It's No Mystery, So It Must Be Intentional: How Institutions Fail to Support Black STEM Doctoral Students' Mental Health

Dr. Brooke Charae Coley, Massachusetts Institute of Technology

Brooke Coley, PhD is an Assistant Professor in Engineering at the Polytechnic School of the Ira A. Fulton Schools of Engineering at Arizona State University. Dr. Coley is Principal Investigator of the Shifting Perceptions, Attitudes and Cultures in Engine

Dr. Jennifer M. Bekki, Arizona State University, Polytechnic Campus

Jennifer M. Bekki is an Associate Professor in The Polytechnic School within the Ira A. Fulton Schools of Engineering at Arizona State University. Her research aims to understand and address inequities arising from racism and sexism within STEM graduate education.

Dr. Kerrie G. Wilkins-Yel, University of Massachusetts, Boston

Dr. Kerrie G. Wilkins-Yel is an Assistant Professor of Counseling Psychology at the University of Massachusetts Boston. She examines the psychological science of environmental agents that influence persistence intentions among women, particularly women of

Miss Fantasi Nicole, Arizona State University, Polytechnic Campus

Fantasi Nicole is a PhD Candidate who identifies as a Black feminist killjoy who stands for racial and gendered equity and justice. Her fantasy is that all scholars, both degreed and pursuing, will contribute new knowledge of interest in engineering scholarship with the full, uninhibited support of the academy.

Debalina Maitra, Massachusetts Institute of Technology

Debalina Maitra is a Post-doctoral Research Associate at ASU. Prior to her current role, Debalina Maitra was employed by CAFECS (Chicago Alliance for Equity in Computer Science), a NSF-funded Research Practice Partnership, for almost two years. She compl

Juan David Gutierrez
Motahareh Darvishpour Ahandani
Michelle Campbell

**It's No Mystery, So It Must Be Intentional: How Institutions Fail
to Support Black STEM Doctoral Students' Mental Health**

A sizable, and growing, body of literature details the racialized climate that Black doctoral students in STEM endure. They experience simultaneous invisibility and hypervisibility, racial segregation, frequent microaggressions, and perceived incompetence as they navigate their academic environments (Alexander & Herman, 2016; Burt, et al, 2018; McGee, et al, 2019; Thomas, et al. 2021; Wilkins-Yel, et al. 2019; Wilkins-Yel et al., 2022). Moreover, despite a convergence of these findings across researchers, institutions, and studies, STEM departmental culture and climate continue to center whiteness, positioning Black students as outsiders (McGee, 2020; National Academies of Sciences, Engineering, and Medicine, 2023).

In 2020, the brutality and visibility of the murder of George Floyd spurred renewed protests and broad calls for action in response to systemic anti-Black racism. Institutions and organizations across all sectors of society clamored to respond by developing and distributing statements describing their commitments to racial equity and related change efforts. Educational institutions were no different, releasing statements with sweeping promises to enact anti-racist practices in an effort make their institutions healthier and more equitable for Black students, staff, and faculty.

Reports during the last five years have also noted an alarming increase in mental health concerns among graduate students (Evans, et al., 2018; Nature, 2019). Doctoral students in STEM, specifically, described experiencing high levels of burnout, depression, and anxiety (Nagy, et al., 2019; Wilkins-Yel, et al., 2021). Many institutions have tried to respond, espousing commitments to prioritize mental health and wellbeing among their student body. However, while reports such as the National Academy of Sciences' *Graduate STEM Education in the 21st Century* (2018) recommend greater support for graduate student mental health, still largely overlooked is the role that institutional climate plays in the state of mental health (Baik, et al., 2019; Rosenbaum & Liebert, 2015; Wiest & Treacy, 2019). McGee and colleagues (2019) found that racialized experiences in STEM increase Black doctoral students' psychological distress and contribute to students questioning their competence.

The claimed, concurrent focus on supporting Black students and graduate student mental health should logically result in clear, intentional actions that support the mental health of Black graduate

students. This paper seeks to illuminate, from the lived experiences of Black STEM doctoral students themselves, the fidelity of those commitments. We present findings detailing the efforts institutions have implemented to advance general student wellness, we uncover actions (and inactions) that have been taken explicitly for the well-being and/or support of Black graduate students, and we detail what Black graduate students would like their academic institutions to be doing.

