


# Scholars From Underrepresented Groups in Engineering and the Social Sciences (SURGE) Capacity in Disasters: The Benefits and Challenges of Mentoring for Racial and Ethnic Minority Graduate Students


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## Abstract

**Objective:** The purpose of this study was to evaluate the mentoring program of the Minority Scholars from Under-Represented Groups in Engineering and the Social Sciences (SURGE) Capacity in Disasters initiative, a pilot program that aimed to address the challenges that graduate students of color face in academic programs. SURGE promotes mentoring and professional development through its mentoring program for Science, Technology, Engineering, and Mathematics (STEM) students.

**Methods:** Data collection involved distributing online surveys designed in Qualtrics to mentors and mentees five months after the SURGE program's initiation. Separate surveys were created for student mentees and faculty mentors in order to collect feedback about the mentoring program. Mentees and mentors were also asked to rate their satisfaction with the specific individuals in their mentoring network so that the evaluation team could identify issues that arose across participants.

**Results:** We found that students had several motivations for and expectations from SURGE. A majority of the students found the SURGE mentoring program to have been at least somewhat valuable in helping them achieve these expectations. Nonetheless, students did identify a few challenges, namely lack of swift responsiveness from some mentors, not enough guidance on navigating the mentor-mentee relationship, and little to no in-person interaction. While half of the students mentioned that some individuals within their mentoring team were hard to reach, a majority remained satisfied with the overall responsiveness of their mentors. This suggests that the many-to-many mentoring model helped to ensure none were entirely dissatisfied on this measure.

**Conclusions:** These findings support previous research and show promise for mentoring as an effective intervention to the challenges that underrepresented students face in their academic programs and for their retention and representation, particularly in hazards and disaster-related fields.

**Implications:** Overall, given the unique barriers and challenges to retention for minority students in graduate programs, it is important to understand the mentoring needs of underrepresented students in order to provide the best possible help to them during what can be an extraordinarily difficult transition into academia. It is especially crucial to do this for underrepresented students in the fields of hazards and disaster research and practice, as their contributions and perspectives are needed to address social disparities and inequities.

**Keywords:** *many-to-many mentoring, mentoring programs, minority student retention, graduate school, diversity*

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## Introduction

Racial and ethnic minorities are disproportionately underrepresented in science and engineering education. Due to financial constraints and other institutional factors limiting their ability to attend graduate school, such as discrimination in admission criteria, they tend to be poorly represented in these programs, leaving many to feel as if they are on the sidelines in their departments (Brunsmas et al., 2017; Gay, 2004; McNairy, 1996; Torres et al., 2010). As such, racial and ethnic minority students are often excluded and isolated during their graduate studies, leaving many to find their way through complicated program requirements on their own. This lack of support can have detrimental effects on their matriculation rates.

Research shows that mentoring, and particularly many-to-many mentoring—defined as there being more than one mentor in a group, with each being assigned two or more mentees (Huizing, 2012)—is an effective intervention for low matriculation rates among racial and ethnic minority students. Mentoring programs can provide access to resources and social capital that racial and ethnic minority students often lack but that are vital to their success in academic programs. Dixon and Louis-Charles (2015) observed that efforts are being made to address the underrepresentation of students of color in academia through programs such as the William Averette Anderson Fund (also known as the Bill Anderson Fund [BAF]), which is dedicated to increasing the participation of historically underrepresented students in hazards and disaster PhD programs by bringing together cohorts of graduate students in different academic disciplines from universities across the country for professional development training and mentoring. The hazards and disaster field is broad, encompassing a variety of STEM and social science disciplines focusing on research and/or practice related to natural hazards, societal disasters, and public health emergencies. Initiatives like the BAF can improve the support for students of color by exposing them to professionals and other students of color in the field beyond the few in their own home departments, providing a support network and better preparing them to finish their programs and contribute to their professional fields (Dixon & Louis-Charles, 2015). However, such programs are quite limited in number and few published studies have documented such efforts (Waugh & Goss, 2019).

The NSF-INCLUDES<sup>1</sup> pilot initiative, *Minority Scholars from Underrepresented Groups in Engineering and the Social Sciences (SURGE) Capacity in Disasters*, was a two-year pilot project that created a framework to

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<sup>1</sup> NSF INCLUDES (National Science Foundation—Inclusion Across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science) is a national initiative with a mission to enhance STEM leadership and focuses on NSF's commitment to diversity and inclusion in STEM fields.

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diversify the fields of disaster research and practice by recruiting and training students from underrepresented backgrounds and by facilitating mentoring relationships between students and professionals in the hazard and disaster fields. SURGE participants represented a diverse range of disciplinary backgrounds, such as civil and architectural engineering, urban planning, ecology, and sociology, and received training that transcended disciplinary silos. The program was designed to increase student access to resources and to help mitigate barriers to retention through ample support and guidance. SURGE complements its focus on student training and mentoring with activities that directly engage underserved communities through service-learning activities.

In 2018, SURGE welcomed its first cohort of 10 master's and PhD students from underrepresented backgrounds enrolled in graduate programs at various universities across the United States. This paper utilizes findings from an evaluation of the SURGE mentoring program to discuss the benefits and challenges associated with mentoring for racial and ethnic minority students. Below we review the literature on student mentoring to situate our analyses within broader discourses on student professionalization. We then discuss lessons learned through our evaluation of the mentoring component of SURGE. The evaluation of the SURGE mentoring program highlighted both successes and challenges. Thus, we conclude by emphasizing insights that will be of interest to educators hoping to implement other mentoring programs, particularly those geared toward addressing minority representation in STEM fields and other professional communities of research and practice.

## Literature Review

### Challenges in Academic Programs for Underrepresented Students

Racial and ethnic minorities face several barriers to success in graduate programs. The lack of both diversity in course content and access to faculty of color provides significant challenges to minorities in academic programs. Additionally, these students often face microaggressions and other instances of racism and discrimination that create even more educational barriers (Brunsmas et al., 2017; McGee, 2020). These challenges can manifest themselves in several ways, including treatment as a criminal or a second-class citizen, underestimation of personal ability, and isolation (Torres et al., 2010). This results in fewer racial and ethnic minority students graduating with a master's degree or PhD compared to white students. Research from the American Council on Education (n.d.) shows that between 2015 and 2017, master's degree recipients were 51% white, while only 26% were students of color. Similarly, doctoral and professional degree recipients were 56% white, while only 26% were students of color.

