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RESEARCH ARTICLE

How Undergraduates Historically Underrepresented in Biomedical Sciences Value Multiple Components of a Research Training Program

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Abstract

To promote diversity in the STEM workforce, undergraduate research training programs incorporating a variety of intervention strategies have been developed to support students from historically underrepresented backgrounds in overcoming numerous systemic barriers to pursuing careers in science. However, relatively little research has focused on how students experience and value these interventions and the ways in which the interventions support student success. The current study analyzed qualitative interviews from participants ($n = 15$) in a comprehensive research training program for undergraduates historically underrepresented in biomedical research to investigate the student perspective on how specific program components address barriers and support their research training, academic progress, and career preparation. Findings indicated that students benefit from authentic research experiences, mentoring, supplemental curriculum, financial assistance, and a supportive program environment. Participants described how the program helped them address financial concerns, navigate academic and career choices, build science identity and efficacy, and feel a sense of belonging within a caring community. The study highlights how multi-faceted research training programs offering a variety of supports can contribute to student retention and development according to the needs and circumstances of individual students.

Keywords Underrepresented minority students · STEM education · Undergraduate research training programs

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Background

Diversification of the biomedical research workforce to better reflect the demographics of the population remains a high national priority (Estrada et al., 2016). Widespread health disparities disproportionately affecting individuals from underrepresented racial and ethnic groups (Braveman et al., 2011) point to the importance of having a diverse group of researchers to tackle pressing health issues (Valantine & Collins, 2015). Racial and ethnic diversity in the biomedical workforce is associated with greater innovation in research (Hofstra et al., 2020), leads to higher-quality science (Freeman & Huang, 2015), and plays a role in improving healthcare for those from traditionally marginalized racial and ethnic groups (Shen et al., 2018).

Historically, marginalized student populations have been underrepresented in obtaining degrees in scientific disciplines leading to research careers, with lower rates of undergraduate degree completion and widening discrepancies at graduate degree levels (Estrada et al., 2016; National Science Foundation, 2017). The 2019 US Census estimated that 31.9% of the population identify as either Hispanic or Black or African American (US Census Bureau, 2019), while only 20% of students who received doctorates in 2019 were from these groups (National Center for Science & Engineering Statistics, 2019) highlighting significant gaps between the diversity of the general population and those in biomedical careers. Notably, while underrepresented minority (URM) students make up 31% of the college population, they attain only 13% of STEM degrees awarded (National Science Foundation, 2017).

To explain ongoing disparities in degree attainment and graduate school matriculation, research points to wide-ranging systemic challenges and barriers that URM students face as they pursue STEM degrees (Pierszalowski et al., 2021). Researchers posit that long-standing structural racism in academia plays a central role in the suppression of STEM degree achievement among non-white students and creates a complex web of challenges and barriers for these students on their pathways (McGee, 2020; Tilghman et al., 2021). For instance, students from historically underrepresented groups experience lower levels of belongingness, negative self-perceptions about their fit and abilities, and ongoing experiences with a hostile institutional environment (Chen, 2009; Hurtado & Ruiz, 2012; Johnson, 2012). These students also report regular and persistent experiences with stereotype threat, discrimination, bias, and microaggressions in STEM environments (Beasley & Fischer, 2012; Griffith et al., 2019; Rainey et al., 2018). For STEM students of color, a sense of belonging can be integral to success (Mondisa & McComb, 2015) along with social support and safe social spaces or counterspaces (Ong et al., 2018; Williams et al., 2017). URM students also have been systematically excluded from opportunities to build science capital through networking and often do not have access to the implicit knowledge needed to navigate the challenges they face on their pathway to a STEM degree (DeWitt et al., 2016). In addition, underrepresented students often face financial barriers at college and are disproportionately impacted by financial strain while pursuing their

undergraduate degrees (Kuh et al., 2006). Such financial concerns can negatively affect the academic and social experiences of undergraduates (Hurtado et al., 2010).

Several national initiatives have sought to address disparities in STEM graduation rates and to support students from diverse backgrounds interested in STEM careers by focusing on interventions at the undergraduate level (Lopatto, 2004; Tsui, 2007). Importantly, successful programs must address the psychological, social, cultural, and financial factors that pose barriers for historically underrepresented students (Gazley et al., 2014; Hilts et al., 2018; Hurtado et al., 2007). The extant literature indicates a wide range of program interventions intended to influence the trajectories of undergraduates participating in STEM enrichment programs, including workshops and curricula, financial assistance, hands-on research experience, mentorship, and informal program support (Maton et al., 2012; Tsui, 2007). Participation in these programs has been linked with higher graduation rates (Barlow & Villarejo, 2004), an increased likelihood of pursuing additional research activities and education at the graduate degree level (Hathaway et al., 2002), an increased likelihood of pursuing a PhD program in STEM (Carter et al., 2009), and a greater interest in pursuing a career in research (Harrison et al., 2011).

Among URM undergraduates, participating in a hands-on research experience has been shown to have a positive effect on academic and career goals (Carpi et al., 2017) and persistence in STEM fields (Chang et al., 2014). Multi-dimensional mentoring that provides students with various types of support (e.g., role modeling and providing emotional, professional, and academic support) is especially beneficial. In particular, mentoring at the undergraduate level is highly valued by students (Kendricks et al., 2013), has been linked with positive academic outcomes (Nora & Crisp, 2007), and has been associated with a greater likelihood of continuing to a graduate degree (Campbell & Campbell, 1997). Although mentoring appears to contribute to persistence in undergraduate students from all backgrounds, it may be even more salient for URM students (Hu & Ma, 2010).

A variety of other program activities and supports are also considered important for the success of URM undergraduates in STEM. For example, STEM enrichment programs frequently provide financial assistance for students, which has been linked to positive academic outcomes such as improved academic performance, engagement, and persistence (Nora et al., 2006). Programs also prioritize professional development activities, which contribute positively to URM STEM undergraduates' understanding of the graduate school application process and career pathways (Ghee et al., 2016). Seminars and workshops focusing on skills and knowledge for navigating the culture of science support STEM engagement and persistence among undergraduates, especially for URM students (Wrighting et al., 2021). Likewise, interventions that foster a sense of community also improve outcomes among URM STEM undergraduates (Maton et al., 2016). Notably, increased coordination between sources of support such as academic advising and career counseling can help improve motivation among STEM undergraduates (Cromley et al., 2016; Tsui, 2007).

