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Dr. Kerrie Wilkins-Yel, University of Massachusetts Boston

Kerrie Wilkins-Yel, Ph.D., is the Executive Director of Radical Investment in Strategic Solutions towards Equity (RISSE) Consulting LLC and an Associate Professor of Counseling Psychology at the University of Massachusetts Boston. She is an NSF Early CAREER award recipient whose research broadly focuses on advancing equity, access, and wellness in STEM.

**Stephanie Marando-Blanck, University of Massachusetts
Pavneet Kaur Bharaj, California State University, Bakersfield
Aisha Farra**

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Kerrie Wilkins-Yel¹, Stephanie Marando-Blanck¹, Angela Wang¹, Aisha Farra¹, Pavneet Kaur Bharaj², and Aishwarya Shridhar¹

¹ University of Massachusetts Boston

² California State University Bakersfield

Introduction

It is well known that Women of Color (WOC) navigate an onslaught of marginalizing experiences in science, technology, engineering, and math (STEM) disciplines. These marginalizing experiences are characterized by alienating program environments rife with gendered-racism, invisibility, isolation, and the frequent need to prove one's legitimacy in STEM (Alexander & Hermann, 2016; Bryson & Kowalske, 2022; Johnson, 2011; Wilkins-Yel et al., 2019). A burgeoning area of research has highlighted how these experiences of difference have negatively impacted WOC's mental health and, in turn, their persistence in STEM (Evans et al., 2018; Wilkins-Yel et al., 2022). One group uniquely positioned to create systemic change in these dominant white masculine milieus is graduate advisors. Advisors are stewards of the STEM climate across laboratories, classrooms, and their broader departments. Yet, graduate students broadly, as well as graduate WOC more specifically, rarely described mental health with their STEM graduate advisors (Mousavi et al., 2018; Wilkins-Yel et al., 2022; Wilkins-Yel et al., 2023). To date, there is a dearth in research examining how systemic agents, such as STEM graduate advisors, actively *support* graduate Women of Color's mental health.

Extensive research documents the harmful and toxic ways in which graduate advisors negatively affect Black and Latinx graduate students. However, there have been fewer attempts to highlight how graduate advisors can *positively* support graduate students, especially Black and Latinx graduate women in STEM. Understanding the actions currently being implemented by STEM graduate advisors to promote Black and Latinx graduate women's mental health, and in turn STEM persistence, can provide unique insights and actionable strategies into how STEM faculty can support their graduate advisees. It is not enough to describe the unsupportive behaviors that advisors need to discontinue, the field also needs illustrative examples of the supportive behaviors that advisors need to start implementing.

Extant research that examines support as a precursor to academic success has highlighted two key types of support: psychosocial and instrumental support (Primé et al., 2015; Sheehy, 2019; Wilkins-Yel et al., 2023). Psychosocial support is characterized by providing positive encouragement, supporting students on an emotional or personal level, engaging in empathy, mutual understanding, and providing a safe space for students to emote. Instrumental support consists of providing tangible, hands-on aid, and practical assistance across various areas of life, including academics, career, and personal matters. For example, this may include financial support, offering professional guidance, collaborating on research endeavors, and facilitating practical forms of support. Both psychosocial and instrumental support has been found to be

influential in promoting academic success (Dawson et al., 2015; Kram, 1983; Primé et al., 2015; Sheehy, 2019; Wilkins-Yel et al., 2023). However, more work is needed to concretely understand how graduate advisors in STEM can support Black and Latinx graduate women through the provision of psychosocial and instrumental support.

To address the current gap in the literature, the current study adopted an asset-based approach to examining how STEM graduate advisors supported the mental health of Black and Latinx graduate women in STEM.

