

## **Piloting the EMPOWERS Program: Inaugurating Student-Centered Holistic Mentorship for STEM Practitioners in Academia**

**Ms. Randi Sims, Clemson University**

Randi is a current Ph.D. student in the department of Engineering and Science Education at Clemson University. Her research interests center around undergraduate research experiences using both qualitative and quantitative methodologies. Her career goals are to work as an evaluator or consultant on educationally based research projects with an emphasis on statistical analyses and big data.

**Sofia Brewer, Clemson University**

**Lily Fender, Clemson University**

**Kassidy Maron**

**Adelyn Dwyer, Clemson University**

**Dr. Karen A High, Clemson University**

Dr. Karen High holds an academic appointment in the Engineering Science and Education department and joint appointments in the Chemical and Biomolecular Engineering department as well as the Environmental Engineering and Earth Sciences department. Prior

**Marieke Van Puymbroeck**

# **Piloting the EMPOWERS Program: Inaugurating Student-Centered Holistic Mentorship for STEM Practitioners in Academia**

## **Abstract**

Attention to mental health and inclusion are critical for the retention and success of STEM graduate students. Faculty advisors are key to fostering these essential aspects of the graduate experience within the academic system. However, most faculty advisors are unaware of how to mentor holistically (considering students' mental, physical, and emotional well-being in addition to their academic work) to benefit their students and themselves. At the same time, graduate students are often unaware of how to approach their faculty advisors in a respectable yet firm manner. At Clemson University, the EMPOWERS (Evaluating Mentoring Practices for Optimal Work-life balance in Education and Research in STEM graduate studies) program trains faculty advisors on how to mentor using evidence-based techniques and to promote the mental, physical and emotional well-being of their graduate students. Within EMPOWERS, faculty and graduate student mentors learn key aspects of holistic mentoring--a comprehensive bidirectional approach to mentorship that integrates career and psychosocial support to foster a supportive relationship promoting personal and professional enrichment--from modules developed by University faculty.

This graduate student-centered, mixed-methods study focuses on our initial research and evaluation efforts of EMPOWERS through three piloted instruments: 1) We examine the results of a piloted graduate student mental health, well-being, and inclusion survey, 2) We explore quantitative and qualitative results of an evaluation survey, and 3) We present the results of interviews with EMPOWERS graduate student participants on their mentoring self-efficacy. Results from our pilot study will ultimately culminate in two surveys and one interview protocol intended for use in future EMPOWERS work to measure changes in graduate students' perceptions of personal well-being, self-efficacy, and inclusion. Additionally, the long-lasting effects of this program and study aim to provide practical and holistic mentoring training for both faculty and graduate students broadly throughout STEM.

## **Introduction**

Research indicates that graduate student attrition rates are a rapidly growing concern [1], [2]. Moreover, current calls for systematic change in graduate studies are widespread [3]. Several reasons are given for this phenomenon, including increased mental health challenges, lack of career planning and development, and ineffective mentoring practices [4], [5], [6], [7]. Ineffective mentoring can take various forms, including “toxic mentoring,” when a mentor’s actions or behaviors harm or undermine a mentee’s experience [8]. “Toxic mentoring,” which can lead to graduate student attrition, is prevalent at many R1 and R2 institutions [9], [10], [11]. Well-being and mental health are critical to graduate students' success and completion of their degree programs [12].

