

THE JACKSON HEART STUDY: PREPARING AFRICAN AMERICAN HIGH SCHOOL STUDENTS FOR HEALTH CAREERS AND RESEARCH

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In 1999, Tougaloo College (TC), located in Jackson, Mississippi, was charged, as a part of its role in the Jackson Heart Study (JHS), with creating a pool of well-trained high school students who, upon entering college, could successfully complete undergraduate and graduate or professional degrees in the health professions, biomedical research, and public health. TC identified the following educational challenges experienced by Mississippi high school students: inadequate exposure to reading, writing, logic, and quantitative skills; inadequate course work in science and mathematics; lack of mentors and role models in science-related fields as well as for exploration and identification of career options in the health professions and biomedical research. To this end, the JHS Undergraduate Training and Education Center (JHS UTEC) developed three four-week summer workshops in Science, Language Arts, and Mathematics (SLAM) for high school students in grades 9 through 11. Since SLAM's inception, more than 900 students have completed the program, and more than 90% have enrolled in college. In addition, according to National Student Clearinghouse and participant-reported data, many of the SLAM participants have earned not only undergraduate degrees in science, but also graduate degrees in a health-related and STEM fields. This article details the SLAM curricula and strategies for recruiting, selecting, training, and retaining high school students; we also present data to illustrate the success of the SLAM program. *Ethn Dis.* 2020;30(1):25-32; doi:10.18865/ed.30.1.25

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INTRODUCTION

The purpose of this article is to present the unique role of the Jackson Heart Study (JHS) in planning and implementing best practices for advancing Science, Technology, Engineering and Mathematics (STEM) paths during a 20-year period (1999-2019) of preparing African American high school students for health careers and research. The JHS is the largest single-site, prospective, epidemiologic investigation of cardiovascular disease (CVD) ever undertaken. It is a population-based, observational, longitudinal study located in Jackson, Mississippi. Since there is a greater prevalence of cardiovascular disease among African Americans, the purpose of the JHS is to explore the reasons for this disparity, and to uncover new approaches to reduce it. The JHS exemplifies a unique collaborative model among three college and university partners, the Jackson community, and the National Institutes of Health (NIH) National Heart, Lung

and Blood Institute (NHLBI) and the National Institute on Minority Health and Health Disparities (NIMHD) to discover and test best practices for eliminating health disparities. The JHS aims generated by NIH/NHLBI included: "establishing a single-site epidemiological study of African American men and women; identifying risk factors for the development and progression of CVD; building research capabilities in minority institutions; and, attracting minority students to careers in public health and epidemiology."¹ Addressing these comprehensive aims required close collaboration among Jackson State University (JSU), Tougaloo College (TC), and University of Mississippi Medical Center (UMMC). Specifically, TC addressed the aim of preparing a pool of high school students for health careers and research.

INCREASING THE DIVERSITY OF AMERICA'S PUBLIC HEALTH, HEALTH PROFESSIONAL, AND BIOMEDICAL RESEARCH WORKFORCE

Documentation of the need to increase the diversity of America's pub-

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lic health, health professional, and biomedical research workforce has increased steadily since the publishing of the *Report of the Secretary's Task Force on Black and Minority Health* in 1980.² Among the recommendations emanating from this report, commonly known as the Heckler Report, was the need to increase the number of minority health professionals in the workforce. In 2003, the Institute of Medicine's publication *Unequal Treatment*³ documented the potential

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benefits to health and healing when the patient and health care provider shared the same ethnic/racial identity.

