

# Promoting careers, transfer success and information use and literacy: Evaluation of a health career pipeline program at an urban community college

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**Abstract.** There is an urgent need for employees from diverse backgrounds in the health field. Community colleges are where many low-income and under-represented students begin their academic career. A career pipeline program was implemented at a community college to promote rigorous health careers, facilitate transfer success and develop information literacy skills. We assessed students' confidence with fitting into a career, the impact of the program on students' academic and career choices, salient program components, successes and challenges, and suggestions for improvement. Fifty-nine students enrolled in the program and 64% ( $n = 38$ ) completed, all were minority students. Students reported increased confidence with fitting into their career and a positive impact on their choice of academic and career paths. Important aspects of the program were exposure to health professionals, mentoring, peer connections, academic and professional skill building, developing information literacy and experiential learning. Most students are either pursuing a bachelor degree or have graduated with the intent of pursuing graduate degree. Our experience demonstrates the feasibility of implementing a health career pipeline at a community college. Future programs should focus on career and academic skill building, information literacy, mentoring, peer connection, experiential activities, targeted outreach to male students, and facilitating the transfer process.

**Keywords:** Health career pipeline program, minority students, community college, enrichment program, information literacy skills, transfer process

## 1. Introduction

### 1.1. *The need for qualified employees from diverse backgrounds in the health field*

There is an urgent need for qualified employees from minority and low-income backgrounds to work in the health field. By 2060 the US population will be more racially and ethnically diverse than

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it is today [1]. Yet compared to the general population, health disparities continue to persist among low-income and minority groups [2]. Many have called for an increase in the diversity of students in health career training and internship programs [3–7]. Increasing the number of minority providers is important because they can enhance culturally competent care and improve the health outcomes of minority populations [3,8]. Pipeline programs are an effective way to increase the number of minority students in the health professions by helping to reduce the gaps in educational attainment associated with income, race, ethnicity and gender [9,10]. Several programs have been conducted with underserved middle, high school and four-year college students in after school and summer program settings. These programs have had varying degrees of success in areas such as improving attitude and motivation toward selecting a health career, increasing science-based skills and health-related knowledge, and improving representation of minority groups in health-related academic programs and the health professions [11–23].

### *1.2. The need for a community college program to promote health careers, facilitate transfer success and develop information literacy skills*

To our knowledge, there are no career pipeline programs reported in the literature that promote advanced health degrees, targeted specifically for community college students. Community colleges are where many low-income and under-represented minority students begin their path toward higher education attainment [24]. A recent study found that medical students who use a community college pathway are more likely to have intentions to practice in underserved communities, however they are less likely to be accepted into medical school. The authors posit the need for more financial aid, scholarships and counseling programs to support students at the community college level who are interested in the healthcare field [25]. Further, although many students begin with the intention of completing community college only 14% of low-income students do so [26]. In addition, research indicates that college students, especially those who are first-generation, struggle with information literacy competencies [27]. In general, higher education stakeholders agree that information literacy is important to a broad liberal arts education, the world of work and students' lives [28]. To that end we applied for and received funding to address the following goals at our College: (1) implement a career pipeline program for students who are interested in health careers that require an advanced degree (2) assist students in navigating a critical milestone: graduation from community college and entry into a four-year college and (3) develop information literacy skills among our students so they can become self-directed in advancing their academic and career paths. The investigators designed a quantitative and qualitative evaluation strategy to answer the following questions:

- (1) What impact would a health career pipeline at a community college have on students' confidence in choosing a career path and their career and academic intentions?
- (2) Which parts of the program would students find most useful and what would be their suggestions for improvement?
- (3) What would be the successes and challenges of implementing a health career pipeline at a community college?
- (4) What would be the long-term outcome of students' academic and career trajectory and what elements of the program would they perceive as contributing to their success?

## 2. Methods

### 2.1. Study design

Our evaluation of the program included both quantitative and qualitative methods. In a pre-survey we collected basic demographic information about students, their major, their status as a first-generation college student, the number of hours a week they worked outside of school as well as competing demands outside of work that included the options of “family responsibilities”, “extracurricular activities” and “other”. We collected quantitative data in a post-survey at the end of each year. Students were asked to assess their confidence with fitting into a health career after completing the program on a five-point Likert scale that ranged from “completely more confident” to “not more confident”. Next, they were asked if the program had an impact on their choice of bachelor degree program by answering “yes” or “no”, and if “yes” to describe how it made an impact. They were also asked if the program had an impact on their choice of career by answering “yes” or “no”, and if “yes” to describe how it made an impact. Finally, a year after the program ended, we checked the students’ records for the following information: graduation from the College, transfer to a senior college before graduation, senior college matriculation and overall GPA at our College.

