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Fear, fuel, and fire!: Black STEM doctoral students' career decisions during the Trump presidency

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ABSTRACT

President Trump's education policies continue to marginalize Black STEM students at the highest levels of education. Responding to a survey on their racialized educational experiences and future career trajectories, an ethnically diverse group of Black STEM doctoral students expressed anxiety about trying to pursue a STEM career during the Trump presidency. Their responses reflected their heightened sense of urgency to be change agents for racial justice in both the STEM arena and the wider society. These survey findings demonstrate that the Trump administration has created anxiety among minoritized people about pursuing STEM careers and triggered an activist spirit in this group of future STEM PhDs. In this paper, I discuss the ways the racist ideologies, practices, and policies of the Trump administration are impairing scientific innovation and increasing activism among Black STEMers. The findings reveal a vital need to continue discussing the consequences of the Trump administration's assault on Blacks in the STEM disciplines.

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Introduction

Higher education institutions have been vital to the development of Black intellectual thought and achievement (Green, 2003). In April 2019, Dr. Jamal Eric Watson, executive editor of *Diverse: Issues in Higher Education*, asked a panel of Black university scholars, "What is the role of the Black intellectual in the age of Donald Trump?" Several responded that one major role is to fight against the proliferation of negative fake news about Black people, which essentially began with the founding of this country. The hallmark of the Black intellectual tradition is to correct and challenge the stereotyping and other racists acts that are common in the ideologies and discourse of historically White institutions (Manning, 2000). The panelists discussed the historical significance of the political activism that led to the creation of the field of Black studies and spoke of their desire to connect Black intellectuals to the Black activists working on the front lines. They agreed that, during the Trump years, Black intellectuals have to be more aggressive and committed to the moral responsibility their work entails while remaining unapologetically Black. One panelist stressed the importance of politically conscious Black intellectuals using their academic training to analyze and deconstruct White supremacy and to keep the citizenry informed about the structural ways racism disrupts the lives of Black people (Elfman, 2018).

One of the biggest strengths of the Black intellectual movement is its prescriptive steps and strategies for the empowerment of Black people. Black intellectuals always have been part of

STEM innovation and invention in the United States and Black scholars have long produced significant scholarship and advanced their academic disciplines, even as they empowered their communities by making practical connections between scholarship and social struggle (Favors, 2019).¹ Their pedagogy and scholarship often challenged the status quo on behalf of historically marginalized people, while the mostly White and Asian male science community has largely ignored, minimized, and silenced the contributions of Black STEM intellectuals (Gutiérrez, 2018). This negating of the contributions of Black and other historically marginalized STEM intellectuals is playing out in the highest ranks of the Trump administration, including the president himself.

Given the recent attacks on policies, programs, and universities that were designed to encourage equal access to higher education, this study examines how the Trump administration has influenced the academic aims and career trajectories of Black students currently enrolled in STEM PhD programs. Driving this study is the primary research question, 'How do the practices and policies of the current U.S. executive branch influence the current and future career plans of Black STEM PhD students?' The study highlights the impact of Trump administration policies on Black STEM doctoral students' professional futures. Guiding this study is the theory of structural racism, which examines the inequities and racial injustice rooted in U.S. society that stem from the historical exclusion of particular groups from major social, economic, and political institutions.

The outline of this article is as follows. To illuminate the racial disparity in the STEM professions, I first provide an overview of the current racial and ethnic landscape in the field. This includes the current career trajectories of STEM students by race and ethnicity. Next, I discuss the long and robust history of Black intellectual thought in STEM in the United States. Then, I present the Trump administration's stance on higher education, including proposed cuts to government funding of STEM, which could directly impact Black students and Black STEM intellectual production. I next lay out the conceptual framework used in the study, which draws from the theory of structural racism, and posit that policies and proposals under the Trump administration are rooted in the historical and contemporary realities of racism that are embedded in U.S. society. I then provide an overview of our data and methods and present the results, which are thematically based on how Black PhD students describe the Trump administration's influence on their current studies and future career plans. I conclude with the implications of this study and directions for future research.