Theoretical Framework

The current study draws on intersectionality as a guiding framework (Collins et al., 2021; Crenshaw, 1991). Intersectionality is grounded in the theoretical understanding that differing domains of power and oppression disproportionately impact those holding multiple marginalized identities. These interlocking forces of marginalization, such as racism and sexism, play a key role in maintaining power structures that systematically oppress marginalized groups (Collins, 2021). Graduate WOC in STEM must simultaneously navigate a myriad of race- and gender-based experiences in their STEM milieus given that these spaces continue to be dominated by white, heteronormative, continuing generation, and economically privileged men (McGee, 2020; Wilkins-Yel et al., 2019a). These gendered and racialized experiences in STEM have been shown to disproportionately impact graduate WOC's intentions to persist in their STEM program, their mental health, and overall satisfaction in their doctoral programs (Blackburn, 2017; Johnson, 2011; Ong et al., 2018; Wilkins-Yel et al., 2019). Extant literature has continued to highlight the importance of examining the experiences of minoritized graduate students and acknowledge how systems of oppression serve as barriers to their persistence. Given that graduate advisors are institutional stakeholders in STEM, they can play a key role in perpetuating or disrupting practices that can harm graduate WOC. Consequently, the current study sought to elevate the voices of Black and Latinx graduate WOC in STEM to uniquely understand how these systemic agents (i.e., graduate advisors) supported their mental health.

Method

Participants

The current study consisted of 33 Black and Latinx/e graduate women. Participants were enrolled in an array of STEM disciplines including Engineering, Computer Science, Chemistry, and Physics. All participants were pursuing a doctoral degree at the time of the study. See Table 1 for a detailed breakdown of the participants' demographics.

Procedures

Upon receiving IRB approval from the first author's institution, recruitment letters were electronically mailed to STEM departments across the United States. In doing so, administrators and directors were asked to disseminate the recruitment information to the graduate students enrolled in their department. Interested students who provided their consent were asked to complete an online survey via Qualtrics. As part of this survey, participants were asked to

provide their open-ended responses to the following question, “*In what ways has support from your graduate advisor impacted your mental health and wellbeing over the past academic year, if at all?*”. The data used in the current study was drawn from the responses to this open-ended question.

Table 1

Participants' Demographics

Pseudonym	Race/Ethnicity	STEM Discipline	Year
Cherie	Black	Chemistry	2
Kiera	Black	Computer Science	7
Kimani	Black	Ecology	1
Tiffany	Black	Engineering	-
Hailey	Black	Engineering	3
Adah	Black	Engineering	3
Dakota	Black	Engineering	1
Erika	Black	Mathematics	-
Yasmine	Black	Mathematics	3
Sasha	Black	Psychology	3
Naomi	Black	Archeology	1
Zahra	Black	Bioinformatics	-
Isabel	Latine/x	Acoustics	1
Inés	Latine/x	Biochemistry	1
Susana	Latine/x	Biology	3
Mariana	Latine/x	Biology	1
Irene	Latine/x	Chemistry	2
Jade	Latine/x	Chemistry	4
Luz	Latine/x	Engineering	-
Elena	Latine/x	Engineering	1
Maura	Latine/x	Engineering	1
Rosalind	Latine/x	Engineering	3
Marisol	Latine/x	Engineering	2
Carissa	Latine/x	Nature Conservation	1
Leila	Latine/x	Physics	2
Raquel	Latine/x	Physics	-
Carla	Latine/x	Psychology	1
Sara	Latine/x	Soil Science	5
Celeste	Latine/x	Statistics	1
Alicia	Latine/x	Wildlife Science	1
Ashley	Black, Latine/x	Biology	-
Natalia	Black, Latine/x	Biology	3
Adriana	Black, Latine/x	Chemistry	4
Natalia	Black, Latine/x	Biology	3

Data Analysis

Thematic analysis (Braun & Clark, 2006), grounded in a critical constructivist paradigm, was used to analyze participants' open-ended responses. The data analysis team consisted of the

first three authors of this study. These co-authors engaged in an iterative process (Strauss & Corbin, 1990) to generate and refine the findings. First, members of the data analysis team inductively coded a subset of the data to gain a preliminary understanding of participants' open-ended responses. We then met frequently to discuss and refine these codes, which contributed to the development of the study's codebook. Second, we coded the remaining data set in pairs and analyzed patterns within and across coded excerpts. Through a collective and collaborative discussion, the research team iteratively created emergent themes. These discussions also grounded the data analysis team in the participants' narratives, which in turn increased the confirmability and trustworthiness of the study's findings. As an additional layer of analysis, we employed the extant frame of psychosocial support and instrumental support as an entry into making meaning of the data.