Theoretical Framework

Our work is guided by the theory of racialized organizations (Ray, 2019) and is situated through the conceptual lens of institutional betrayal (Smith & Freyd, 2014). The theory of racialized organizations defines the following four major tenets explaining the manifestations of racism in organizations: (1) racialized organizations enhance or diminish the agency of racial groups; (2) racialized organizations legitimate the unequal distribution of resources; (3) whiteness is a credential; and (4) the decoupling of formal rules from organizational practice is often racialized (Ray, 2019). Our work emphasizes the need to understand how organizations institutionalize racial inequities as a starting point for re-envisioning change efforts, structures, and models. For this work, we focus on institutions as organizations and the ways that their racialization impact Black graduate students in STEM. To inform the framing and execution of this work, we situate the role that institutional climate plays in Black graduate student mental health, leveraging the theory's tenets.

We also aim to conceptualize this work through the added lens of institutional betrayal. Institutional betrayal takes place when trusted institutions act in ways that inflict, directly or indirectly, harm on those depending on it for their safety and well-being (Smith & Freyd, 2014). This lens adds to the framing of the study, as we see institutions as being responsible for the endured traumatic experiences and psychological distress of Black graduate students impacted by persistent racism in educational environments. Through this added lens of institutional betrayal, we shed light on the conscientious neglect for the endured injustice of one of its major constituent groups.

Method

This data presented here comes from a subset of data collected for a larger study funded by the National Science Foundation and approved by the Institutional Review Boards at the researchers' institutions.

Co-Constructors. We drew the data for this study from semi-structured interviews with 11 Black doctoral students in STEM. We refer to the interviewed students as "co-constructors" (vs. "participants") to underscore their collaborative role in the construction of knowledge. The use of the label "co-constructors" also explicitly rejects white supremacy, providing agency and power to the Black STEM graduate student community through the amplification of their lived experiences.

At the time of data collection, two co-constructors attended Historically Black Colleges and Universities (HBCUs), two attended Hispanic Serving Institutions (HSIs), and seven attended Traditionally White Institutions (TWIs). They were pursuing doctoral degrees in the computer sciences (N=4), engineering (N = 5), and the biological sciences (N = 2). Table 1 provides additional demographic information about the co-constructors, including their pseudonyms. In the final column of Table 1, the number of plusses following the designation "Black" indicates the number of other marginalized identities the co-constructor held. In Table 1, we note these multiple marginal identities as intersectional characteristics. The concept of intersectionality (Collins, 1991; Crenshaw, 1989, 1991) was originally used discuss how power manifests in structures and marginalizes Black women. We extend that here to include experiences of interlocking marginalization that occur across broader groups of people with multiple, marginalized identities. Specifically, in addition to being Black, the other marginalized identities held by our co-constructors include the following: women or gender diverse gender identity, international student identity, LGBTQIA identity, disabled student identity, and low SES identity. Notably, all the co-constructors held at least one additional, marginalized identity beyond being Black.

Procedure. Co-constructors who identified as Black and enrolled in a STEM doctoral program within the United States at the time of data collection were eligible for the study. We created a recruitment flier that invited Black doctoral students in STEM to work with our research team to share their experiences within the culture of their doctoral program, their relationship with their

advisor, and how those things impact their mental health and career trajectory decisions. The flier provided a link to sign up for the study and provided information about compensation. We distributed it through related social media outlets and email listservs.