We assessed qualitative data in a post survey at the end of each semester by providing students with a list of the academic and professional development workshops and other activities that took place during the semester and asked students to write down at least two elements of the program they found most helpful and why. Next, we asked students to write about at least two ways the program could be improved at the end of each semester. Faculty maintained journal entries throughout each cohort regarding the successes and challenges of implementing the program. Also, we conducted a semi-structured follow-up telephone survey with students one to three years post completion of program (depending on their cohort) with open-ended questions regarding their current academic standing, career intentions and reflections on the strengths and weaknesses of the program. Finally, we did a post-hoc review of student use of information technology during the program.

### 2.2. Study sample and setting

Our assessment was carried out at an urban community college. The College is a federally designated Hispanic-Serving Institution and serves over 10,500 students annually, 61% of whom are Hispanic/Latino, 33% African-American/Black, 4% Asian, and 2% White. More than half (56%) are women and 84% of students are estimated to be low-income. Even with financial assistance, many students struggle to meet their daily needs: 40% come from households that earn less than \$15,000 annually; 37% worry about having enough to eat and 68% worry about housing costs [29].

### 2.3. Selection criteria and recruitment process

The program was implemented for rising sophomores with a 3.0 or higher GPA whose intent was to transfer to a four-year college and eventually earn a master’s degree or higher in a health-related field. The program was advertised to all eligible students through targeted emails, posts on the college’s website and advisor and faculty recommendations. The funder expected 25 students to be enrolled in each cohort.

#### 2.4. *Human subjects*

The study was approved by the College's Institutional Review Board as an expedited study. Each participant provided us with written informed consent to have the data they provided and information we collected from their student records to be included in the study results. All student data were masked to prevent identification of individual students.

#### 2.5. *Intervention*

Our pipeline program was a year-long program that was structured in three cohorts and application cycles, over three years. Students participated in workshops six times a semester in the fall and spring, and three times during the summer session, except for the first cohort, which had programming in the spring and summer only due to funding issues. During the academic year, the workshops were conducted during club hours on Thursdays from 12pm–2pm so as not to conflict with classes. During the summer the workshops were conducted during the times that were convenient to most students. The grant team included three faculty members and one administrator who together developed and administered the program and mentored students.

Activities included academic and professional development workshops, and exposure to diverse health professionals. Examples of the workshop curriculum is listed in Table 1. A particular focus was placed on developing students' information literacy skills so they could become adept at locating, evaluating and using appropriate resources on their own to advance their academic and career paths. Faculty and staff taught these skills in four crucial areas, which incorporated extensive use of the internet and various web-based information resources, and are detailed below.

- A college librarian taught hands-on research and information literacy instruction sessions. The first cohort participated in one class for two hours and the second and third cohorts participated in two classes that lasted two hours each. During these classes, students engaged in learning information literacy concepts including searching health-related databases, identifying and evaluating appropriate sources of various types, such as a health-related peer reviewed journal versus a government-based website, and evaluating and citing sources.
- Faculty conducted an interactive workshop with students on how to identify and apply to appropriate academic programs. During these sessions' students navigated various websites such as the Common Application [30], the National Center for Education Statistics' College Navigator [31] and professional websites, for example, the Association of American Medical Colleges [32], to learn about different programs and the application process. Following the session, faculty assigned students a presentation where they were asked to apply the concepts they had learned in this workshop. Students presented to their peers detailing the steps they needed to take in order to achieve their career goals including the identification of appropriate bachelor and graduate degree programs, required standardized tests and application requirements.
- An academic advisor conducted a workshop with students on finding academic scholarships and writing personal statements. The advisor encouraged students to use the College library's reference section to find scholarship resources. During this two-hour session navigated websites such as the Federal Student Aid's Finding and Applying for Scholarships webpage [33] and Career One Stop [34], which is a website sponsored by the U.S. Department of Labor and offers an online search tool to find scholarships.
- A career specialist conducted a workshop with students on careers in the health field and searching for health-related internships, summer bridge programs and jobs. During the two-hour session, conducted

Table 1  
Examples of curriculum included in the workshops

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Careers in the health field and searching for health-related internships, summer bridge programs and jobs
Communication skills
Health professions panel
Interviewing skills
Library research and information literacy sessions
Professionalism and self-presentation
Research careers in biology and chemistry
Resumes/cover letters
Scholarship applications and personal statements
Study skills
Self-Care and empathy
Searching for and applying to academic programs and related student presentations
Test taking strategies
Time management
Transferring to a senior college

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in a computer lab, students explored free career exploration websites to learn more about health careers including Explore Health Careers [35], New York Health Careers [36], the U.S. Department of Labor's Occupational Information Network (O\*NET) [37] and the United States Bureau of Labor Statistics' Occupational Outlook Handbook [38]. The career specialist also provided students with an extensive list of health-related internship programs and summer bridge programs and discussed commonly used job search engine websites. At the end of the session, students were encouraged to use these resources to conduct more research on their own to identify suitable summer internship opportunities and future jobs possibilities.