Physical isolation from peers with similar backgrounds in their academic programs may leave many students of color feeling excluded from the rest of their department and without the ability to talk to others that share their "experiential frames of reference" (Gay 2004, p. 268). This experience can have detrimental effects. Peer support is important for academic success by providing supportive study groups and connections with similar goal-oriented peers (Palmer et al., 2011). It also provides connections to community for students (Shotton et al., 2007). Minority students may also find themselves with unwanted attention due to being the "only one," which Gay (2004) termed "problematic popularity" (pp. 284–285). For example, they may be expected to take on extra tasks and responsibilities in committees due to their identities. Such tasks require additional energy, both emotional and intellectual, that may limit the energy that students of color can then dedicate to their academic coursework and to their own research (Gay, 2004). Park and Bahia (2022) identified this as pedagogical labor, conceptualized as the emotionally taxing expectation that students of color need to educate their peers and faculty about race, racism, and colonialism, even though this is not their job. This expectation also assumes that students of color are a monolithic group that can be represented by one person and ignores factors that lead to different experiences within racial and ethnic groups, such as socioeconomic class (McNairy, 1996; Park & Bahia, 2022).

Racial and ethnic minorities, women, and other underrepresented groups tend to find their personal ability underestimated by faculty and other graduate students, which in turn may leave them “excluded from substantive engagement in intellectual discourse” (Gay, 2004, p. 273; Torres et al., 2010). For example, these students face challenges with raising issues related to race in their class discussions and regularly deal with classmates and instructors that are unwilling to engage, citing ignorance as a reason (Gay, 2004). Indeed, Curtis-Boles et al. (2020) found that it is often instructors, not students, who most frequently discriminate against students of color in the classroom. Further contributing to the underestimation of the personal ability of students of color is benign neglect from advisors who may refuse to give any critical feedback on their work (Gay, 2004; Torres et al., 2010). Burt et al. (2019) found that Black men experience a range of microaggressions from their advisors, such as assumptions of intellectual inferiority and criminality, tokenism, and stereotyping. Such instances of discrimination and microaggressions are associated with increased mental health issues, which can further impede educational success for students (Burt et al., 2019; Torres et al., 2010). While these problems are structural and must also be addressed at the institutional level, they can be mediated through mentoring or facilitating long-term relationships of guidance and support for students of color (Brunsma et al., 2017; Gay, 2004).

In general, graduate departments have been reported to be lacking in focus around diversity issues (Davidson & Foster-Johnson, 2001; Young & Brooks, 2008). Students of color are often expected to conform and assimilate to the existing overall culture of their graduate program, making it difficult for them to thrive in such an environment (Davidson & Foster-Johnson, 2001). McGee (2020) argued that universities institutionalize diversity mentoring programs designed to assimilate underrepresented students of color, without recognizing the racially hostile work and educational spaces within STEM departments. Instead, programs that create safe, inclusive environments and acknowledge students’ identities are necessary for students of color to succeed (Trent et al., 2021). It is necessary for faculty to reflect on this issue and to seek development, diversity training, and multicultural competence to better serve their students of color (McNairy, 1996; Thomas et al., 2007). Departments can and should consider including mentoring, especially for minority students, in faculty evaluations and in consideration for departmental-level awards, especially for faculty seeking tenure and promotion (Thomas et al., 2007). However, diversity should be addressed not only at the classroom and faculty level, but also institutionally (McNairy, 1996; Young & Brooks, 2008). Institutions need to critically examine the structural racism within graduate programs (McGee, 2020). Adserias et al. (2016) identified leadership styles as one of the main contributing factors to successful institutional change, which in turn can produce the change needed for a diversity agenda to thrive. Leaders who practice both transactional and transformational leadership are the most successful at producing change. Transactional leaders build relationships based on trust and honesty (Bensimon et al., 1989). Transformational leaders serve as teachers and moral guides (Tierney, 1989), often providing mentoring to students to help them achieve personal and collective goals and growth (Bass & Riggio, 2006). Leaders and mentors who engage in both of these leadership styles are most likely to support institutional change (Adserias et al., 2017).

### **Mentoring for Students of Color**

Mentoring is defined by Santos and Reigadas (2005) as a “process through which persons of higher status, special achievements and prestige, instruct, counsel, guide and facilitate the intellectual and career development of program participants” (p. 339). Mentoring is further marked by a beneficial, personal relationship for both mentor and mentee and is focused on both emotional and psychological support (Davidson & Foster-Johnson, 2001). Through mentoring, students are given access to ample benefits, including help with college adjustment, greater networking opportunities, socialization into both the role of scientist and the academic environment, and increased emotional and academic support, leading to higher success in their academic programs and greater retention (Griffin et al., 2020; Santos & Reigadas, 2002, 2005; Shotton et al., 2007; Shultz et al., 2001; Stoeger et al., 2017).

While connecting to other minority students can help mediate barriers for students of color in their academic programs (Thomas et al, 2007), networks that are multitiered and multipurposed have been found to be most helpful (Young & Brooks, 2008). Mentoring is valuable to minority students because it pairs them with knowledgeable, experienced, visible, and powerful individuals within their academic departments (Thomas et al., 2007), which in turn gives them access to critical information regarding their graduate program and to professional development opportunities otherwise not readily available (Griffin et al., 2020). For instance, mentoring is associated with higher levels of perceived self-efficacy, better-defined academic goals, and a higher level of concern for college performance among Latino students (Santos & Reigadas, 2002). Griffin et al. (2020) also found that psychosocial support in mentoring relationships can lead to comfort around asking hard questions of their mentors, creating new opportunities for learning and growth as a professional for students of color. Similarly, Ramos (2019) argued for a balance of challenge and support in mentoring relationships, particularly through an ethic of care that can improve the holistic well-being of students of color by demonstrating the mentor's commitment to student engagement and success. For minority students, mentoring can make all the difference with respect to academic and professional development.

It is not enough to simply mentor students of color, however. The framing of race within a mentoring relationship is important, as well. While students of color highlight the importance of being mentored by a faculty member of the same gender and race/ethnicity (Kricorian et al., 2020), this is not always possible and can actually lead to overburdening faculty of color, especially women of color. As such, white faculty must also be prepared to mentor students of color. It is important to note that a colorblind approach to mentoring students of color can have detrimental effects (Young & Brooks, 2008). Students of color can have several experiences that should be considered in their mentoring relationships, such as differences in power status dynamics, individualistic versus collectivist cultural backgrounds, and differing communication styles (Davidson & Foster-Johnson, 2001). White mentors should not assume similar experiences and expectations between themselves and students of color; instead, white mentors should be expected to have conversations around race and to learn from students of color (Davidson & Foster-Johnson, 2001; McNairy, 1996; Young & Brooks, 2008). Similarly, Harris and Lee (2019) argued for an advocate-mentoring model, where the advocate-mentor exercises genuine cultural sensitivity and acts as a social justice activist, using their privilege and social status to push for institutional change.