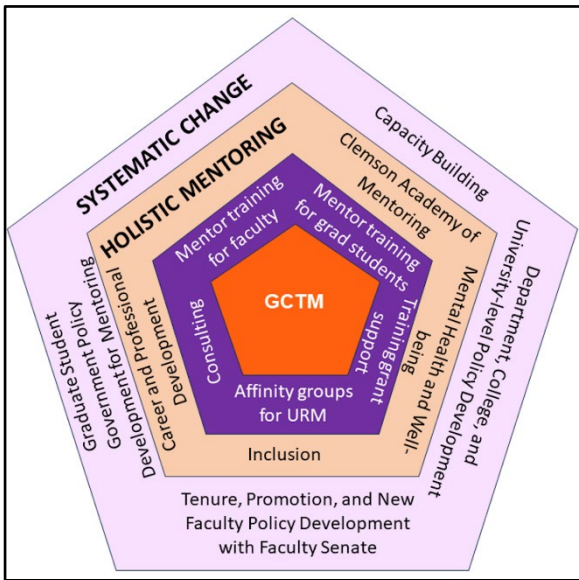
Mentors cannot assume full blame for the issue of "toxic mentoring" as most faculty are not trained to become effective mentors during their graduate studies; this training often occurs on the job in academic positions [13]. Historically, mentoring has focused on a unidirectional relationship, a top-down approach where the mentor provides information to the mentee without reciprocity [14]. Contemporary literature indicates the importance of both parties' autonomy,

relational practice, and active engagement in the mentoring relationship. Holistic mentorship, "a professional, working alliance in which individuals work together over time to support the personal and professional growth, development, and success of the relational partners through the provision of career and psychosocial support," describes the bidirectional nature of the robust and complex mentoring relationship that goes beyond professional support [15], [16]. An essential tenet of the mentoring relationship is awareness of and sensitivity/responsiveness to individual differences and needs. Culturally competent mentoring involves awareness of one's own potential implicit or explicit biases, recognition of the diversity of experiences, and how these experiences inform relationships and engagement in graduate school. Graduate students must be able to explore, reflect, and learn in a culturally sensitive, safe, and respectful relationship with their mentor [14], [17].

Perhaps no mentoring relationship is more important in a graduate student's degree than the relationship with their faculty advisor. Faculty advisors can "make or break" a graduate student experience by providing or withholding financial, professional, academic, and even emotional support to their mentees [11], [18], [19]. Graduate students who receive these supports are more likely to graduate, discover a sense of belonging in their respective fields, and meet long-term professional goals [18]. Furthermore, holistic mentoring increases the value of the graduate student experience through mental, physical, and emotional support [20], which is especially critical for graduate students from diverse backgrounds [21].

These graduate students cannot solely rely on their mentors to provide these experiences. At the same time, students must be able to push for their needs to be met as well. As graduate students gain confidence in the mentoring relationship, they can communicate more effectively [22]. Time in a mentoring relationship is one source of confidence. However, other avenues can be effective for new mentees. Mentoring training is one avenue that has been explored for helping graduate students navigate their mentoring relationship. From a national perspective, mentor training programs such as the Center for the Improvement of Mentored Experiences in Research (CIMER) and the National Research Mentoring Network (NRMN) are shown to be extremely effective in increasing student satisfaction with their mentors [23]. Universities such as Purdue and Duke also house internal mentor training programs for faculty, even housing centers for mentor training [24], [25]. Through training, mentees can more quickly discover techniques to approach their mentoring relationship that senior graduate students have learned through experience. Additionally, sharing advice and experiences through formal or informal training can create a sense of comradery among new mentees [26].

The EMPOWERS (Evaluating Mentoring Practices for Optimal Work-life Balance in Education and Research in STEM graduate Studies) program is a four-year, multi-dimensional program that aims to enhance the mentoring environment for faculty and graduate students. EMPOWERS was developed to respond to the high levels of distress in graduate students due to poor mentoring. This mixed-methods study utilizes two piloted instruments to research and evaluate EMPOWERS: [1] We present the findings from interviews with EMPOWERS graduate student participants regarding their mentoring relationship self-efficacy, and [2] we examine the results of the graduate student mental health, well-being, and inclusion and evaluation surveys. To understand the impact of the EMPOWERS program on graduate student mental health, well-being, and inclusion, we are guided by the following research question: ***In what ways does holistic mentor training impact graduate student mental health, well-being, and inclusion?***