We used Blackboard [39], an online application for teaching and learning, to manage the material for the program and enable students to have access to these materials. On the site we included presentations and documents from speakers and any links to websites they discussed during the workshop sessions, as well as the program's schedule for the semester and the mentors' contact information. We also included links to free online assessment tools such as a career aptitude tests, a leaning style assessment and a time management quiz. Students were required to take these assessments prior to relevant workshops and discuss their results during the sessions. Students also uploaded their presentation assignments to the site and used the site to contact each other and their faculty mentors. If students were absent from any sessions, they were instructed to visit the program's Blackboard site and review the materials they had missed.

Finally, students were assigned a mentor from the grant team who provided academic and career advisement, guided students through the transfer process to a senior college, and assisted students with securing a summer internship and/or bridge program placement. Students were required to work at least 120 hours and they earned a stipend, supported by funding from the grant, to defray living expenses.

## 2.6. Data analysis

We used descriptive statistics to summarize our findings. For the pre-survey and post-survey data analysis, we used Microsoft Excel to generate data for the findings. Our analysis included summaries of the total number of participants, frequencies and percentages of responses. Core faculty for the

Table 2  
Demographics of participants ( $N = 59$ )

	Cohort 1	Cohort 2	Cohort 3	Total
Total	11	23	25	59
Gender				
Female	8	16	18	42
Male	3	7	7	17
Ethnicity				
Hispanic	4	5	14	23
African American	7	14	10	31
Asian	0	1	1	2
More than One	0	3	0	3
Age range	22–46 yrs	20–59 yrs	20–55 yrs	20–59 yrs

program independently reviewed the post surveys, follow-up interview notes, and faculty journals using independent open and axial coding. We did not use qualitative analysis software. After independent coding the faculty held consensus meetings to compare emergent themes and reach a consensus. Next, we collapsed the themes into larger categories.

### 3. Results

#### 3.1. Demographics

Across all three cohorts, 59 students enrolled in the program including 11 students in cohort one, 23 students in cohort two, and 25 students in cohort three. Of the total students ( $n = 59$ ), fifty-three percent (53%) were African American, 39% were Hispanic, 5% identified as more than one ethnicity, and 3% were Asian. The students were between the ages of 19 and 55, with a median age of 25, and more than two-thirds (69%) were female. Their majors were dietetics and nutrition (36%), biology (25%), liberal arts (25%), chemistry (7%), and psychology (7%).

#### 3.2. Completers

Sixty-four percent of students ( $N = 59$ ) completed the program. Of the students who completed the program ( $n = 38$ ), 58% were African American, 32% were Hispanic, 5% were Asian, and 5% identified as more than one ethnicity. The students were between the ages of 20-59 years old, with a median age of 24, seventy-nine percent (79%) were female and 21% were male. Fifty-eight percent (58%) worked 11 or more hours a week and 39% were first generation college students. Their reported competing demands outside of work were family responsibilities (34%) and other extracurricular activities (38%). Eighty-eight percent (88%) graduated, 12% transferred before graduating, 48% continued their studies at a senior college in the same university system and 18% went on to other 4-year institutions. Their average GPA was 3.6. All participants completed a summer internship or bridge program, examples are included in Table 3.

Table 3  
Examples of paid summer internship and/or bridge programs completed by participants

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Biological research with the American Museum of Natural History
Biological research with a professor at Lehman College
Bronx Area Health Education Center
Bronx Community Health Leaders at Montefiore's Family Health Center
Community Management Intern at Duane Reade Pharmacy
Health Career Connection
Mentoring in Medicine
Microbiology research with a professor
Montefiore's Health Opportunities Program
Mount Sinai Adolescent Health Center
National Institute of Diabetes and Digestive Kidney Diseases Diversity Summer Research Training Program
Summer Undergraduate Medical Program at Einstein College of Medicine
Tri-Institutional Minority Society Summer Scholars Research Program at Weill Cornell Medicine
Shadowing an Occupational Therapist
Summer Health Professions Education Program

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### 3.3. Non-completers

Thirty-six percent of students ( $N = 59$ ) dropped out of the program. No students withdrew from the first cohort ( $n = 11$ ), which lasted a shorter amount of time than the other two cohorts and had fewer students. In the second cohort ( $n = 23$ ), eleven students (48%) withdrew and in the third cohort ( $n = 25$ ), ten students (40%) withdrew. Of the 21 students who withdrew, fifteen stopped attending sessions during the first semester and six students completed the first semester of programming but did not return for the second semester. Of the students who did not complete the program ( $n = 21$ ), 52% were Hispanic, 42% were African American, and 5% identified as more than one ethnicity. The students were between 19 and 31 years old, with a median age of 22, fifty-seven percent (57%) were female and 43% were male. Sixty-seven percent (67%) worked 11 or more hours a week and 48% were first generation college students. Their reported competing demands outside of work were family responsibilities (38%) and other extracurricular activities (24%). Seventy-six percent (76%) graduated from the College, 19% continued their studies at a senior college in the same university system as our College and 5% are currently enrolled at the College; their average GPA was 3.36. Of the students who graduated from the College ( $n = 16$ ), 31% graduated from the College at the end of the Fall semester, which was during the middle of the program. Of the 17 male students enrolled in the program, over half (53%) withdrew. Of the 42 female students enrolled in the program, 29% withdrew.