Table 1: *Co-constructor demographic information. In the final column of the table, the number of "+s" following "Black" indicates the number of additional marginalized identities that the co-constructor holds.*

Co-Constructor Pseudonym	Institution Type	Discipline	Year in PhD Program	Intersectional Characteristics
Jasmine	HBCU	Computer Science	5th	Black+
Hunter	HBCU	Engineering	2nd	Black+
Tanya	TWI	Computer Science	1st	Black++
Destiny	TWI	Biological Sciences	>5th	Black+
Keisha	TWI	Computer Sciences	3rd	Black+
Ebony	TWI	Engineering	2nd	Black++
Tanisha	HSI	Engineering	2nd	Black++
Brianna	HSI	Engineering	3rd	Black++
Dominique	TWI	Engineering	1st	Black++
Jeremiah	TWI	Computer Science	3rd	Black++
Erica	TWI	Biological Sciences	1st	Black+++

Co-constructors who chose to work with us first completed a screening and demographic survey, which evaluated eligibility requirements (i.e., racial identity, field of study, and doctoral program enrollment) and collected additional demographic information around: year in program, ethnicity, international and immigrant status, parental education level, sexual identity, gender identity, childhood family income level, disability identity, age, and parental status (i.e., whether or not they have children). Following submission of the survey, co-constructors completed an individual, semi-structured interview via Zoom. Interviews ranged in length from 37 to 153 minutes (average length was 91 minutes) and were each conducted by two members of our research team. Our interviewing research team members included faculty principal investigators in engineering education and counseling psychology, a post-doctoral scholar in engineering education, a graduate research assistant in engineering education, a graduate research assistant in linguistics, and a volunteer gradate researcher in counseling psychology. We ensured that each interview team included at least one interviewer who identifies as Black. This decision prioritized the comfort of the co-constructor and potential for alliance between the co-constructor and interview team, both of particular importance given the difficult and culturally sensitive nature of the interview topics (Razon & Ross, 2012; Tillman, 2002).

We conducted interviews during the spring, summer, and fall in 2022. Interviews consisted of 14 questions and related probes designed to elicit co-constructors support (or lack of support) experiences with their academic culture and their advisor, their mental health and wellbeing, their career trajectory and aspirations, and their identity as a Black student. Data presented here focuses on their response to the second in the following sequence of questions: 1) *Both the COVID-19 pandemic and the heightened visibility of Black people being murdered at the hands of police have been rampant over the last two years. How, if at all, have these experiences affected your mental health and your ability to function? and 2*) *How has your STEM department/program supported Black doctoral students' mental health? If not, how would you like your STEM department/program to support Black doctoral students' mental health?* Upon completion of the interview, we distributed a $50 Amazon e-gift card to co-constructors.

Positionality. In alignment with Secules et al. (2021), we considered multiple aspects of our team's positionality while conducting this work. Our research team is comprised of three faculty leads, two from engineering / engineering education, and one from counseling psychology. Two of the faculty leads identify as Black women, and one identifies as a white woman. All three have previous scholarship and personal investment focused on dismantling systemic, oppressive issues that persist in doctoral education. The confluence of these professional and social identities and experiences drew us as a team to focus specifically on the topic of understanding the institutional support provided to Black graduate students in STEM and the impact of those (or the lack of those) on the students.

Each member of our research team was involved in data collection and/or data analysis activities. Along with the faculty leads, our team includes four doctoral researchers and one post-doctoral scholar. Among them are two Black women, one Latinx researcher, and two Women of Color. One of the graduate student researchers is studying counseling psychology, one getting their degree in linguistics, and the others are in engineering education. Within our team, one of our graduate researchers holds the same professional and racial identity as the co-constructors (i.e., a Black doctoral student in a STEM program). All other members of our team hold both an insider (on racial identity and/or professional identity and/or doctoral student vs. faculty status) and outsider (along same dimensions) role. We prioritized alignment along racial identities during data collection to prioritize the comfort of co-constructors, and we were intentional, individually and

collectively, in considering our simultaneous insider / outsider perspectives during the meaning making process. We considered the diversity of identities and reflection about them during our process to be a strength and an example of our explicit consideration of ourselves, researchers, as instruments (Secules, et al. 2021). As a team, we also approached this work with collective awareness of the existence of systemic racism and its impact on the lived experiences of Black doctoral students in STEM. We believe institutions need to do more to address the longstanding inequities and brought that belief to the data collection and analysis portions of this study.

Analytic Approach. We grounded our thematic analysis (Braun & Clark, 2006) in the critical and constructivist paradigms. We used Rev, a commercial transcription service, to transcribe each interview, and final transcripts were de-identified (names and institutions) to maintain co-constructor confidentiality.