Multiple approaches to increasing the diversity of America's public health, health professional, and biomedical research workforce have been implemented and evaluated since the 1980s. Some programs featured building a pipeline from high school to college to graduate and/or professional degrees in the sciences, health careers, and biomedical research. In *An Annotated Bibliography: Evalua-*

tion of Pipeline Development Programs Designed to Increase Diversity in the Health Professions,⁴ six of the 24 programs described were implemented for high school students (Bediako,⁵ Campbell,⁶ Latino Center for Medical Education and Research,⁷ Lewis,⁸ Slater,⁹ and Thomson¹⁰). In addition, Winkleby¹¹ chronicled 18 years of the Stanford Medical Youth Science Program, a five-week residential program for low-income high school students throughout California. Key program components included: academic enrichment in the biological and health sciences; health careers knowledge; personalized college admission preparation and career counseling; direct interactions and apprenticeships with role models, health professionals, scientists, college and medical students; and long-term college and career support.

Among the universities with longstanding college preparatory programs for high school students are: Georgetown University's Summer Programs for High School Students¹² and Xavier University of Louisiana's Pre-College Summer Programs.¹³ The program located at the Medical College of Georgia was conducted for three hours on 18 Saturday mornings during the academic year.¹⁴ Louisiana State University's High School Science Initiative,¹⁵ begun in 1985, was an eight-week program that met daily Monday through Friday and included both experiential and lecture learning activities culminating with students' oral presentations relating to their research or clinical experience. Many of these approaches initiated between 1985 and 1997 were forerunners of TC's JHS Summer

Outreach Program for high school students, which began in 1999.

TOUGALOO COLLEGE: A PIONEER FOR EXCELLENCE IN EDUCATION FOR AFRICAN AMERICANS

TC has been a pioneer in the development of curricula and special programs for African American students from Mississippi and beyond. TC's Upward Bound Program is the oldest in the state. It works closely with Student Support Services and Talent Search programs to seek out and prepare first-generation college students. Upward Bound¹⁶ is a federally funded educational program in the United States that is one of a cluster of programs now referred to as TRiO. These programs resulted from the federal Economic Opportunity Act of 1964 and the Higher Education Act of 1965. Upward Bound Programs are implemented and monitored by the United States Department of Education. The goal of Upward Bound is to provide better opportunities to high school students from low-income households, those living in rural areas, or those with parents who did not attend college. The latter are referred to as "first-generation college students."¹⁶

As of 1998, TC had, for 25 years, sponsored a Summer Science Program for high school students interested in medical careers. The program was supported by a Health Careers Opportunity Program (HCOP) grant,¹⁷ which were first available in 1972 and encouraged three goals for students: to complete high school; to be accept-

ed and complete college; and to be accepted and complete an advanced program in one of the health professions.

METHODS

The Summer Outreach Program for 9th, 10th and 11th grade high school students was initiated at TC through the initial JHS contract funded by NIH/NHLBI. TC was funded to develop an Undergraduate Training and Education Center (UTEC) to attract minority students to careers in public health and epidemiology with a specific aim of preparing high school students for health careers and research. The Summer Outreach Program began in 1999 with one Life Sciences course. The preliminary plan was to add a course in mathematics the next summer to be followed by a pre-college workshop the following summer. This was

a traditional approach of content-based courses in biology, chemistry, and mathematics. One problem with this approach was that it did not provide students with an understanding of the importance of quantitative, communication, and critical thinking skills for the study of science. Subsequently, the JHS Observational Studies Monitoring Board (OSMB) recommended an approach to teaching biology, chemistry and mathematics along with communication and critical thinking skills, and issues related to public health and epidemiology.

The JHS UTEC principal investigator at TC selected and charged a High School Outreach Program Planning Committee to revise the curriculum. The committee, comprising individuals who represented the Jackson Public Schools, UMMC, JSU, Millsaps College, and TC, was chaired by a long-time, public school teacher and administrator (Figure 1).

The revised curriculum was developed using the approach of Wiggins and McTighe's Understanding by Design,¹⁸ which involved identifying desired results, determining acceptable evidence of achievement of those results, and then planning learning experiences and instruction. The resulting four-week Science, Language Arts, Mathematics (SLAM) I, II and III for 9th, 10th and 11th graders, respectively, utilizing an integrated approach to teaching these skills, was developed and implemented in 2001.

