Early Exposure to STEM Research as a Foundational Experience for STEM Careers

MARIANNA SAVOCA
Stony Brook University
KAREN KERNAN
Stony Brook University
CATHERINE SCOTT
Stony Brook University
MONICA F. BUGALLO
Stony Brook University

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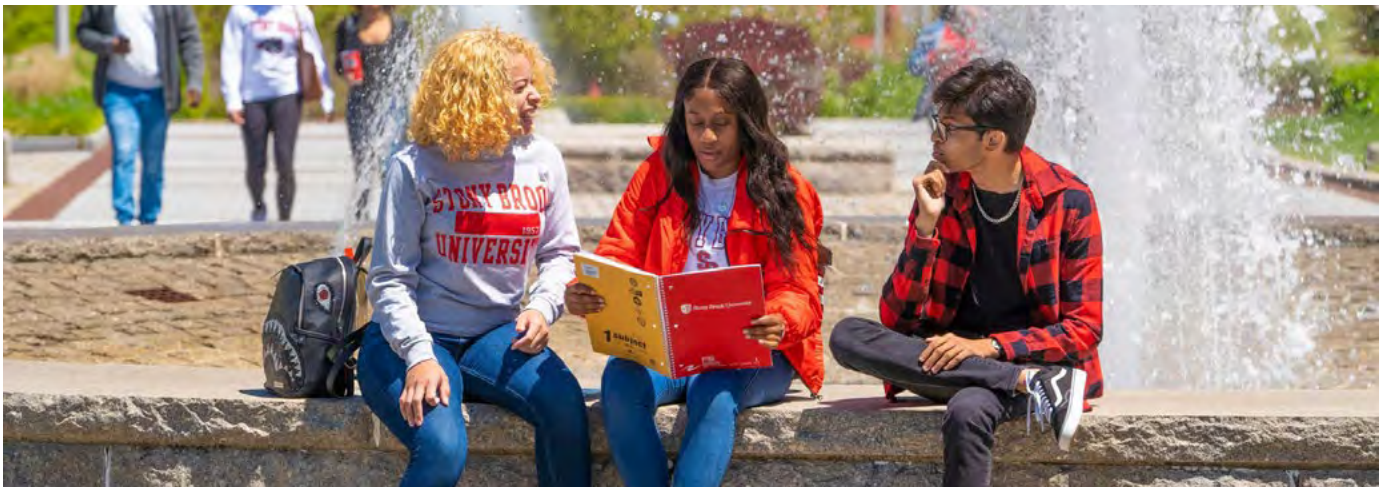
ABSTRACT

The benefits of undergraduate research to student persistence and success have been established in the literature. Less-studied, however, is the impact of early exposure to research among students from underserved backgrounds. This qualitative study of undergraduates participating in a unique summer research program uncovers the deeper meaning of the overall experience for the students: from the lab itself to the mentors, peers, professional development, socials, and the impact of the program staff. Three major themes emerged: (1) Early exposure to research is a foundation for career direction; (2) Relationships with peers and mentors are highly valued; and (3) Development of skills leads to personal and professional growth and confidence. Additionally, underrepresented students described the value of having minority role models and peers as well as the excitement of continuing their research throughout their undergraduate careers. A compensation package of stipend and housing made a practical difference for several of the participants. This study offers a deeper understanding of these impacts through the voices of the participants.

A large body of literature supports authentic research experiences as valuable to persistence in STEM, deep learning, STEM identity and self-efficacy (Eagan et al., 2013; Linn et al., 2015; NASEM, 2017). Undergraduate research is one of eleven high-impact practices (that include experiential activities such as internships, service learning, capstone projects, and e-portfolio), educational strategies shown to foster deep learning and practical gains and have cumulative and compensatory effects for underserved students (Kuh, 2008). Moreover, early research exposure has been shown to increase student persistence in STEM (Altman et al., 2019; Graham et al., 2013; Nagda et al., 1998). Yet, there are not enough authentic research experiences for undergraduates (Graham et al., 2013; Linn et al., 2015; Olson & Riordan, 2012), and fewer underserved students have access to structured research programs (Hurtado et al., 2014).