Researchers' Positionalities

The six co-authors of this study consisted of a multidisciplinary group of women, five of whom are from minoritized racial/ethnic backgrounds including Black, East and South Asian, Middle Eastern and Latinx, as well as one of whom is white. We also span a number of stages in our academic and professional journeys including masters and doctoral students as well as tenure-track and tenured faculty. Our expertise is steeped in teacher education as well as psychology disciplines such as counseling, clinical, mental health counseling, and school psychology. Together, we are committed to advancing STEM persistence among Women of Color in STEM in a manner centered on thriving.

Results

Analysis of the Black and Latinx graduate women participants' responses identified two broad themes: provision of psychosocial support and provision of instrumental support. Within the provision of psychosocial support theme, we identified four sub themes: 1) Advisors' Flexibility, Comfortability, and Advocacy, 2) Personal Wellbeing Support, 3) Humanism and Empathic Understanding, and 4) Disrupting Grind Culture. These themes and sub-themes are described in detail below.

Theme #1: Psychosocial Support

Subtheme #1: Advisors' Flexibility, Comfortability, and Advocacy

One quality that was highlighted by several participants was their advisor's ability to be flexible. Black and Latinx graduate women participants identified an advisor's flexibility as one of the most important attributes that supported their mental health. Notably, an advisor's track record of demonstrating flexibility contributed to advisees feeling more *comfortable* talking to them about personal situations that arise, and asking for support amidst challenges. Multiple excerpts described this feeling of comfortability, and the ways in which advisors fostered a space where students could express their needs openly. For example, Yasmine, a Black woman in Mathematics shared,

This semester has been emotionally and mentally challenging. My advisor is understanding, so I felt comfortable sharing this information with her. It was very comforting to have my advisor support me and be patient while I took the time to prioritize my mental health/well-being. — Yasmine, Black woman, Mathematics

Yasmine’s advisor provided support by being patient and understanding, which in turn increased Yasmine’s comfort in disclosing the toll that the semester levied on her. Additionally, participants underscored the importance of not facing any academic or social repercussions when they shared their personal challenges openly with their advisors. For example, Zahra, a Black woman in Bioinformatics shared, “knowing that I can ask her for time off or for mental health days, no questions asked, is a huge relief.”

A crucial factor in advisors being able to foster feelings of comfortability with their advisees was them explicitly prioritizing their advisees’ wellness. Marisol, a Latinx woman in Engineering, stated that her advisor would make “it clear that life happens and that it was okay to take some time off.” She went on to state that “this made it easy on my end [because] I was trying to feel less guilty about not being as productive”. Similarly, Jade, a Latinx woman in Chemistry, shared, “my advisor's support took the form...of advocating for me when my mental health began to rapidly decline due to extreme stress.” She went on to share that her advisor gave her “extra time to prepare and seek out mental health support.” Not only was the provision of extra time important, but Jade’s advisor went a step further by encouraging her to lean into mental health support systems. Advisors advocating for their students to engage in mental health support systems communicated to students that their advisors prioritized their mental health.

Advisors creating a comfortable, open, and non-judgmental environment was critical to advisees prioritizing their mental health without feeling a sense of guilt or inadequacy. Other components surrounding this theme of flexibility included advisors encouraging frequent breaks, canceling meetings, decreasing workload around the holidays, giving additional time for any academic or research work, and providing greater flexibility surrounding meetings times or deadlines.