Although a variety of strategies to support underrepresented students in STEM have been implemented and evaluated, very little is known about how students

experience these interventions and how programs support students in overcoming barriers. The perspectives of student participants are essential for understanding which program elements are most helpful and most appreciated. STEM enrichment programs often utilize a multi-faceted approach, mobilizing more than one intervention to support students, which makes isolating and assessing the benefit of individual program components a challenge (Tsui, 2007). Given the high cost of multi-faceted research training programs (Rincon & George-Jackson, 2016), ensuring that program components contribute to positive undergraduate research training is of paramount importance. Qualitative research that gives voice to student experiences has provided important insights regarding the personal and program factors that influence the success of undergraduates in STEM (Burton & Vicente, 2021; Gibau, 2015; Thiry et al., 2012). Qualitative research is also well suited to explore student perspectives regarding the value of different program components within a comprehensive research training program.

The current study focused on participants in an undergraduate research training program that includes multiple intervention components to investigate how students believe different program elements contribute to their undergraduate success and career development goals. The study used in-depth qualitative interviews to explore student perceptions of how various intervention elements addressed barriers to their personal, academic, and career development. Specifically, the study investigated the following research question: How do students describe specific research training program components as helping to overcome barriers and contributing to educational progress, preparation for research, and career development?

Method

The present study is part of a larger ongoing mixed-methods evaluation of the BUILD EXITO project, a comprehensive research training program for undergraduates historically underrepresented in the biomedical sciences. BUILD EXITO aims to engage and retain undergraduate students from diverse backgrounds in biomedical research and to prepare participants to continue biomedical research through graduate school and/or entry into the biomedical research workforce. BUILD EXITO offers a comprehensive, 3-year, developmentally sequenced training model that integrates an enhanced curriculum, a long-term research experience, a multi-faceted mentoring model, a supportive environment, and a financial package including stipend and tuition remission (see Richardson et al., 2017). Given its range of programmatic interventions, BUILD EXITO provides a unique opportunity to explore how different STEM enrichment program components support participants in their undergraduate and graduate trajectories. The present investigation uses data from in-depth qualitative interviews to analyze how various program components helped students to navigate potential barriers and to prepare for future education and career opportunities.

Intervention Description

In 2014, the National Institutes of Health launched the Building Infrastructure Leading to Diversity (BUILD) initiative to develop and test new approaches for diversifying the future biomedical workforce (Valantine & Collins, 2015). The BUILD initiative funded 10 academic institutions around the USA to provide training and support to historically underrepresented undergraduate students in their pursuit of biomedical degrees and to provide a pathway to enhance their prospects for becoming future contributors in NIH-funded research.

BUILD EXITO is a collaborative multi-institutional project led by Portland State University (PSU), a major public urban university that prioritizes student access and opportunity, and Oregon Health & Science University (OHSU), a research-intensive academic health center. The BUILD EXITO network includes additional partners that are 2-year and 4-year institutions of higher education in Oregon, Washington, Alaska, Hawaii, Guam, American Samoa, and the Northern Mariana Islands. BUILD EXITO has two parallel scholar training pathways depending upon whether students initially enroll in the program at 2-year or 4-year institutions. Community college partners recruit and enroll EXITO scholars on their campuses and implement the first year of the BUILD EXITO program model. These scholars then transfer to PSU, where they complete the final two years of the program. Scholars entering BUILD EXITO at PSU or at 4-year university partners complete the entire program at their home institutions. OHSU, which does not have undergraduate degree programs, hosts many scholars in their research placements.

BUILD EXITO features a cohort model designed to accommodate multiple biomedical majors and disciplines (e.g., natural and social sciences), multiple partner institutions, and students who transfer from 2-year colleges. Over the 3-year developmental pathway, BUILD EXITO weaves together program components to provide personal, social, academic, and financial support to promote student success leading to graduate studies and research careers (see Fig. 1). The training model's core components include the following:

- Curriculum—an integrated and culturally congruent curriculum to teach content, skills, and the implicit codes and conventions for navigating higher education and the culture of scientific research. Scholars enroll in a required gateway to research course, participate in intensive summer skills workshops, and engage in weekly enrichment sessions that support personal and professional development. (see Marriott et al., 2021).
- Research experience—placement in a 19-month internship with an active, funded, faculty-driven research group with ongoing projects, called a Research Learning Community (RLC), to gain authentic experience and develop science identity and self-efficacy. While receiving training, scholars make meaningful contributions to the work of their RLCs, which may be large, well-staffed labs or faculty researchers working with a few students. (see Honoré et al., 2020).
- Mentoring—multi-faceted developmental mentoring for individualized academic scaffolding and personal support, with each scholar matched with a research, career, and peer mentor. Research mentors supervise research training

Fig. 1 Graphic depiction of program components in BUILD EXITO 3-year training model

in the RLC. Career mentors are faculty who provide academic and career advising. Peer mentors offer the student perspective on college life and navigating the training program. (see Keller & Lindwall, 2020).

- Supportive environment—a program culture of support including strong connections with cohort peers and faculty to buffer against feelings of isolation or not belonging through activities and events, study and meeting spaces, advising, and service referrals.

- Financial support—in the final two years of the program scholars at PSU receive a trainee funding package that includes both monthly stipend and tuition remission during the academic year to reduce financial stresses and allow a focus on training as well as hourly wages for continuing to work in the RLC as a primary summer job. Scholars at other 4-year institutions receive hourly wages to support their RLC work. All scholars have funding to permit conference travel.

Sample

The study sample consisted of 15 EXITO scholars who were seniors and in the final stages of the program at the time of the study. This sampling decision was designed to enroll participants who were familiar with all elements of the intervention and could reflect on the entire program experience. Given this sampling criteria, 74 scholars active in the program were eligible to participate in the study. A sample size of 15 was pre-determined based on research indicating a high likelihood of achieving thematic saturation with this number of participants, meaning additional subjects would probably not yield additional insights (Namey et al., 2016). Participants were chosen using stratified sampling methods, ensuring a proportional number of interviews per current institution and original institution (for transfer students coming to PSU). At the time the interviews were conducted, students were enrolled at Portland State University or at a 4-year partner institution: University of Alaska Anchorage, University of Guam, or University of Hawaii-Manoa. For each program site, eligible scholars were listed in a randomized sequence mirroring the relative percentage of EXITO students enrolled at each institution, with half of PSU students transferring from community college partners and half starting at PSU. Scholars were invited in that sequence to participate in the study according to the designated number to be sampled at the site. Each scholar was sent two reminders after the initial invitation. If an invited scholar declined or did not respond, the next scholar in the sequence was invited until the designated number for the site sample was fulfilled. After multiple unsuccessful contacts at two sites, the site coordinators were asked to refer scholars likely to participate. The interviews were completed during the participants' last term of participation in the program, which for many was within a term or two of graduation from college.