The content of the three workshops was articulated so that each overlapped with the other. For example, mathematics skills supported the student's work in the science laboratory, and the work in language arts made connections in the student's work in the mathematics workshop and science laboratory. The three subject areas in each workshop were sequential and they expanded on skills learned

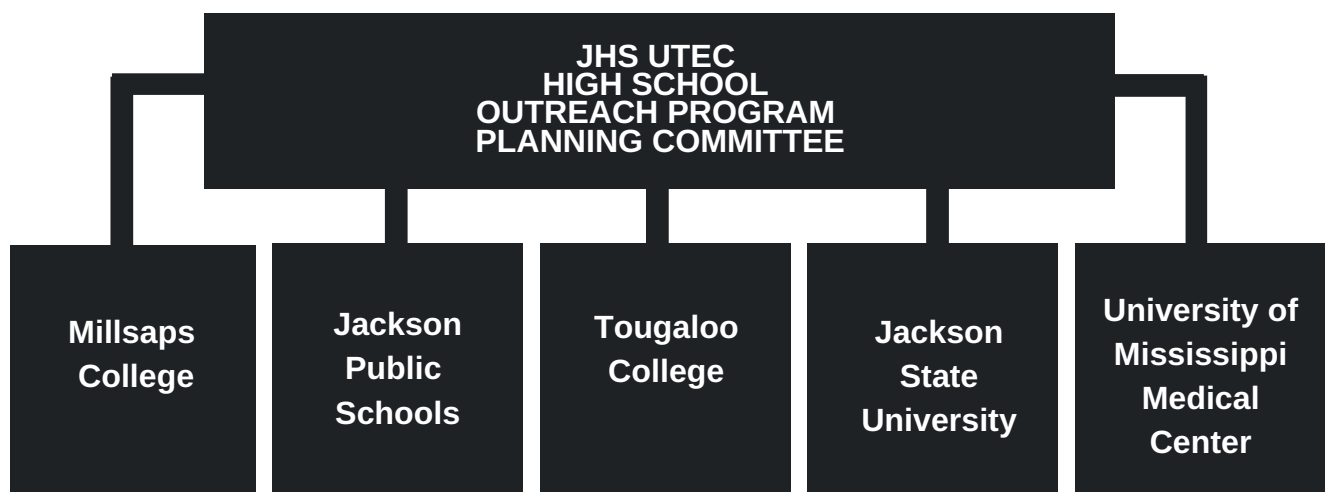


Figure 1. JHS UTEC high school outreach program planning committee

Table 1. Science, language arts, and mathematics (SLAM) courses

	SLAM 1	SLAM 2	SLAM 3
Science	Introduction to Biology	Introduction to Chemistry	Introduction to Physics and Engineering
Language Arts	Introduction to Concepts in Literature and Composition	Literature and Composition II	Advanced Concepts in Literature and Composition
Mathematics	Algebra	Statistics	Calculus
Reading	Vocabulary and Comprehension	Vocabulary and Comprehension	Vocabulary and Comprehension

the previous summer. A detailed outline was developed for the courses for all three SLAM workshops (Table 1).

SLAM course offerings have remained relatively consistent throughout the program’s history. Each SLAM workshop consists of a science, language arts, and mathematics core. The skill sets that are developed in each of these cores vary by SLAM workshop (I, II, or III).

The science component of SLAM I helps students develop and use essential biology concepts. In the language arts component, students learn the basic elements of the essay, as well as the importance of language arts in the work of scientists. The mathematics component helps students refine the algebra and basic mathematics skills necessary for mathematical problem solving.

The SLAM II science course acquaints students with the language and tools of chemistry and scientific experimentation. In language arts, students enhance their writing and critical thinking skills to argue against or for claims made in scientific texts. The mathematics component introduces students to elementary statistics and provides them with interactive opportunities to apply those statistics to real world situations.