Subtheme #2: Supporting Advisee’s Wellness

Results indicated that a salient component of psychosocial support was graduate advisors supporting their advisee’s wellness. Several participants in our study shared instances of navigating grief, illness, and an array of challenges. Amidst these difficult moments, participants described feeling supported when their advisors displayed understanding, flexibility with work deadlines, and encouraging students to prioritize their wellness. For example, Alicia, a Latinx woman in Wildlife Science, wrote, “My grandmother died this past month, and I had been going back and forth in the months preceding her death - my primary advisor was very understanding on what this meant for my research timelines and involvement in the lab.” Tiffany, a Black woman in Engineering, found comfort in having a personal connection with her advisor, “sometime last year, I was really sick and had to be in the hospital for some time and my advisor

and his wife were there for me in that period.” Feeling supported throughout these difficult experiences can lessen the toll that these difficulties have on advisees’ mental health.

Many Black and Latinx doctoral women wrote about the invaluable impact this aspect of psychosocial support had on them. For example, Luz, a Latinx woman in Engineering, noted, “I am very grateful for all the support he has given me. It gives me peace of mind that I can usually count on him to help me get through rough patches.” Another student, Natalia, a Black and Latinx woman in Biology, wrote how joining a new advisor’s lab at a pivotal moment in her personal life gave her the support she needed to navigate personal challenges, which in turn, positively affected her academics. She stated, “no more calls from advisors at inappropriate times and no more threats. I feel much lighter now and it shows in the improved quality of my work.” For some students like Ashley, this type of support even impacted their STEM persistence:

I truly hit a wall when I first started graduate school as I realized the habits I developed in undergrad were unhealthy. My advisor's support played a pivotal role in me *staying in* graduate school. – Ashley, Black and Latinx woman, Biology

Ashley’s narrative indicates that when graduate advisors supported their advisees through challenges that affected their wellness, it not only supported their mental health, but it also played a salient role in them persisting in their STEM majors.

Subtheme #3: Humanism and Empathic Understanding

Another theme that was emphasized by several participants was their advisor’s ability to take a humanistic and empathic approach. This centered around the idea that advisors were able to empathize or understand their students as humans and not only students or graduate research assistants. For example, Cherie, a Black woman in Chemistry, shared, “my advisor has been supportive in that she treats me as a human being and not just a graduate student that needs to meet deadlines and bring in money.” Importantly, by seeing their advisees as *humans*, graduate advisors were actively eliminating the pressure students may feel to be perfect. Maura, a Latinx woman in Engineering, described not experiencing anxiety before her meetings with her advisor, which allowed her to “not feel [like] I have to put together a "perfect" presentation for our check-in meetings.” She further stated that by not having to be “perfect” she could “focus on other things like my coursework [and] research”. By providing a space for advisees to express themselves openly, participants described being able to feel more emotionally supported by their advisors, which in turn, allowed them to focus on their academic work more effectively.

The support from my advisor has given me a safe space to talk about my frustrations, mental wellbeing, and issues. As the only person of color in my department it's a lot to

handle and carry, however my advisor reassures me that I do have a place here and that I am successful. — Naomi, Black woman, Archeology

For Naomi, having a graduate advisor who provided a safe space to listen and positively reassured her of her place in STEM was wholly beneficial, especially as the only person of color in her department. Other actionable ways in which advisors demonstrated a humanistic advising style include regular check-ins, providing a safe space for students to share personal challenges, engaging in active listening skills, and relating to and being understanding of students' personal and academic struggles.

Subtheme #4: Disrupting Grind Culture

Lastly, graduate advisors provided psychosocial support to Black and Latine/x women in STEM doctoral programs by actively taking steps to disrupt grind culture in STEM. These steps manifested in several ways, including creating lab cultures that prevented burnout, encouraging healthy work boundaries, and celebrating students' pursuits of non-academic activities. For instance, Irene a Latinx women in Chemistry shared,

My new advisors know that we all have a personal life and do not believe that graduate school should take over your life. They check in with me to make sure that I am reaching my goals, but to also ensure that I am taking care of myself. They do not expect their students to drop everything in order to do their research, and will plan meetings around our schedules. – Irene, Latinx woman, Chemistry