Our team followed a two-step coding process (Saldaña, 2021) for analysis. Six transcripts from the 11 included in this study were distributed to all members of the research team. In teams of two or three, we analyzed the relevant sections of the transcripts, and our team met on two occasions to discuss related observations and inferences. Based on these discussions, we created a deductive codebook with three first cycle codes: what institutions did to support all graduate students; what institutions did to explicitly support Black graduate students; and what Black graduate students wish the institution would have done to support them. We then uploaded the relevant sections of all 11 transcripts to Dedoose, a web-based qualitative data analysis application, and conducted first cycle coding. Next, we conducted pattern coding to make meaning within each of the three first cycle codes.

Limitations. The results presented here are not without limitations. While we acknowledged the intersectional identities (see Table 1) of our co-constructors, our results do not explicitly speak to differential experiences because of these identities. There are certainly differences in the experiences among Black students that were not highlighted here. Future work provides an opportunity to unpack findings in a way that more explicitly addresses intersectionality. Similarly, our sample includes co-constructors at three distinct institution types: HBCUs, TWIs, and HSIs. We have not directly focused our analysis on differential experiences among these, which provides both another limitation to our analysis and an opportunity for future address. Finally, as with any

qualitative study, we acknowledge that the results here, while we believe relatable to the overall Black graduate student experience in STEM within the United States, are not generalizable. The ideas expressed by these co-constructors may also be missing aspects of the Black graduate experience that would have been identified with a different group of co-constructors.

Results

Our findings are discussed in three parts. First, we present findings related to the mental health support that co-constructors indicated was provided to *all* students. Second, we share results about the mental health support provided by institutions explicitly to support *Black* students, and we finally present data about the types of support Black doctoral students in STEM wish their institutions had provided.

Mental Health Support for All Students. Co-constructors shared that their programs do not actively prioritize mental health. Tanisha, for example, commented that "I don't think mental health is really all that emphasized in grad school … It's such an avoided topic … I would just say that the fact that every other thing is emphasized, but mental health, kind of speaks volumes." She goes on to describe how she experiences this lack of attention to mental health in her own lab: "The mentality that my PI still carries on into his lab, where regardless of what you have going on, he expects you to be there." Ebony describes her program as actually dismissing mental health struggles as a normal part of graduate school:

> All of our program directors have PhDs. They're like, "Oh, well, things were hard. That's part of the process." Like, "It's going to be hard, you're going to be depressed." And it's like, let's not normalize depression here. That's weird. And that's counterproductive and it's destructive. So yeah, they're not doing much. - Co-Constructor Ebony

Other co-constructors commented that their institutions provided access to counseling. Destiny shared that "The graduate college as a whole, they send out these emails for us to do wellness workshops… Or to have some group therapy sessions." Similarly, Brianna indicated that at her institution, "with the graduate healthcare that we get here, you get free talk space." Co-constructors reported taking advantage of this support, but it wasn't always constructive. Brianna went on to say "And that's [talk space] a tool that is good for some people. I tried it. I don't think it really worked for me." Ebony shared that "I know at our student health center, we get three or four free

counseling … if you have an issue, three to four sessions is not going to do it unless it's a crisis situation." Others, such as Keisha, were explicit to state that there is a lack of therapists sharing and/or versed in the Black experience, which made the therapy comparable to being non-existent.

> At my institution... I feel like I don't have anybody to talk to. Why would I trust their therapist or their DEI programs? I don't know. If you already feel like an outcast in university, you feel like they're excluding you, you feel like you feel invisible….
> - Co-Constructor Keisha

Two co-constructors shared what, among the institutions represented, seemed to be more novel approaches to mental health support. One institution implemented "mental health days." Hunter shared that "four, five days, I don't know, four days in the semester, and no homework, nothing due. No, professor is allowed to, if something is due on that day, you have extension. So, I think that is good overall." Another institution created a pot of money, a "Morale Fund," for supporting mental health and socializing among students in the program. Tanya describes it as "money in CS for us just to go and do whatever things we want to do, as long as we do it together, so that was really helpful."