The SLAM III science course exposes students to aspects of forensic

science, physics, and engineering and allows the students to develop technology guided by scientific inquiry. The language arts course expands students’ critical thinking and writing skills and provides them with the skills to articulate their ideas. The mathematics course introduces students to the fundamental concepts of calculus. All three SLAM workshops include a reading enhancement course, which is designed to help students improve their reading comprehension and vocabulary skills, and an ACT preparatory course, which is designed to help students improve their test-taking skills.

To ensure that the faculty teaching the courses relate their courses to the other subject areas, the SLAM instructors meet almost daily at lunch to discuss what they are doing in each of their classes. These SLAM instructor meetings also allow instructors to identify students who are not progressing as satisfactorily as expected. Having these conversations in a group setting allows all instructors who interact with the SLAM students to share insight that otherwise may not have been discussed and, thus, promotes the holistic evaluation of students’ academic and personal growth. Students are evaluated on their progress in each of their respective classes through quizzes, homework assign-

ments, tests, and writing assignments at least weekly. Students who are not progressing satisfactorily, as assessed by their performance on homework assignments and tests, are provided with a plan for improvement.

Activity Periods and Hands-On Learning

During SLAM, at least two one-hour periods each week are reserved as “activity periods.” These activity periods allow SLAM participants to meet and interact with health professionals and biomedical researchers. SLAM speakers have included former SLAM participants who are currently health care providers and/or researchers, current and/or former JHS investigators, former JHS UTEC Scholars, and professionals from local and national health organizations and agencies.

In summer 2018, the UTEC presented a Health Careers Exploration Fair (HCEF) for the SLAM participants. The HCEF featured representatives from professional and graduate schools around the state, as well as health professionals from local health clinics. Students learned about pathways to careers in optometry, dentistry, nursing, medicine, and pharmacy, as well as the job responsibilities of professionals in each of these health sciences.

In 2004, the SLAM coordinator and a faculty member from UMMC School of Pharmacy collaborated to plan and implement a health promotion program entitled “Know Your Numbers” (KYN). KYN is sponsored by the Mississippi State Department of Health (MSDH) and involves teaching community populations about several key numbers associated with CVD risk: blood pressure; blood sugar, hemoglobin A1C; body weight, height and body mass index; and total, bad, and good cholesterol. While the core SLAM courses provide SLAM participants with the basic knowledge that they need to understand cardiovascular disease (CVD) and its impact on African Americans, KYN allows SLAM students to apply the science, mathematics, writing, and reading skills that they have refined through SLAM to better understand the epidemiology of CVD and heart health.

Eligibility, Recruitment, and Application

Students who are enrolled in the 9th, 10th and 11th grades during the academic year preceding the summer in which they will participate in SLAM are eligible for the program. Eligible students must be able to commit to full participation in all four weeks of the SLAM session into which they may apply. Once the application information is made available, information about SLAM is mailed to high school administrators and instructors in the Jackson metropolitan area. In addition, application information is distributed to social and civic organizations, particularly those with programmatic thrusts in education, mentorship, and/or training.

The SLAM coordinator, UTEC staff, and SLAM instructors also attend Parent Teacher Association (PTA) and school board meetings and participate in community health events to provide information about and recruit for SLAM. UTEC staff and SLAM instructors have formed relationships with instructors, counselors, and administrators of public and private high schools in the Jackson, Mississippi metropolitan area. Through these relationships, students who are eligible to participate in SLAM are identified and referred to the SLAM coordinator. Additional prospective SLAM participants are also identified and referred to the SLAM coordinator by former SLAM participants. The referrals that result from these relationships with local educators, administrators, and former SLAM participants have been the most effective methods for SLAM recruitment.

The UTEC’s presence on social media and the internet has provided unique opportunities to reach and recruit students for the SLAM program. In 2019, a contact form was posted on the UTEC’s website and on its social media channels through which contact information for those interested in SLAM is collected. The SLAM coordinator follows up by email and/or telephone to provide additional information about the SLAM program.