Stony Brook University - State University of New York is the flagship of the SUNY system. Its summer undergraduate research program is highly competitive; stipends are limited. With seed funding from SUNY, a planning team was convened by the president, and led by the vice provost for Faculty Affairs and Diversity, Equity, and Inclusion. The team was comprised of the vice provost and directors of two administrative units: undergraduate research and career center. The existing 10-week standalone summer research experience for high achieving students served as the model for this new program, which would specifically target underserved students with little to no research experience but high interest in STEM and would develop a series of professional development activities to create a sense of belonging among the students and contribute to their career readiness. Explorations in STEM Research had four goals: (1) Facilitate the participation of underserved undergraduates in STEM research; (2) Increase student research skills, communication skills, and knowledge of career options that prepare them for graduate school and careers in STEM; (3) Increase student retention in



STEM fields; and (4) Expand and develop faculty-mentored undergraduate research across campus.

Ten students participated in the first year, 2013. Students were matched with faculty mentors for a fully immersive experience in research. A weekly two-hour professional development series supplemented lab time, involving faculty and students talking about ethics in research, career options, and graduate school. A poster session was held for participants to display and discuss their work. The assessment plan utilized formative feedback, an adaptation of the Survey of Undergraduate Research Experiences III (Lopatto, 2007), an oral report and poster presentation scoring rubric, and feedback from research mentors. Assessments consistently demonstrate that the program is achieving its goals. In 2019 the project team sought to conduct a retrospective analysis of the program with this research question: Does early exposure to STEM research impact the development of STEM academic, research, social, and career engagement outcomes among students?

METHODS

A qualitative research method in the phenomenological tradition with a semi-structured interview protocol (Bevan, 2014; Giorgi, 1995), was used to understand the meaning participants derived from their experience. Email invitations were sent to all 112 students/graduates who participated. Twenty-five agreed to participate. Interviewees were diverse (Black: 16%, Latin: 20%, Asian: 20%, Caucasian: 36%, Multi-ethnic: 4%, and undisclosed: 4%). Almost half of the interviewees were from the life sciences, nearly half from physical sciences, with a couple of social science and undeclared majors. Hour-long Zoom interviews were conducted, recorded, and transcribed. Interviewers asked nine questions to elicit memorable experiences, influential aspects, perceptions on social interactions, and professional development.

An inductive, thematic analysis approach (Clarke, Braun, & Hayfield, 2015) was used to code transcripts. The researchers independently analyzed the transcripts for themes, then met several times to discuss findings. Consensus was reached on themes. Researchers then re-reviewed transcripts to code and categorize, pulling quotes to support each theme.

Early Exposure is a Foundation for Career Direction

The Explorations in STEM Research experience clearly impacted career thinking and trajectory. A large majority (92%) completed STEM degrees (i.e., engineering, physics, biochemistry) and pursued graduate degrees or jobs in STEM, achieving one of the goals. Most participants described the program as a gateway experience for a career in research and a springboard to future opportunities. Several perceived the program as a foundation because they had little to no previous experience in research. For example, Gayle noted the timing of that experience as formative:

> "That's because that first summer research experience showed me how much I enjoy it and how much I wanted to be a part of my life forever."

Tom described "an important butterfly effect," which gave him the opportunity to learn from peers about research in disciplines different from his and

exposure to science careers, including academia, national labs, and industry. Marlene's career path was largely influenced by the program:

> "If I didn't do that program, I don't know if I would have gone into research afterwards or if I would have would even have had the experience that would have enabled me to get these jobs post graduating… I just kept on doing research, and even after I graduated, I did research for like four years… And then I started working at these research labs and these major hospitals in the city. And then I ended up getting my master's in neuroscience."

Donna described how being a member of a research team prompted a shift in her career thinking:

> "…helped me re-envision how I could be a contributor to the healthcare field because originally, I wanted to go to med school… I ended up getting my master's in mechanical engineering because I realized I could build devices for people instead of just being a doctor."