**Figure 1.** Structure of Clemson University's GCTM Program

### Study Context

The EMPOWERS program was designed to address issues related to ineffective mentoring through three distinct goals: 1) Promoting growth in mentoring relationships for faculty members and graduate students through mentor training, 2) Understanding mechanisms and impact of improved mentoring relationships for faculty and graduate students through foundational, theoretically framed research, and 3) Affecting systemic change at the university level for graduate student inclusivity, mental health, and well-being. EMPOWERS was founded as a part of Clemson University's Graduate Center on Transformational Mentorship (GCTM) (**Figure 1**). The GCTM was created

in 2022 as a centralized unit that would enhance the mentoring of graduate students at Clemson University. The GCTM currently provides mentor training for faculty and graduate students, support for training grants, consulting to departments, and affinity group support for under-represented minorities (international students, first-generation scholars, and scholars of color).

Through the EMPOWERS program, holistic mentoring training has expanded beyond the existing CIMER modules and focused on needs identified by Clemson University faculty and graduate students. These modules were developed by senior personnel and faculty at Clemson University with expertise in mentorship and holistic mentoring. Module structures include case studies, think-pair-share, group discussions, and resources. These modules focus on incorporating mental health, well-being, inclusion, and career and professional development components. For more information on the EMPOWERS program activities, feel free to visit our [active training repository](#). EMPOWERS has reached approximately 60 graduate students and 80 faculty members.

### Theoretical Framework

Bronfenbrenner's ecological systems theory--based on nested structures within a broad system--was used to structure and inform our study of the EMPOWERS program. Theoretically, these structures build upon each other and are defined as locations with interactions between individuals [27]. In university settings, ecological systems theory is often conceptualized as classrooms, departments, colleges, and institutions. This contextualization is critical in diversity, equity, and inclusion research to understand better the underlying environmental deficits at various systemic levels that further oppress marginalized students [28]. Studies investigating individual nested structures can also pinpoint specific support for students at each level and how these supports provide a platform for student success at higher levels of the ecosystem [29]. For students of color, female students, and socioeconomically disadvantaged students in STEM,

providing practical and appropriate support at each level is crucial for supporting student well-being through combating systemic inequities at higher ecosystem levels [29].

Ecological systems theory is essential to understanding mentoring relationships, which occur at the microsystem level of the university ecosystem [28]. Previous literature broadly focuses on successful mentoring practices at this ecosystem level through career guidance, equitable mentorship, and trust-building [30]. While a large body of literature specifically hones in on this microsystem, recent research has expanded the

higher levels of the ecosystem, suggesting that mentorship training at the mesosystem (department) or exosystem (college level) provides critical support to both faculty mentors and graduate student mentees [29], [31]. In the context of this study, we lean on three levels of the ecosystem – the individual, microsystem, and mesosystem. We present our interview and survey findings from the view of the individual, the impacts on the mentee/mentor relationship as the microsystem, and the mentoring community built as the mesosystem (**Figure 2**).