Moreover, while informal mentoring may be associated with better outcomes for mentoring program participants (Davidson & Foster-Johnson, 2001), it is most effective when complemented by formal programs with institutional support (Young & Brooks, 2008). Although formal recognition may bring forth trouble in the absence of authentic engagement and the need to justify existence and funding (Young & Brooks, 2008), formal mentoring programs are undeniably associated with many benefits. Indeed, Banks and Dohy (2019) suggest that institutional initiatives that provide high-quality mentorships, especially from faculty of color, are vital to address opportunity gaps between students of color and white students. Samari et al. (2022) detailed the creation of the Mentoring of Students and Igniting Community (MOSAIC) program as an anti-racist faculty-to-student mentorship institutional initiative for students of color and first-generation students. The program's success and subsequent growth show that MOSAIC fills a critical gap for students of color in schools of public health, connecting students to role models that can provide social and intellectual capital.

Mentoring programs can take several forms. Stoeger et al. (2017) identified group mentoring—defined by Huizing (2012) as a mentoring relationship consisting of more than two people interacting and collaborating simultaneously—as a more effective model than one-on-one mentoring. According to the literature, group mentoring includes peer group mentoring, one-to-many mentoring, many-to-one mentoring, and many-to-many mentoring (see Huizing [2012] for definitions and examples). Huizing (2012) identified the many-to-many mentoring model, where the mentoring role is assigned to two or more people within the group, as the one holding the most promise for positive outcomes given the increased contact that comes with having multiple mentors and mentees. In having multiple mentors, a mentee has more access to an individual who

can provide support and other tangible help, even when one mentor is busy or unavailable. Indeed, Santos and Reigadas (2005) found more frequent contact with a mentor to be associated with increased adjustment to college, better academic performance, and higher satisfaction with the mentoring program. In addition to more positive experiences (Shotton et al., 2007), increased interaction lends itself to proactive intervention at the first sign of academic or social difficulty (Shultz et al., 2001). The online many-to-many mentoring model that Stoeger et al. (2017) examined was particularly useful, as it allowed mentees to interact with mentors through virtual means without the common scheduling conflicts, commuting time, and administrative burdens found in academia (Li et al., 2022; Silverstein et al., 2022). This allows students to meet with their mentors more frequently (Li et al., 2022). In addition, an online mentoring model allows students to have mentors from other institutions, which can broaden a student's social capital beyond their own limited institutional network.

## Theoretical Framework

The findings presented in this article are part of a larger evaluation study examining the SURGE model. During its initial stages, the evaluation plan was focused solely on the mentoring component of the model. However, SURGE was loosely designed around a collective impact framework (Hanleybrown et al., 2012), and key components were intended to be mutually reinforcing and closely linked. SURGE took a multifaceted approach to graduate student training and linked in-person learning with field application to professional networking and support. For instance, in addition to the mentoring program, core activities of the SURGE program included workshops, fieldwork in disaster-stricken minority communities, professional development activities (e.g., conference participation, report development), and the creation of peer networks in the form of two cohorts. The larger evaluation effort thus evolved to capture high-level insights across the breadth of SURGE activities rather than examining any single initiative in great depth.

The SURGE leadership team focused on five principles of practice for collective impact (Collective Impact Forum, 2016). These principles include equity in program design, inclusion of and collaboration with community members, the use of data for continuous learning and improvement, the creation of internal cultures that foster trust and respect, and customization for the local context. The program's emphasis on equity and stakeholder engagements was manifested primarily through its focus on training historically underrepresented students to conduct research in underserved communities and in collaboration with local researchers and stakeholders living in these communities. The evaluation process and sustained observation from its internal evaluator provided data to support continuous improvement. Consultation and agenda-setting with local collaborators, as well as reflections and discussions with the student trainees in the field, were intended to build a culture of trust and mutual respect. Finally, the project leadership customized the initiative to the local context by working directly with local collaborators to tailor the students' guided fieldwork projects to their data and research needs.

The overarching evaluation strategy began with the creation of a logic model to ensure a common understanding among the program's leadership regarding the overarching vision, activities, and implementation strategies for SURGE. The team convened to collectively review the logic model, which facilitated discussions about program inputs, planned activities, anticipated outcomes, and definitions of success regarding short- and long-term goals. An evaluation plan was then drafted to provide a lens into the program's functioning and impacts without being burdensome to the overarching training effort. The evaluation involved a mixed-method approach, including surveys for students and mentors, participant observation during in-person events, interviews with external partners, and content analysis of products created by students (e.g., reports, posters). Each component was intended to contribute actionable information and recommendations that would allow for course correction throughout the development of the SURGE program and to enhance understanding of the program's outcomes upon its conclusion. Below we

detail our approach toward examining the mentoring dimension of the program as context for our discussion of the findings.

## Methods

### The SURGE Model

SURGE was designed to directly address the participation and retention of minority STEM graduate students by employing a mentoring program as part of its efforts to diversify professional communities in the hazards and disaster fields. By facilitating relationships among emerging and established professionals, the program sought to ensure that minority scholars received the appropriate guidance and resources to participate in important hazards and disaster-related work and ultimately help lead efforts to decrease vulnerability and increase resilience to disaster, particularly within communities that are often overlooked and underserved.

SURGE's first cohort of students included individuals from different institutions nationwide and a range of disciplines, including the social and environmental sciences and engineering. Rather than a traditional one-to-one mentoring partnership, SURGE adopted a derivative of the many-to-many mentoring model to connect students with multiple established professionals in hazards and disaster fields and multiple pathways toward meeting their various mentoring needs. Both mentors and mentees were also provided with guidance materials to encourage utilization of best practices and relationship-building. In the short term, these activities were intended to connect students with established academics and practitioners who could provide professional development support and guidance tailored to the hazards and disaster field. In the long term, the program was intended to enhance students' social capital and help them establish themselves as hazards and disaster scholars within an expansive interdisciplinary professional community. This evaluation effort was designed to support progress toward short-term outcomes by collecting timely information to guide decision-making on the part of the leadership team.

SURGE program's leadership selected mentors based on professional accomplishments across a range of academic disciplines within the hazards and disaster field, established research or professional interest in addressing disproportionate disaster impacts among socially vulnerable groups, and expressed interest in mentoring SURGE students. These mentors were expected to ensure access to high-quality scholars and a range of disciplinary, career, racial, and ethnic backgrounds. Of 18 registered mentors, 16 were tenured or tenure-track faculty members, and two were practitioners. Six were persons of color; 12 were white. Nine identified as women, and nine identified as men.

Students were given access to an online portal where they were able to review the biographies, curriculum vitae, and personal introductory videos of the available mentors. Students were able to choose mentors according to their own self-identified needs and use email scripts to reach out to them. To prevent mentors from becoming overburdened, the web interface was set up to limit mentors from taking on more than three students at one time; however, due to communication constraints within the platform, this function did not work as intended. As a result, two mentors took on a total of four students. A total of 14 mentors were selected by students and took on active mentoring roles. Most students were matched with mentors outside of their institutions and met virtually via phone or video conference call.