Mona Lisa highlights the benefit for students new to research, which speaks directly to early engagement:

> "That combination of it being a program that offers funding to students but also takes promising students who haven't been in a lab before is like can really set up a lot of people for success, who otherwise wouldn't have gotten involved."

Diane connected the experience to her senior engineering design project, which won a regional business competition, received state recognition, and prompted the application for a patent. At the time of the interview, she was in medical school:

> "Had I not done that program. I really wouldn't have learned the skills that I did… Now I'm in clinical rotations in the hospital… a lot of those skills that I just started and really were kind of like molding at that point really are valuable even till now that I was able to build those then and kind of keep on building on them as I went forward."

Relationships with influential others

Interactions between students and mentors were shown to matter greatly. Diane conveys:

> "What was most influential was definitely the relationship I had with my PI. I feel like through the program, I kind of did more than I probably would have done otherwise…. The program set a standard of expectations that I wouldn't have known, had I not gone through it. The relationship I was able to establish with my PI was amazing to the point where I was able to continue that relationship for many years."

Mona-Lisa found having a female PI was motivating:

> "I think one of the most important aspects was my PI who…was a female investigator who was really successful, and I found that she was a very great role model in terms of explaining how the PhD process works and how she thinks about science. I just thought that the lab

was a really nice environment to sort of get acclimated because I worked in some other labs after that that were not as welcoming."

Lab colleagues were also mentioned as significant and influential mentors. Donna remembers her graduate mentor as being *"the most influential"* and states that he *"gave me the skills to be able to adapt and succeed"* and helped her *"to really think better."* Chris described the motivation that came from having graduate students as lab colleagues:

"their level of confidence in what they were doing, and mechanical engineering put me a little bit like in check. like oh shoot… [I've] got a long way to go. I think that just being around people who are successful and smart pushes me a little bit to be better."

A few respondents surprisingly had little to say about faculty – one forgot the name of the PI and another shared that there was limited contact with the PI. April reported having difficulty relating to her mentor because of age: *"I saw her as more of like a grandmother cause she's old."* The most negative report came from a student who reported feeling left out because the faculty conducted group meetings in a different language. Feedback like this is concerning and will be addressed in the recommendations section.

Several participants viewed the program directors as mentoring influences, as Mark states:

"The way that they ran the program I think was very inviting and collegial and interesting and not just willing, but also interested to have a one-on-one relationship with a student, which I thought was really inspirational and motivational."

Peer impact was mixed; some valued social interactions while others mentioned networking. Those who forged strong peer relationships seemed to bond for other reasons (e.g., having classes together). Relationships within the research group had more influence than within the cohort.

The whole team and also the other students… was beyond valuable and the program is really the people that made the program and my cohort. I mean, they were all amazing students, they really were supportive and really helped me think in different ways. And I think that was one of the most valuable aspects of the program." -Donna

"It made me feel like I wasn't going to struggle alone. I wasn't in on this alone. It made me feel like there were other people who were really trying to figure it out as well. And then we could work together as a team, not only to bond, but also to share experiences and to move forward with the research study." -Jeremy

Perhaps the most compelling statement reflecting the importance of peer group came from a URM student, Marlene, who shared:

"I was very, very, very grateful for the opportunity because I was a minority in the program. I was kind of shy, maybe to reach out to PIs and say, hey, I want to work in your lab. I ended up doing it before, but I never had my funding to just do a project on my own…I think that there were other minorities in the program, and it made me feel good because they were my peers, and I was like oh my God is so cool that I get to see one of you guys doing what I'm trying to do."

Donna pointed to her long-lasting connections to people in the program as bolstering the support and confidence she built up through the program experience to help her reach her career aspirations:

"I am where I am now really because it's been a tribe of people, mostly women, who've really helped me get here and, you know, I wouldn't have been able to meet them if I didn't know how to network or if I was scared of staying in my comfort zone."

