
5	How would you rate your current understanding of the resources available to young women interested in medicine?					
6	How would you rate your willingness to					

	reach out to potential mentors for help with an application for an internship or job or for professional advice?					
7	How would you rate your current ability to help make healthy changes in your community?					
8	How would you rate your access to role models in medicine/science who are similar to you?					
9	How interested are you in attending medical school?	No Interest	Little Interest	Interest	Very Interested	Definitely Interested

What is your gender identity?

☐ Female ☐ Male ☐ Non-binary/ third gender

☐ Prefer to self describe _____☐ Prefer not to say

Trans and gender identity diverse (TGID) is an umbrella term that refers to people whose gender identity, expression or behavior is different from those typically associated with their assigned sex at birth. Other identities considered to fall under the TGID umbrella can include non-binary, gender fluid, and genderqueer – as well as many more.

Do you identify as TGID?

☐ Yes ☐ No ☐ Prefer not to say

Part B: Administered 2 times, post-conference and 2-months post-conference

		Poor (1)	Needs Improvement (2)	Average (3)	Above Average (4)	Excellent (5)
10	How would you rate your overall satisfaction with your experience at "I Look Like a Cardiologist"?					
11	How effective was your table discussion with the faculty members of cardiology issues in your community in helping you to understand the role of cardiology?					
12	How effective was your table discussion about equity issues in cardiology in helping you to understand challenging situations that some cardiologists might face because of their identities such as gender and race?					
13	How effective were the mini-lectures on why cardiology					

	and the process of becoming a cardiologist in helping you understand career of a cardiologist and the process of becoming one?					
14	How effecting/useful was the information presented in the medical school admissions crash course about college through graduate school admission?					
15	How effective was your meeting with your assigned mentor in helping to answer your remaining questions about cardiology?					

Part C: Administered 1 time, 2-months post-conference

		Never (1)	Once (2)	More than Once (3)	2-4 Times (4)	5+ Times (5)
16	In the past two months, how often have you been able to connect					

	something discussed at ILLC with your current schoolwork?					
17	In the past two months, how often have you spent time deeply considering or planning for a career in medicine including looking a pre-med websites, studying for standardized tests, talking with medical professionals about their careers, or other initial pre-health activities?					
18	In the past two months, how often have you been in contact with your assigned mentor over email?					
19	In the past two months, how often have you been in contact with another member of ILLC (other mentor, peer, program coordinator) over email for					

	advice about academic and career development?					
20	In the past two months, how often have you engaged in pre-health related community service?					
21	In the past two months, how often have you explored summer programs and internships related to pre-health careers?					

Appendix B Informed Consent Script for Interviews

Read to both student and parent if student is under 18

Thank you for sitting down with me and participating in a follow up interview that I am conducting as part of my EdD program at the University of Pittsburgh. The purpose of this interview is to learn about your experience with the "I Look Like a Cardiologist" Conference. For this 20-30 minute interview, I appreciate any insight you can provide about your experience with the ILLC program. Your honest feedback will help us to improve and expand the program.

Your participation in this interview is voluntary. You can stop the interview at any time or skip any questions. As we speak, I will be taking notes and audio recording our discussion. I will keep these notes and any transcripts confidential and will not share them outside my project. All data received from you will be given an ID#. All stored data will have this number on it and not your real name. All your responses are confidential, and data will be maintained under lock and key. We will not associate the information you provide with your name in reports, but it may be possible for someone to think they can identify you. Upon satisfactory completion of all data collection activities, you will receive a brief synopsis of the findings from our research study.

Based on what we have shared and given these conditions, do you agree to participate in today's interview? [If YES, continue. If NO, stop the interview and thank them for their time.] If the student is under 18, does your parent agree for you to participate in this interview? [If YES, continue. If NO, stop the interview and thank them for their time]. Do you have any questions before we begin? [Field questions, or say you'll reach back after consulting with project team members or course instructors]. I would like to audio-record the conversations to check the

accuracy of my notes. Do you agree to this? Does your parent agree to this? [If they disagree do not record and be prepared to take detailed notes]. Your parent is free to sit in through the duration of our interview or they may leave.

This interview is being conducted as part of my dissertation research for the EdD program at the University of Pittsburgh. My research is conducted under instruction and guidance of my advisor, Dr. Jill Perry, who can be reached at jperry@pitt.edu.

Purpose: To understand how students experienced the "I Look Like a Cardiology" Conference in order to improve and adapt the conference proceedings in a handbook for widespread use.

Appendix C Interview Protocol with Student Participants in the "I Look Like a Cardiologist" Conference: Adapted from Sandhu et al. (2018)

1. If What specific activities at the Conference had the greatest impact on your learning?
    a. *Probes:* Which activities do you find yourself still thinking about if any? How do you feel that simulations of challenging situations facing female cardiologists impacted you? What was your experience in the group discussions at your table with your mentors about public health issues in cardiology?
2. Are you still interested in pursuing medical school and a career in medicine?
    a. *Probes*: What did you know about medical school admissions before the conference? What was your understanding of residency and fellowship? What was the most surprising thing you learned?
3. Tell me about your experience with your "I Look Like a Cardiologist" mentor?
    a. *Probes*: How would you describe your meeting with your mentor? What advice did she give you related to being a cardiologist? Do you feel that she can continue to serve as a resource for you? Why or why not? How have you continued that relationship?
4. In the period following the conference, how has your thinking about your future college and career plans changed based on your attending the conference?
    a. *Probes:* Are you still interested in medicine? Why or why not? Have you considered other college or career pathways?
5. In the period following the conference, have you been able to relate any of the conference material to your academic classes in school or to your extracurricular activities?

a. *Probes:* What classes? How were you able to relate our discussions to those settings? What impact on your community have you had based on what you learned at “I Look Like a Cardiologist?”

6. In the period following the conference, have you explored any summer programs or internship possibilities that you learned about as a result of your participation in “I Look Like a Cardiologist?

    a. *Probes:* How are you planning to use your summer? Is there more information we could have provided you in order to help make those summer plans?

Appendix D Recruitment Email

Recruitment email for students and parents of students who have already expressed interest in being interviewed.

Dear {Student Name} and {Parent Name},

Thank you for offering to be interviewed about your experience with the "I Look Like a Cardiologist" conference. We are eager to hear your impressions of and suggestions for our program. We now have approval from the University of Pittsburgh Institutional Review Board (IRB) to begin scheduling and conducting our interviews.

Interviews will be conducted with a videoconference over Skype or FaceTime, which ever you prefer, and will lost no longer than 30-minutes. If you cannot videoconference, we can also arrange a telephone call. All interviews will be recorded with QuickTime Player and stored in a secure electronic location to which only I have access. The information from your interview will be anonymized before being analyzed for research purposes.