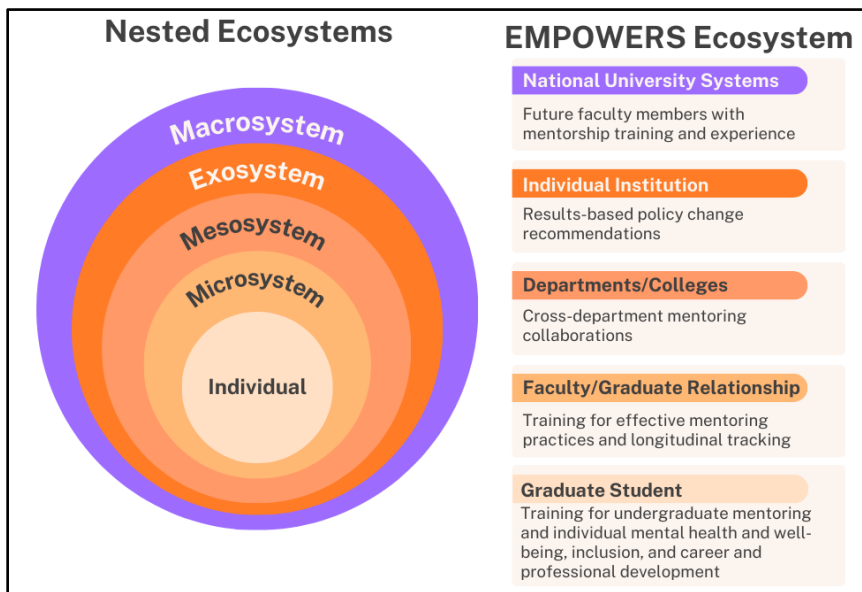
### Positionality

The authors acknowledge our positionality in analyzing interview statements and survey data from graduate students involved in EMPOWERS. All authors have worked closely with the EMPOWERS program, with two authors as the principal investigators on the project. Two authors have extensive experience mentoring graduate students, and two others are current graduate students. We leverage our expertise in mentorship training from a mentor and mentee perspective to better understand our participants.

### Methods

Data were collected and analyzed under Clemson University human subject protocol: IRB2024-0954. Quantitative data were obtained through a well-being survey and an evaluation survey distributed to all graduate students immediately after participation in EMPOWERS training. Qualitative data were obtained through open-ended questions on the evaluation survey and follow-up interviews. Surveys were distributed through Qualtrics.

The **well-being survey** concerned graduate students' mental health, well-being, and inclusion. All questions in this survey originated from [32]. The survey contains 28 Likert-scale questions which load onto 11 distinct factors (**Table 1**) (scale: 1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Neither agree nor disagree*, 4 = *Agree*, 5 = *Strongly agree*). In addition to the 11 factors, the



**Figure 2.** EMPOWERS conceptualization of Ecological Systems Theory

survey also asked who they believe their primary mentor is, how often they met with their advisor, and what they intend to do upon graduation. Other questions included the number of modules they participated in, their involvement in other graduate student professional development activities, and standard demographic questions. In this first survey iteration, participants were also asked for feedback on the overall structure of the survey, including possible improvements. A total of 32 participants responded to this survey, which resulted in 28 usable responses after cleaning.

The **evaluation survey** consisted of Likert questions (scale: *1 = Strongly disagree*, *2 = Disagree*, *3 = Neither agree nor disagree*, *4 = Agree*, *5 = Strongly agree*) about the quality of the mentor training and previous mentorship training the participant may have taken. Open-ended questions were asked about changes in mentoring relationships, feeling part of the University community, valuable training aspects, and possible improvements to the EMPOWERS training modules. Standard demographic questions were also asked. The evaluation survey contained a total of 11 complete responses.

**Table 1.** Questions from the well-being survey, mapped to their respective factors.

Factor	Questions
Academic Success	<i>I'm on track to complete my degree program on time.</i>
	<i>I have the space and the resources I need in the university to succeed academically.</i>
	<i>My academic work is meaningful and inspires me.</i>
	<i>My academic work stretches and challenges me intellectually.</i>
	<i>I feel well-prepared by the methods training I've received in my program.</i>
Academic Support	<i>I'm satisfied with the mentorship and advice I receive at the university.</i>
	<i>I'm satisfied with the career support I receive at the university.</i>
Mentor Support	<i>(REVERSED) My primary mentor doesn't really advocate for me</i>
	<i>My primary mentor allows me to set my own priorities.</i>
	<i>My primary mentor provides advice and resources in support of my goals and ambitions.</i>
	<i>My primary mentor helps me find other mentors and sponsors.</i>
	<i>My primary mentor seems genuinely interested in my personal well-being.</i>
	<i>My primary mentor is aware of and supportive of my financial well-being.</i>
	<i>My primary mentor is actively involved in my academic training.</i>
	<i>My primary mentor is open to outside opportunities such as internships, mentoring and training.</i>
	<i>My primary mentor is an asset to my career and professional development.</i>
	<i>(REVERSED) My primary mentor impedes my career development.</i>
Mentor Knowledge	<i>My primary mentor shares knowledgeable information about career opportunities within academia.</i>
	<i>My primary mentor shares knowledgeable information about career opportunities outside of academia.</i>
Program Climate	<i>In my graduate program, I feel valued and included by my peers.</i>
	<i>In my graduate program, I feel valued and included by the faculty.</i>
	<i>In my graduate program, I feel valued and included by the administration and staff.</i>
University Community	<i>There is a strong sense of community in my graduate program.</i>
	<i>There is a strong sense of community among graduate students in the university.</i>
Social Support	<i>If I were sick, I could easily find someone to help me with my daily academic duties.</i>
	<i>There is someone I can turn to for advice about handling academic problems.</i>
	<i>When I need suggestions on how to deal with a personal problem, I know someone I can turn to.</i>
	<i>If an academic issue arose, it would be difficult to find someone who could give me good advice about how to handle it.</i>