Additionally, students and mentors were provided with guidebooks intended to help foster best practices for developing successful mentoring relationships. Student guidebooks discussed the overarching mission of SURGE, described the structure and goals of the mentoring program and mentoring as a broader concept, and provided guidance on how to communicate effectively and maximize the benefits of their mentoring relationships. They provided key considerations for prospective mentees, suggesting potential areas in which mentors may provide support (e.g., developing manuscripts, cultivating a professional network, accepting and

using criticism). They encouraged students to consider what they desired from their mentoring relationships and what they could reasonably commit to in terms of their interactions with mentors. They also linked to online guides and tools for creating an individual development plan (IDP) that would facilitate their efforts to set academic and professional goals and provided checklists with tips for connecting with their selected mentors and maintaining a mentoring relationship. Mentor guidebooks were designed with a similar structure to the student guides. They included an overview of the SURGE program; discussed the design, goals, and vision for the mentoring program; and provided guidance on developing effective mentoring relationships. In addition to general information about mentoring best practices, the mentor guidebooks discussed challenges such as discrimination, tokenism, and other issues known to undermine academic success among minority students. This was included so that mentors would engage deeply with the implications of the students' experiences as underrepresented minorities in graduate programs. They also linked to additional resources on mentoring graduate students.

The goal of this many-to-many mentoring model was to give SURGE students the opportunity to build a large network that could accommodate their diverse sets of needs. The online portal allowed students to move beyond their own academic programs to find support from established mentors in the field located anywhere in the country, not limiting students to mentors accessible only in person, which can be fruitful for students (Thomas et al., 2007). Students and mentors were each instructed to meet for at least one hour per month.

### **Mentoring Program Evaluation**

The SURGE mentoring program was designed to provide students with a network of up to five mentors each that could be leveraged to obtain different perspectives and meet the spectrum of their needs. The measurement system designed for this component of the program was intended to evaluate how students were utilizing the tools and guidance available to them to build their mentoring networks, how they were engaging these networks once established, and what kinds of support they were receiving. Data collection activities needed to be reasonably unobtrusive to avoid a significant time burden for participants, while still producing useful insights and recommendations for the program's leadership. Additionally, mentors were provided with cloud-based spreadsheets to log their interactions with mentees to track communication frequency and concerns. All research activities for this evaluation were approved by the University of Colorado Boulder's Institutional Review Board (Protocol #18-0404).

Data collection primarily involved distributing online surveys designed in Qualtrics to mentors and mentees five months after the program's initiation. Separate surveys were created for student mentees and faculty mentors. Invitations were sent to all active participants. All students enrolled in the first cohort of SURGE ( $N = 10$ ) completed the mentoring survey. Invitations were sent to all active SURGE mentors ( $N = 13$ ) but only five responses were recorded, yielding a response rate of 38% for this group. Survey questions for the mentoring program focused on five broad areas including: 1) mentoring objectives and motivations, 2) feedback on tools and guidance, 3) satisfaction with the mentoring experience, 4) emergent challenges and concerns, and 5) open-ended feedback. Given the small number of participants, responses on quantitative survey questions were analyzed by comparing descriptive statistics. Responses to the open-ended survey items were grouped and analyzed thematically by one of the authors.

### **Instrumentation**

#### **Mentors**

The mentor survey included open-ended questions that asked participants to describe what motivated them to serve as SURGE mentors; what challenges, if any, they had encountered with the mentoring program; what, if anything, they would have changed about the program; and what suggestions they had for feedback.

The survey also included several closed-ended questions that inquired about other core themes.



***Mentoring Objectives and Motivations***

Participants were asked about the topics on which mentees needed support, including advice for navigating an academic program, post-graduation career paths, help with publishing academic articles, and other (multiple choice, open-ended).

***Feedback on Tools and Resources***

Participants were asked whether they had used the mentor guidebook and, if they had, the extent to which they found it useful (5-point Likert scale); whether or not they had discussed an IDP with their mentees (yes/no) and, if they had, the extent to which they found it useful (5-point Likert scale); and whether they had used the online mentor portal (yes/no) and, if they had, the extent to which they found it useful (5-point Likert scale).

***Satisfaction and Value of the Mentoring Program******Resources to Which They Connected Their Mentees***

These included publishing opportunities, post-graduation opportunities, professional introductions, literature relevant to research interests, and other (multiple choice).

***Perceived Value of the Mentoring Program***

This section included questions on the value of the mentoring program for their mentees (4-point Likert scale, open-ended detail) and the value of the mentoring program for the mentor personally (4-point Likert scale, open-ended detail).

***Mentees***

The mentee survey included open-ended questions that asked participants to describe what challenges, if any, they had encountered with the mentoring program; what, if anything, they would have changed about the program; and what suggestions they had for feedback. Items related to core themes were captured using both closed- and open-ended survey items.

***Mentoring Objectives and Motivations***

Participants were asked what criteria they considered in forming teams of mentors, including professional reputation, mentors' videos in the online portal, similar research interests, professional experience of the mentors, other (multiple choice and open-ended), as well as interests/needs they hoped to address through their mentoring relationships, including advice for navigating an academic program, post-graduation career paths, help with publishing academic articles, other (multiple choice and open-ended).

***Feedback on Tools and Guidance***

Participants were asked whether they had read the mentee guidebook (yes/no) and, if they had, the extent to which they found it useful (5-point Likert scale); whether or not they had completed an IDP (yes/no) and, if they had, the extent to which they found it useful (5-point Likert scale); whether they had used the online mentor portal (yes/no) and, if they had, the extent to which they found it useful (5-point Likert scale, open-ended response); and whether they had used email scripts that were provided to reach out to their mentors and, if they had, the extent to which they found them useful (5-point Likert scale).

***Satisfaction and Value of the Mentoring Program******Resources to Which Their Mentors Connected Them***

These included publishing opportunities, post-graduation opportunities, professional introductions, literature relevant to research interests, and other (multiple choice, open-ended).

***Perceived Value of the Mentoring Program***

This section included questions about value for themselves (4-point Likert scale) and what was valuable about

the mentoring program, including social networks, guidance on academic developments, help with publishing academic articles, and other (multiple choice, open-ended).

### ***Final Open-Ended Questions***

Participants were asked what they would change about the mentoring program and how the mentoring program had contributed to their graduate experience.

## **Results**

Below we discuss our findings on the benefits and challenges of the mentoring component of SURGE for racial and ethnic minority graduate students. We begin by discussing the motivations and objectives for both students and mentors. We then summarize the feedback on tools and guidance, the satisfaction and value of the mentoring program for both the mentors and mentees, and the emergent challenges and concerns. We conclude with recommendations. Please note when reading the results that responses were not mutually exclusive; thus, the total number of responses may be greater than 10, the total number of SURGE students.