The interview will include the opportunity for you to ask me questions about both the "I Look Like a Cardiologist" program and about the research processes that I am using.

Please email me a list of times that it is convenient for you to be interviewed and if you are under 18, that your parent could also attend in order to give their consent for you to be interviewed. Parents may, but do not have to, stay for the duration of the interview.

Thank you again for volunteering to be interviewed. I look forward to our conversation.

Best,

Diana Rodgers
University of Pittsburgh Doctoral Candidate in Education

Recruitment email for students and parents of students who have not already expressed interest in being interviewed.

Dear {Student Name} and {Parent Name},

I am writing to see if you would be interested in being interviewed about your experience with the "I Look Like a Cardiologist" conference. We are eager to hear our students' impressions of and suggestions for our program.

Interviews will be conducted with a videoconference over Skype or FaceTime, which ever you prefer, and will last no longer than 30 minutes. If you cannot videoconference, we can also arrange a telephone call. All interviews will be recorded with QuickTime Player and stored in a secure electronic location to which only I have access. The information from your interview will be anonymized before being analyzed for research purposes.

The interview will include the opportunity for you to ask me questions about both the "I Look Like a Cardiologist" program and about the research processes that I am using.

Please email me a list of times that it is convenient for you to be interviewed and if you are under 18, that your parent could also attend in order to give their consent for you to be interviewed. Parents may, but do not have to, stay for the duration of the interview.

Thank you again for considering being interviewed. I look forward to our conversation.

Best,

Diana Rodgers
University of Pittsburgh Doctoral Candidate in Education

Appendix E Student Self-Assessed Knowledge of Cardiology and Medical School Admission, Access to Mentors, and Interest in Attending Medical School

Table 4 Student Self-Assessed Knowledge of Cardiology and Medical School Admission, Access to Mentors, and Interest in Attending Medical School

	Pre-Conference Average (n=40)	Post-Conference Average (n=29)	Pre-Conference to Post-Conference % Change	2 Months Post-Conference Average (n=27)	Post-Conference to 2 Months Post-Conference % Change	Pre-Conference to 2 Months Post-Conference % Change
Understanding what a cardiologist does*	2.92	4.03	27.54%	4.22	4.50%	30.81%
Understanding how heart disease affects the community*	2.82	3.9	27.69%	4.22	7.58%	33.18%
Understanding different types of cardiology*	2.05	3.52	41.76%	3.96	11.11%	48.23%
Ability to make healthy changes in your community*	2.9	4	27.50%	3.96	-1.01%	26.77%
Understanding medical school admission*	2.1	3.9	46.15%	4.22	7.57%	50.24%
Understanding resources for young women interested in medicine*	2.1	3.55	40.85%	4.22	7.58%	50.24%

Table 4 continued

Willingness to reach out to potential mentors *	3.69	4.17	13.01%	4.07	-2.46%	9.34%
Access to medical role models who are similar to you*	2.77	4.03	31.27%	3.93	-2.46%	29.52%
Interested in attending medical school?**	4.39	4.2	-4.52%	4.56	7.89%	3.73%

*Poor (1), Needs Improvement (2), Average (3), Above Average (4), Excellent (5) | **No Interest (1), Little Interest (2), Interested (3), Very Interested (4), Definitely Interested (5)

Appendix F Student Assessment of the Efficacy of Program Elements of "I Look Like a Cardiologist" and Overall Program Satisfaction

Table 5 Student Assessment of the Efficacy of Program Elements of "I Look Like a Cardiologist" and Overall Program Satisfaction

	Post Conference Average (n=29)	2 Month Post Conference Average (n=27)	% Change
Effectiveness of mini-lectures on why cardiology and the process of becoming a cardiologist*	4.45	4.26	-4.46%
Effectiveness of presentation on college and medical school admission*	4.62	4.37	-5.72%
Effectiveness of table discussion with the faculty members*	4.62	4.41	-4.76%
Effectiveness of table discussion about equity issues in cardiology*	4.66	4.48	-4.02%
Effectiveness of meeting with your assigned mentor*	4.34	4.11	-5.60%
Overall satisfaction with "I Look Like a Cardiologist"*	4.45	4.74	6.12%

*Poor (1), Needs Improvement (2), Average (3), Above Average (4), Excellent (5)

Appendix G Coding Schemes

Coding is an iterative process. First cycle coding used in vivo and descriptive coding. Second cycle coding resulted in three dominant themes. The two-cycle coding scheme is documented below.

Theme 1: Relating to Their Lives Now		
CODE: *Career Exploration*		
Sub-Codes:		
Non-Medical Career Paths	*Other Healthcare Careers*	*Career Selection Process*
Medical Specialties	*Other Science Careers*	
CODE: *Relevant Medical and Health Care Information*		
Sub-Codes		
Disease Prevention	Medical Information	New Public Health Awareness
Nutrition		
CODE: *Follow-up on Conference Material*		
Sub-Codes		
"revisit [conference material] to give me motivation"	*Applied to Summer Programs*	*Awareness Raising*
Community Service	*Independent Skill Development*	*Related Material to Coursework*
Reviewed Summer Program Resources	*Science Research*	*Shadowing Experience*
Shared Learnings with Peers	*Connected to Extra Curricular Activities*	*Non-Mentor Contact*

Theme 2: Preparing for the Physician Journey		
Code: *College and Medical School Admissions*		
Sub-Codes:		
"Normalizes the process of not getting admitted the first time"	*"get your skills together"*	*"online [research] can only get you so far"*
Challenging Application Process	*College Major*	*Medical School Application*
Standardized Tests	*Study Skills*	*Academic Achievement*
College Search		
CODE: *Increase in Self-Efficacy*		

Sub-Codes:		
"Benefit in the long run"	*"I'm ready for the battle."*	*Increased Understanding of Medicine*
"I could help fill that gap."	*Personally Relevant Advice*	*Following Passions*
Increase in Personal Self-Efficacy	*Medical Journey Now Seems Do-Able*	*Physician Capable*
Pre-Conference Misunderstanding Now Clarified		
CODE: *Enthusiasm for Medicine*		
Sub-Codes:		
Continued Interest in Medicine	*Increased Excitement About Medicine*	*Increased Interest in Cardiology*
CODE: *Challenging Career Path*		
Sub-Codes:		
"Pretty demanding schedule"	*Personal Demands of Medical Career*	*Personal Demands of Medical School*
Time Investment	*Rewards Despite Challenges*	
CODE: *Challenges for Women and URMs*		
Sub-Codes:		
"I could identify with a lot of the situations"	*"I know that I'm going to face that"*	*"It isn't going to be just me"*
"People sitting at my table had experienced that firsthand"	*"Perpetuated sexism"*	*Challenges for Minoritized Groups*
Challenges for Women	*Surprised This Still Happens*	