All survey respondents from the well-being survey were asked if they would like to participate in **follow-up interviews**. These interviews were conducted to better understand mentoring self-efficacy for survey participants. Interview questions probed specific interactions with participants' mentors and mentees and how the EMPOWERS program impacted them. These questions focused on improvements in confidence or belonging within their mentoring relationships. Two survey respondents, Liam and Temilola (both pseudonyms), volunteered for the interview.

Quantitative data from the evaluation and well-being surveys were analyzed through descriptive statistics. Open-ended questions were analyzed for common themes. All data were cleaned and analyzed using R version 4.4.2. Conventional thematic analyses were used to identify themes within the data from the follow-up interviews [33], [34]. Steps included open coding to develop initial codes, refining these codes through categories, and developing subsequent themes. One coder coded the interviews and developed all themes.

### Limitations

We acknowledge that our initial analysis of the EMPOWERS programs has limitations. Our sample sizes were smaller than preferred for our well-being survey ( $n = 28$ ) and our interviews ( $n = 2$ ). Interviewees also volunteered to participate, which could lead to positive sampling bias. However, all participants were offered incentives, which we hope mitigated the potential positive skew. This version of our program is our first year, baseline data. However, in future iterations (in line with program growth), we plan to have much larger response rates for both surveys ( $n > 80$ ) and interviews ( $n = 10$ ). We also note that these were our first iterations of each survey and the interview protocol, which will likely undergo revisions. All results must be understood in the context of the EMPOWERS program and cannot necessarily be generalized to other graduate mentorship programs.

### Results

#### *Participation in holistic mentorship training helps graduate students confidently communicate with their mentors.*

All scales on both surveys were based on a scale of  $1 = \text{Strongly disagree}$ ,  $2 = \text{Disagree}$ ,  $3 = \text{Neither agree nor disagree}$ ,  $4 = \text{Agree}$ ,  $5 = \text{Strongly Agree}$ . Results from the **well-being survey** indicate that graduate student participants generally have good relationships with their primary mentors. When asked questions about how supportive their mentors are, 90% of participants *Agreed to Strongly Agreed* that their mentor was supportive and essential to their academic success ( $x = 4.3/5.0$ ; *Agree to Strongly Agree*). Similarly, 64% of participants *Agreed* that their mentor helped them share the *academic knowledge* necessary to their professional development ( $x = 4.0/5.0$ ; *Agree*). No differences were seen between any demographic groups. Overall, results show a baseline positive relationship between graduate students and their mentors who participated in mentor training. However, we cannot claim that this relationship is a result of the EMPOWERS program. The positive nature of this relationship could instead be the driver for individuals participating in the program.

Despite the positive relationships participants shared with their primary mentors, they wanted to change how they communicated with their mentors. **Evaluation survey** results indicate that 80% of participants planned to change their relationship with their primary mentor due to participation

in mentor training ( $x = 4.3/5.0$ ; *Agree to Strongly Agree*). Open-ended comments further describe that these changes would be because of candid and direct communication and setting more explicit expectations. Therefore, there is still a need for change in communication between mentees and mentors.

**Exploratory interviews** revealed similar sentiments. Both participants noted that their biggest takeaways involve communicating with their mentors effectively. One interviewee, Temilola, describes how she has found freedom in speaking with her mentor.