### 3.4. Program impact

Ninety-five percent (95%) of participants ( $n = 38$ ) completed the post survey after finishing the program. Eighty-four (84%) of students ( $n = 36$ ) reported they were completely, more, or much more confident in their career path after completing the program. A majority (54%) of participants ( $n = 36$ ), reported "yes" the program had an impact on their choice of bachelor degree program. Of the 19 students who responded yes, the following themes emerged in their descriptions: 42% became surer of their choice of major, 32% changed their major because of the program, and 26% reported the program provided overall guidance on

the steps involved in their major. Almost half (48%) of the students ( $n = 36$ ) reported the program made an impact on their choice of career. Of the 17 students who responded yes, the following themes emerged when reporting their descriptions: 59% reported they were more definite of the steps involved in their career plans, 24% changed their career path because of the program and 18% reported they were more comfortable with not knowing their career path at this time.

### 3.5. *Curriculum successes*

We asked students to write about the elements of the program they benefitted from the most and suggestions for improvement. Ninety-five percent (95%) of participants ( $n = 38$ ) completed the post semester surveys. The emergent themes we found and exemplars are listed in Table 4. In addition, four students who withdrew from the program completed a post semester survey. Their feedback regarding curriculum successes reflects the feedback given by those students who completed the program. Exposure to health professionals was important to all students. Students liked hearing from a wide range of professionals about their daily responsibilities and academic and career paths; several students reported how it helped them narrow down their career choices. The information session about health careers and finding internships, summer bridge programs and jobs was mentioned by almost all students. Most students reported an increase in awareness about the breadth of health careers and an improvement in their ability to find quality internships and jobs by searching the internet. Some reported a realization that individuals can have multiple paths within their career. An analysis of the program's Blackboard site indicated that students spent an average of 9.3 hours accessing the resources on the site.

Eighty-percent of students reported their mentors were invaluable because they provided both personal and professional guidance and helped them set realistic and practical goals. A majority of students found the session on writing personal statements and finding scholarships very helpful. Students reported they were able to review examples of personal statements and use them as models while writing their own statements. Many reported this session helped to increase their knowledge about scholarships and how to find scholarship information. Seventy-five percent of participants reported the workshop on searching for and applying to academic programs, and the related presentation assignment, as one of their top choices. Many noted the presentation helped them formulate their own plans, apply the research skills they had learned, and remove some of the confusion around the application process. To several students, it was also extremely helpful to hear about others students' intended academic and career paths. Some noted it gave them a chance to practice their speaking skills in a supportive environment.

Many students reported how they gained a significant amount of knowledge from the other elements of the program as well. Over seventy percent of students reported that their internship played a key role in their learning experience. They enjoyed exploring different internship opportunities and others noted they had never completed an internship prior to this program. A majority of students reported the session on professionalism was instrumental in that it helped them figure out the best ways to interact with professors and colleagues in a professional manner. A number of students noted the workshops on interviewing skills, time management, self-care, writing resumes, cover-letters and transferring, were all helpful because they increased their academic and career skills. Finally, a handful of students reported the library research and information literacy sessions was useful. However, one student reported that although the session was helpful, most of the students had already completed a session like this before. Another student stated that the library information session was unnecessary.



Table 4  
Reported sections of the curriculum and activities students learned from the most  $N = 36$

Theme	% of students who commented	Quotes supporting theme
Panel Health Professionals	100%	<p>“I felt that I learned the most from the health professions panel because it allowed me to hear experiences from a wide range of professionals in the health field....The take-away from the panel discussion was that education is a journey and it can lead to different directions (planned or unplanned), and specializations one may not have previously thought about. It was inspiring to say the least.”</p> <p>“Being able to directly ask questions to professionals who are already working in my fields of interest, was also beneficial in helping me figure out what I want to start narrowing my field of study on ....”</p> <p>“The panel discussion helped me understand first hand from professionals in their own fields. They discussed the roads they traveled in order to achieve their dreams and for me it shed light on questions that I had with other professions and daily activities.”</p> <p>“It was amazing to be able to interact with health professionals so closely. I had the opportunity to learn about many other professions without having to change my major.”</p> <p>“I was exposed to career areas that I had not previously heard of or would have otherwise considered.”</p>
Information sessions about careers in health and finding internships, summer bridge programs and jobs.	90%	<p>“The session on career options in the health field is where I got exposed to other parts of the health sector. I was unfamiliar with these fields.”</p> <p>“I learned about the different professions and how one can graduate with a BSN in a particular field but still go on and pursue a Master’s in a totally different area.”</p> <p>“I gained exposure to career areas I had never heard of or had very little knowledge about.”</p> <p>I got a lot of benefits out of it, because it helped me know how to look for internships.</p>
Mentoring	80%	<p>“Having a mentor was great. My mentor really helped me to be more realistic about my goals”</p> <p>“Without my mentoring experience I would have never been accepted to my current internship.”</p> <p>“The mentoring gave me the practical information to make the right decisions.”</p>
Personal statements and applying to scholarships	75%	<p>“The workshop on personal statements was very important to me because I got a chance to analyze other people’s personal statements and it helped me write my own personal statement.”</p> <p>“The workshop on finding scholarships was very helpful. It introduced me to scholarships, how to find scholarships and writing a personal statement.”</p>
Searching for and applying to academic programs and related student presentations	73%	<p>“Students presentations is number one. The application process is really confusing and so detailed. To see it broken down clearly and for different fields was helpful.” “Hearing about the plans that other people had helped me formulate my own plans.”</p>