Theme 3: Envisioning the Future		
CODE: *Hearing Diverse Perspectives*		
Sub-Codes:		
Medicine as Service	*Professional Evolution*	*Positive Group Experience*
Different Career Focuses Within Medicine	*Diverse Career Journeys*	
CODE: *Positive Mentor Experience*		
Sub-Codes:		
"I felt like I could be honest"	*"It was very personalized"*	*"able to stay in contact and it was awesome"*
Limited Mentor Contact	*Personal Connection with Mentor*	*Mentor as a Resource*
Positive Day-Of Mentoring Experience	*Significant Mentor Contact*	*Mentor as Inspiration*

Additional Codes		
CODE: *Suggestions for Conference Improvement*		
Sub-Codes:		
Facilitate Post-Conference Mentor Relationship	*Make a Recurring Conference*	*Resources Aimed at 11th Graders*
CODE: Challenges Faced at Conference		
Sub-Codes:		
Decreased Self-Efficacy Over Time	*No Related Coursework*	*Shyness During Conference*

Figure 10 Coding Schemes

Appendix H Program Hosting Guide

I Look Like a Cardiologist

Program Hosting Guide

Diana H. Rodgers Ed.M., M.A.

Fit Education Consulting LLC

and

Kathryn Berlacher M.D., Ed.M.

University of Pittsburgh Medical Center

Introduction

The “I Look Like a Cardiologist” program was born over a cup of coffee: I was working on my doctorate in education with a focus on medical school admissions equity issues and Katie graciously agreed to allow me to interview her for a class paper. Katie and I had talked on a number of occasions prior to this because in her capacity of cardiology fellowship program director at the University of Pittsburgh Medical Center, she was my husband’s boss. I knew her interests in social justice, healthcare equity, and promoting women in cardiology would make her an ideal interview subject for my paper. I didn’t know, however, that our meeting would reshape my doctoral work and start the most exciting project in which I have ever been a part.

Women are underrepresented in cardiology despite their graduating from medical school and entering internal medicine residencies in equal numbers to men for almost 20 years. What would happen, Katie and I wondered, if we could reach out to talented young women interested in medicine earlier. In my professional capacity as an educational consultant focused on college and graduate school admission, I regularly encounter young women who would be ideal future cardiologist, but when they are pressed about their interest in medicine, they most frequently identify pediatrics, obstetrics, and oncology as career goals. Katie and I hypothesized that by introducing this type of high school student to cardiology early in their educational planning, we could develop a pathway into cardiology for young women.

UPMC was the perfect location to launch such a program. In addition to our being located in a racially and socioeconomically diverse city, UPMC’s cardiovascular disease

fellowship program has been about 50% women (the national average is closer to 20%) since Katie took over as program director. Further in the past five years, four out of the past five chief fellows have been women. That is, at UPMC, young female cardiologists are thriving. In addition, the Heart and Vascular Institute at UPMC has a culture of mentoring, equity, and community outreach that would make hosting a program for students easily attainable and consistent with institutional values.

This handbook is being written after two "I Look Like a Cardiologist" events have been successfully hosted. After our first conference in January 2019, I changed my doctoral dissertation research to be an evaluation of our program implementation and design using data collected at and after the October 2019 conference. This handbook is the result of that data analysis. **We believe that our model can be used in any academic medical center committed to diversifying their field and that this model can be transferred to a variety of specialties and for a variety of target populations.**

We look forward to hearing about your events inspired by or in direct imitation of "I Look Like a Cardiologist" and are happy to answer any questions you have about implementation and design.

Best,

Diana H. Rodgers M.A., Ed.M.

Founder|CEO Fit Education Consulting LLC

diana@fiteducationconsulting.com

Key People

Program Director

A female practicing physician with a passion for teaching and community outreach. In addition to serving as the face of the program for your student participants, this person has to be able to recruit mentors from the residency, fellowship, and faculty. Katie Berlacher served this role for us.

Program Education Coordinator

An educational consultant with expertise in your region. This person needs to be able to identify all of the target high schools from which you will recruit student participants and evaluate applications in a way that is sensitive to the diversity of students' experiences. Knowledge of educational nonprofits and foundations in your region is a plus. This person is the point-person for students and their families during the application process and in the follow up process. A good place to look for this person is by using the IECA website in order to identify educational consultants with experience in college and secondary school admissions. Alternatively, if your university has a Master's degree program in Higher Education or Private School Administration, you could look there to find someone with an admissions or counseling background. Diana Rodgers served this role for us.

Administrator

An administrator who works at the hospital or for the department can be incredibly helpful in securing parking permits, a conference space, ordering catered lunches and snacks, assembling swag bags, and contacting internal public relations and local press. It is helpful to have this person on hand on the day of the event to put out any logistical fires.

Recruitment

Done entirely by Program Education Coordinator

Assembling a diverse group of young women interested in medicine takes planning. We wanted to be able to select the students based on our perception of their actual ability to eventually be admitted to medical school. However, we wanted a holistic process in which a student with more middling grades, but whom had extraordinary circumstances that accounted for lacking grades (foster care, recent immigrant, extreme poverty) would not be excluded. With the following application and admissions process, we hosted racially, economically, ethnically, sexual orientation/gender identity, and geographically diverse groups of girls.

This is the recruitment timeline:

5 months prior

- Build your website. Ours is www.ilooklikeacardiologist.com.
- Identify your target high schools and community partners and make a spreadsheet with email addresses and mailing addresses. We identified the principal, guidance counselors, and science department heads at every public, religious, and private high school in Allegheny County and high schools on the borders of neighboring counties. We also emailed several local education nonprofits.

4 months prior

- Email a link to your website and a pdf of your application materials to all school and community officials in your spreadsheet.
- Mail a poster advertisement, several applications, and an information cover letter to each high school. To whom you put the attention on the envelope is up to you, however, we prioritized gifted and talented coordinators and high school science department chairs. A HOSA teacher-coordinator might also be a good choice.

2 months prior

- Applications should be due two months prior to your event. We allowed students to submit by mail or electronically.
- Review applications and offer acceptances, waitlists, and denials. See next section about application review.
- Accepted students should RSVP with an online form (Google Forms worked for us). Include full name, high school, parent name, student contact information, parent contact information, dietary restrictions, and if relevant, tee shirt size in the RSVP.
- Waitlisted students should complete an online form indicating their interest in remaining on the waitlist.

1-2 weeks prior

- Follow up with all enrolled and committed students with parking information and any permission slips they will need to submit.