### **Mentoring Objectives and Motivations**

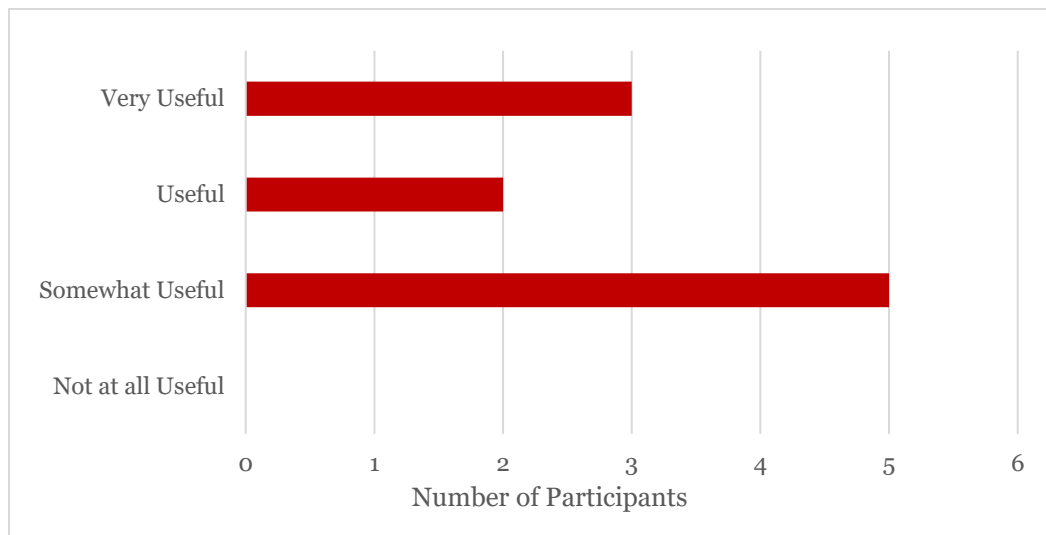
To understand SURGE student mentoring goals, the survey inquired about what interests participants were hoping to address through their mentoring relationships and what criteria they had each considered in forming their mentoring team. Students overwhelmingly ( $n = 9$ ) indicated that they were hoping for advice about their post-graduate career paths. Advice about navigating an academic program and assistance with academic publications were also common responses ( $n = 7$ ). Other concerns ( $n = 3$ ) included better understanding of disaster research, potential research collaboration, and advice on graduate theses/dissertations. In populating their mentor network, students assessed potential mentors primarily based upon professional experience and similarity of research interests ( $n = 9$ ). The mentors' introduction videos ( $n = 5$ ) and professional reputations ( $n = 4$ ) were less frequently referenced, likely because some students had minimal training in the hazards and disaster field and stated that they were not sufficiently aware of the professional reputations of established scholars to factor them into their decision-making. Nonetheless, these factors still influenced some mentees.

We also asked mentor respondents to explain what had motivated them to serve in this capacity. Values of diversity appear to be a core theme among this group as all ( $n = 5$ ) mentor responses referenced a desire to help students from underrepresented backgrounds. One respondent also expressed appreciation for the program's many-to-many mentor network design.

### **Feedback on Tools and Guidance**

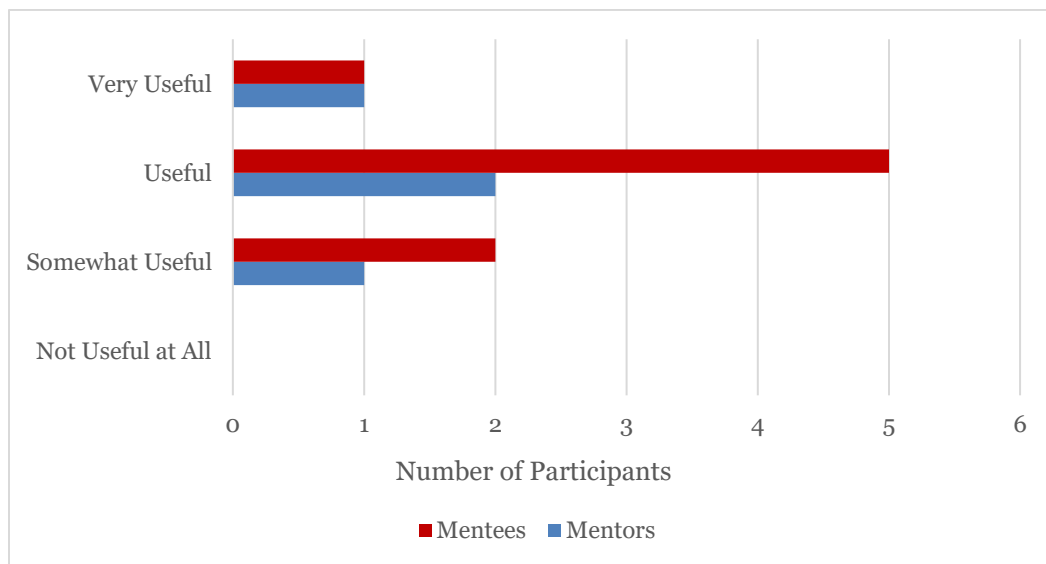
SURGE students used an online portal to acquaint themselves with potential mentors and record their mentoring selections. All students appeared to find value in this approach as each of the students stated that the portal had been, at minimum, somewhat useful for constructing their mentoring team. On a four-point scale from "Not at all Useful" to "Very Useful," we received a mean of 2.8 (see Figure 1).

**Figure 1.** *Usefulness of the Mentoring Portal*

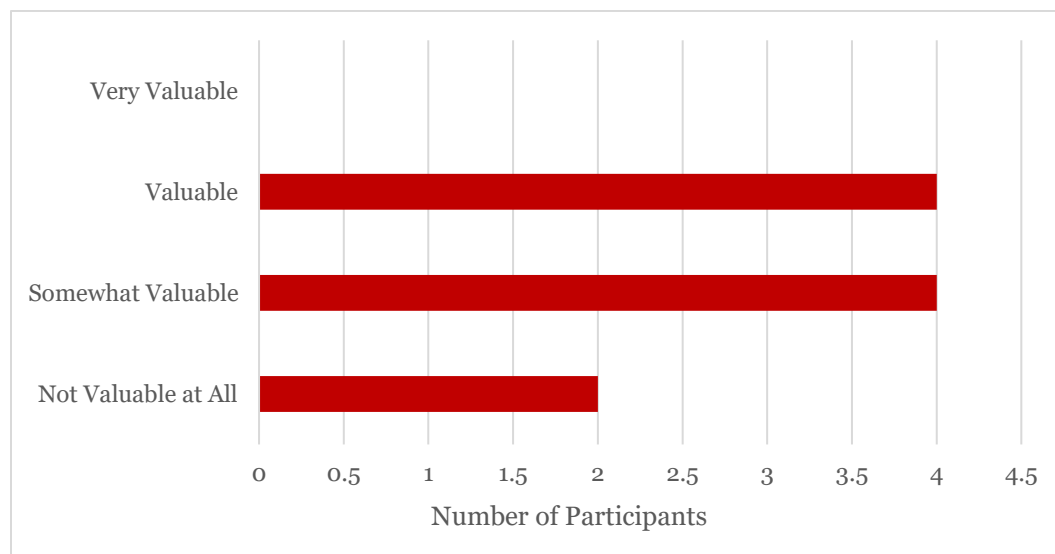


Students and mentors were also each provided with guidebooks to help foster best practices for developing successful professional relationships. A majority in both groups (8 students, 4 mentors) utilized these materials. All mentors and mentees who had read the guidebook agreed to varying degrees that it had been useful. On a four-point scale from “Not at all Useful” to “Very Useful,” we received a mean of 2.5 from mentees and 2.4 from mentors (see Figure 2).