Explicit Mental Health Support for Black Students. Most institutions did not employ any intentional actions to support Black students, at least none that were visible to co-constructors. Brittney, for example, shared that "I don't think my department really does anything specifically for Black doctoral students that they don't offer everybody, which, I guess, is fine…" Destiny similarly commented that her "department hasn't done anything to support our mental health. The program … they send out these emails for us to do wellness workshops, but it's not geared just towards Black students. It's open to all." In fact, only one co-constructor, Jasmine, who attends an HBCU, was able to describe explicit support provided by her institution to Black students in the form of workshops.

> I'm not sure if they ask us questions or how it works in terms of how they figure out the workshop that they're going to have for us, but it is... Maybe it's the sense of you see other people within your fellowship who are dealing with the same struggles and we're all dealing with the same thing and we look like one another, so there might be that sense of comfort there where you're not in the minority amongst that group. - Co-Constructor Jasmine

Furthermore, in one case among our co-constructors, the efforts of the institution "to help" Black students proved to be counter to their intent. Tanya described being bothered by the assumption of

likeness across vastly different Black individuals when her institution tried to force a bond between her and another Black Ph.D. student:

> In my lab, there's also another African American woman who joined with me, and I felt like they were really pushing us together. I didn't like it, at first, because not all Black people are the same. I'm not going to be her friend just because she's a Black woman, and it was really annoying because they kept pushing us and getting us to Zoom and all that stuff. Also, she is from the North, and while I was born in the North, I was raised in the South. We're vastly different people. It felt like they kept talking about how we're going to do the Ph.D. together, and I was like, "Is my Ph.D. acceptance contingent on her? If I don't go, does she can't go, vice versa?" - Co-Constructor Tanya

Tanya further shared that in her program, Black students were assigned a specific person to contact in the event they encountered any race conscious issues, "We have someone who's in place to help us with anything, any type of issues we have. He's our person, so we have our own dedicated person to go to."

What Black Doctoral Students Wish Their Institutions Would Do. Co-constructors described several things they wish their institutions would do to support their mental health more effectively. First, they suggested "just create a better environment, a more conducive environment." Jeremiah suggests that this could be an outcome of explicit efforts to bring Black students together.

> The opportunity for them to come together. It's not there. Especially in the computing program, and the engineering program, they need a lot to do a lot more things to really connect people together. And I think that's also a thing that where colleges need to work with each other." -- Co-Constructor Jeremiah

Another explicit suggestion related to climate and culture is to provide training to faculty and administrators so that they can be more culturally responsive and effective in their mentorship and advising of Black graduate students. Dominique identifies faculty as the gatekeepers of STEM culture and suggests that without addressing the problems with faculty, the racialized experiences of Black graduate students will never be gone.

> If they can actually put these professors themselves in programs to actually help them, it will reflect on students. Because, PhD, your PIs could either make you or break you… It's like, they own you most times. So it's important, if the source of my problem is still there and you're giving me medication, it's not exactly helpful, because the source is still there. -- Co-Constructor Dominique

Tae similarly comments on the importance of university personnel faculty, administrators, staff understanding that Blackness is not a monolith, highlighting the impact to her of that assumption.

> I really hope people learn Black people are not all the same, especially not within the different continents, in different countries, but even within different regions. A Southern Black person is different from a Western Black person. Even a Southern Black person's going to be different from another Southern Black. I mean, there's just so many different components. We're all just very individualistic. It's annoying. I feel like I'm being treated like an animal, like I'm a tiger, so all tigers should be friends together" - Co-Constructor Tanya

Co-constructors went on to highlight the importance of having authentic support along their academic journey, underscoring the difference between what they would like and what they are experiencing now. Keisha describes experiencing hazing instead of support.

> Throughout the process, you really need people who can remind you that they're rooting for you to succeed because so much of what you get is the opposite. So much of what you get is the opposite. You feel like people are waiting to prove that you can't hack it, and so it's stupid. It's like, 'Why do we have these programs where they're deliberately hazing you, almost, to fail?' - Co-Constructor Keisha

Tanisha describes the performative nature of the support provided by her institution, sharing that "My department loves to talk about how they're composed of more women than men. They're composed of more minorities than majority individuals. … These are wonderful things to post on social media to make yourself look great and diverse." She goes on to describe the lack of action that accompanies these statements. "But there's more to it than just diversity and inclusivity…. Okay, great. You have the numbers, you have the statistics, you are quite literally showing it off as like a trophy. Now, what are you doing to help them?"