Admissions

Done entirely by Program Education Coordinator

Application Design

The application can be paper or electronic. We were very flexible with the way that things were submitted (all in the body of an email, a pdf, mailed), as long as all relevant material was included. We required the following information:

- Biographical Information
  - Full Name
  - Phone Number
  - Email Address
  - Parent/Guardian Name and Phone Number
- Educational Information
  - High School Name and Graduation Year
  - Guidance Counselor Name
  - Complete transcript with current year courses listed
  - Any relevant test score reports such as PSAT, SAT, AP, ACT, PSSA, SSAT, IB
  - Essays (about 250 words each)
- Required of all students: We are interested in bringing together a diverse group of young people from backgrounds underrepresented in medicine including female students, racial and ethnic minority students, GLBTQIA+ students, first generation college students, or students from a disadvantaged socioeconomic background. In a few short paragraphs, introduce yourself and tell us about your unique background or identity.
- Choose 2 of the following:
  - How did you become interested in a career in medicine, and what excites you about working in health care?
  - What is the most significant health care challenge that you observe in your community, and what would be the first step that you would take after completing your medical training to address it?
  - Please discuss your most significant extra-curricular activity. Why is it so important to you?
  - What challenges do you think women and underrepresented minorities in medicine may face that their peers to not face? How would you start to address that challenge?

I Look Like a Cardiologist!

A Free Outreach Program for Diverse High School Students

Scaife Hall in Oakland, Pittsburgh

Heart disease is the most frequent cause of death for Americans.

The next generation of physicians will be the ones to change that fact.

Dear Teachers, Counselors, and Community Leaders,

We are thrilled to invite your students to apply to the I Look Like a Cardiologist Conference hosted by Dr. Kathryn Berlacher, head of the Cardiology Fellowship Program at the University of Pittsburgh Medical Center. We had our first conference targeting young women in January and due to its success, we want to expand the program to other students from backgrounds underrepresented in medicine. Students must be in 10^{th}-12^{th} grade in Fall 2019 and identify as female.

The event will include:

- A panel discussion with diverse young cardiologists on being a pre-medical student in college, medical school admissions, and the process of becoming a doctor
- An interactive workshop about being underrepresented in medicine
- Information about free and paid summer programs for pre-med high school and college students
- Mentoring sessions
- A crash course in cardiology with Dr. Berlacher

Further, it is our hope that each student who attends will be paired with a current physician who can provide mentoring throughout the student's high school and college years.

We will be selecting 40 students to attend. **The application deadline has been extended to September 25 and admissions decisions will be emailed by September 29.** Please share this letter with your science department colleagues, HOSA advisors, GATE coordinators, and college counselors who might be able to identify interested students. Students may apply by mail using the attached application or online at www.ilooklikeacardiologist. com. Please feel free to make copies of the application and hang the flyer.

For more information and copies of the application, visit: www.ilooklikeacardiologist.com.

We look forward to working with your students.

Best,

Kathryn Berlacher, M.D., M.S.

Cardiology Fellowship Director at UPMC

Program Director

Diana Rodgers, M.A., M.Ed.

Doctoral Candidate in Higher Education Management at University of Pittsburgh

Education Coordinator

I Look Like a Cardiologist!

October 19th, 2019-Application

Personal Information

Last name: _____

First name: _____ Middle name: _____

Date of birth: _____ Contact phone:_____

Email:_____

Parent/guardian name:_____

Parent guardian email:_____

Education Information

High school:_____

Graduation year:_____

Guidance counselor name:_____

Science course and level for 2019-2020 school year:_____

Math course and level for 2019-2020 school year:_____

English course and level for 2019-2020 school year:_____

Required Question

1. We are interested in bringing together a diverse group of young people from backgrounds underrepresented in medicine including female students, racial and ethnic minority students, GLBTQIA+ students, first generation college students, or students from a disadvantaged socioeconomic background. In a few short paragraphs, introduce yourself and tell us about your unique background or identity.

Short Answer Questions

Please either handwrite or type answers to 2 of the 5 following questions. Each answer should be about 100-250 words.

2. How did you become interested in a career in medicine, and what excites you about working in health care?
3. What is the most significant health care challenge that you observe in your community, and what would be the first step that you would take after completing your medical training to address it?
4. Please discuss your most significant extra-curricular activity. Why is it so important to you?
5. What challenges do you think women and underrepresented minorities in medicine may face that their peers to not face? How would you start to address that challenge?

Supporting Information

Please attach the following documents

- High school transcript (unofficial or a photo is fine)
- Any SAT/PSAT/ACT/AP/IB/PLAN scores (unofficial from College Board or ACT website are fine)
- Any other information that you feel is relevant to help us make our acceptance decision.

Admissions

This was done entirely by Program Education Coordinator

Application Review

- We found it helpful to enter all of the application material into a single spreadsheet.
  - In addition to the biographical and education categories, add columns for weighted GPA, Class Rank, Current Math Course/Level, Current Science Course/Level, Current English Course/Level, Test Scores, Academic Score, Essay 1 Score, Essay 2 Score, Essay 3 Score, Essay Total Score, Bonus Points, and Application Total
  - Fill in everything except the Academic Score, Essay Total Score, Bonus Points, and Application Total
- Calculating the Academic Score
  - Sort the applications by high school. This will allow you to see how students are performing within the context of their high school.
  - Review each student's grades, paying particular attention to their enrollment in honors/AP/IB/CHS classes, class rank, and standardized test scores.
  - Be sensitive to the expectations of a student based on grade level. That is, it would be unusual for even a high achieving 10th grader to take AP Calculus but this would probably be the expected math course for the majority of your 12th grade applicants.
  - Assign a holistic academic score out of 15 points.
- Calculating the Essay Scores
  - Each essay is worth a maximum of 5 points.
  - Students should have thoroughly and thoughtfully answered the question asked.
- Bonus Points
  - Your organization can determine a maximum amount of Bonus Points to award students. We have a maximum of 3 points.
  - Students can earn Bonus Points for any reason that makes sense for your institution. Think about populations that your mentors are most interested in serving based on their personal identities and set up your terms explicitly.
  - For reference, our bonus point categories:
    - 1 bonus point to any student who attends a Pittsburgh Public School or Oakland Catholic High School as a gesture of goodwill to our academic neighbors.
    - 1 bonus point to students who wrote about being from racial/ethnic groups underrepresented in medicine, being a first-generation college student, and/or being from a disadvantaged socioeconomic background such as receiving free lunch or living in public housing and/or being an immigrant or English Language Learner.
    - 1 bonus point to students who wrote about identifying on the LGBTQIA+ spectrum because this is a group that our faculty and fellows are passionate about serving.

Final Decisions

After you have evaluated all of your applications and scored them, sort the applications by score.