*“That session [relating with your advisor] helped me to understand that you can **express how you feel politely**. If you feel overwhelmed, it **is not bad to say that you’re overwhelmed**. It has worked for me.” - Temilola*

In this quote, Temilola explains how she has found freedom in speaking with her advisor due to attending one of the communication-based sessions offered by the EMPOWERS program. She also goes on to explain how communicating this way with her mentor has been received:

*“I did say **I was overwhelmed** and I didn’t mince words. I said it, and it helped me. **I got help**.” - Temilola*

Temilola clearly explained to her advisor that she was overwhelmed, which allowed her to get the help she needed. Throughout the interview, she describes her previously tenuous relationship with her advisor and how better communication has allowed her to strengthen this relationship along with her mental health.

The other interviewee, Liam, gave a similar sentiment:

*“[The session] helped me think about and put into practice, **if I need something, say something**.” - Liam*

His phrase, “If I need something, say something,” encompasses clearly and concisely communicating with a mentor. Liam and Temilola desire to express their needs to their advisor without fear. Liam explicitly notes that the session gave him the confidence to work with his mentor. Later in the interview, he provides explicit instances where this communication between mentor and mentee can be essential for a graduate student.

*“There are times as a graduate student where you need that form signed. You need that paper reviewed. You need something from somebody else and **you can’t be afraid or hesitant to say**, ‘Hey I need this, it’s holding me back, it’s stopping my progress right now’.” - Liam*

Much like Temilola, Liam has utilized the skills he learned during mentorship training to keep his academic progress moving forward. Through mentorship training, both interviewees have gained confidence in their mentoring relationship and know they can and should ask for what they need.

***Participation in interactive holistic mentorship training builds community between graduate students.***

The efficacy behind EMPOWERS’ mentor training can be linked to the community-building and interactivity within the sessions. Likert-scale data from the evaluation survey reveal that 90% of respondents *Agree to Strongly Agree* that training sessions helped participants feel part of the

mentoring community at Clemson University ( $x = 4.5/5.0$ ; *Agree to Strongly Agree*). Additionally, 90% of graduate students mentioned that they found the training valuable ( $x = 4.3/5.0$ ; *Agree to Strongly Agree*) and would recommend it to their colleagues ( $x = 4.2/5.0$ ; *Agree to Strongly Agree*). Open-ended responses mentioned that the most valuable aspects of each session were the open discussions and opportunities to ask questions about mentoring. These open discussions between mentees were noted to be the most important aspects of incorporating participants into the university-wide mentoring community.

Interviewees demonstrated that the EMPOWERS program was built with interactivity and connection in mind. Interviewees such as Temilola reflect this sentiment and note the importance of interactivity within sessions:

*“I like the fact that the session was interactive. There was an opportunity for **students to be together** in breakout rooms, **express how you feel**, your worries.” - Temilola*

She expresses that one of the main components of the EMPOWERS program is finding connections with other mentees and interacting with individuals in similar academic positions. In his interview, Liam explains that the small group feel of the sessions was significant in developing connections with others:

*“It made it a better experience because it was such a small group. There was **a lot of community**... and I really enjoyed that a lot.” - Liam*

Both Liam and Temilola note the importance of interaction and using small-group breakout rooms to build connections within the community. Throughout both interviews, they said that they could compare and contrast approaches for working through a mentoring scenario.

*“[Working through a scenario] was even better when there were **other students** besides me because you expect to have **different approaches**. Not everybody thinks about a situation the same way. Then you could say, ‘Why did you decide to do that?’ or explain why I decided to do this”. - Liam*

Liam expresses the importance of working alongside someone with potentially different experiences to see how the approaches may differ. Temilola had a similar experience during her time in her session:

*“When I got to the [relating with your advisor] session, I **heard from other people**, and at that point, I was able to say, ‘Okay, I did this; it worked for me.’ Other people were expressing what they have been through as well. It made me understand that it is not bad for you to be overwhelmed **and you can say it politely**.” - Temilola*

In this quote, she notes the importance of hearing perspectives from other participants while sharing her own experiences. Specifically, she builds her confidence and prioritizes her well-being when she realizes she is not the only one struggling. She also states that ‘it is not bad’ to feel bad and that it is okay to communicate it politely and respectfully to your mentor.