Prospective SLAM students must submit an application form; two letters of recommendation, one of which must be provided by a mathematics or science teacher; a transcript; and an essay. In 2018, the application process for SLAM was updated to allow for online submissions of applications and letters of recommendations.

Applications are reviewed by a selection committee composed of members from each of the JHS partnering institutions, community members, and faculty from TC. Applicants are evaluated on their overall grade point average; the rigor of the high school coursework they have completed or are completing; their test scores on college entrance exams; the quality of their responses to five essay questions; and the strength of the recommendations provided by two of their instructors. Students in SLAM I and II who complete courses successfully are invited to return the following summer for SLAM II and III, respectively. Students who are invited to return are not required to submit an application.

Statistics

The SLAM coordinator is responsible for collecting data on key milestones in the progression of students through the summer programs, while the tracking assistant enters relevant data into the Research Electronic Data Capture (REDCap) database. In 2016, the JHS PI engaged an external evaluator to conduct a longitudinal study of the SLAM program from 1999-2016. The data collected included demographics, ACT composite and subject area scores, high school grade point average, and high school graduation rank (B. Powell, PhD, unpublished data, December 2016).

Descriptive statistics are used to report aggregate data about demographic characteristics of SLAM participants and academic characteristics including, but not limited to, the years of SLAM attended, the SLAM awards received, the number of ACT attempts and scores achieved,

post-secondary educational institutions attended, and the disciplines studied at those institutions. Statistical analyses are conducted using Microsoft Excel and StataSE 16.

RESULTS

In 1999 and 2000, a total of 73 students participated in the “Life Sciences” course that preceded SLAM. Since 2001, participants in SLAM included students from public and private high schools in the Jackson metropolitan area who reside in Hinds, Madison, and Rankin counties. Other SLAM participants include those from various cities in the state of Mississippi, and a small percentage of SLAM students have come

from at least eight other states including Alabama, California, Colorado, Connecticut, Georgia, Ohio, Tennessee and Texas. As shown in Figure 2, a total of 987 new (first time, non-returning) students have participated in the program between 2001 and 2018.

Although the gender composition of cohorts has varied slightly throughout SLAM’s history, on average, male students have represented nearly a third of all participants, and female students have represented the remaining 70% of cohort members. In addition, the majority (99%) of participants identify as African American, and <1% have identified as White American or Native American.

Between 2001 and 2018, 63% of students were retained between SLAM I and SLAM II and between

SLAM II and SLAM III. Because the SLAM workshops are designed to build upon prior knowledge, it is encouraging when students complete each SLAM workshop over three consecutive summers. Of the 987 students who participated in the SLAM program, 211 (21%) students completed all three consecutive work-

Between 2001 and 2016, SLAM participants earned a total of 455 undergraduate degrees from 97 of the nation’s public and private colleges and universities.