Table 4 (Continued).

		<p>“Student presentations helped me learn about different requirements of the different fields in a short amount of time.”</p> <p>“The presentations gave me a lot of confidence and preparation to present. I am a shy person but through our usual interactions I have really worked on it.”</p> <p>“During the project, I was able to make a list of the schools that I want to attend for my master program and their requirements and admission process. As a result of this project I was able to make the best decision as to which school to attend for my bachelor’s degree program and how to transition to the master’s level as well.”</p>
Internship Experience	72%	<p>“The program gave me the opportunity to apply to many different internships that I was not aware of, I got accepted into one and I’m having a great experience .....at the end of this internship I will have something substantial to put on my resume.”</p> <p>“The internship had the most important impact on my learning capabilities. It was a learning experience for me when I stepped into the lab. The doctors and medical techs were awesome.”</p> <p>“I have always wanted to do an internship but I never took the steps to do it until I joined ATHP.”</p>
Professionalism and Self-Presentation	70%	<p>“The first session on professionalism was helpful to me throughout the semester. We as students always need guidelines on how to approach professors, a boss or anyone overseeing us. This session gave me knowledge about how I should be approaching my supervisors. It made me realize the mistakes that I have been making.”</p> <p>“Professionalism, I learned about the correct way to interact with colleagues in a professional way.”</p>
Interviewing skills	57%	<p>“Interviewing skills was very useful...we got a heads up on the type of stuff that employers are looking for.”</p> <p>“I was able to understand the importance of preparing for an interview and it helped connect me with the right people on campus to get help.”</p>
Time Management	52%	<p>“Time management is something I struggled with and the presenter’s advice was very useful.”</p> <p>“Time Management- This is an area where I deeply struggle and since the presentation have implemented a lot of the suggested strategies presented.”</p> <p>“Time management. I learned a lot from this because I felt that the speaker helped us understand how to create a calendar correctly and find our best time to study. This really helped me get better at time management.”</p>
Self-care	48%	<p>“The self-care presentation because it reminded us that we need to take care of ourselves before we care for others.”</p>
Resumes/Cover letters	40%	<p>“I got a lot of important points on how to create my resume and a cover letter.”</p> <p>“I was able to understand the important topic of a resume and cover letter and it did help me connect with people and get help on at the career services office on campus.”</p>
Transfer to Senior College	30%	<p>“The transferring to a four-year college session was very helpful. I actually learned a lot about the transfer process. For me, this being my last semester, this is information I needed to know.”</p> <p>“The transfer process was very informative and it was easy to know my next steps after the presentation.”</p>
Library research and information literacy sessions	15%	<p>“The library information session. It was helpful, but most of the students already did a session like this before.”</p>

### *3.6. Suggestions for improvement*

We asked students to provide suggestions on how to improve the program; three main themes emerged from those who completed the program and they included more connection to their mentors, more connection with fellow students, and the inclusion of field trips and other activities off campus. First, students were grateful for the assistance their mentors provided, however they would have preferred a more personal connection with them. One student stated,

“I want more of a personal connection with all of the mentors, it should not just be about my educational choices. I want them to share their successes and failures in life”.

Second, several students noted that they did not feel a connection to other students in the program until later in the academic year. They would have preferred to see more group work and ice breaker activities in the first semester so they could get to know each other better. A student noted,

“It took until the second semester to know each other well. It would have been so much better for us to know each other well in the first semester. I think this could [have] happened through more small group activities at the beginning”.