Demographic variables were collected from participants' program applications. All but two participants were from the second cohort enrolled in the program (one scholar from cohort one had stopped out briefly; one scholar from cohort three had an accelerated placement). A majority of participants identified as belonging to an underrepresented racial or ethnic group; one-third ($n=5$) of the participants self-identified as both white and non-Hispanic. Two-thirds of participants ($n=10$) identified as female, three identified as male, and two identified as non-binary. The mean age was 24 years (s.d. = 5), and over half ($n=8$) were first-generation college students (see Table 1 for detailed demographic information). On most of these demographic factors, this sample was fairly representative of the overall enrollment of

Table 1 Sample characteristics ($n = 15$)

Demographic categories	*N*	%
Age		
18–25	11	73.3%
26 and older	4	26.7%
Gender		
Female	10	66.7%
Male	3	20.0%
Non-binary	2	13.3%
Race/ethnicity		
Asian (non-Hispanic)	2	13.3%
Black/African American (non-Hispanic)	3	20.0%
More than one race (non-Hispanic)	2	13.3%
More than one race/Hispanic	2	13.3%
White (non-Hispanic)	5	33.3%
White/Hispanic	1	6.7%
Self-reported factors		
Receiving need-based financial aid	11	73.3%
First generation college student	8	53.3%
Experience in foster care system	3	20.0%
BUILD EXITO Institution		
Portland State University	10	66.7%
Start and stay	*(5)*	*(33.3%)*
Transfer from community college partner	*(5)*	*(33.3%)*
University of Alaska Anchorage	2	13.3%
University of Guam	1	6.7%
University of Hawai'i System	2	13.3%

Source: Scholar application

scholars in their cohort: 28% non-Hispanic white; 77% female; 57% first generation, and mean age 24 (s.d. = 6). All participants were majoring in biomedical fields.

Procedures

Three members of the evaluation team, all of whom had previous experience performing qualitative research, conducted one-on-one semi-structured qualitative interviews with participants. Interviews were conducted between November 2018 and March 2019, either in-person or remotely via phone and video chat (Irvine et al., 2013) depending on university location, scholar availability, and technological feasibility. Regardless of modality, all interviews were recorded and transcribed. The audio for one interview was corrupted after the first 15 min, and the rest of the interview was lost; the saved portion of the interview was used in the analysis. All procedures adhered to IRB-approved protocols.

The semi-structured interview framework was chosen for its flexibility and versatility in obtaining rich, descriptive data reflecting the personal insights and experiences of participants regarding numerous topics of interest (Kallio et al., 2016). After asking participants about their plans and goals leading up to and following graduation, interview questions asked them to identify financial and other barriers to pursuing an advanced degree and to describe how BUILD EXITO did or did not address those barriers. Additional questions asked more generally about their experience as participants in BUILD EXITO and how participation had an impact on them. Finally, participants were asked questions about their science identity, e.g., "Do you see yourself as a researcher/scientist? Why or why not?" Relevant portions of the interview protocol are presented in the Appendix.

Data Analysis

The interview recordings were first transcribed by an external transcription service. Quality assurance was then performed by a member of the research team, who listened to the recordings while cleaning the transcripts. The data were uploaded to Dedoose (version 8.3.47) for storage and analysis. The first iteration of codes was created using a general inductive approach for evaluation data (Merolla & Serpe, 2013; Thomas, 2006). After the first iteration of codes was created, two members of the research team achieved high inter-rater reliability on one of the transcripts. The remaining interviews were then evenly divided between the two researchers for preliminary coding. After this first round, both researchers reviewed and annotated all interviews.

The team used the framework method (Gale et al., 2013) to structure the analysis and met weekly to discuss emerging themes, their meanings, and adapt to discrepancies within and between themes. The team prepared memos documenting the emerging themes apparent in all interviews. Prominent codes and preliminary themes were fine-tuned and calibrated using a "Themes Case Level Matrix" with a row for each student and columns containing thematic matches, their accompanying interview notes, and supporting coded interview excerpts from both researchers. This matrix allowed both researchers to identify and compare themes alongside the descriptive text and researcher notes accompanying each theme. Both researchers could work independently on a particular theme and later meet to discuss. The Themes Case Level Matrix was used as a shared analysis "window" and was instrumental in seeing frequencies, distributions, and sometimes overlapping sub-themes between and within themes. The main themes were refined using this matrix, and weekly meetings were used to share and solve discrepancies. Through this iterative process, themes emerged and merged throughout the analysis until a final consensus on the findings was achieved.

In analyzing the themes, it was noted that scholars frequently referenced specific BUILD EXITO program components that promoted their personal and professional development and supported them in surmounting particular challenges and barriers. In other words, themes relating to certain barriers and/or benefits were typically discussed in conjunction with particular program components. Given the overlapping

correspondences between the barriers/benefits and the intervention components, an analytic decision was made to organize the presentation of findings according to the intervention components. This approach, centering on the source of support rather than on the barrier encountered or the benefit derived, proved to be more parsimonious and also offered practical insights relevant for the design and development of multi-faceted programs.

Results

Analysis of the interview data generated several themes highlighting ways in which participation in BUILD EXITO supported the education and career development of scholars. For example, scholars described how the program provided information and guidance that helped them navigate the unfamiliar terrain of higher education during their undergraduate experience. The program also introduced them to new career pathways and facilitated their planning for post-baccalaureate research trajectories. Scholars emphasized the development of a research identity through connections with researchers and research experiences that enabled them to envision themselves as future scientists. In addition, the interviews revealed how financial constraints influenced their undergraduate experiences and plans for future education, indicating the significance of the financial package provided through the program. Scholars also stressed the value of interpersonal relationships developed through the program, which provided crucial psychosocial support that helped them cope and persevere when contending with a range of health issues and life events.