Skills Leading to Personal & Professional Growth

Participants valued the personal and professional skills they gained throughout the program: putting themselves out there, becoming independent, working with a team, gaining professionalism, communication, presentation, and self-confidence.

"Resume review and career building as a freshman, it was so important for me to be exposed to that because it's so good to start early with that stuff." - Joan

Diane recalled critical thinking skills, communication, and teamwork as contributing to success in medical school:

> "The program really kind of pushed me towards building skill sets that involved being able to communicate, being able to critically analyze and so it was that push that I needed. I ended up having a more senior role in the lab where I oversaw a couple of projects… Communication skills, presenting skills, being able to work in a team collaboratively with other people; definitely important in medical school. Now I'm in clinical rotations and that's really valuable to present patients to attendings."

The program also prompted commitment to coursework:

> "I was more eager to take on projects… after that summer. As time went on, I started becoming more independent until the point where now I am working on something on my own…made me more driven when it comes to academic classes" - Bobby
>
> "[It] helped me a lot setting up a structure and sticking to the schedule and being disciplined…I became more motivated." - Ben

Nearly every participant remarked about improving speaking skills discussing science, literature, and research, which built confidence.

> "Being able to take something dense and being able to transform that for the public. I think it's just one of the greatest skills anyone can have and so actually I've taken that and have continued to develop it…those research presentations were the fundamentals of me learning proper communication skills which, you know, I'm still definitely learning, but it was very much so a pillar." - Donna

Many participants cited the practice and poster session as impactful – often as a fear to overcome, and leading to pride:

> "Helped me be more confident in myself because I've done it before, you know, especially in that environment that was a lot more nurturing, and so I had the chance to really mess up. You know, make my mistakes and learn how to get better…Every year forthcoming I feel like I was able to do so much better in every single presentation that I had because I had the experience." - Diane

Gayle expressed that the poster presentation requirement was "*very helpful in forcing me to have a very deep understanding of my research"* while Ben offered this perspective on the value of peer practice:

> "I get to see other people's presentations and see how professional they are and how much time and effort they put into the presentation and the poster and everything, so if it was only my own I wouldn't learn anything, just practice my own way of presenting."

Donna acknowledged the value of learning about professionalism:

> "I will never forget. Leslie how, you know, she told us to correctly give a handshake. It's something that sticks with me to this day. So, when other people don't give good handshakes, I'm like, I hear her voice in my head… it's just lessons that I think have evolved along the way."

Several remarked about growth, from getting pushed out of their comfort zones to learning about career services, building resumes, starting professional networks, and improving their sense of self-worth and potential for success. Tamara explains that being accepted to the program conferred a sense of legitimacy for her about her place in the lab:

> "Just being confident that you know, like oh I deserve to be there…the skills that you obtain in that summer will follow you throughout college because you're putting this program on your resume and it's part of your experience."