- Identify how many students you will accept to the program, waitlist, and deny. You do not have to deny any student, you can waitlist everyone not accepted, but we denied students whose application scores were significantly lower than other applicants.
- You may choose not to accept only the top scorers. For example, if purely accepting students who scored 25 points or higher would result in an overrepresentation of students from a certain high school or background, you may want to look towards your waitlisted students in order to create the balance that you are looking to achieve.
- Only accept the number of students for whom you have space to host.

Notification

- Build a reply form website for accepted students that you can link to in your acceptance email. For us, this is a non-navigable page within our main website.
  - Create response areas for name, email address, parent/guardian name and contact. If you are going to give away a tee-shirt, ask for size. If you are going to serve food or snacks, ask about dietary restrictions.
- Build a reply form for waitlisted students that you can link to in your waitlist email. For us, this is a non-navigable page within our main website.
  - Create response areas for name, email address, and if they would like to stay on the waitlist or would like to be removed from in.
- We use a MailChimp account in order to send mass emails.
  - Draft and send a celebratory acceptance email to all of the accepted students and their parents that includes your RSVP link. You may also want to inform them that details such as parking and location will be confirmed in an email about a week prior.
  - Draft and send an email to all of the waitlisted students and their parents that includes the waitlist request link. Identify if you are planning on holding a subsequent conference and encourage those students to apply again.
  - Draft and send a denial email to those students. You may want to encourage these students to apply again or you may just want to write that the application process was competitive, and you wish them the best of luck in the future.
- Monitor the responses. Within a week, we had all but two responses. In both cases, I sent a follow up email to the accepted student and their parent from a regular email address because I suspected that the email was sorted into junk.
- Accept students off the waitlist if necessary.

Recruiting Mentors

Done entirely by Program Director

Who should serve as mentors?

- Mentors should represent different points on the medical school through practicing physician journey. Ideally, you'll have female medical students interested in cardiology, internal medicine residents interested in cardiology, cardiology fellows, and cardiology junior and senior faculty.
- Mentors should be from diverse personal backgrounds and be comfortable speaking about these backgrounds. Having mentors that the students could personally relate to was one of the things that the students reported loving most about their experience. For example, one Black student had never met a black doctor prior to our conference, and she reported an increase in self-efficacy just from talking with our three Black mentors.
- Mentors do not necessarily have to be women, but they have to be committed to gender equity within cardiology and be willing to speak to students about gender equity issues.

How many mentors?

- Ideally, one mentor for each student.
- Realistically, a 2:1 student to mentor ratio is fine.

What is expected?

- All mentors are expected to contact the education coordinator or the administrator with the name that they prefer the students to call them, their educational information and any details they want the students to know in the "Meet Our Mentors" handout and their tee-shirt size.
- All mentors are expected to be at the conference for the duration of the day.
- All mentors are expected to fully participate in conference activities.
- All mentors are expected to fully engage their student(s) and offer practical advice during the 1:1/2:1 time.
- Table leader mentors lead the small group discussion parts of the morning which include conversations on public health and workplace challenges and discrimination.
- All mentors are expected to follow up with their mentees occasionally over email.

Why should someone volunteer to serve as a mentor?

- A great outreach opportunity if they are interested in medical education or public health.

- A great opportunity to spend informal time with professional peers.
- All of our mentors reported feeling energized and more passionate about their work following the conference.

Preparation

Swag Bag *Assembled by Administrator*

- We gave each student and each mentor a swag bag
- Our bags were reusable logoed bags from the Pennsylvania ACC chapter, but paper gift bags would work, too. Reusable grocery bags with the medical school or hospital logo would also be a fun choice.
- Name tags. Students have their preferred name and high school. Mentors have the name that they prefer the students to use. Our mentors varied from "First name only" to "Dr. First Name" to "Dr. Last Name."
- We had tee-shirts made with our "I Look Like a Cardiologist" logo that we included. If including tee-shirts, clip nametags to the outside of the bag so that the right size is given to each student and mentor.
- We included prepackaged snacks and a water bottle that students could have at any point during the morning.
- A folder and pen with copies of all conference materials and the following handouts:
  - Activity Schedule
  - Meet Your Mentors: a quick guide with mentors' names, stage in training/practice, email address, educational background, and other information.
  - Sheet with list of student names and their paired mentor.
  - Sheet with student table assignments.
  - Summer Programs guide: a list of low and no cost summer programs for teenagers in your region (prepared by Education Coordinator)
  - College admissions tips (prepared by Education Coordinator)

Plan Conference Activities and Flow

- The Program Director and the Education Coordinator plan the conference activities and delegate tasks and topics to mentors when necessary.
- Our conference schedule and activities follow this page with all example hand-outs.
- Assign students to table groups with about 4-6 students and 2-3 mentors per table. Take care to separate students who go to the same school and have mentors represent diverse backgrounds and career points at each table.

Logistics *Largely handled by Administrator*

- Identify a conference space and order appropriate table set up.
- Determine where students should park if driving themselves and secure parking vouchers.
- Order food and drinks, we served breakfast/snack and lunch.
- Assemble swag bags.

- Alert internal public relations and local media

Final Email

- The Education Coordinator should draft a final email with all of the logistics.
- Include any permission slips that you want/need the students to print and bring with parent signatures. We drafted a general participation permission and included a UPMC media permission slip in order to publish photos and videos of the conference.

Conference Activities

I Look Like a Cardiologist Schedule

7:45-8:20	Registration and Introduction
8:20-8:35	Mini-Lecture: Cardiology 101 *Program Director*
8:35-8:50	My Journey to Becoming a Cardiologist *Dynamic Junior Faculty Member*
8:50-9:45	Facilitated Small Group Discussion: How table mentors chose cardiology and cardiology in the community
9:45-10:00	Break and snacks
10:00-10:30	Presentation and table discussion: College and medical school admissions crash course and mentors share how they chose their college
10:30-11:00	Bring yourself to cardiology
11:00-11:50	Facilitated small group discussion: Challenges of underrepresented physicians
11:55-12:00	Formal programming wrap-up
12:00-12:30	Lunch with paired mentor
12:30-1:00	Networking more broadly and closing thoughts

Registration and Introductions

- The Program Director and Education Coordinator arrive early and label the table numbers in order to facilitate getting the students to their assigned group.
- The Program Director and Education Coordinator greet the students and mentors as they enter the conference space and help them find their swag bag and assigned table.
- Once all of the students have arrived, the program director welcomes the group to the conference.
- All mentors are invited to stand up and introduce themselves. We recommend the mentor introduce their full name, the name they want the students to call them, and their job title. For example: "My name is Dr. Jane Good, but please call me Jane. I'm currently the chief cardiology fellow at UPMC."
- All students are invited to stand up and introduce themselves. We recommend the student share his/her name, grade, and high school.
- The Education Coordinator introduces him/herself and identifies him/herself.
- Tell the students, if applicable, that they are permitted to use the restroom, drink water, eat a snack whenever they want. Remember that at their high school, this is unlikely the case.