Curriculum: Workshops and Seminars

Planning for Graduate School

Thirteen of the 15 scholars in the study noted that they benefited from post-undergraduate planning support at EXITO workshops, which addressed financial and non-financial barriers to pursuing an advanced degree after graduation. Scholars displayed trepidation toward financing post-undergraduate plans and mostly focused on actionable steps they could take as undergraduate students to prepare for the expenses of graduate school. Scholars recalled how EXITO workshops had provided helpful information regarding approaches for funding graduate education. As one participant shared,

> The program enrichment coordinator brought in a bunch of faculty from Portland State, OHSU, and other outside institutions to help inform us about ways we can fund our graduate record exam, or grants we can apply for and scholarships you could apply for that would help offset some of the funds that we will be tasked with paying for.

However, another scholar who attended a partner institution wished that their workshops had focused more on the financial aspects of planning for graduate

school. This scholar stated, "the sessions that they hold, they primarily focus on getting in [to graduate school] and what you need to do to get there, but not the financial piece of it."

Scholars noted that workshops for non-financial aspects of post-undergraduate planning had been helpful too. These workshops introduced scholars to different research topics and career opportunities, helped them envision their future goals, and promoted the development of practical skills such as networking and self-presentation. This opportunity to explore and discuss a variety of options enabled students to chart a course for their undergraduate experience. As one scholar explained, "EXITO helped me figure out how I should lay out a plan, how I should do everything, and to actually […] make a decision, this is the area I want to go to." In instances where scholars were the first in their family to attend college or apply to graduate school, the skills learned were especially valuable. One participant commented:

> [For] first-gen students [like me], it's 10 times harder to climb up. [EXITO] provides this bridge. [...] I didn't even know how to write [...] a personal statement. I didn't know how a cover letter worked. There's so many things I didn't know, and then I joined EXITO and then it opened [the] research field for people like me, who [...] had interest but didn't know where to start.

One-to-One Support

In addition to Enrichment workshops, five PSU scholars noted the one-to-one support they received from Enrichment staff for preparing their graduate school applications (e.g., writing personal statements, cover letters, and CVs). This individualized coaching often went beyond the technical elements of preparing such documents to assist scholars in exploring and defining their interests, priorities, and goals. As one participant shared, "I'm so grateful for that because when I finished that essay it really cemented on what I wanted to do [and why I'm] doing it. And it helped build a better pathway to graduate school." Participants also shared feedback with suggestions for the Enrichment workshops, which were mandatory for scholars at PSU. Due to the range of scholars' post-graduate interests, Enrichment covers an array of topics related to post-graduate plans and concerns. A small proportion of scholars expressed frustration that they had to spend time at Enrichment instead of earning money or studying. Others noted that, although they found Enrichment sessions helpful, they thought the workshops could be improved by having more structure. As one participant emphasized,

> I think things like working on cover letters, looking at outlines and examples of cover letters and personal statements and then having people come in for panels and doing mock interviews, I think those are all great. But just always having a plan and always having a structure is a really good idea not only to make scholars come to the meetings but also make them feel they're getting something out of the meeting.

Scholars at partner institutions that did not offer the same kinds of regular workshops and panels expressed interest in having access to PSU's workshops or having more workshops at their institution. One participant from a partner institution shared the following:

> [At] PSU, I'm sure they have tons of workshops and everything like that for all kinds of stuff because that's where all the funding is coming in. But it'd be nice if they had some more stuff like that too here just in general. [...] I mean they have some workshops sometimes. I've only been to one. I think that was on the CV and creating your resume, but if they had other workshops, whatever can help us achieve our goals, that would've been great too.

Financial Assistance

Allowing Focus on Research and Academics

Thirteen of 15 scholars mentioned how EXITO financial assistance had been instrumental in pursuing their research training and development. Scholars were appreciative of the funds received—especially the monthly stipends—that allowed them to focus more on academics and research. In their interviews, scholars clearly indicated the significance of finances as they attempted to balance competing demands for coursework, research experiences, and employment. For example, one scholar commented, "If there was no EXITO funding, if there was no compensation, it would be really hard to prioritize the research because it would have to come second to paying your bills, which would be another job."

Some scholars indicated the financial support resulted in improved grades and reduced stress. As one participant stated,

> …[The funding from EXITO has] taken away some of the burden of having to come up with finances. So I've been able to: 1) reduce my stress levels and 2) focus more on school. And because of the financial support that I've been receiving from NIH [through EXITO], I have had my grades improve tremendously.

Even with EXITO's financial assistance, eight scholars (six at PSU and two at partner institutions) mentioned that they were working one or two jobs while in EXITO, in addition to working in their RLC placement and attending school full time. Although several scholars wished that EXITO provided financial assistance for graduate school applications and exams, some noted that they would try to set aside a portion of their EXITO funds to help take care of those costs. For example, one scholar conjectured that "if I spend wisely then I might have extra EXITO money to be able to help with that sort of stuff."

Reducing Financial Burden Prior to Graduate School

Seven out of 15 scholars discussed how finances directly contributed to their immediate graduate school enrollment plans. Two scholars noted that their EXITO

financial support, in addition to their other scholarships, would enable them to graduate debt-free or nearly debt-free. Their lack of undergraduate debt factored into their decision to apply for graduate school; at the time of the interviews, both scholars were in the process of applying to post-graduate programs. Conversely, among scholars who hadn't applied to graduate school at the time of the interview, financial concern was the most commonly cited reason for delaying their application. Five participants intended to take time off to work and save money and/or pay off undergraduate debts. For example, one participant explained,

> The biggest fear for me is I really want to pay off [my undergraduate] loan and have it stop accruing interest before I really dive into my advanced degree. I'm hoping my gap year will allow me to get a good enough job to be able to pay off my loans and then I won't have to worry about my undergrad loans accruing as I'm in med school.

Scholars at partner institutions in the Pacific Islands discussed how PSU scholars received more financial benefits than they did, which included tuition remission at PSU. Additionally, they noted that scholars based at PSU were able to use their travel funds more efficiently; scholars outside of the contiguous US faced additional barriers of greater distance and cost when attending conferences off-island or out of state.

Research Experience

Research Learning Communities (RLCs) played a pivotal role in scholars' trajectories toward graduate school and research careers. Making meaningful contributions to research projects allowed scholars to develop their research skills, experience work in research settings, explore their likes and dislikes in research, and imagine themselves as future scientists. Furthermore, for some scholars, the RLC internship transformed into employment after graduation.