Despite these positive sentiments, most respondents (61%) in the well-being survey felt less strongly that there is currently a strong sense of community among graduate students ( $x = 3.6/5.0$ ; *Neither agree nor disagree to Agree*). While these results are still positive, this was one

of the lowest levels of agreement in the well-being survey, indicating that there is room to grow for the graduate community at Clemson University.

The importance of the community and connections between the graduate student mentees is well-captured by this quote at the end of Temilola's interviews: *"Sometimes you think you are the only person going through what you're going through, but when you hear from other people your spirit is lifted. You are motivated to keep pushing since you are not alone in that boat."*

## Discussion

This initial research on the EMPOWERS program used both interviews and data from two surveys to provide initial insights into the following research question: ***In what ways does holistic mentor training impact graduate students' mental health, well-being, and inclusion?*** Our results indicate that holistic mentor training significantly impacts graduate students in two distinct ways:

[1] During holistic mentor training, graduate students built connections within the mentoring community and with each other. EMPOWERS was built on the idea that connections between mentees and mentors could help participants share their perspectives and ideas about mentoring. Through these connections, the hope is that graduate students will find a sense of belonging and acceptance within their university mentoring communities [35], [36]. This sharing was apparent during training sessions as interviewees noted group discussions as the most critical component of the sessions. Specifically, participants mentioned that hearing perspectives from others helped them feel more self-assured. This idea aligns with the literature showing the value of shared experiences in promoting mental health and wellbeing [37].

[2] After mentor training, graduate students find more confidence in and effective ways of communicating with their mentor. Survey results indicated that communication is one of the ways that mentees look to transform their relationships with their mentors. From holistic mentor training, mentees learn the value of communicating their needs. Interviewees mention that they were previously nervous about communicating necessities to their advisors, as well as the state of their mental health. After participating in mentor training, participants learned how to ask for their needs to be met. Both interviewees referenced instances where they could later ask their academic advisors for academic and psychosocial support. The ability of graduate students to communicate effectively with their mentors is one of the most important goals of EMPOWERS. Effective communication from both sides of the mentoring relationship is essential to holistic mentoring [38]. Previous studies have demonstrated the importance of mentoring communication on graduate student retention [39]. When communication is effective, graduate students feel more confident and are more likely to progress academically [22]. Additionally, graduate students can learn to be more effective as future mentors [40].

Overall, we view this first iteration of the EMPOWERS program and the holistic mentor training it provides as a success. Our results suggest that graduate students are already implementing more effective mentoring practices within their mentoring relationships and building a mentoring community. Both surveys provide evidence of the program's importance to graduate students and the need for students to learn how to mentor and be mentored effectively.

The issues about graduate students' mental health, well-being, and inclusion cannot be solved solely by learning to communicate effectively with their mentors. Graduate students also require

support from their peers, department, college, and university [1], [18], [36]. As captured by ecological systems theory, the effects of these supports can be both top-down and bottom-up [27], [28]. The results of this first iteration of the EMPOWERS programs show that the program has positively impacted graduate students individually through the microsystem level (mentoring relationships) and the macrosystem level (connections with peers).

As stated, this study pertains to our initial research and evaluation efforts towards the EMPOWERS program. All data is from only one semester of the program and only the pre-version of our well-being survey. To better understand the impact of the EMPOWERS program, future iterations will include a post-survey to calculate changes in perceptions. We plan to build upon these results in our future five years with the program. Ultimately, the goal of EMPOWERS is to inspire change through holistic mentor training at each level of the ecosystem. While we have demonstrated initial success at the individual, microsystem, and macrosystem levels, future endeavors plan to move upwards. Within the next few years, we will also work to better understand the impact of holistic mentor training from the viewpoint of university administration and those from other institutions. We will continue to monitor the program's efficacy in future iterations through the surveys and interview protocol outlined in this study.

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