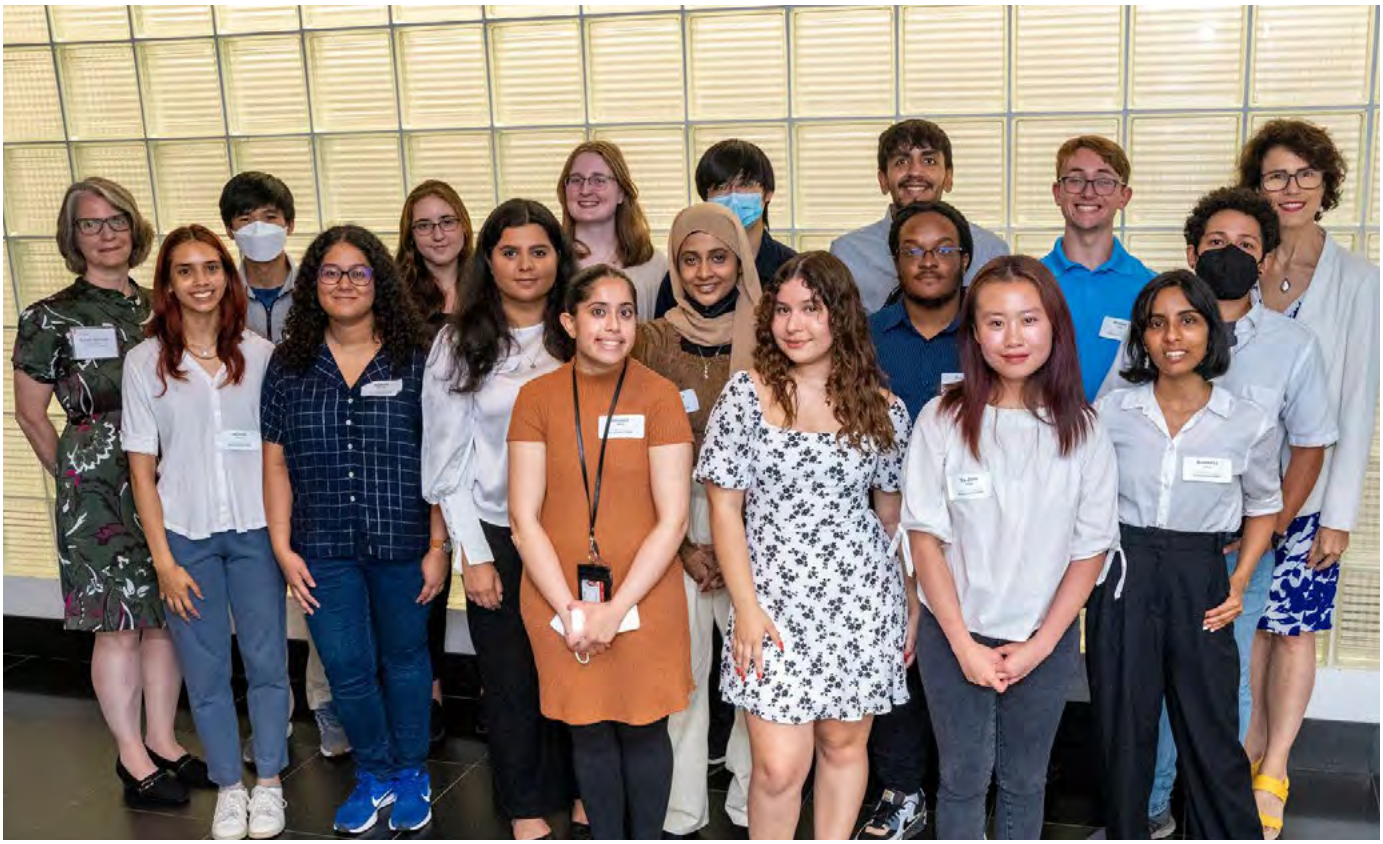
Two students credited the program as a centerpiece of their undergraduate experience:

> "It was one of the highlights of my undergrad career being in that program." - Diane

> "This experience with URECA Explorations in STEM has been one of the greatest experiences of my life and I constantly reflect on it because it makes me feel that without these experiences I wouldn't have been where I am today." - Jeremy

Compensation aspect

The compensation aspect of the program was crucial. From 2015-2019, participants received a $3500 stipend plus housing for the 10 weeks. In other



years, only housing was provided to students living more than 50 miles away from campus.

> "The only way I would have been able to do that was if I got grant money, and so, if I hadn't gotten the Explorations in STEM grant, like I would have went back [home] and I don't know that I would have done science that summer." - Mark

Marlene expressed a similar sentiment:

> "I would never have been able to do a research program without being funded. If I wasn't doing that program, I would have been working like I do every summer just trying to get finances in order...the funding was a huge help because I was like, Oh, great, like, I don't have to work. I can just focus on this academic thing that's going to help me in the long run."

One department sponsored several students' stipends. Having a cohort with unequal compensation was perceived very negatively by one respondent, April, who shared:

> "Well, it just kinda sucked that I was a ___ major and so I couldn't get housing. So like, for me having to go [by] train everyday just to like get to the program and go back, and then other people would just have like their dorm and stuff. So that was one thing I was kind of jealous of that I wish I had."