Goodness-of-Fit

Many scholars spoke about the importance of an RLC placement that was aligned with their personal research interests, leading to an analysis of congruence. RLC congruence was determined to be high or low based on scholars' descriptions of how closely the focus of the RLC's research matched either their research or professional interests. At the time of the interviews, a majority of participants ($n=9$) were in RLCs aligned with at least one of their primary research interests, and this congruence seemed beneficial for their research development and future prospects. Most of these scholars ($n=8$) either were considering or had plans to continue working in their RLCs after they completed EXITO. Furthermore, all four scholars who, at the time of the interviews, already had applied to graduate school for the following year had been in RLCs that were closely related to their areas of interest.

Conversely, when scholars experienced lower congruence with their RLC topics, they ran the risk of being deterred from pursuing research at least temporarily.

One scholar discussed how they considered leaving the program due to weak RLC congruence, "They assigned me to [a research mentor], and I wasn't really feeling [their] project. They're really good projects, but I just was not sold. And then, not too long after that I was thinking of quitting EXITO." However, in instances of low congruence where scholars were not deterred from research, their RLC experiences helped them to define their desired paths through process of elimination. On participant made the following observation:

> You know, I realized that[...] I would rather just do more of gathering data than writing papers. I realized that doing a lot of literature is...I'm just not about it. I just learned that about myself, which is great because you want to know what you don't like so you don't end up doing it for the rest of your life.

Research Identity

Several scholars ($n=6$) experienced a shift in their relationship to research based on their experience in their RLC. One scholar described several ways in which their RLC experience helped to foster their passion for research:

> [My relationship to research is] definitely constantly changing because of the experience that I've had with lab meetings, reading papers, really digging into protocols, trying experiments, failing over and over, and then finally succeeding. I think with all of those combined, it makes me have a richer understanding and love it more and want to pull at it more. Whereas before, I would look at protocol, look at a paper and just see words and think, 'oh my God, how can I do this?'

Most scholars ($n=12$) espoused the sentiment that they were "unlikely" researchers prior to EXITO, usually resulting from having one or more identity traits that did not fit with the profile of a "typical" researcher and had not considered a research career before joining EXITO. Many scholars who saw aspects of their identity as being at odds with those of a researcher struggled with imposter syndrome at some point in the program. However, in most instances, their experiences in EXITO helped them to overcome feelings of being an imposter. Through hands-on research experience in their RLCs, scholars learned skills and knowledge that contributed to changes in self-perception. Scholars often described gaining confidence in themselves and in their research abilities because of what they had accomplished in their RLCs. In the end, most scholars ($n=13$) described seeing themselves as researchers, often attributing that shift in identity to their RLC duties and experiences, as well as the progress that they had made since they started in their RLC. Moreover, their experiences in EXITO were instrumental in directing their desired post-graduate trajectories toward research. For example, a participant shared the following:

> I'm just a kid from [my hometown], I'm not expected to be here, be able to work [in my RLC]. If you told me that when I was in high school, I would have laughed like, "Good one." Don't get me wrong, I wasn't dumb kid, but [...] EXITO kind of made this possible, a little more realistic for me.

Scholars also discussed areas in which RLCs didn't meet expectations or created confusion, either for themselves or for other scholars. Scholars with difficult RLC experiences believed that research mentors needed more preparation for working with undergraduate students and marginalized populations. For example, one participant suggested that "specific issues or specific backgrounds" scholars were willing to share could be provided so that mentors "kind of know and they can maybe educate themselves a little bit." Another scholar added the following:

> I think my big suggestion to BUILD EXITO is just be more direct with the expectations of the scholars and highlight that undergraduate student research is not rare but uncommon, [...] so [the lab leads] don't treat them like grad students. Treat them like they've never done this before and this is their first time.

Scholars were aware of the power imbalance within RLCs. Switching RLCs is discouraged, and RLCs are often potential sources for letters of recommendation, networking opportunities, and even post-EXITO work opportunities. One scholar recounted how their lab lead "made it very clear that if we don't work 15 h [which is above the program's 10-h requirement], we aren't getting a good letter of recommendation." Another scholar felt there was a similar unspoken rule in their lab. Due to such power imbalances, scholars noted it would be helpful to receive guidance from the program about how to respond to potential challenges that might arise, including a participant who shared the following:

> Because when you're in that position and you're just the intern, [...] you feel so much more powerless and just kind of uncomfortable, too uncomfortable to even bring it up. But if someone has already told you that might be something to look out for, then you know that people understand.

Three scholars mentioned receiving support from EXITO faculty and staff when navigating difficulties in their RLC placements. In one instance, a site leader intervened on a scholar's behalf to create a new RLC that matched their interest. In other instances, EXITO staff and faculty championed scholars' moves to new research mentors or RLC placements. Scholars mentioned that this type of support helped them to stay in the program.

Mentoring

Mentors helped pave the way forward for scholars by providing various forms of individualized interpersonal support. Scholars often used the general term "mentor" when discussing either career or research mentors, though they referred to their research mentor specifically when talking about their RLC experiences. In addition to offering assistance to address immediate needs related to school and research training, mentors were sources of advice and guidance for planning long-term academic and career goals. Mentors also facilitated networking contacts that connected scholars with future opportunities. Mentors provided direct affirmation as scholars developed their own identities as researchers and also role modeled possibilities for

scholars. In the context of RLC research, scholars noted it was important for mentors not only to provide guidance but also to support the development of autonomy.

Relational Support and Building Efficacy

Mentors often served as role models for scholars, providing them with a feeling that their desired degrees and careers were attainable because the mentor had achieved them. One scholar noted how working directly with their mentors had helped them to feel more confident in pursuing a degree that they had previously felt was unattainable:

> [The] EXITO program [...] got me into contact with professionals, [like my research mentor and career mentor]. Being able to work with them, and then being able to hear from them, because you have this preconceived notion about something, but then working with those people, you see that it's attainable. They're human just like you. [...] I was kind of thrown into working with all [these professionals with my intended degree], working side by side with them, it's brought down a wall.

Some scholars noted particular ways in which their relationships with their mentors had helped them to affirm and nurture their own identity within academia. One such scholar discussed how sharing a mutual identity trait with their mentor had significantly influenced their experience as both a researcher and an academic:

> I think the past year-and-a-half research experience that I've had in my research lab has been extremely important for me because [...] I have an amazing lab mentor who [shares my same gender and race]. So that's helped build my identity and build my confidence as [someone with that identity] in academia and more specifically in [my area of] research.

One scholar discovered their desired graduate school degree and career path through networking at a conference that their mentor had encouraged them to attend. Another scholar noted that their career mentor was a primary source of support in navigating the medical school application process: "For me, nobody's ever done med school in my family. Nobody knows the route. […] It's a good thing that I do have my career mentor who is a doctor. […] If I didn't have her, I'd probably be in the dark."