By reassuring their advisees that their graduate work should not supersede their personal lives, Irene's advisors disrupted the notion that graduate students in STEM should push themselves to their breaking point to complete their academic responsibilities. They supported their students' mental health by stressing the importance of developing what Celeste, a Latinx woman in Statistics, considers a "rich and fulfilling" life beyond academia. Furthermore, participants described appreciating when their advisor checked-up on not only the status of their academic goals, but also on students' progress in other aspects of their lives. For example, Susana, a Latinx woman in Biology, reported that her advisor "celebrated my decision to pursue activities outside of my research and to attend therapy." Ashley, a Black and Latinx woman in Botany, wrote that her advisor "supported my life changes, even if that would look like I am working less."

Maura, a Latinx woman in Engineering, contrasted her advisor's behavior with the stories she had heard about unsupportive advisors who overworked their students. She noted, "I often read "horror stories" on Reddit about grad students having advisors [who] expect them to work 50+ hours on a 20-hours GRA/TA assistantship." She went on to state, "I appreciate that my advisor is not like this. I know that I can have the weekends to do things I enjoy, which keeps me

happy.” Maura shared that receiving this type of support “will prevent burnout” in the long run, which is something she experienced in undergrad.

Disrupting the grind culture in STEM might seem daunting to some graduate advisors. However, as seen in the responses here, simple acts such as welcoming students’ interests outside of their programs and encouraging and helping students to cultivate healthy habits in their lives during graduate school are all acts that disrupt the grind culture in STEM. This type of support from advisors is crucial for promoting mental health and STEM persistence among Black and Latinx graduate women in STEM.

Theme #2: Instrumental Support

Instrumental support that positively affected Black and Latinx graduate women participants’ mental health manifested in several ways. This included graduate advisors offering students regular research meetings and academic discussions, providing strength-based feedback, and ensuring that students had adequate funding throughout their program.

One component of instrumental support that was important to Black and Latinx graduate women’s mental wellbeing was the ability to rely on their advisor through regular advisor-advisee meetings. For example, Cherie, a Black woman in Chemistry, noted that she and her advisor “meet regularly to talk about research and classes, and we also have group lunches to just discuss everyday life.” Similarly, Elena, a Latinx woman in Engineering, stated, “She’s always there for me, no matter how busy she is, [she] always makes time to discuss anything on my mind.” Another student, Kiera, a Black woman in Computer Science, shared that she was at a point in her doctoral program where she was focused solely on graduating and that finding an advisor with “a reputation of getting things done” was beneficial to her mental health. For all of these students, graduate advisors supported their mental health by providing instrumental support in the form of stable and reliable mentorship.

The second characteristic of instrumental support evident throughout participants’ responses was the provision of strength-based feedback. Black and Latinx graduate women participants reported that graduate advisors who used “positive feedback,” were more likely to support their advisees’ mental health, compared to advisors who tore their advisees down. Cherie, shared, “my advisor does not tear individuals down. She instead uses a "sandwich" method to point out areas that are on track and areas that need improvement.” These sentiments demonstrate the importance of reinforcing and acknowledging the efforts of Black and Latinx graduate women's work while also identifying areas that need to be strengthened as ways to support their mental health.

Participants noted that a significant aspect of instrumental support was graduate advisors providing adequate funding for them throughout their programs. Black and Latinx graduate women’s participants shared that this type of instrumental support relieved the stress and mental fatigue that is typically associated with financial challenges during graduate school. For example, Inés, a Latinx Biochemistry major, wrote that having reasonable funding allowed her to “not have to be extremely worried about financing my studies”. In some cases, advisors needed to

advocate on behalf of their students by speaking to various deans or other department faculty about how to ensure their advisee would be financially compensated for work on a particular project. For Celeste, a Latinx woman in Statistics, shared that this financial advocacy and support from her advisor was beneficial to her mental health. Similarly, Adriana, a Black and Latinx woman in Chemistry, wrote, “I also know that my advisor does sometimes look out for me when it comes to funding or travel grants or things of that nature.”