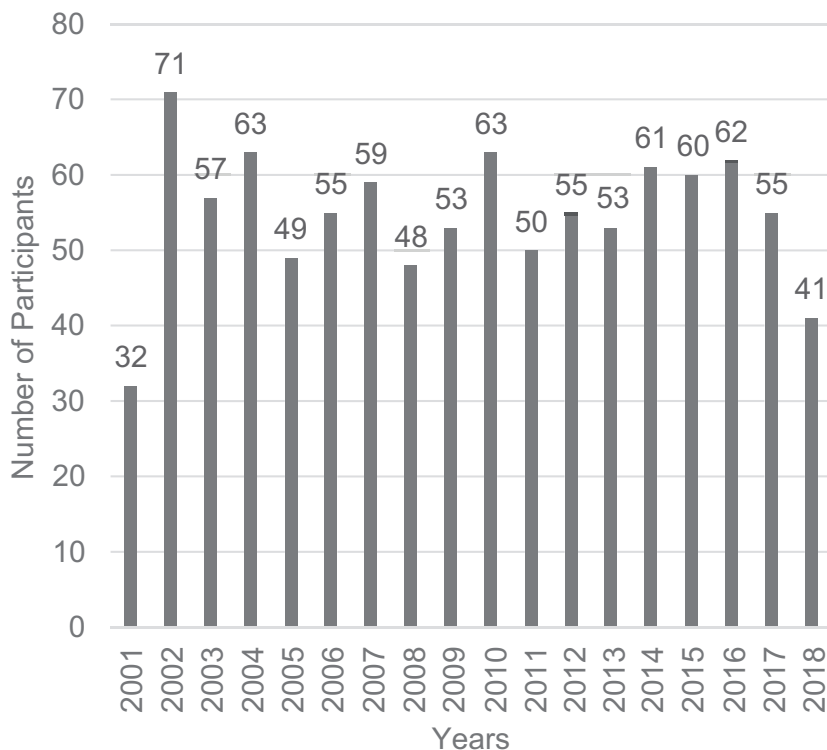


Figure 2. Total number of SLAM participants, 2001-2018 (N=987)

shops (SLAM I, SLAM II, and SLAM III). During exit interviews, students who did not return to SLAM indicated that they did not return for the following reasons: unexpected academic rigor; summer employment; time conflicts with other extracurricular activities (eg, band and/or athletic camps); and lack of interest.

Between 2001 and 2016, SLAM participants earned a total of 455 undergraduate degrees from 97 of the nation’s public and private colleges and universities. Approximately 37% of SLAM participants studied biology and chemistry at their undergraduate institutions. Approximately 49% of SLAM participants earned bachelor of sci-

ence degrees. SLAM participants also completed graduate work in the biological and public health sciences. Approximately 24% of SLAM participants earned the master of science degree and 11% earned the master of public health degree.

Since 2001, 50 SLAM participants attended Tougaloo College and participated in the UTEC Scholars Program. Of the 36 students who matriculated through the “SLAM Participant to Scholar” pipeline, and for which there are data, 10 pursued medical degrees, four pursued PhD degrees in a science, and nine pursued public health degrees (Figure 3).

DISCUSSION

Since its inception, the SLAM program has attracted minority students to careers in public health and epidemiology through an academically rigorous, hands-on summer experience. The high retention rates of participants in the sequential SLAM workshops (I, II, III), coupled with the data on the number of SLAM participants who pursue health and research careers, provide evidence that SLAM is meeting the NIH/NHLBI aim. As improved tracking approaches are implemented, even more convincing data will be available to expand the evidence base.

Improved tracking approaches and increasing the pipeline of SLAM students who enter the JHS Scholar program at TC are two challenges that are being addressed. Missing data about the post-secondary education of some SLAM participants hinders the ability to accurately assess the num-

ber of SLAM participants who have pursued science and research careers. Winkleby and Helm used telephone tracking to maintain contact with the high school students who participated in their programs.¹¹ Winkleby reported that a student and staff directory was generated and mailed to all graduates annually which encouraged continuing contact among participants and between participants and staff.¹¹ Helm reported that data on medical school application activities were retrieved from the Student Application Information Management System (SAIMS) of the Association of American Medical Colleges (AAMC).¹⁵ Parents of SLAM students in a focus group interview suggested the use of social media, a SLAM web-

page, and a newsletter featuring the achievements of current SLAM students and the career paths of participants who completed the program.