Third, many students reported they would have liked more experiential learning activities off campus such as field trips to health agencies, community-based organizations, senior colleges and/or graduate school programs, a visit to a biology and/or medical simulation lab or shadow a clinician for the day. There was a general feeling that these experiences could help them further narrow down their career choices and provide inspiration. One student wrote,

“I would love to see hands-on workshops off campus. Perhaps you could reach out to the Biology or Nursing departments at a senior college so that participants could spend a day in the lab to learn and get a head start. I would have loved to see how they examine the life-size dummies, give a head to toe assessment, suturing techniques, etc. Perhaps a trip to a medical school for this”

Finally, of the four students who withdrew from the program, two mentioned they would have liked to see more discussion regarding strategies on how to be successful at accomplishing the program requirements, especially the internship requirement. One student mentioned they worried about dealing with the realities of combining their family life with job and school demands as well as the program requirements.

### *3.7. Faculty perspectives*

Faculty maintained a monthly journal regarding the successes and challenges of implementing the program. In regards to successes, faculty noted that students created a strong network among themselves and shared information with each other. Most students were engaged during the sessions and collaborated well with their peers during group work. The institution provided significant support to the program. Several faculty and staff members volunteered to be guest speakers and conducted many of the program’s workshops.

Faculty faced several challenges while implementing the program. Faculty reported that some students lacked proactivity, especially with securing internship placements and keeping appointments with their mentors. Others lacked professionalism, for example many students would miss sessions or come late. Faculty found it difficult to recruit and retain qualified students in the program, despite significant outreach on campus and attempts to keep students in the program. In addition, it was hard to schedule summer

meetings because of students' varied schedules. Finally, the program did not provide funding for a dedicated staff coordinator. As a result, the program faculty had to plan and coordinate the program, while also mentoring students. This put a strain on faculty and limited the amount of time they could spend mentoring students.

### 3.8. *Long term impact of program*

Thirty-five out of 38 students (92%) responded to the follow-up questionnaire, conducted 1–3 years after program completion, depending on the student's cohort. Twenty six percent (26%) of students ( $n = 35$ ) have completed a bachelor degree, 66% are pursuing a bachelor degree and 9% hold an AS degree but are not in school. Eighty-nine percent (89%) of students ( $n = 35$ ) plan to pursue a master's degree or higher in the future. The top intended career paths are medicine (20%), nursing (14%) nutrition (14%), public health (9%) and occupational therapy (6%) (Table 5). All students reported what they liked most about the program was being a part of group of like-minded individuals and building relationships with their peers and faculty in the program. Many students, 80% ( $n = 35$ ), reported the presentation about their academic and career path was the most useful activity in the program. The presentation gave them the opportunity to apply the research skills they had learned, think several steps ahead about their future plans, and presenting helped to build their self-confidence. Seventy percent of students ( $n = 35$ ), reported that mentoring, exposure to health professionals and the internship experience were key elements to making the program worthwhile to them. Many students ( $n = 35$ ) reported they would like to see the following in future programming: (1) 75% would like to see visits from program alumni, (2) 65% would like field trips off campus to senior colleges and health agencies, (3) 57% want more time spent with mentors, and (4) 40% would like us to find ways to facilitate continued contact among members of their cohort, for example reunions and/or through keeping in contact via social media.

## 4. Discussion

### 4.1. *Major findings*

Our findings are consistent with previous reports in the literature, which found that intensive mentoring [13,16,17,19–21], exposure to health career paths and professionals [14,22,23], summer internship and research experiences [13,19], practicing presentation skills [11] and developing a plan to reach career goals [22] are elements associated with an increase in underrepresented students' confidence in their choice of academic major and career path. New contributions to the literature include a successful year-long program targeted specifically for high-achieving community college students interested in advanced health careers, intense mentoring to help students navigate the transition from community to senior college and a focus on developing students' professional and academic skills, with a particular emphasis on increasing students' information literacy skills. In the following sections, we will discuss the most salient aspects of the program, the importance of mentoring and connection to peers, implementation challenges and suggestions for future programs.

### 4.2. *Salient aspects of the program*

All the students who completed the program either graduated from the College or transferred to a senior college before graduating. Many have completed their bachelor degree and a majority are currently

Table 5  
Highest degree obtained and future academic and career plans ( $N = 35$ )