Luz, a Latinx woman in Engineering, described her advisor as being understanding and supportive of the financial difficulties she experienced. She stated, “my family’s financial situation has been extremely difficult and my advisor has been very supportive. He helped me get a side job on campus so I can earn some extra cash to help my family.” So, not only did Luz’s advisor provide psychosocial support by understanding the unique stressors related to her family’s financial situation, but he also provided instrumental support by actively seeking out additional opportunities for her to earn additional income to support her family.

It is in this way that psychosocial support and instrumental support work in tandem to support graduate students’ mental health.

Discussion

The current study examined how STEM graduate advisors supported the mental health of Black and Latinx graduate women in STEM. Analysis of the results highlighted three noteworthy contributions to the field. First, this undertaking answers the clarion call to address the ‘mental health crisis’ that is plaguing STEM graduate education (Evans et al., 2018; Nagy et al., 2019; Wilkins-Yel et al., 2022). Given the hegemonic white male culture that dominates many STEM milieus, graduate WOC must contend with a myriad of gendered and racialized experiences. Navigating these experiences can levy a significant psychological toll and stymie graduate WOC’s intentions to persist in STEM. Combating these negative outcomes of the current STEM climate requires transformative change at the institutional level.

Second, the present study uniquely shed light on how graduate advisors can *positively* support Black and Latinx graduate women in STEM. Graduate advisors are among the institutional stakeholders who wield the most direct influence on graduate students, including graduate WOC. Results indicated that advisors who demonstrated flexibility, fostered comfortability among advisees, adopted a humanistic and empathic approach, disrupted grind culture, and provided tangible support such as adequate funding, were most effective in supporting Black and Latinx graduate women’s mental health. To date, we have an extensive understanding of how graduate advisors negatively affect graduate students’ mental health, but short of stopping these harmful behaviors, little is known about the specific advisor behaviors that Black and Latinx graduate women in STEM characterize as *positively* supporting their mental health. This study offered unique insights and illustrative examples of how STEM graduate advisors can support their graduate advisees’ mental health.

Third, the results of this study shed light on the importance of not only supporting students through academic challenges, but also personal challenges (Wilkins-Yel, et al., 2022).

Several participants described navigating challenges related to grief and loss, financial difficulties, and physical health challenges. Participants noted that having an advising relationship where they were able to discuss these personal concerns openly, was very helpful in supporting their mental health. In keeping with our intersectional frame, it is important to consider the various interlocking systems of oppression that advisees are navigating. In addition to racism and sexism, graduate advisees may also be economically marginalized, first in their family to pursue college and doctoral education, and navigating (in)visible disabilities, such as mental health challenges. The compound effect of these intersecting concerns can take a significant toll on minoritized students' mental health and STEM persistence. Consequently, it is imperative that graduate advisors create an advising relationship where advisees can speak openly about both their academic and personal challenges, without fear of any negative repercussions. Contrary to commonly held beliefs, allowing advisees to openly discuss personal challenges and providing flexible accommodations did not reduce their productivity. In fact, the Black and Latinx participants in this study illustrated that by being supported by their advisors, and, in turn, feeling psychologically well, they were more motivated and energized to carry out their academic and research responsibilities, as well as more likely to persist in their STEM doctoral programs.

Conclusion

As key institutional stakeholders in STEM, graduate advisors play a significant role in transforming the perpetuation of current STEM practices. Given the continued underrepresentation of WOC in STEM, it is evident that current practices are antiquated, harmful, and actively thwarting efforts to broaden participation in STEM. The current study shed light on tangible practices that Black and Latinx graduate women in STEM characterized as supportive of their mental health. These include demonstrating flexibility, fostering comfortability among advisees, adopting a humanistic and empathic approach, disrupting grind culture, and providing tangible support such as adequate funding. Taken together, these findings offer, in some sense, a blueprint to supporting Black and Latinx graduate women's mental health. We implore upon STEM graduate advisors to implement these practices immediately.

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