Approximately 25% of every group of 12 entering JHS scholars have participated in one or more of the SLAM workshops. JHS scholars are TC students who, in the second semester of their freshman year, submit an application and meet the criteria for selection into the JHS Scholar program. JHS scholars complete a series of four courses to prepare them for entry into graduate and professional schools to pursue careers in health professions, biomedical research, and public health.¹⁹ JHS scholars engage in mentored academic-year and summer research experiences. In the sum-

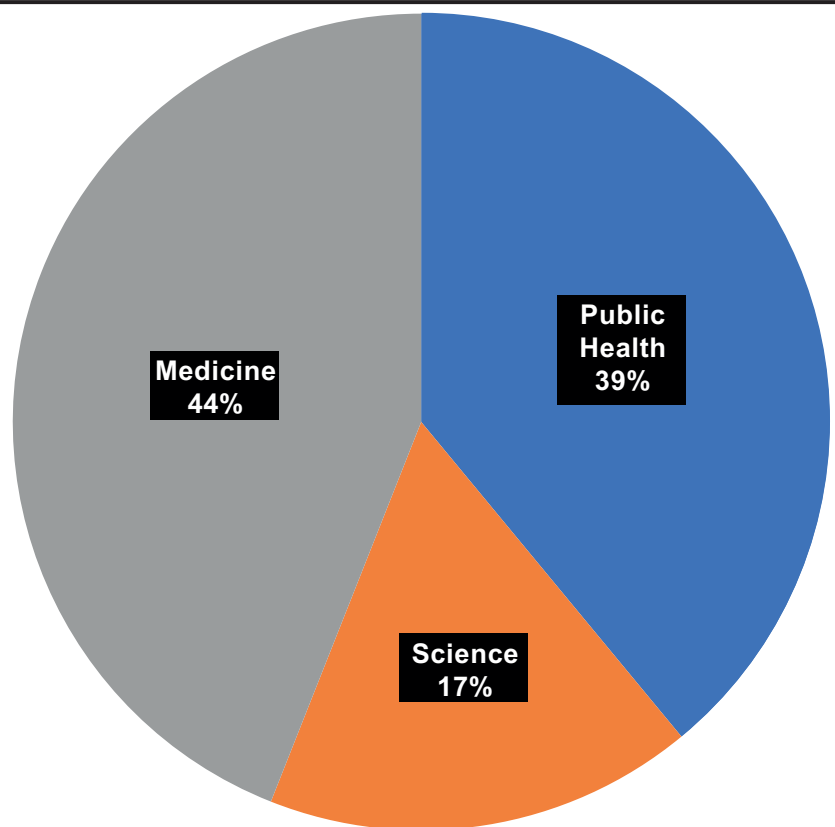


Figure 3. Careers pursued by students in the SLAM-JHS UTEC scholar pipeline (n=23)

mer between the scholars' freshman and sophomore years, they serve as peer mentors to SLAM students. The JHS Scholar/SLAM Participant Mentoring Program promotes the benefits of TC and the JHS Scholar Program. Several JHS scholars continue mentoring SLAM participants beyond the SLAM program. Periodic contact through telephone, email, social media, and newsletter, as well as the implementation of a SLAM webpage and an annually updated SLAM directory, are all approaches that will be pursued to strengthen tracking activities and SLAM to JHS scholar progression.

Future investigations will include examining career trajectories of former SLAM participants, the rigor and impact of the content and delivery of SLAM workshops, and the effectiveness of ancillary and hands-on-activities. The learning environment, peer mentoring, tracking and pipeline progression, and outcomes will be documented. Longitudinal data will be compared with similar programs that prepare high school students for careers in the health professions, public health, and epidemiology.

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CONFLICT OF INTEREST

No conflicts of interest to report.

AUTHOR CONTRIBUTIONS

Research concept and design: Mohamed,

Srinivasan; Acquisition of data: Harris, White; Data analysis and interpretation: Harris, Henderson; Manuscript draft: Harris, Henderson, Mohamed, Srinivasan; Statistical expertise: Harris; Acquisition of funding: White; Administrative: Harris, Henderson, White, Mohamed, Srinivasan; Supervision: Harris, Henderson, Srinivasan