Mini-Lectures

Our students liked being talked to like adults. Aim for a first-year college student level.

Cardiology 101

- The Program Director gives an interactive mini-lecture on cardiology using Powerpoint.
- It is useful to frame this lecture in the material of a typical high school biology class. Students will have likely been exposed to organ systems and the circulatory and respiratory system. Use this anatomy knowledge as a starting point.
- Lecture may want to include different types of cardiology, common cardiovascular diseases, the reason why cardiovascular disease is so pervasive, what the work-day of a typical cardiologist looks like.
- Make it as interactive as possible. For example, when you put an EKG on the Powerpoint "How many of you have ever seen this?," "What do you notice?," "Table mentors, can you explain this image to your group?"

Why I am a Cardiologist

- Prior to the conference, identify the most dynamic speaker among your mentors. For us, this was a young male attending who we knew could convey enthusiasm and warmth and was unafraid to be a little self-deprecating.

- Have this person present a mini-lecture that may or may not include Powerpoint slides about their journey from high school to fellowship or practice and why they chose the field of cardiology.
- The goal is to make the students excited about this field as potential path and to clarify the steps to becoming a cardiologist.

Facilitated Small Group Discussion: Cardiology in the Community

Lead by the mentors at each table

How We Chose Cardiology

Within table groups, all mentors should explain how they selected a career in medicine and cardiology more specifically. Emphasize the process of choosing a career. What other careers did you consider? How did you narrow down your choices?

Cardiology in the Community

Now that the students have some basic information about cardiology as a field, the table mentors can begin a discussion about how the students might be witnessing cardiovascular health issues in their communities. This will likely be different based on the specific healthcare needs of your community, but here are topics that the students found both interesting and accessible:

- Obesity
- Nutrition, especially in regard to school lunches and availability of fresh food
- Tobacco usage
- Opioid epidemic
- Juuling and vaping, actually our students taught our mentors a lot about this
- Mental health and health care
- Health care access and affordability
- Pregnancy and women's health, many of our students were interested in women's issues and reported liking adults who spoke with them candidly about these issues
- Alcohol usage
- Genetics

Action Steps

Mentors should finish this discussion by asking each student to identify a way that they can currently work to improve the heart health of their community. A good way to do that is to ask students about the activities in which they are currently engaged and build from there. For example, a student in student government might feel empowered to advocate for more heart healthy school

lunch options. A student on the cross-country team might be able to develop a buddy walking or running program with a local senior center.

Mini-Lecture: Pre-Med Admissions Crash Course

Presented by the Education Coordinator. If education coordinator does not have an admissions background, recruit a local college counselor to present. The Independent Educational Consultant Association has a geographically sorted counselor directory.

The goal of this presentation is to give the students relevant information about getting admitted to colleges which will best support their pre-medical journey. Discuss standardized testing prep resources, internship and summer programming opportunities, course selection, interviews, and community service expectations.

Medical school admissions topics should include that there is no “pre-med” major, medical school admissions course requirements, MCAT, pre-health advising in college, research and service recommendations.

During the follow up question session, the students may have specific questions about medical school admission, so it could be helpful to have a mentor who has served on a medical school admissions committee if one is available.

Diana Rodgers, our program’s education coordinator, prepared a handout that is found at the end of this document. This handout guided our discussion and you are free to use it unchanged as long as it is attributed.

Panel Discussion: Bring Yourself to Cardiology

Facilitated by Program Director—four mentors had been approached prior to the conference about their willingness to speak about their personal identities

The purpose of this panel is to show the students that while being a physician is a huge part of our mentors' identities, it isn't the only part of their identity. People of all backgrounds and interests can and do become cardiologists, and they are able to incorporate bits of themselves into their practice.

We did this by asking 4 mentors from backgrounds similar to some of our students to each talk about a specific part of their identity, how it impacted their medical school through practice journey, how their background helps them be a better physician. While each of the four panelists spoke uninterrupted for about 2 minutes, a conversation emerged about being able to relate to their patients in ways different than physicians from more represented backgrounds, how to explain their career to their family, and how their career goals are shaped by their underrepresented background.

Our panelists spoke about the following identities: being African-American, being a first generation college student, being a member of the LGBT community, and being LatinX. In conversations with our student participants, several of the girls mentioned that they wanted to hear more about being both a mother and a physician and another student mentioned an influential conversation she had during some of the open networking time with a mentor who had served in the military.

Your panelists should reflect your students in meaningful ways and the students' applications will probably be your best guide as to who should serve on your panel. For example, if several of your students are Hijabbi Muslims and you have a fellow who wears a Hijab, perhaps she would be willing to speak about this. Similarly, if your student population has a large number of immigrants or first-generation Americans, a doctor who immigrated to the US as a child may be an ideal pick.

Facilitated Small Group Discussion: Challenges of Underrepresented Physicians

During the facilitated small group discussions, the mentors will present several scenarios to the students at their table groups. The goal of this discussion is to show the students the ways that different groups whom are underrepresented in medicine may face discrimination or mistreatment. By talking through how these situations could be handled, the students will start to develop the tools to combat discrimination and the self-efficacy to realize that any slight directed at them based on their race, gender, or other underrepresented status is the result of societal issues not a lack of aptitude.

The scenarios that we developed are based on experiences shared by the fellows and faculty at UPMC and you are free to use ours with attribution or develop your own specific to your institution or student population. Our scenarios focus on women in medicine because 41/42 of our students were female-identifying. The scenarios are found on the following page.

Challenges of Women in Medicine Scenarios

Developed by Diana Rodgers

in consultation with the 2018-2019 Female Cardiology Fellows at UPCM

Print one of these sheets out per table and give to one of the mentors.

Scenario 1

It is time for your college counseling meeting at your high school. You are meeting with your guidance counselor discussing your plans for the future when you mention that you hope to complete a biology major with pre-medical training because you hope to become a physician. Suddenly, your guidance counselor smiles gently at you and says, “Training to be a physician is such a long process, have you considered nursing instead?” How do you respond?

Scenario 2

You are a college sophomore in an introduction to programming class. You took this class because you’re interested in the ways that computer programming can help analyze health data to show disease patterns in certain populations. You are doing well in the class and are helping your friend, Matt, who is struggling. After going to office hours to meet with the professor about a recent test, Matt is offered a spot in the professor’s research lab. You also go to office hours and despite having earned a higher grade, the professor does not tell you about any research opportunities. You suspect this is because you’re female. How do you address this?

Scenario 3

You made it to medical school and are a third-year student considering what type of residency best suits your talents. Your interest in cardiology has only deepened (how could it not?!) and you tell your family at Thanksgiving that you plan on doing an internal medicine residency followed by a cardiology fellowship. Your dad is beyond proud of you, but your mom gets upset and asks through tears, “Aren’t you going to think about having babies?” How do you respond?