Cohort 1	Highest degree obtained	What are your future plans?
Male	BS Neuroscience	Working in health information systems, no plans for graduate school.
Female	BA Social Science	Planning to apply to a master's degree program in occupational therapy.
Female	AS Nursing	Planning to obtain BS in nursing and eventually a master's degree in nursing.
Male	BS Biology	Applying for a master's degree in biology. Plans to apply to medical school.
Male	BS Psychology	Working as a college administrator, applying to medical school.
Female	AS Nutrition	Working as a dietary aid. No plans for a bachelor degree program.
Female	AS Biology	Pursing a degree in physical anthropology. Plans to apply to dental school.
Female	BS Nutrition	Applying to master degree programs in nutrition.
Female	AS Nursing	Planning to obtain a BS and master's degree in nursing.
Cohort 2		
Female	AS Nutrition	Working as a nurse's aide, plans to eventually pursue a BS in nursing.
Female	AS Psychology	Pursuing a BA in English and then a master's degree in creative writing.
Female	AS Nutrition	Planning to obtain BS and master's degree in nursing.
Female	AS Nursing	Planning to obtain BS and master's degree in nursing.
Male	BS Biology	Pursing a master's degree in biology, plans to apply to medical school.
Female	AS Nutrition	Pursing a BA in general studies. Plans to obtain a master's in public health.
Female	AS Nutrition	Pursing a BS in human biology and then a master's degree in education.
Female	BS Biology	Planning to apply for a masters in biology.
Female	AS Nutrition	Working as a dietary aid. No plans for a bachelor degree.
Female	AS Comm.	Pursing a BS and a masters degree in speech language pathology.
Male	AS Biology	Pursing a BS in biology. Planning to apply to medical school.
Female	AS Chemistry	Pursing a doctorate degree in pharmacology.
Male	BS Biology	Applying to medical school.
Male	BS Biology	Applying to master in public health programs and then medical school.
Cohort 3		
Female	AS Nutrition	Pursing a BA in global health and then a master's in public health.
Female	AS Nursing	Planning to obtain BS and master's degree in nursing.
Male	AS Biology	Pursing a combined BS/MS program in occupational therapy.
Female	AS Human Serv	Pursing a BA in general studies and master's in public administration.
Female	AS Public Health	Pursing a BS in health education.
Female	AS Biology	Pursing BS in neuroscience. Plans to apply to medical school.
Male	AS Nutrition	Pursing BS in nutrition and master's in sports psychology.
Female	AS Nutrition	Pursing BS in health education and then masters in nutrition.
Female	AS Nutrition	Pursing BS in nutrition and then a master's in nutrition.
Female	AS Nutrition	Pursing BS in nutrition and then a master's in nutrition.
Female	AS Psychology	Pursing BS in psychology and then a master's in psychology.
Female	AS Biology	Pursing BS in biology. Plans to apply to physician assistant programs.

pursuing their bachelor degree. Almost all students who completed the program plan to pursue at least a masters' degree in a health-related field. Many students reported they felt more confident in their choice of major and the steps involved their career path after completing the program.

Students greatly benefitted from exposure to health professionals and three of the workshops that emphasized information literacy including (1) the information session about careers in health and finding internships, summer bridge programs and jobs, (2) the workshop on writing personal statements and

finding scholarships and (3) the workshop on searching for and applying to academic programs and the related student presentation. Through these activities, students gained more awareness of where and how to find high quality information about health careers, academic programs and scholarship options and this in turn assisted them narrowing down options and building their confidence. Specifically, students identified the presentation regarding their own academic and career path as having a significant impact on them. The presentation gave them the opportunity to present to their peers, apply the skills they had learned regarding internet-based research and formulate their own plans. Even a year or more after the program had ended, students considered the presentation to be one of the most impactful activities of the program. These findings are not surprising considering that community college students are more likely to be first generation, and come from low-income families and underrepresented groups, and therefore may lack the information, robust social networks and guidance they need in making education and career decisions [40].

The focus on academic and professional skills building were key components to our program's success. Students found the workshop on professionalism particularly valuable because it helped them figure out the best ways to interact with professors and colleagues in a professional manner. Our students are typically from a resource-limited background and may not be aware of how to navigate the formal and informal expectations of professional and academic settings. Research has shown that those students who are lacking in social and cultural capital may also be the least likely able to navigate the system and take advantage of resources available at college [41]. Therefore, this type of skill building programming can have a lasting impact on students' success if it is embedded in a pipeline program.

Finally, it is vital to include experiential learning activities in programs that work with underrepresented students in order to help them make career decisions. The experience of participating in an internship played a key role in our students' learning. Many reported they had never completed an internship before and the program gave them the emotional and financial support they needed to make an internship a reality. Further, students would like to see more experiential learning activities included in future program such as field trips and shadowing a clinician. This supports the findings of others who concluded that programs which provide hands-on experiences, and access to positive role models, are the most successful in making an impact on students' career decisions [42].

#### *4.3. Importance of mentoring and connection to peers*

Our study confirms the findings of others regarding the power of mentoring [13,16,17,19–21] and peer support [43]. A year or more after the program had ended students still highly valued the relationships they had built with their peers and mentors. Our program provided a protected space where students could connect with other high achieving students and build one on one relationships with faculty and staff. Students liked the connections so much that some of their main suggestions for improvement were finding ways to increase activities that promote mentor and peer connection as well as connections to program alumni and facilitating connections to their peers after the program has ended. These findings are similar to others who have found that pairing minority students with health professionals, faculty and other high achieving students from similar backgrounds may provide the mentoring a social support needed for success in pursuing a health career [44].