Guidance and Autonomy

The importance of receiving both support and autonomy from their research mentors in their RLCs emerged for many scholars. In one instance, a scholar mentioned how they felt confident in their ability to conduct their own research when given appropriate assistance, summarizing their feelings by saying, "It's not easy, but I can do it with help." Another scholar who was given autonomy in their RLC described feeling like a real researcher and displayed excitement about their relationship to research:

> [E]very time I'm at my RLC, I just feel like I still have it in me to become this great scientist. [...] We're already doing real science. [...] When my lab lead travels, she trusts me to take care of her [human specimen] cultures. [...] She doesn't have to watch over me.

A few scholars described difficult relationships with their mentors, including having mentors who were too demanding or who were challenging to work with. Two scholars decided to change RLCs due to issues with their research mentors. Although substituting RLCs temporarily disrupted their research experiences, both scholars noted being much happier in their new placements. One participant mentioned how the RLC had shed light on their previous lab experience:

> I actually ended up learning a lot from [my first] research placement, but then I also had troubles with my mentor, so I did end up switching. […] It was a really good decision, especially considering how much I like my current research placement. […] I don't think I really realized how much of a mismatch the subject matter was [in my first lab]. But the emotional stuff was what […] led to me switching.

Supportive Environment

Personalized Undergraduate Experiences

A supportive program environment was reflected in comments from scholars regarding their interactions with EXITO staff, faculty, and peers, which recognizably helped scholars navigate challenges throughout their undergraduate education. In particular, staff and faculty provided scholars with assistance tailored to their specific needs, while social connections with peers contributed to scholars' undergraduate retention. Scholars recognized that EXITO provided them with access to resources they otherwise would not have known about or sought out. EXITO staff and faculty supported scholars with direct advocacy and helped them navigate institutional challenges, ranging from intervening on behalf of a reasonable academic accommodation to helping them prepare questions before they met with an academic advisor. Scholars found that this level of support helped them to persist when faced with academic and institutional challenges. As one scholar noted, "[Before EXITO], I would initially say, 'Whatever,' and walk away from it. But if I bring it up to someone in the EXITO office and they don't know, they'll know someone who knows." Similarly, scholars found that the program was able to connect them with direct access to resources that could support them in persisting. One participant shared the following:

> When I reach out [to EXITO faculty/staff], if they're not able to direct me in the correct way, they can contact someone [who can…]. That's been kind of integral to being able to be as successful as I am. I don't think I would have been graduating this term [otherwise].

Support and Retention

Unexpectedly, a majority of scholars interviewed ($n = 10$) mentioned experiencing health barriers or significant personal events that affected their undergraduate journey. Health barriers ranged widely and included both mental and physical health challenges, while life events usually involved loved ones. Of these scholars, several cited EXITO as important in retaining them at their university and/or managing their health and life stressors. Some scholars benefited from emotional support from EXITO staff and peers and structured social aspects such as the Enrichment workshops, while others credited EXITO as one of the main reasons that they had not dropped out of college, including one participant who noted:

> I was kind of really coming up against those physical issues. But keeping going, like the enrichment sessions. I [would go] to see my friends, [...] who I could talk with just about different issues, kind of get their input, get that emotional support. And I think that also helped me at least make it to the end of fall term, because I mean I could have withdrawn, things were pretty bad. I could have done that, but I finished out the term.

The bonding and peer support established within EXITO cohorts had wide-reaching effects for many scholars. The diversity of the cohort was also an important feature for some scholars. One scholar recounted how seeing the diversity of their EXITO cohort at the beginning of the program helped them to feel like they could "fit in really well." Two scholars specifically cited social connections with their cohort as being a primary factor in deciding to stay at their institution, when faced with barriers that otherwise would have caused them to leave. One of them described how the social aspects of EXITO had positively affected their undergraduate experience:

> [Before EXITO], I was planning on transferring back [home] because I was having such a terrible time. I didn't have a community that I could rely on. I was doing poorly in school. I was very depressed because I didn't really have friends or any family here. But as soon as I was accepted into BUILD EXITO, I made so many friends just in that first week. I decided to stay at Portland State to utilize the full EXITO opportunity. Having a group of folks that I could turn to and I could see constantly on a regular basis, that was really motivating for me. It made me want to go to school more.

Many participants discussed EXITO's support comprehensively or holistically encompassing all aspects of the program, using a wide lens when reflecting on how the program had influenced their post-undergraduate plans and desired trajectories. For example, one participant stated,

> If EXITO didn't exist, and I never went into it, I probably, throughout my career in PSU, would be lost. [...] So the fact that I met EXITO at such an early stage of my undergrad career, it sets me up so that I know what I need to do, I know what I need to prepare for, and I know what I'm going to be walking towards right after.

Discussion

This study investigated how undergraduates historically underrepresented in biomedical sciences perceived the value of participating in a comprehensive research training program to overcome barriers in pursuing their education and career goals. In-depth qualitative interviews provided rich and detailed descriptions reflecting participant perspectives on the contributions of specific program components to their undergraduate experiences and desired post-graduate trajectories. Scholars voiced the challenges they faced and highlighted the ways in which various intervention components were useful in supporting their progress toward a research career. It is noteworthy that the interview protocol asked in general terms how the overall program helped to address barriers, particularly financial concerns, but it did not refer to any specific intervention components. Nevertheless, each major program component was represented in the responses of scholars, indicating the capacity of a comprehensive, multi-component training program to address a variety of needs and challenges confronting different participants. In other words, each scholar noted that certain elements of the intervention were beneficial, although the value or emphasis placed on the components may have varied according to their own needs and circumstances.

A major theme expressed by scholars in the current study was the significance of finances and other tangible support in persevering through their undergraduate education and making their post-graduate plans. The interview protocol asked about financial barriers, prompting responses on this topic. Previous research has identified financial concerns as a factor limiting the STEM education and employment choices of historically underrepresented students (Burton & Vicente, 2021; Hirst et al., 2014). The salience of financial assistance for the current sample is not surprising given that a majority reported being eligible for need-based financial aid and half held another job in addition to working in their research internship and attending school full time. Scholars consistently emphasized the importance of the BUILD EXITO stipend and tuition remission package in easing their financial burden and enabling them to devote time to their academics and research training. Receiving the financial package had ancillary benefits as well, such as alleviating stress, reducing student loan debt, and reinforcing that their contributions to research projects were valuable and should be compensated. Scholars noted that the program also addressed financial questions through the enrichment workshops, which provided practical information and advice regarding scholarship opportunities and sources of funding for graduate school. Although finances are widely considered to be a barrier for underrepresented students pursuing STEM education, the current findings provide important emphasis on this point given the relatively little empirical evidence substantiating the significance of financial concerns (Pierszalowski et al., 2021).