**Figure 2.** *Utility of Mentor/Mentee Guidebooks*



Only four students completed an IDP, though they all found the exercise to be useful. On a four-point scale from “Not at all Useful” to “Very Useful,” we received a mean of 1.5 (see Figure 3). Please note that all “Not Applicable” responses pertain to students who did not complete an IDP and are coded as 0.

**Figure 3.** Usefulness of the Development of an Individual Development Plan (IDP)

### Satisfaction and Value of the Mentoring Program

SURGE students composed their mentoring teams independently and based upon their interest in the options available within the mentoring pool and personal mentoring needs. Their mentoring teams ranged in size from a minimum of two ( $n = 1$ ) to the limit of five mentors ( $n = 1$ ) total. Most students ( $n = 4$ ) had four mentors.

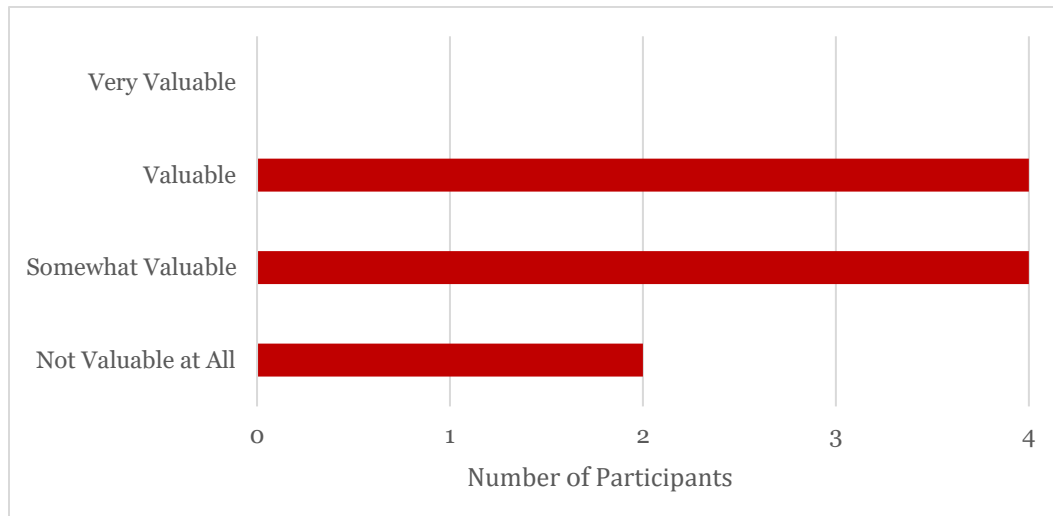
#### Satisfaction with SURGE Mentors and Mentees

Students were asked to rate how satisfied they were with the degree of responsiveness from each of their mentors using a five-point Likert scale ranging from “Very Satisfied” to “Not at All Satisfied.” All respondents were, at minimum, “Somewhat Satisfied” with the degree of responsiveness from at least one of their mentors. Most mentors ( $n = 9$ ) received at least one rating of “Very Satisfied.” The next most common rating was “Somewhat Satisfied” ( $n = 8$ ), followed by “Not at All Satisfied” ( $n = 5$ ), and “Satisfied” ( $n = 3$ ). Please note that all students had more than one mentor and were rating *each* of them for this question.

Due to the smaller number of respondents, mentors’ assessments of satisfaction with their mentees’ level of responsiveness are not sufficiently comprehensive to provide an assessment of the entire cohort of SURGE students. However, of the six students for whom scores were submitted, all received a minimum score of “Satisfied” from their mentors.

#### Value of SURGE Mentoring Program

In assessing the program, students were asked to rate, on a 4-point Likert scale, how valuable they personally found the SURGE mentoring program. While responses varied, with some perceiving greater value than others, all found at least some value in the program. On a 4-point scale from “Not at all Valuable” to “Very Valuable,” we received a mean of 2.8 (see Figure 4). The mentors’ responses tracked similarly to the students, with most ( $n = 4$ ) rating the program as “Valuable” and one as “Somewhat Valuable.”

**Figure 4.** *Value of the Mentoring Program*

Breaking these data down further, students were asked what specifically they found valuable about the mentoring program. Student responses indicated that mentors were providing guidance on academic development ( $n = 8$ ), helping to establish their networks ( $n = 6$ ), and assisting with the writing and publication of academic articles ( $n = 3$ ). One respondent also referenced opportunities for job and postdoc connections.

Mentees were also asked about resources to which mentors had connected them. Responses indicate that mentors are most frequently expanding SURGE students' professional networks ( $n = 3$ ) and helping them to get better acquainted with bodies of literature that relate to their research interests ( $n = 3$ ). To a lesser extent, they were exposing them to new publishing ( $n = 2$ ) and career opportunities ( $n = 2$ ).

An open-ended follow-up question about what the SURGE mentoring program had contributed to students' graduate experience enabled students to elaborate on these reflections in the broader context of their professional development. Three responses cited the short timeframe with which they had been involved in the mentoring program, revealing that this stage may be too early to develop sound assessments of the program's value and benefits. Nonetheless, two themes revealed what aspects of the mentoring program were most valuable to SURGE students and mentors: Expansion of professional networks and understanding of the disaster field. Three students emphasized the expansion of their professional network. For example, one stated, "One mentor that I have been communicating with [name redacted] has been very helpful in providing literature and connecting me to other people who may benefit my career." Another explained that mentors were helping them to become better acquainted with the disaster field, saying, "I've benefited from guidance from scholars in the field, and I'm gaining a better understanding on how to [utilize] my current and previous research and evaluation experience in the disaster field."

As mentioned previously, most students were new to the hazards and disaster field. Having mentors who could connect them to resources such as literature and other scholars was particularly helpful. These students' reflections shed light on the potential for mentoring relationships such as those promoted by SURGE to enhance students' social capital and connect them with opportunities that may have otherwise been inaccessible. While such benefits may be particularly valuable for students who had little formal training in this field of research outside of the program, these remarks suggest that even those who were more experienced in this arena benefitted from the increased exposure outside of their home departments.