Racial and ethnic landscape of stem PhD workers

Blacks and Latinx are underrepresented in the STEM workforce. Although they make up 11% and 16% of the U.S. workforce, respectively, only 9% and 7% of STEM workers are Black and Latinx. Moreover, Blacks and Latinx in STEM occupations earn less than their White and Asian counterparts (Funk & Parker, 2018).

There are vast gender and racial/ethnic disparities among engineering graduate students, which begin with enrollment. From 2009 to 2016, the percentage of female engineering graduate students only increased from 23.0% to 24.6% (National Science Foundation [NSF], 2019). In the same period, Asian American enrollment dropped from 6.9% to 5.9%, while the enrollment of temporary residents, including all foreign nationals/nonresidents, rose substantially, from 45.6% to 56.6% (Table 1). In contrast, over the same seven years, the percentage of African American engineering graduate students declined from 2.9% to 2.2% (NSF, 2019).

From 2002 to 2017, the total number of PhD recipients increased from 40,031 to 54,664, but the percentage of Black doctoral recipients increased only slightly, from 5.1% to 5.4% (NSF, 2011, 2017). In fact, many of the STEM fields did not have any Black PhD recipients during that period (National Center for Science and Engineering Statistics, 2017).² From 2009 to 2016, African American engineering doctoral students earned the lowest percentage of doctoral degrees and

Table 1. Percentage of graduate enrollment by ethnicity and gender: 168,443.

	2009	2016	Percentage Change
Women	23.0	24.6	+6.9
Asian Americans	6.9	5.9	-14.5
Latina/Latino Americans	3.6	4.1	+13.9
Temporary Residents	45.6	56.6	+24.1
African Americans	2.9	2.2	-24.1

Source: <https://nces.ed.gov/pubs/nsf19304/data>.

Table 2. Percentage of doctoral degrees awarded by ethnicity and gender in 2016: 168,443.

	2009	2016	Percentage Change
Women	21.6	23.6	+9.3
Asian Americans	6.4	6.4	0
Latina/Latino Americans	1.9	2.8	+47.4
Foreign Nationals	57.4	55.6	-3.1
African Americans	1.8	1.9	+5.6

Source: <https://nces.ed.gov/pubs/nsf19304/data>.

had the smallest increase among domestic students in the percentage of degrees awarded, from 1.8% to 1.9% (NSF, 2019). Moreover, of the 203 engineering schools documented by the American Society for Engineering Education in 2018, 53.7% did not award any doctoral degrees to Black students and only 12.8% awarded doctoral degrees to three or more Black students (American Society for Engineering Education, 2019) (Table 2).³

In the career trajectories of racial/ethnic groups, 29.5% of Asian science and engineering doctoral graduates reported that they planned to work for industries, which compares to 15.8% for Hispanic/Latino graduates and 13.2% for Black doctoral recipients (NSF, 2019). In contrast, Blacks comprised 21.5% of the doctoral recipients who planned to work in the realms of “elementary and secondary schools, government, non-profit organizations, other, and unknown” (NSF, 2019); this percentage was relatively high in comparison to other racial groups, such as Asian doctoral students, of whom only 9.6% were planning to work for such organizations (NSF, 2019).