Co-constructors also expressed a desire for their programs to increase the representation of Black scholars among both faculty and graduate students, across the full range of the academic career cycle. Keisha says, "If I'm a Black PhD student, have a Black professor, have a Black junior professor, have someone who's senior…I just feel like more people who look like me would be kind of cool." Ebony describes the detrimental impact to Black students and Black faculty when there are so few:

> In terms of our administration, we need to see more Black people who aren't spread so thin because the one person that we have has their hands in literally everything. And it's to the point where they can't even be available for students -- Co-Constructor Ebony

Co-constructors also shared a desire to take advantage of professional mental health support on campus, and also to see changes to the ways that support is provided. Destiny comments on her experience seeing other Black students utilizing mental health services on campus. She states "When I did do the group therapy [it] is majority Black students. So even though it wasn't just tailored towards, "Hey, Black students do this," We all saw that opportunity to go in and … support our mental health." Ebony also took advantage of mental health services on her campus, and commented on the importance of having "in person therapists, people that you can talk to that are specially equipped to deal with... I don't know. The Black experience. That would be great." She goes on to suggest having counselors embedded within individual programs. She states, "I think implementing a BME specific counselor or therapist of some sort would be helpful."

Finally, several co-constructors commented on the importance of paying attention to students' financial needs. Keisha describes her experiences with reimbursements as "You spend a bunch of money and then you wait three months to get it back, get reimbursed." She goes on to say "If you didn't come from a family with some resources, how would you even do that? There's so many things about that... That system is super stressful."

Discussion and Implications

The voices of the co-constructors provide direct visibility into key components of the Black STEM graduate student experience with institutional support (or lack thereof). Notable among these is that all but one of the institutions represented by our co-constructors have not employed *any* intentional support for Black students. Given that the job of the institution is to provide equitable spaces where all students can thrive, the lack of intentionality to explicit strategic activities to support the success and/or well-being of Black students, particularly in navigating during and pseudo-post pandemic times, is negligent, and a clear example of institutional betrayal (Smith & Freyd, 2014).

Amid "commitments" from these same institutions in response to systemic racism and mental health crises, this failure to act is inequitable and a perpetuation of the very issues so many

institutions promised to address. Co-constructors reported seeing through the performative aspects of these statements. Of note is that the need to move from statements to actions has been called out by other researchers (Coley & Holly, 2021). Furthermore, racialized organizations (Ray, 2019) diminish one's agency when individuals are not supported to have the power to act. Black students' agency diminishes when environments leave obscure and nebulous, such as commitments to change that never take place, what should be explicit and transparent processes for support of their self-preservation.

Another salient implication from the co-constructors' experiences is that representation matters, among not only faculty and administrators (as also highlighted by Mcgee, 2019), but also among university mental health resources. Wilkins-Yel, et al. (2022) find that culturally responsive university-based therapy can be an important support for doctoral students, including for Women of Color specifically. However, co-constructors in this study received and took advantage of access to therapy, a free service of the university, but that therapy was ineffective. The providers were unaware of the Black experience and thus unable to provide mental health support that left Black students empowered, equipped with tools to effectively weather their environments, or feeling affirmed in their Blackness. Provision of therapy is one thing, but provision of a colonized resource does not advance Black mental health. Mental health support with a therapist versed in the Black experience is necessary for therapy to truly be effective for Black students.