Scenario 4

You are a cardiology fellow making rounds in the CCU. You have a group of third year medical students with you and you are teaching them the basics of your field. You enter a patient room and present the patient. When you ask the patient if he has any questions, he directs all of his questions to the male medical student even though you have made it clear that you are the doctor and he is still in training. How do you respond politely and professionally?

Lunch with Paired Mentors

The logistics of this will probably vary based on your space and the type of meal which you are providing. In both the students' and mentors' packets that they were given at the beginning of the day, a list should of mentor/student pairs should have been provided. We had students find their paired mentor, both selected a box lunch, and the mentor/student pairs and groups found a place to eat and talk.

We did not give specific guidance about the contents of their discussions, but the students reported learning about the mentor's educational path, the ways that they incorporated their personal interests into medicine, and what the mentors wish they had known about college and career while still in high school. The students liked sharing their interest with the mentors and having the mentors suggest college courses and experiences that the students might like.

We capped these meetings at about 30 minutes and all of the students reported wanting more time. We think it is better to stop the meetings short than to have them get too long and awkward. Further, by encouraging the meetings to wrap up before they are truly finished, you can encourage the students and mentors to continue the relationship over email which will help lead to the lasting relationships that we seek to build. **Provide students with the full names and email addresses for all mentors in their program packet.**

Open Networking

Allow time for the students to talk to any of the mentors or other students whom they want. By building in the time, students are free to make meaningful connections that will last. Our students have invited physicians to come speak to their advanced biology classes, set up meetings to learn more about research, and initiated shadowing opportunities during this time.

Wrap Up

Thank the students for attending and the mentors for volunteering their time. Let the students know that they will continue to receive emails from the education coordinator, if applicable, and encourage them to stay in touch.

10 Tips for College-Bound High School Students and Future Professionals

Diana Rodgers

Founder/CEO Fit Education Consulting LLC

The following is advice that I share with my college applicant clients. Of course, none of this is a silver bullet that will guarantee your acceptance at a single dream college, internship, or graduate program. But, these are easy steps that you can take in high school and college to maximize opportunities available to you.

Get a professional email address that will travel with you for life and learn how to write an email like an adult.

Many of you have school email addresses. That's fine, but your school has the right to terminate them after graduation. I encourage my college applicants to use a Gmail address for all professional work. This way, you can also always save a resume in Google Drive/Docs and people from various points in your life can always reach you. Make it your name or your name with a number.

When emailing with adults for professional and educational reasons, make sure to sound professional. Start with a greeting such as "Dear Dr./Professor/Ms./Mr/ Jones." Acknowledge your shared experience or humanity such as "I enjoyed meeting you at the rockclimbing conference" or "I hope you are well." Explain as briefly as possible why you are writing such as "I am writing to ask you for a letter of recommendation for my study abroad program" or "I am writing because I would like to set up a time to meet in order to review my recent term paper." Add a closing such

as “Sincerely,” “Gratefully,” “Kindly,” your first and last name, and how they know you such as “Student in Chem 101 course” or “Central High School, Philadelphia.”

Dress nicely for school.

Even if you wear a uniform, take increased pride in your appearance. I call this the Pat Monaghan rule because when I was a teacher, we had a student who was a nice, polite kid, but not a stellar student. However, his parents always made him wear a button-down shirt to school every day. One day, a government official made a surprise visit to our high school and we needed a kid to give him a tour. Pat was tapped because we knew that he would look presentable in the photo-op and because he was reliably polite and articulate. Pat’s tour turned into a summer internship at the State House, acceptance at his “reach” college, and now a public policy job.

Similarly, you never know when one of your professors in college will bring in a last-minute guest speaker with whom you would love an internship. Are you really going to go up to this person after class looking like you rolled out of bed?

Talk to every adult about their work.

There are so many cool jobs that you might not know about. Ask adults around you about their professional life, the training that they needed, and what they like about their jobs. You might be inspired to explore a different career path.

I realize that job titles might be misleading or confusing. Truthfully, when many of my friends tell me their official title, I have a hard time picturing their work life. I have learned to ask: “So what does a typical workday look like for you?” if I’m unclear.

Take the hardest level of math available to you in high school.

So many fields at the college level and beyond require a strong mathematics foundation. When I am working with an applicant interested in highly selective colleges and careers, the first that that I look at is their math level. At minimum, try to get one year of calculus in high school. It is often possible for you to "skip" a year of high school math by doing a summer course or independent study online. If you feel that you are behind in math, speak with your guidance counselor about these options.

Learn to seek out mentoring.

A great mentor can open a lot of doors for you and inspire you to try new things. If there are adults in your life who have jobs that you're curious about, attended a college that you're interested in, or have made some interesting life choices that you want to learn more about, seek them out. Ask them to meet you for coffee or to eat lunch in their classroom. Asked them about their careers and lives. You are not being a pain or too forward! A really smart young person once told me that a student could get a great education at his underperforming school if they knew where to look for it. What he meant was that he would listen to his friends talk about the teachers whom he didn't have in class, and if they seemed interesting, he would go an introduce himself.

I taught high school for six years before incorporating my consulting practice. I am still in regular contact with over 50 of my former students and about 40 of my former clients through email and texting. We FaceTime to talk about course selection in college and graduate school or I'll text them an opportunity for an internship that I come across when looking at summer programs for a current client. Because they make the effort to stay in touch with me, I know what they're

interested in and can point them in the right direction or to someone who I know that might have a good answer to their questions.

Write thank you notes to everyone.

Along your educational journey, you will encounter a lot of people who help you directly or indirectly. You need to reach out and offer some kind of formal thanks in the form of a handwritten note or an email. Did one of your teachers tip you off to this program? Send her a thank you email this afternoon explaining what you learned. Did your dance teacher connect you with a college dance coach? Send him a thank you. People are willing to go out on a limb for you if they feel appreciated.

If you don't already do this, you should be writing a thank you note/email to each of your teachers at the end of each school year after grades are posted (so it doesn't seem like you're angling for a higher mark). It doesn't have to be long or saccharine, but it should acknowledge your appreciation and what they taught you. Handwritten thank you notes are absolutely mandatory for college interviewers. Hint: send the mentors with whom you interact today a thank you email!

Pare down your extra-curricular activities.

Can you throw a football like Tom Brady? Did you play the cello at Carnegie Hall? Has your artwork received national level awards? If you answered no to all of these questions, the reality is that your extra-curricular activities are not going to be the thing that gets you into college, medical school, or beyond. Of course, you need to do something, but the biggest challenge that I am currently facing with my top college applicants is that they are doing too many things.