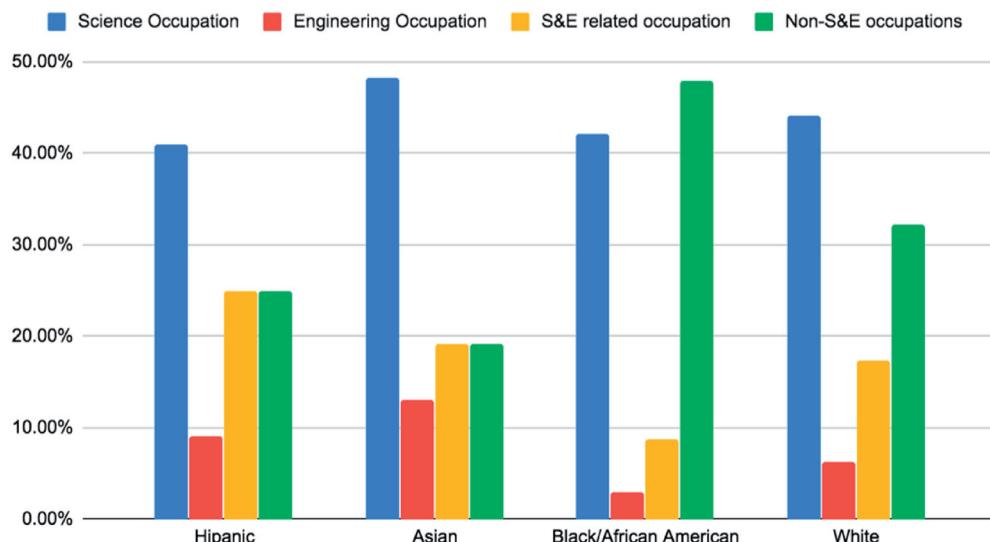
Employment data for 2017 show that 52.3% of employees with science and engineering (S&E) doctoral degrees work as scientists, engineers, and postsecondary S&E teachers, while 17.8% work in other S&E-related jobs; 29.9% of employees with S&E doctoral degrees reported working in non-S&E related jobs (NSF, 2019). Blacks represent only 3.6% of S&E doctoral holders who have S&E-related jobs; 47.8% of Black S&E doctoral holders work in non-S&E occupations (e.g., the arts and humanities, non-S&E teaching, management, sales and marketing, social services; NSF, 2019). Figure 1 displays more trends in S&E doctoral holder employment by race and ethnicity.

Using the same data, Turk-Bicakci et al. (2014) found that about one in six of all STEM PhDs who graduated in 2010 did not work in a STEM job after graduation. However, this statistic masks differences by race and gender. Black women STEM PhDs were the most likely (22%) to work in a non-STEM job after graduation, followed by Black men (20%) and White women (20%) (p. 6). Among those who left the field, Black women (46%) and Black men (42%) were the most likely to be working in government. This may be because, for generations, government work was preferable to private-sector employment in terms of job security and overt discrimination (Turk-Bicakci et al., 2014). Asian STEM PhDs are especially likely to be employed in for-profit work, both STEM and non-STEM jobs, which may reflect their model minority status; this puts them at the top of the racialized hierarchy in STEM education that is based on perceived ability (Martin, 2009).

The anti-science president: the impact of trump administration STEM policies

Racial bias in government agencies began long before Donald Trump became president. Researchers who examined National Institutes of Health (NIH) award data found that

Figure Z: S&E PhD holder Employment by Race/Ethnicity (2017)

Figure 1. S&E PhD holder Employment by Race/Ethnicity. Source: <https://ncses.nsf.gov/pubs/nsf19304/data>

underrepresented minorities were awarded NIH grants at 78%–90% the rate of White and mixed-race applicants every year between 1985 and 2013. Even though NIH mandated in 1994 that investigators must include women and minorities in clinical studies, funding of underrepresented minorities remained stagnant. Several researchers studying these disparities point to racial bias and conservatism (Check Hayden, 2015; Clauset et al., 2015; Ginther et al., 2011; Guthrie et al., 2019; Oh et al., 2015). Another study found that part of the NIH funding gap can be attributed to the different topics scientists propose to study and how those topics are valued by grant reviewers. African American scientists may be more likely to conduct research on such topics as community-oriented disease prevention than on cellular mechanisms or the basics of genetics (Hoppe et al., 2019). Historically Black Colleges and Universities (HBCUs), which have long conducted STEM research that strives to reduce disparities within their communities while producing Black STEM graduates, struggle desperately to secure adequate research funding (Toldson, 2017). In 2014, for example, HBCUs accounted for only 0.8% of all funds allocated to higher education institutions for research and development (\$34.8 million of \$4.1 billion; Toldson & Preston, 2015). HBCUs also were underrepresented in NSF programs focused on education research. The implications of government-sanctioned racial disparities in STEM hamper each stage of the innovation process.