Racialized organizations (Ray, 2019) legitimate the unequal distribution of resources when the opportunity and access afforded individuals within the organization is variable. Providing Black students free counseling at the intersection of two pandemics appears to be the provision of a critical resource. Yet inaccessibility to therapists that share in the identity and lived experience of the students, something commonly afforded to white students, compromises the effectiveness of the resource, and thus makes it unequal. The counseling scenario also doubles as an example of the racialized decoupling within organizations, another tenet of racialized organizations (Ray, 2019). Racialized decoupling occurs when there is a contradiction in place between the rules and policies and the executed routines and norms. While institutions boasted an effort in solidarity to promote mental health support for students, little account was given to consider how race might contribute to the effectiveness of such support. In racialized decoupling, we operate on the assumption that race does not matter in the provision of recourse, support and/or services and this

is not true for Black students. This is also because there is an assumed white center, which illustrates and connects the final tenet of racialized organizations, whiteness as a credential. In whiteness being a credential, whiteness is accepted as the default, which provides access for phenotypical whiteness.

Co-constructors also highlighted the need for faculty training in culturally responsive mentorship. They shared experiences of faculty ignorance around a perceived monolith of Blackness and the associated benefit to students of pairing Black students together. While research illustrates that Black students benefit from counterspaces and critical masses of other Black students (Ong, et al., 2018; Thomas, et al., 2019), it should not be the position of the institution to force bonds of solidarity based on race.

More broadly, faculty need to gain comfort and training in how to discuss issues unique to the Black experience so that they can effectively support and advocate for their Black students, an implication also found in Wilkins-Yel, et al. (2021) and Wilkins-Yel, et al. (2022). Multiple co-constructors highlighted that there is a formally designated (or informal designee as the only Black faculty member) person for handling "Black student issues" at their institutions. This necessarily isolates the support and overburdens Black and Black-allied faculty. Equity and anti-racism must be a responsibility shared across all members of the academic community (and society). Institutions are responsible for moving beyond the issuance of statements to the contracting and delivery of anti-racism training for their faculty, administration, and staff. They furthermore need to set up procedures and policies to hold these same stakeholders accountable for related actions.

Finally, multiple co-constructors commented that their departments did not engage with the topic of mental health at all, in at least one case actually dismissing mental health challenges as an expected part of the graduate student experience. While mental health expertise is certainly not the same as STEM expertise, all faculty in STEM also have the responsibility to deal with and support mental health. As suggested in Wilkins-Yel, et al. (2022), faculty in STEM must become aware with the warning signs of psychological distress and advocate proactively for their students to take advantage of on-campus or off-campus mental health resources. Institutions must take responsibility for this training, for the dissemination of related information to faculty, and for normalizing mental health awareness and support as a regular part of faculty mentorship.

The recommendations shared in this paper highlight the critical and unmet needs of Black graduate students across institutions and STEM disciplines. We would like to underscore that this paper is not the first (and will certainly not be the last) that highlights these issues or gives proposed solutions. With this in mind, we close the paper by revisiting the title, which highlights that it is not a mystery what needs to be done to improve equity and enact anti-racism in our STEM doctoral programs. And, if it is not a mystery, then it stands to reason that the inaction must be intentional. Our hope is that institutions will take note and take action … how many more papers and reports need to get written, presentations delivered, calls for equity made, for real change to occur?

Acknowledgements

References

Alexander, Q. R., & Hermann, M. A. (2016). African-American women's experiences in graduate science, technology, engineering, and mathematics education at a predominantly white university: A qualitative investigation. *Journal of Diversity in Higher Education, 9*(4), 307–322.

Baik, C., Larcombe, W., & Brooker, A. (2019). How universities can enhance student mental wellbeing: the student perspective. *Higher Education Research & Development*, *38*(4), 674-687.

Burt, B. A., Williams, K. L., & Smith, W. A. (2018). Into the storm: Ecological and sociological impediments to Black males' persistence in engineering graduate programs. *American Educational Research Journal*, *55*(5), 965–1006.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Coley, B., & Holly, J. (2021, October). Starting with the promises: moving from inspirational words to institutional action in addressing systemic racism. In *2021 IEEE Frontiers in Education Conference (FIE)* (pp. 1-4). IEEE.

Collins, P. H. (1991). *Black feminist thought: Knowledge, consciousness, and the politics of empowerment*. New York, NY: Routledge

Crenshaw, K. W. (1989). Demarginalizing the intersection of race and sex: A Black feminist critique of antidiscrimination doctrine, feminist theory, and antiracist politics. *University of Chicago Legal Forum*, 140, 139–167.