Compensation also imparted a sense of responsibility for students and mentors. Millicent described the salary as giving her motivation to *"rise to that expectation."*

> "Well, I think a bit of it was [it] let me feel like I need to earn my salary, so you know, if I'm going to be getting this grant weekly, I want to make sure that I'm putting in the work to get it."

Marlene echoed this sentiment, saying:

> "because we're getting sponsored it feels like a very serious project and have your PI so invested in it."

The campus offers multiple ways to be involved in research: credit, volunteer, and paid. The emphasis on funding summer research experiences through the Undergraduate Research and Creative Activities (URECA) office and further emphasized with *Explorations in STEM* allows students to immerse

themselves in a faculty mentored research experience without other responsibilities. Compensation appears to impart a sense of responsibility in both the students and faculty mentors. Because *Explorations in STEM* admits students who are new to research, it fills a niche on campus, helping students without previous experience to get support early on, positioning them to apply for more competitive research fellowships or internships (on and off-campus) later in their undergraduate careers.

LINGERING QUESTIONS

Is failure to persist in STEM a failure?

Two students who ultimately left STEM responded that the program showed them that research was not for them.

> "I feel like it helped me academically by helping me in figuring out what I don't like but also giving me a lot of ways to set a foundation to what I really want." - April
>
> "It was a good experience, because it exposed me to a side, you know, an option of my career. It made me realize that it wasn't exactly the direction that I wanted to go into even though I enjoy what I was learning."-Jennifer

While these examples do not support the retention goal, given that our program title focuses on "exploration," self-realization is also considered a success. In fact, the inclusion of the career center as a key collaborator from the beginning signaled to students and faculty that the experience was intended to promote self-reflection about the match between laboratory, STEM careers, and personal interests. Recent trends in career development point to the application of a design thinking model to ideate and prototype multiple career paths, strongly emphasizing experiences to help validate career thinking or prompt new directions (Burnett & Evans, 2016).

Whom does the program most benefit?

Diane, who participated during her first and second years, described the value of having this program early, comparing her experience to classmates who had experienced a "sink or swim" approach:

> "I had so much guidance that I always felt like I knew what I was doing and I knew what to do. And I knew who to ask. So I really appreciated early on that I had that support system that it made me just, I feel like I launched ahead so fast, instead of having to figure it out on my own and kind of struggle throughout. I was able to just kind of go leaps and bounds forward."

She continued:

> "Had I not done that program. I really wouldn't have learned the skills… I wouldn't be as strong as I am in a lot of the research aspects, scientific aspects…that learning experience, all that feedback back then when I was just starting out…It influenced me and pushed me to where I am now."

Freshman/sophomores appeared to derive the most benefit, though juniors who were underserved in STEM or financially disadvantaged with no previous research also found the program to provide a jump-start for their career. Marlene, who got started in research in her junior year, reflected:

> "So it was definitely influential like if I didn't do that program. I don't know if I would have gone into research or if I would have even had the experience that enabled me to get these jobs post graduation…with Explorations in STEM, having that applying to jobs as a new graduate student opened up a lot of doors because even if it was something small, you know, you're exposed to it. You know how a lab works… the doors open so much more."

Donna, who joined as a freshman, emphasized relationships:

> "they were just always there as like a big support throughout my whole undergrad experience."

Although we might suggest that students who participate as freshman/sophomores reap the most benefits, it appears that the most significant consideration for program eligibility is having little to no experience. As Craig put it, *"the Explorations in STEM… was for people that kind of showed aptitude but didn't have the experience, and that was me."*

Several of the research participants came from

the early cohorts, further demonstrating the powerful impact of the program on students who discussed this several years later. In addition to analyzing the program through the lens of year-in-year, we considered the range of majors/disciplines. Does it work to have biology students together with engineers? A few respondents pointed out that some programming talks/workshops were more geared for other majors, but overall students enjoyed meeting people in other fields and learning about their research.