Mentors were asked a less detailed set of questions pertaining to the value of their role in SURGE. When asked to explain what they personally had found valuable about the program, responses focused on the qualities of the students and enjoyment of the mentoring process itself. Here are their responses: “Provided me the opportunity to connect with a student in a different field and from a racial/ethnic group historically under-represented in higher education,” “I believe in cultivating and fostering students and junior faculty, and the SURGE mentoring program provides an avenue to help in that endeavor,” “I enjoy learning from these students [and] hearing about their interest[s],” and “I feel that the variety of questions from these mentees help me with my own mentoring of minority students enrolled at my university.”

In sum, both mentors and mentees felt that the program had benefited them in some way. Mentors provided a range of resources, and responses indicate that mentors are facilitating progress toward programmatic goals of professional development training in the hazards and disaster field, as well as enhancing social capital among SURGE students. This supports broader literature on mentoring as a means for underrepresented graduate students to access greater networking opportunities and social support, leading to better adjustment to the academic environment (Santos & Reigadas, 2002, 2005; Shotton et al., 2007; Shultz et al, 2001; Stoeger et al., 2017; Griffin et al., 2020). Moreover, mentors’ responses indicate that mentors highly enjoy mentoring students, specifically those from different fields or underrepresented racial and ethnic backgrounds.

### **Emergent Challenges and Concerns**

All respondents were asked to identify what challenges they had encountered with the SURGE mentoring program. Students were provided with a pre-populated list of items and an opportunity to contribute open-ended feedback. Challenges identified from the list included: Mentors being hard to reach (n = 5), not receiving the guidance they were expecting (n = 5), inability to select their preferred mentor(s) within the portal (n = 2), and difficulties integrating the activities of the mentoring program with the requirements of their graduate program (n = 2).

Additionally, in open-ended feedback, one student suggested that it would be useful to have more structure in the process, including suggested topics for discussion during mentoring sessions. Another elaborated that some mentors were slow to respond to emails. Three students mentioned at various points throughout the survey that it would have been nice to be able to meet all their mentors in person. One student expressed reservations about selecting the maximum number of mentors available:

I personally think I shouldn’t have picked the maximum amount of mentors. Managing five different relationships at varying stages is too much for me. I think initially having five is what I felt like I needed, but I think starting with two or three, seeing how those fostered and potentially adding on more later would have been a better strategy.

For mentors, the question regarding challenges was asked solely as an open-ended item. Only one respondent stated that they had encountered a challenge, noting that a mentee was not as interested in research as they had anticipated. They also stated, however, that they were still willing to support this individual. Another noted that it was too early to tell what aspects of the program might be challenging. One noted that they wished they had been able to attend a major conference within the field in order to meet their mentees in person.

### **Recommendations for Changes**

A primary goal for this data collection effort was to identify implementation challenges so that they could be resolved in a timely manner. Reflecting this objective, both students and mentors were asked what, if anything, they would change about the SURGE mentoring program. Of the students who responded to this

question (n = 6), two requested more structure and guidance on how to build their mentoring teams. Both respondents explained that the variety of options was in some ways overwhelming. One elaborated on the difficulties that this created for an emerging scholar who was still exploring different interests:

I like the many-to-many model a lot, so I wouldn't change that. However, I think perhaps the handbook should break down some models on how to get the most out of the program ... I like the freedom of crafting what I "want"/"need," but depending on where you are in your life, those wants and needs can be rapidly changing ... what I needed when I picked my mentors and what I need now [are] different and [the] program doesn't allow for that kind of flexibility.

One student stated that they would like to see the portal populated with more mentors representing their own discipline and area of interest, while another suggested a workshop at which students could interact with their mentors. A sixth student requested better alignment between the boots-on-the-ground experience, a reconnaissance research and service learning mission to the Virgin Islands in 2018, and the mentoring program. Only one mentor responded with a note about increasing recruitment efforts at the outset.

No new issues were raised in the final comments. However, one mentor expressed that they thought the SURGE mentoring program was valuable and worthwhile. One student's comment was hopeful but noticeably more reserved: "I like the potential of the mentor program. Honestly, I have not spoken much with my other two mentors. Hopefully, this will change in the future."

## Discussion

In this article, we presented findings on the benefits and challenges of the SURGE mentoring program for racial and ethnic minority graduate students of color. We found that students had several motivations for and expectations from the program. In line with the literature on the challenges that underrepresented students face in academic programs, SURGE students wanted help with navigating their academic program and guidance on academic development (i.e., advice on post-graduation career paths, help with learning the literature in their field, and assistance with publishing). Indeed, most of the students found the SURGE mentoring program to have been at least somewhat valuable in helping them achieve these expectations. Students indicated specifically that they found receiving guidance with academic development and with establishing professional networks a valuable aspect of the program.

Nonetheless, students did identify a few challenges, namely, lack of swift response from some mentors, not enough guidance on navigating the mentor-mentee relationship, and little to no in-person interaction. While half of the students mentioned that some individuals within their mentoring team were hard to reach, a majority remained satisfied with the responsiveness of their mentors overall. This suggests that the many-to-many mentoring model helped to ensure none were entirely dissatisfied on this measure as they had more than one mentor to reach out to (Huizing, 2012; Santos & Reigadas, 2005). The finding that many mentors were hard to reach also suggests a need for greater emphasis on mentoring in departmental evaluations of faculty to encourage more commitment among mentors (Thomas et al., 2007). Having more committed mentors for students of color is crucial. Adserias et al. (2016) argued that by enacting engaged transactional and transformational leadership, mentors are more likely to make a difference in the careers of graduate students of color and in the development and institutionalization of a diversity agenda in their departments. Further, although students received a mentor/mentee guidebook with some points for guidance, many craved more instruction on how to navigate their mentor/mentee relationship. This highlights a potential need for clearer communication about this resource and for feedback about the content provided therein. This finding also shows that formal mentoring programs and guidelines and less ambiguity are more beneficial to students (Banks & Dohy, 2019; McGee, 2020; Samari et al., 2022; Young & Brooks, 2008). The virtual aspect of the

mentoring program also helped to ensure that students had access to a diverse group of mentors from all over the United States and from a variety of disciplinary programs, which helped mitigate problems associated with a lack of support from diverse faculty and students in their own programs and other administrative burdens (Li et al., 2022; Silverstein et al., 2022; Stoeger et al., 2017). Nonetheless, both students and mentors expressed that they would have liked an opportunity to meet and interact in person, revealing a need for perhaps covering expenses for a workshop for all in the mentoring program.