Another challenge noted by many scholars involved identifying and navigating the unfamiliar pathways to a career in science. Historically underrepresented students, many of whom may be the first in their families to attend college, may have a limited view of their career options and may not know how to pursue these

opportunities, especially in the absence of role models reflecting their backgrounds or lived experiences (Estrada et al., 2016; Lott & Rogers, 2011). BUILD EXITO enabled scholars to connect with faculty and staff who could help them explore and make choices about their research interests and career possibilities. As respondents observed, being in research settings and developing relationships with researchers, especially those with shared identities, demystified the aura of science and made the process of becoming a researcher seem more attainable. BUILD EXITO's formal mentoring matches and also the exposure to additional colleagues in the RLC research placements fostered relationships in which scholars could learn about the journey to becoming a researcher. The current findings suggesting the value of such relationships reflect other research indicating that mentoring supports students from historically underrepresented backgrounds in envisioning their future prospects in STEM disciplines (Atkins et al., 2020). Along these lines, scholar comments touched on the issue of similarity or concordance with the mentor on aspects of identity, such as gender and race, which in previous research has been associated with academic performance and persistence (Campbell & Campbell, 2007). Likewise, same-race mentors support the racial identity formation and psychosocial needs of African American students (Watt, 2006). Underrepresented students in STEM benefit from seeing individuals from their own racial and ethnic backgrounds in faculty and research positions (Gibau, 2015) and also report typically having little access to faculty of color in their disciplines (Hurtado et al., 2011).

Scholars in the current study also highlighted the importance of tangible support for educational and career planning, i.e., mapping out goals and steps for accomplishing them. Similarly, scholars appreciated guidance on the practical tasks required to advance in academia, such as preparing CVs and personal statements, and noted that working on these activities involving self-representation helped them to define their interests and goals. The BUILD EXITO enrichment workshops provided a structured venue for activities promoting knowledge and skills pertaining to professional development, but scholars also benefited from personalized one-to-one coaching and support from enrichment faculty and mentors. These findings reinforce the need for students from underrepresented backgrounds to gain access and insight into the "hidden" or "implicit" curriculum of higher education and the culture of research (Thompson & Jensen-Ryan, 2018; Wrighting et al., 2021).

Another prominent theme that emerged from the scholar interviews focused on their development of a science identity through their apprenticeship experiences in research placements. Scholars described the transition from seeing themselves as unlike the "typical" scientist to identifying themselves as researchers based on their actual contributions in a research setting. This narrative is consistent with previous findings regarding the role of participating in authentic undergraduate research experiences in developing a science identity that motivates commitment and persistence in STEM education (Merolla & Serpe, 2013). Likewise, scholars were able to develop a sense of efficacy because the long-term RLC placements enabled them to become immersed in the research, learn skills, and play an important role in conducting studies. In the research placements, a developmental shifting from structure and supervision to autonomy seemed to promote feelings of confidence for scholars.

The RLC placement experience is a cornerstone of the BUILD EXITO program because developing applied skills and gaining a sense of efficacy in research is associated with greater success in pursuing a scientific career (Chang et al., 2014; Hurtado et al., 2009).

Although BUILD EXITO is intentional in trying to establish a supportive environment for scholars, it is more difficult to define that element of the program as a specific form of intervention. However, the current findings indicate some of the ways in which program faculty, staff, and peers provide personal and social support to scholars in circumstances when it promotes their perseverance. Scholars facing particular challenges, such as health conditions or other life stresses, noted how BUILD EXITO staff offered personalized attention that could include emotional support, advocacy, or connections to relevant campus services and resources. This informal support through the program was especially significant when other program elements did not suffice. Students who were ready to leave the program due to barriers were instead retained because staff and faculty provided individualized guidance and care. In addition, having regular program spaces to promote belonging within a cohort of peers provided an essential social network that was crucial for supporting and retaining some scholars in the program and in school itself. Previous research indicates that being integrated into a social community with shared values regarding science promotes motivation and persistence in STEM (Estrada et al., 2011), and the current findings reinforce the importance of a sense of belonging within a program context and within a peer group. Strong peer networks and feeling a sense of community within the larger university are important predictors of academic success and persistence, especially for transfer students in STEM disciplines (Maunder, 2018; Townley et al., 2013).

Overall, the findings of the current study suggest that scholars find value in a range of research training program components. Scholars described various ways in which the distinct components supported their persistence, promoted their growth and development, and prepared them for the next stages in their career trajectories. The design of the BUILD EXITO training model was inspired by holistic, socioecological theoretical frameworks emphasizing multi-layered contextual influences on student success (e.g., Bronfenbrenner, 1992; Hurtado et al., 2012). Furthermore, specific structural barriers and challenges in the environment associated with demographic factors such as gender, race/ethnicity, and socioeconomic status can demand different forms of adaptation or result in disparities in development (Garcia Coll et al., 1996; Spencer et al., 1997). In addition, there was a recognition that student preparedness for engaging in research encompasses several dimensions, such as orientation to research, motivation, self-efficacy, and research environment (Shaw et al., 2013). Consequently, BUILD EXITO was intended as a multi-faceted intervention operating on multiple levels, with a focus not just on individual student learning but also the development of supportive interpersonal networks and institutional infrastructure to facilitate undergraduate research experiences (see Richardson et al., 2017). The findings of this study offer validation of this multi-dimensional approach ensuring scholars had access to a variety of components to meet their particular combination of needs for learning and support. Scholar comments highlighted the significance of attending to personal and environmental challenges and

barriers as well as promoting academic and research-oriented experiences in supporting the development of STEM careers.

The findings also illustrate the role of qualitative studies in raising the voices of underrepresented students in STEM intervention programs to understand their experiences within overlapping contexts of achievement, marginalization, and background (Gibau, 2015). The findings resonate with survey research from another comprehensive research program for underrepresented undergraduates in which students rated the benefit of multiple elements: financial scholarship, being part of the program community, and research experience had the greatest impact (Maton et al., 2012). Furthermore, the current findings suggest that multi-faceted training interventions offering several points of contact allow participants to tap into the specific program supports and opportunities that match their particular set of needs and priorities. The current study also demonstrates the difficulty of distinguishing certain intervention components as more meaningful than others and instead suggests training programs are stronger with several interdependent and reinforcing elements (Cromley et al., 2016).