#### 4.4. *Importance of baseline information technology skill sets*

A post-hoc review concluded that all completing students had adequate basic Internet, web searching, and computer skills to meet the needs of the program. This conclusion is based on teacher and mentor observations, not on formal survey or polling. The program curricula did not provide further IT training, and looking back, there was not a perceived or expressed need. Most of the students appear to have had such training prior to enrolling in the program. This probably reflects the substantial infusion of basic IT training and skills development into the primary and secondary curriculum, prior to community college, plus remedial training at the community college for those students who need it.

#### 4.5. *Challenges and suggestions for future programs*

Some of the challenges we faced were a lack of student proactivity, absenteeism, scheduling difficulties and a lack of a dedicated staff coordinator. In addition, we had an attrition rate of 36%, which occurred in the second and third years of the program when there were more students in the program and the programming lasted a year. Those who withdrew from the program were a bit younger and included a higher percentage of students who worked more than 11 hours a week and more likely to be first-generation college students. Similar to findings in the literature [45], our students faced many barriers to staying in our program including juggling school and work, family obligations, and financially supporting themselves. In addition, most of the students who completed the program were female and more than half of the male students who enrolled in the program withdrew. This reflects current trends in that male students tend to be less engaged in campus activities as compared to women [46]. These barriers, along with some students graduating from the College in the fall semester and not returning, reduced the number of students who completed the program. We also faced issues with recruiting enough qualified students to the program, possibly due to barriers presented by low-income and conflicting obligations.

To resolve some of these issues, future programs at the community college level should consider developing a more competitive pool of applicants through a multi-phase selection process in the fall semester that ensures students are both interested and prepared for the program in the spring semester. To recruit students, program faculty could host a series of workshops each fall semester for all interested students at the college about choosing health careers and transfer programs. In particular, faculty could conduct targeted outreach to attract male students to these workshops through email blasts, advisor outreach, and partnering with male academic support programs on campus. Program faculty could also connect students to advisors and faculty for one-on-one counseling regarding the college application process. This would expose more students at the college to the transfer process and career choices, ensure that candidates qualify for the program, and provide faculty the opportunity to observe students' motivation, communication, and follow-through. The program faculty could then review applications, conduct interviews, and provide an orientation to explain requirements and expectations of the program. From this robust pool of students, the faculty could select 15–20 of the most qualified students who have a health career goal and have applied for and/or been accepted to a four-year college. From our experience, 15–20 students, who meet over the course of one semester, appears to be the most optimal strategy to ensure group cohesion and accountability.

The programming could be held eight times in the spring semester only and advisors could block a specific time in students' schedules for the program so as not to conflict with club activities and students' classes. This would most likely reduce absenteeism because students would not have to manage the conflicting demands of clubs and other activities. We suggest that future programs have a half time case

manager to oversee the program, recruit students, and provide students with counseling, case management, internship placement and referral across all the departments on campus offering allied health studies, thus bridging silos and removing barriers that might otherwise lead to attrition. Faculty would then be free for mentoring, academic advisement, program evaluation, and continuous improvement and knowledge dissemination. Students could participate in a paid summer bridge program or internship but we suggest no programming during the summer, thus eliminating scheduling difficulties. The case manager could check in and follow up with students and their preceptors during the summer to ensure students are meeting expectations.

#### 4.6. *Limitations*

Our study had limitations. The students selected for our program came from a small group of defined students who responded to our advertisements for the program and are from one urban community college. The participating students may represent a more self-motivated cohort than students at large. These factors likely reduce the generalizability of our findings.

Also, the participating students were academic high achievers, based on their GPA data. The students who completed the program had higher GPAs on average than those who dropped out, and the drop outs had higher GPAs than the all college averages that reflect non-participating students as well.

The data reported by the students in the post survey and follow-up survey was self-reported and may have reflected students' omission of information or attributing it to events that occurred outside of the program. The journal entries that were maintained by the faculty were self-reported and may have reflected omission of information or attributing it to events that occurred outside of the program as well. Additionally, no control groups were included in this study, thus precluding a comparison of the results for completing students with drop out students and the student body at large. Thus, again, generalizations beyond the specific study population while consistent with other study results, are speculative.

## 5. **Conclusion**

### 5.1. *Program feasibility and applicability*

Our experience demonstrates the feasibility and success associated with implementing a health career pipeline at an urban community college, with an emphasis on assisting students with the transfer process and developing information literacy skills so students can be self-directed in navigating their academic and career paths. Most students who completed the program are either pursuing a bachelor degree or have graduated in a health-related field. A majority plan to obtain a master's degree or higher in such fields as medicine, nursing and nutrition. The most salient aspects of the program were the sessions that emphasized information literacy skills, exposure to health professionals, intense mentoring and a connection to like-minded peers.

Future programs at this level should consider focusing on career and academic skill development along with a strong emphasis on mentoring, peer connection, experiential learning activities and developing information literacy skills. In addition, they might consider using a multi-phase selection process, targeted outreach to male students, and a part-time coordinator, which together, could improve the pool of eligible students, reduce attrition rates, and improve students' access to and quality of the mentoring they receive.



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