As a junior or a senior, feel free to quit any activity in which you do not have a leadership or prestige role. Do not be afraid that you will look bad if you quit. In fact, it's a really good idea to quit any minor extra-curriculars in order to devote your time to academics and the activities that matter most to you. It's also okay to quit activities to get a job if you need to help pay for your education.

Keep a constantly updated electronic resume.

Over the next few years, you will have a lot of academic and professional experiences. If you do not track them, it is likely that you will forget what you have attended and accomplished. Every time you do something, notate what it was, what adults were in charge, how many hours, and any important take away information. This is particularly important for community service hours which tend to get lost. Start today with ILLC!

Do not pay for community service!

Spending a week in Haiti (or Appalachia or India or wherever) tells me that your parents had enough money to send you on a service trip, not that you are committed to community service. Further, there has been recent backlash against the influx of eager young Americans doing service abroad in that they are often unskilled in what they are doing, are taking jobs away from locals who need them and who do have the requisite skills, and potentially lead to further lack of stability for the children with whom they interact. Something like 90% of the wells built by mission trips around the world are not functional. Children in orphanages in developing nations need qualified, permanent math teachers, not a teenager who recently completed geometry and will be swapped out in a week for another group of teenagers.

Instead, save your money and actually develop a meaningful relationship with service in your own community. Develop and execute a meaningful project such as starting a middle school girls reading group at your local library or commit to regular hours at a local non-profit such as spending every Sunday afternoon at a food pantry.

Learn How to Take Standardized Tests

Standardized tests are a reality of professional life. Even after you are admitted to college, you will have to take standardized tests for graduate and professional school admission and to be licensed in your field. Seriously, ask the mentors here how many standardized tests they have to take to become cardiologists. Taking these tests is a skill that is separate and apart from knowing the information.

There are many great resources online. If you still have to take the SAT, I recommend the free online Khan Academy tutorials. If you are looking for a tutor for the SAT or other standardized testing around college admissions including Subject Tests and APs, I recommend Goldstein Test Prep. They are an affordable option, but more important, their educational director focuses on teaching kids HOW to test so you should be able to apply the skills from SAT/ACT prep to MCATs, USMLEs, and other required testing throughout your career without needing tutoring for each test.

Follow Up Emails

For about 4 months following the conference, the educational coordinator sent a brief monthly email to the students and their families with related material. Often, the emails would include a spotlight on one of our mentors, college application tips, lists of summer programs, or lists of scholarships for which many of our students qualified. This was similar to the other handouts that we provided in the students' folders and that follow this page.

Follow Up Handout

Provide all students with a handout that has every mentor's name, title, and email address. Include a list of ways that students and mentors can continue their relationship including:

- Feedback on a science fair project
- Inviting the mentor to speak to a high school science class
- Organizing a shadowing experience
- Feedback on a college essay or interview
- Asking for feedback on course selection options

Free and Low-Cost Summer Programs for Students Interested in Medicine

Diana Rodgers

Founder/CEO Fit Education Consulting LLC

For current 11th graders

Pennsylvania Governor's School for the Sciences at Carnegie Mellon

Free 5-week summer science intensive.

http://sciences.pa-gov-schools.org/

Hillman Cancer Center Academy

Free program at University of Pittsburgh Medical Center in cancer research. Stipends (payment) available for some qualifying students.

http://hillmanacademy.upmc.com/apply-now/

Center for Disease Control Camp

Free 5-day camp in which you learn about epidemics, biostatistics, and public health. It is in Atlanta and housing is not provided, so you need to stay with friends/family or at a hotel.

https://www.cdc.gov/museum/camp/detective/index.htm

Summer Engineering Seminar at Santa Clara

Take engineering courses and learn about applied science. Low cost and includes college credits.

https://www.scu.edu/engineering/beyond-the-classroom/outreach/summer-engineering-seminar-ses/

For Current 11th and 12th Graders

Summer Internship Program in Biomedical Research for High School Students at the National Institute of Health

Paid program at several sites around the country for students interested in science research.

https://www.training.nih.gov/programs/hs-sip

Magee-Women's Research Institute and Foundation High School Summer Internship

Complete a 4-week research program with a mentor in reproductive biology, women's health, and/or infant health in Pittsburgh

https://mageewomens.org/education/high-school-summer-internship-program/

National Eye Institute Summer Intern Program

Complete a summer internship researching disease of the eye in Maryland. Receive a housing stipend.

https://nei.nih.gov/training/summer_intern

National Institute of Arthritis and Musculoskeletal and Skin Diseases

Complete a summer internship in Maryland. Receive a housing stipend.

https://www.niams.nih.gov/labs/education-training/student-research-training/summer-student-program

For College Students (Current 12th graders accepted to college often qualify)

Summer Internship Program in Biomedical Research for College Students

Paid program in Bethesda, Maryland for students interested in science research

https://www.training.nih.gov/trainees/summer_interns

Children’s Hospital of Colorado Summer Child Health Research Internship

Paid research program at Children’s Hospital Colorado in pediatric research.

https://www.childrenscolorado.org/research-innovation/training-opportunities/

Computer Science Summer Institute at Google

Crash course in computer science, coding, and analytics.

https://buildyourfuture.withgoogle.com/programs/computer-science-summer

institute/#!/qualifications-and-application?detail-content-tabby_activeEl=overview

Summer Premedical Academic Enrichment Program at Pitt

Gain research and shadowing experience while getting hands-on premedical advising.

http://www.medschooldiversity.pitt.edu/our-programs/summer-premedical-academic-enrichment-program-spaep

Notes

This is just the tip of the iceberg. There are hundreds of free and paid summer research, internship, and career experiences for young people. Google is your best friend. Additionally, touch base with your guidance counselor to see if there are local programs that are not widely advertised.

I Look Like a Cardiologist and the Common/Coalition Application

For current seniors:

If you were deferred and/or waitlisted at some of your colleges, you should be sending an appeal letter in which you update the college about your recent accomplishments as they begin to reconsider your application. Feel free to use the following language as a template:

- I was selected through a competitive application process to attend I Look Like a Cardiologist, a free conference for high school girls interested in health care. I spent the day meeting with current female cardiologists, learning about the field, and participating in networking and simulation activities. **ADD SOMETHING PERSONAL ABOUT YOUR EXPERIENCE HERE.**

For current juniors:

When you fill out the Common/Coalition Application, you should include your attendance in either the activities or the honors section. If you have too many honors, put it as an activity.

- If it makes sense for you to include this as an academic honor, you should indicate that this is an honor at the regional level and that you were selected by application.
- If it makes sense for you to include this as an activity, you should categorize it as an academic experience and the description needs to include that you were selected by application. The description should emphasize learning, simulation, networking, and mentoring.

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