With greater academic diversity comes the challenge of designing programming that meets everyone's needs. For example, the Matlab workshop was valued by some, but deemed too elementary by others. The LinkedIn/resume workshop may be more valuable for freshmen than for students with existing profiles. Freshman participants may not be ready for workshops that discuss graduate school. Future iterations of the program will need to balance these differing needs.

LIMITATIONS

This study has several limitations. The timing of the interviews is one. For some, it had been a few years since they participated in the program; recollections were not as deep as for those who were more recent graduates. The sample size was small compared to the total number of participants: of 107 total participants, we interviewed 23%.

We chose to include summer 2020 students in the study; however, that year, the program was drastically different. Students were entirely remote and only those research experiences which could be done remotely were approved by the university. While weekly professional development sessions were still conducted, we acknowledge that the sense of belonging in the Zoomiverse may be lacking and wonder whether those students felt similar levels of confidence after completion.

One last limitation is the timing of the study, as we conducted this study during COVID. This created scheduling issues, and the use of virtual interviews may have impacted the comfort level of the participants and the interviewer/interviewee interaction. Body language, for example, was nearly unobservable.

Future retrospectives could include interviews with students engaged in summer research at the same time who were not part of the cohort-based program with professional development programming. This design could further clarify the impact of the cohort model and programming elements.

RECOMMENDATIONS

This study has helped us understand the value this program has had for students, and yet it also unearthed some previously unknown challenges, such as the issue with the faculty member who conducted group meetings in a language other than English. Orientation and training for the mentors have not been part of our program, nor is this a part of the traditional URECA summer research program. As a result of this study, we plan to institute mentor training with our faculty and graduate students who will be overseeing the experience of these younger undergraduates, and we will continue to refine our midterm and post-program assessments.

The study can also help other campuses who wish to increase student representation in and commitment to STEM. Getting to students early – in the first or second year – is so important, especially for underrepresented students. Early exposure to research will ignite interest, and more importantly, give them early wins, where they can develop competence, confidence, and a sense of belonging in the laboratory environment. A cohort model will create the peer group that may endure throughout the rest of college, and perhaps into careers. This study also confirmed that the principal investigator can serve as role model and mentor, but also can de-motivate and exclude, as we saw in one case. Mentor capabilities should not be assumed, and training should be provided for all faculty and graduate student mentors in mentoring skills as well as equity and belonging.

It should also be noted that funding can make the difference for students who would normally have to earn an income in the summer. We were able to increase the number of student participants by asking academic departments to fund a couple of their own students. We also identified additional support from corporate and private foundations. Another sugges-

tion would be to find an institutional partner, who might help share the cost. Lastly, consider a pilot with a small cohort. Collect data that will help demonstrate impact, which could lead to larger grants.

CONCLUSION

The purpose of this retrospective qualitative study was to understand the impact of early exposure to STEM research on students' academic, research, social, and career engagement over time. Indeed, the *Explorations in STEM* program was shown to be a positive force in students' excitement about STEM, persistence in STEM, and STEM career choices. Recommendations align with the findings: (1) Early exposure to research can serve as a foundation for career direction and a spark for STEM interest, (2) Relationships with peers and mentors should be purposefully nurtured because they matter to the student experience, and (3) Skill development activities beyond the lab will add value, build confidence, and lead to professional growth. Moreover, the provision of summer housing along with the stipend could very well be the difference that helps students with financial need accept the opportunity. Future iterations of the program – or the development of similar programs – should consider the inclusion of more engagement with the mentors through customized training based on level of mentoring experience as well as delivery of some of the professional development components of the program.

Related research has previously demonstrated that access to structured undergraduate research programs benefits underserved students (Graham, et al., 2013; Hurtado et al., 2014; Linn et al., 2015, Zydney et al., 2002). This study confirms the benefit of early research experiences (Nagda et al., 1998), and adds to the literature through its qualitative design that gets to the deeper meaning that the experience had on the students. ■

REFERENCES

Altman, J. D., Chiang, T., Hamann, C. S., Makhluf, H., Peterson, V. & Orel, S. (2019). *Undergraduate research: A road map for meeting future national needs and competing in a world of change*. Retrieved from https://www.cur.org/what/publications/cur_newsletters_white_papers/

Bevan, M. T. (2014). A method of phenomenological interviewing. *Qualitative health research,* 24(1), 136-144.