REFERENCES

- Mehrotra BD, Al-Fadhli H, Fahmy N, Guiterrez-Mohamed ML. *Jackson Heart Study Undergraduate Training Center Technical Proposal; NHLBI-HC-98-03*. Tougaloo, MS: Tougaloo College; 1998.
- Report of the Secretary's Task Force on Black and Minority Health Volume IV, Cardiovascular and Cerebrovascular Disease, Part I and Part II*. 1986. Washington, DC: Department of Health and Human Services.
- Smedley BD, Stith AY, Nelson AR. *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care*. Washington, DC: National Academies Press; 2003.
- US Department of Health and Human Services. *An Annotated Bibliography: Evaluations of Pipeline Development Programs Designed to Increase Diversity in the Health Professions*. Contract# HSSH230200432036C. 2006.
- Bediako MR, McDermott BA, Bleich ME, Colliver JA. Ventures in education: a pipeline to medical education for minority and economically disadvantaged students. *Acad Med*. 1996;71(2):190-192. <https://doi.org/10.1097/00001888-199602000-00029> PMID:8615939
- Campbell PB, Wahl E, Slater M, et al. Paths to success: an evaluation of the gateway to higher education program. *J Women Minor Sci Eng*. 1998;4(2-3):297-308. <https://doi.org/10.1615/JWomenMinorScienEng.v4.i2-3.140>
- Latino Center for Medical Education and Research, University of California San Francisco at Fresno. An evaluation of the Sunnyside High School Doctors Academy. Unpublished report. 2005. Program information available at: <https://www.fresno.ucsf.edu/latino-center-for-medical-education-and-research/about-da/>
- Lewis CL. A state university's model program to increase the number of its disadvantaged students who matriculate into health professions schools. *Acad Med*. 1996;71(10):1050-1057. <https://doi.org/10.1097/00001888-199610000-00010> PMID:9177637
- Slater M, Iler E. A program to prepare minority students for careers in medicine, science, and other high-level professions. *Acad Med*. 1991;66(4):220-225. <https://doi.org/10.1097/00001888-199104000-00011> PMID:2012654
- Thomson WA, Denk JP, Miller LM, Ochoa-Shareg B, Jibaja-Rusth M. Results of a summer academy to increase minority student access to allied health and other health professions. *J Allied Health*. 1992;21(2):79-93. PMID:1639721
- Winkleby MA. The Stanford Medical Youth Science Program: 18 years of a biomedical program for low-income high school students. *Acad Med*. 2007;82(2):139-145. <https://doi.org/10.1097/ACM.0b013e31802d8de6> PMID:17264691
- Georgetown University Summer Programs for High School Students. Last accessed November 19, 2019 from <https://summer.georgetown.edu/programs/SHS05/college-preparatory-program>
- Xavier University of Louisiana Pre-College Summer Programs. Last accessed November 19, 2019 from <https://www.xula.edu/precollegeprograms>
- Fincher RME, Sykes-Brown W, Allen-Noble R. Health science learning academy: a successful "pipeline" educational program for high school students. *Acad Med*. 2002;77(7):737-738. <https://doi.org/10.1097/00001888-200207000-00023> PMID:12114154
- Helm EG, Parker JE, Russell MC. Education and career paths of LSU's summer science program students from 1985-1997. *Acad Med*. 1999;74(4):336-338.
- US Department of Education. *Upward Bound*. Last accessed November 19, 2019 from <https://www2.ed.gov/programs/trioupbound/index.html>
- Health Careers Opportunity Program. Last accessed May 30, 2019 from <https://bhwh.hrsa.gov/fundingopportunities/default.aspx?id=9b288889-b486-4e9d-a02a-2dd-9d80a9ccc>
- Wiggins G, McTighe J. *Understanding by Design*. Alexandria: VA Association for Supervision and Curriculum Development; 1998.
- White WB, Srinivasan A, Nelson C, Fahmy N, Henderson F. Capacity-building for career paths in public health and biomedical research for undergraduate minority students: A Jackson Heart Study success model. *Ethn Dis*. 2016;26(3):399-406. <https://doi.org/10.18865/ed.26.3.399>