Overall, given the unique barriers and challenges to retention for minority students in graduate programs (American Council on Education, n.d.; Brunnsma et al., 2017; Park & Bahia, 2022; Torres et al., 2010), it is important to understand the mentoring needs of underrepresented students in order to provide the best possible help to them during what can be an extraordinarily difficult transition into academia (McNairy, 1996; Gay, 2004; Torres et al., 2010). Our findings show that formal implementation of a mentoring program can help mitigate diversity issues commonly found in academia for marginalized students of color (Davidson & Foster-Johnson, 2001; Burt et al., 2019; McGee, 2020), thereby increasing the representation, retention, and graduation of students of color in graduate programs. It is also important to consider how the recognition of racial differences and cultural sensitivity can benefit students (Harris & Lee, 2019). Programs such as the BAF (Dixon & Louis-Charles, 2015), MOSAIC (Samari et al., 2022), and SURGE all highlight the importance and success of mentorship programs specifically developed for students of color, supporting research that shows a colorblind approach to mentoring students of color can be more harmful than helpful (Young & Brooks, 2008).

It is especially crucial to do this for underrepresented students in the fields of hazards and disaster research and practice, as their contributions and perspectives are needed to address disparities and inequities in the social order. Disasters disproportionately affect low-income ethnic and racial minority populations, whose lack of access to social and economic resources and representation in decision-making tends to leave them more vulnerable to disaster impacts (Thomas et al., 2013). Amplified social vulnerability to disasters “means [marginalized populations] cannot necessarily mitigate risk, live in a safer location, or afford to evacuate when told to do so” (Fordham et al., 2013, p. 12). For example, communities of color often have a much harder time recovering after disaster events due to “poorer quality housing” which is then prone to more damage as a result (Girard & Peacock, 1997, p. 173). Despite patterns of disproportionate vulnerability for racial and ethnic minorities, those working in hazards and disaster-related fields are rarely representative of these communities. Exclusion of racial and ethnic minorities in disaster-related planning and decision-making explains why these activities fail to account for the social, cultural, and language barriers that marginalized communities face during extreme events (Andrulis et al., 2007; Dixon & Louis-Charles, 2015). It is imperative that the work force attempting to study and address such issues is more representative of these communities. Mentoring programs like SURGE are critical for enhancing participation among racial and ethnic minorities in hazards and disaster-related academic fields and the subsequent representation of scholars of color in corresponding careers.

The findings also showcase the need for ongoing evaluation of such programs, which will ensure that the mentoring needs of students of color are met (Hall & Jaugietis, 2011). Although SURGE was focused on the hazards and disaster field, we believe that the lessons learned by evaluating the design of its mentoring program can be applied to similar mentoring programs in other fields. Thus, based on our findings, we conclude by highlighting insights that will be of interest to academic institutions looking to replicate or design and implement similar mentoring programs or initiatives geared toward addressing the unique barriers to retention for students of underrepresented racial and ethnic backgrounds.

## **Implications for Practice**

While relatively unique in its subject area of focus and various components, this evaluation of the SURGE mentoring model has generated insights that can be applied to other graduate training and professionalization programs, particularly those focused on engaging students from underrepresented populations. Multifaceted



programs such as SURGE may require particular approaches to mentoring to encourage the kinds of collaborations and interdisciplinary networks necessary to prepare next-generation scholars and practitioners to conduct convergent research that addresses complex problems (Peek et al., 2020). Below we list several recommendations to enhance the effectiveness of mentoring programs associated with these ambitious initiatives. Such initiatives should:

- Employ a many-to-many model with multiple mentors assigned to multiple students to maximize mentees' contact with mentors representing different backgrounds and perspectives.
- Provide direct financial compensation or other incentives to encourage those volunteering as mentors to remain consistently involved with their mentees.
- Implement a virtual mentoring component as this allows for a greater range of mentors from different institutions and disciplines but also provides an opportunity for mentors and mentees to interact in person (through hosting an annual workshop, for example).
- Provide ample guidance to both mentors and mentees regarding their expectations in the mentoring program, including training to create a baseline level of knowledge about successful mentoring. SURGE distributed a mentor/mentee handbook, but our findings suggest that this was not the most helpful on its own. Other programs have successfully employed workshops for mentors to increase their knowledge of both the mentoring process and cultural competence (Wilson et al., 2010; Hall & Jaugietis, 2011; de Dios et al., 2014). We anticipate similar workshops would also be beneficial for mentees. Other suggestions include asking mentors and mentees to post regularly to a discussion board or web page about their experiences, challenges, concerns, and questions to help each other navigate the mentoring program or personal challenges in their individual academic programs (Hall & Jaugietis, 2011).
- Arrange a meet-and-greet, either virtually or in person, for mentees to get to know potential mentors before asking students to populate their own mentoring network. This will also ensure mentors understand what students need and can better prepare to accept mentees based on the help they can realistically provide.
- Integrate a contact logging requirement that is tied to mentors' incentives and pair with regular reminders and monitoring.
- Provide for continuous evaluation to improve the program and to implement changes meant to better serve the mentees, particularly if the program is designed to support students from underrepresented backgrounds.

## Limitations

Despite the limited sample size, the findings contribute valuable insights into the kinds of considerations that must be addressed when mentoring racial and ethnic minority graduate students, including what students themselves find valuable and beneficial, as well as challenging. At the same time, the limitations of the information presented here must be acknowledged. While data collection from students was relatively simple, hearing back from mentors was more challenging. This is reflected in the comparatively low response rate from mentors and underscores some of the concerns students reported regarding mentors' degree of responsiveness in their own outreach efforts. However, as only a few mentors had completed their contact logs at the time of data collection, conclusions could not be reached regarding the frequency of contact between faculty and their mentees. As mentioned in the recommendations, providing incentives for the mentors and facilitating the establishment of connections between mentors and mentees in a meet-and-greet ahead of the start of the program may help mitigate this issue. In light of concerns regarding overwork and increasingly burdensome service demands that have come to prominence since the onset of the COVID-19

pandemic, particularly for women and faculty of color (McClure & Fryar, 2022), such measures may be necessary to compensate for the increased demand on mentors' time.

Additionally, there was significant variation among students in terms of their mentoring needs. This may in part be due to the inclusion of students from different disciplines, career stages, and universities. Responses in other data collection efforts indicated differing levels of support within the students' degree programs, confidence in their knowledge about hazards and disaster research, and connectedness to an academic community.

## Conclusion

In sum, underrepresented students have a multitude of experiences and insights that will contribute immensely to their fields if only they are given the chance to make a difference. As previously discussed, minority students face several challenges in academic programs that make it difficult for them to navigate academic culture, expectations, and requirements. Mentoring is an important mitigating factor, but for it to be most effective, programs must be specifically geared toward the needs of underrepresented students. As such, we hope that the findings and recommendations provided in this paper will assist other academic programs looking to implement successful mentoring programs geared toward students of color.

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