The analysis of scholar interviews also noted certain program risks and shortcomings that have implications for improving the quality of scholar training experiences. For example, the alignment of research placements with scholar interests was identified as an important factor in achieving desired outcomes, echoing findings on research apprenticeships for high school students indicating higher engagement and satisfaction based on level of interest in the project (Burgin et al., 2012) Likewise, mismatching research interests have been identified as an issue in mentored training programs for early career researchers (Keller et al., 2014). When placements were characterized by high congruence, scholars expressed satisfaction with their research training and often continued working with their research teams in hired positions following program completion. In contrast, a mismatch on research topics between scholar and placement could diminish enthusiasm and cause scholars to question continuing program involvement. In such cases, the responsiveness of program staff in assisting with a transfer to an alternate placement or reframing the benefits of the experience was crucial for scholar retention. To enhance the likelihood of scholars having research placements aligned with their interests, BUILD EXITO has instituted a placement process involving multiple steps: (1) helping scholars to refine their research interests and goals; (2) coaching scholars in self-presentation (i.e., personal statements, CVs, elevator pitches); (3) encouraging scholars to investigate RLC lab placement options on the EXITO website; (4) organizing an RLC matching fair enabling scholars to meet the leaders of multiple RLCs to discuss projects and placements; (5) having scholars submit their ranked RLC placement choices; (6) confirming RLC leaders are willing to mentor an interested scholar; and (7) making a match.

In the current study, Scholars also underscored some of the vulnerabilities arising from power differentials in their research placements. Given their status as undergraduate interns, scholars recognized the difficulty of raising issues or addressing unrealistic expectations with their research supervisors. Power relationships can be complicated in research apprenticeships (Teo & Tan, 2020), and mentees can struggle with implicit or vague expectations and unclear roles and responsibilities (Keller

et al., 2014). The current study adds to the scant literature elevating and exploring the difficulties, such as communication problems, sometimes encountered in research mentoring programs (e.g., Robnett et al., 2018). To avoid these dilemmas, BUILD EXITO enhanced its efforts to give both scholars and research mentors clear guidelines about what is reasonable and appropriate for RLC placements, provide ongoing monitoring and support for placements, and make sure all parties have access to a program staff person who can assist with problem resolution.

Finally, scholars at partner institutions displayed an awareness of differences in program content and services available at the primary institution. Discrepancies in program delivery across multiple sites are commonplace, and sometimes, it is intentional to account for local needs and capacities. BUILD EXITO employs a strategy that emphasizes the core intervention components with the ability to modify implementation to balance fidelity with adaptation to institution-specific circumstances (e.g., Van Daele et al., 2014). Although the primary institution has greater capacity due to the staffing and resources at the hub of the consortium, efforts have been made to improve consistency and equity across sites. With reference to enrichment workshops, for example, the curriculum modules developed at the primary institution are shared with partners, and online sessions provide virtual access for scholars at other sites. However, due to NIH regulations, the standard NIH financial package for trainees can be offered only at PSU, and scholars at other locations must be compensated through hourly wages.

Limitations

The findings of the current study should be interpreted with awareness of study limitations. At the time of the interviews, all participants were slated to graduate from the BUILD EXITO program the following term. Within 12 months of the interviews, all participants had graduated from the program and received their Bachelor's degrees. Taken together, their experiences are reflective of participants who were successful in both the program and their undergraduate careers. However, their experiences do not represent a wide variety of undergraduate trajectories (e.g., leaving the program and dropping out of school). Themes and perspectives different from those reported here may have emerged from participants who did not complete the program. Furthermore, the participants' willingness to be interviewed may have been in part influenced by their successful outcomes in both BUILD EXITO and in their undergraduate careers. Scholars who felt that their trajectories had been less successful may have been less willing to participate in the interviews. Although a randomized sample selection process was used, the initial outreach did not yield responses from all invited interviewees, and supplemental outreach with the support of partner institution faculty potentially contributed to selection bias. Further research is needed on how STEM training programs can best support participants who have a wide variety of trajectories, including participants who may be more likely to leave the program or college (Mau, 2016). Finally, the purpose of the study was to better understand what barriers and supports existed for scholars scheduled to complete EXITO and finish their undergraduate degrees. One interview question

focused on financial concerns as a potential barrier, whereas other questions asked about non-specific barriers or invited other reflections about the training experience. Consequently, the prominence of themes relating to financial barriers is likely due to responses to this leading question. In addition, the fact that many participants relied on need-based financial aid would tend to highlight finances as an important consideration in pursuing their education.

Conclusion

The current study contributes to the small but growing literature representing the in-depth perspectives of historically underrepresented students participating in undergraduate STEM research training programs. This research illuminates the ways in which the multiple components of a comprehensive training program support successful research training, degree completion, and preparation for future career development. The findings suggest each component of a multi-faceted intervention offers important benefits, but individual students may find value in the various components depending on their own set of needs and circumstances. Although financial support emerged as broadly relevant, participants also attributed their retention and persistence in biomedical research to their mentors, research internship experiences, enrichment curriculum, and the supportive environment created by program faculty, staff, and peers.

Appendix

Relevant Portions of Interview Protocol

When do you anticipate graduating?
What are your plans leading up to graduating?
What are your goals after graduation?
What financial barriers to pursuing an advanced degree (including graduation) do you face?

a. How does the EXITO program address those barriers?
b. What barriers does the EXITO program not address?
c. What resources, outside of EXITO, do you utilize to help you with these barriers?

What barriers do you face outside of the university that impact your ability to pursue an advanced degree (including graduation)?

a. How does the EXITO program address those barriers?
b. What barriers does the EXITO program not address?
c. What resources, outside of EXITO, do you utilize to help you with these barriers?

What has your experience been as a participant in EXITO?
Do you see yourself as a researcher/scientist? Why or why not?

a. If not, what are barriers to you seeing yourself as a researcher/scientist?

Do you feel others see you as a researcher/scientist? Why or why not?
How would you describe your relationship to research?
How has your participation in EXITO impacted your experience at your institution?

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Declarations

Conflict of Interest The authors declare no competing interests.

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