Crenshaw, K. W. (1991). Mapping the margins: Intersectionality, identity politics, and violence against women of color. *Stanford Law Review*, 43, 1241–1299.

Evans, T. M., Bira, L., Gastelum, J. B., Weiss, L. T., & Vanderford, N. L. (2018). Evidence for a mental health crisis in graduate education. *Nature Biotechnology*, 36(3), 282–284.

McGee, E., Griffith, D., & Houston, S. (2019). " I know I have to work twice as hard and hope that makes me good enough": Exploring the stress and strain of Black doctoral students in engineering and computing. *Teachers College Record*, *121*(6), n6.

McGee, E. O. (2020). Interrogating structural racism in STEM higher education. *Educational Researcher*, *49*(9), 633-644.

Nagy, G. A., Fang, C. M., Hish, A. J., Kelly, L., Nicchitta, C. V., Dzirasa, K., & Rosenthal, M. Z. (2019). Burnout and mental health problems in biomedical doctoral students. *CBE— Life Sciences Education*, 18(2).

National Academies of Sciences, Engineering, and Medicine. (2018). *Graduate STEM education for the 21st century*. National Academies Press.

National Academies of Sciences, Engineering, and Medicine. 2023. *Advancing Antiracism, Diversity, Equity, and Inclusion in STEMM Organizations: Beyond Broadening Participation*. Washington, DC: The National Academies Press.

Nature. (2019). The mental health of PhD researchers demands urgent attention. 575, 257–258.

Ong M., Smith J. M., Ko L. T. (2018). Counterspaces for women of color in STEM higher education: Marginal and central spaces for persistence and success. *Journal of Research in Science Teaching*, 55, 206–245.

Ray, V. (2019). A theory of racialized organizations. *American Sociological Review*, *84*(1), 26-53.

Razon, N. A., & Ross, K. (2012). Negotiating fluid identities: Alliance-building in qualitative interviews. *Qualitative Inquiry*, 18(6), 494-503.

Rosenbaum, P. J., & Liebert, H. (2015). Reframing the conversation on college student mental health. *Journal of College Student Psychotherapy*, *29*(3), 179-196.S

Saldaña, J. (2021). The coding manual for qualitative researchers. *The coding manual for qualitative researchers*, 1-440.

Secules, S., McCall, C., Mejia, J. A., Beebe, C., Masters, A. S., L. Sánchez-Peña, M., & Svyantek, M. (2021). Positionality practices and dimensions of impact on equity research: A collaborative inquiry and call to the community. *Journal of Engineering Education*, *110*(1), 19-43.

Smith, C. P., & Freyd, J. J. (2014). Institutional betrayal. *American Psychologist*, *69*(6), 575.

Thomas, K., Coley, B. C., Greene, M. L., & London, J. S. (2021). Black faces, white spaces: Understanding the role of counterspaces in the Black engineering graduate student experience. Paper Presented at the CoNECD Annual Conference, 1–17.

Tillman, L. C. (2002). Culturally Sensitive Research Approaches: An African American Perspective. *Educational Researcher*, 31(9), 3–12.

Wiest, L. R., & Treacy, A. C. (2019). Faculty Preparation to Work with College Students with Mental Health Issues. *Educational Research: Theory and Practice*, *30*(1), 46-50.

Wilkins-Yel, K. G., Hyman, J., & Zounlome, N. O. (2019). Linking intersectional invisibility and hypervisibility to experiences of microaggressions among graduate women of color in STEM. *Journal of Vocational Behavior*, *113*, 51-61.

Wilkins-Yel, K. G., Bekki, J., Arnold, A., Bernstein, B., Okwu, C., Natarajan, M., & Randall, A. K. (2021). Understanding the impact of personal challenges and advisor support on stem persistence among graduate women of color. *Journal of Diversity in Higher Education*.

Wilkins-Yel, K. G., Arnold, A., Bekki, J., Natarajan, M., Bernstein, B., & Randall, A. K. (2022). "I can't push off my own Mental Health": Chilly STEM Climates, Mental Health, and

STEM Persistence among Black, Latina, and White Graduate Women. *Sex Roles*, *86* (3-4), 208-232.