Burnett, B., & Evans, D. (2016). *Designing your life: How to build a well-balanced, joyful life*. New York, NY: Knopf

Clarke, V., Braun, V., & Hayfield, N. (2015). Thematic analysis. In J. Smith (Ed.), *Qualitative psychology: A practical guide to research methods* (222-248). London: Sage.

Eagan, M. K., Hurtado, S., Chang, M. J., Garcia, G. A., Herrera, F. A., & Garibay, J. C. (2013). Making a difference in science education: The impact of undergraduate research programs. *American Educational Research Journal,* 50(4), 683-713.

Giorgi, A. (Ed.) (1995). *Phenomenology and psychological research.* Pittsburgh, PA: Dusquesne University Press.

Graham, M. J., Frederick, J., Byars-Watson, A., Barrie-Hunter, A., & Handelsman, J. (2013). Increasing persistence of college students in STEM. *Science Education,* 341(6153), 1455-1456. DOI: 10.1126/science.1240487

Hurtado, S. M., Eagan, K., Figueroa, T., & Hughes, B. E. (2014). *Reversing underrepresentation: The impact of undergraduate research programs on enrollment in STEM Graduate programs.* Los Angeles, CA: Higher Education Research Institute, UCLA.

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Kuh, G. D. (2008).*High impact educational practices: Who has access to them and why they matter.*Washington, DC: Association of American Colleges & Universities.

Linn, M. C., Palmer, E., Baranger, A., Gerard, E., & Stone, E. (2015). Undergraduate research experiences: Impacts and opportunities. *Science*, 347(622). DOI: 10.1126/science.1261757.

Lopatto, D. (2007). Undergraduate research experiences support science career decisions and active learning. *CBE—Life Sciences Education,* 6(4), 297-306.

Nagda, B. A., Gregerman, S. R., Jonides, J., von Hipple, W., & Lerner, J. S. (1998). Undergraduate student-faculty research partnerships affect persistence. *The Review of Higher Education,* 22(1), 55-72.

NASEM - National Academies of Sciences, Engineering, and Medicine. (2017). *Undergraduate research experiences for STEM students: Successes, challenges, and opportunities.* Washington, DC: National Academies Press. DOI: 10.17226/24622.

Olson, S., & Riordan, D. G. (2012). Engage to excel: *Producing one million additional college graduates with degrees in science, technology, engineering, and mathematics.* Report to the president. Washington, DC: Executive Office of the President.

Zydney, A. L., Bennett, J. S., Shahid, A., & Bauer, K. W. (2002). Impact of undergraduate research in engineering. *Journal of Engineering Education,* 91(2), 151-157.

Marianna Savoca is the Associate Vice President for Career Readiness & Experiential Education at Stony Brook University, NY, USA. She is a connector, and proud that this project connects faculty with staff from multiple divisions: student affairs, academic affairs, and educational effectiveness: true collaboration!

Karen Kernan is director of Undergraduate Research & Creative Activities (URECA) at Stony Brook University, NY, USA. She values her partnership with the Career Center since 2013 in running Explorations in STEM summer program.

Catherine Scott is the Director of Educational Effectiveness at Stony Brook University. Her interest in evaluating undergraduate research experiences increased after her first year of evaluating Explorations in STEM and she realized what an impact programs like these make on students.

Mónica F. Bugallo is a Professor of Electrical and Computer Engineering and currently the Vice Provost for Faculty Affairs and Diversity, Equity, and Inclusion at Stony Brook University, NY, USA. Her research is focused on statistical signal processing, with emphasis on the theory of Monte Carlo methods and its application to different disciplines, and she has also focused on STEM education and has initiated successful programs to engage students at all academic stages in the excitement of engineering and research, with focus on underrepresented groups.