President Trump has exacerbated the long history of government discrimination in the STEM arena. He does not use a computer or email, yet he presents himself as an unrivaled leader on Twitter, where his flamboyant 280-character exclamations can make and break White House policies and practices (Romm, 2017). Trump is known for making racist and discriminatory statements, but it is his administration's policies that re-create structural and institutional racism in insidious ways. In October 2019, more than 33 months after President Barack Obama's Council of Advisors on Science and Technology held its final meeting in January 2017, President Trump issued an executive order reestablishing the council. Although the council typically appoints academic researchers who value STEM research, all but one of Trump's first seven appointees were private-sector corporate and industrial leaders (AIP, 2019).

The Trump administration has diminished the role of science in federal policymaking by halting or disrupting research projects nationwide and reducing the influence of scientists in

regulatory decisions. In some cases, he has pressured STEM researchers not to speak publicly (Plummer & Davenport, 2019). The Trump administration is enshrining its anti-science policy in the midst of an COVID-19 epidemic, announcing a halt to the sizable funding the United States sends to the World Health Organization, jeopardizing global efforts to stop the coronavirus pandemic (Keaton & Cheng, 2020). The administration also has impeded research on human-caused climate change, challenged scientific findings related to public health, and abruptly disbanded government-led scientific committees. The EPA under Trump has the lowest number of staffers in over a decade (Plummer & Davenport, 2019). The Sabin Center for Climate Change Law at Columbia University has tracked more than 400 Trump administration efforts to restrict or misuse science since 2017 (Gerrard, 2020), and 250 scientists and technical staff members studying air pollution and chemical testing have been dismissed since Trump took office.⁴ This all has occurred amid a hiring freeze across 16 agencies; 66% of federally employed scientists confirm that this hiring stoppage makes it harder to produce scientific work and that the combined loss of scientific knowledge could erase decades of institutional scientific memory.

The impact of Trump administration policies on the underrepresented in higher education

The administration's proposed budget for 2020 included a \$7 billion cut in funding for the U.S. Department of Education, changed the student loan repayment process, and sought to eliminate the Public Service Loan Forgiveness Program (Harris, 2019). Eliminating this program would be disproportionately detrimental to Black and other disadvantaged students, as it was established to help those who lack the financial means and other resources needed to attend college (Addo et al., 2016; Scott-Clayton & Li, 2016; Woo & Choy, 2011). Moreover, under the Trump administration, the Department of Education's Office for Civil Rights has made it illegal to consider race in the admissions process at some higher educational institutions. This move encourages institutions to scrap their affirmative action policies (Kaleem, 2018), including schools that have specifically sought to diversify their student bodies. These proposed policies will have a particularly adverse effect on Black students who wish to pursue a postsecondary education and thereby impede Black intellectual and educational advancement.

Trump's open advocacy for these politically motivated, exclusionary, race-based policies cannot be separated from the historical and contemporary inequalities endured by Black students across the education spectrum and beyond. The demonization of Black and Brown individuals as unworthy of U.S. citizenship and other forms of racial terrorism have arisen at different points in U.S. history (Huber, 2016), and Trump's racist language is part of a larger blueprint for White supremacists, who have historically demanded that Black and Brown people go back to their "home countries" (Dennis, 1995). Moreover, for more than a century, Black Americans have had to contend with social, legal, and economic barriers that impeded their access to higher education (Fleming, 2018). Until October 1, 1962, Black students were excluded from colleges and universities serving White students while enduring dehumanizing narratives of Black intellectual inferiority, which still exist today. Meanwhile, HBCUs provided access to higher education for Black students and became increasingly important in fostering their intellectual development (Harper et al., 2009). While Trump has provided support for HBCUs, he also has demonstrated his limited understanding of their historical and contemporary necessity by suggesting that these institutions might be unconstitutional because they allocate financial support based solely on race (O'Donnell, 2018).

'Scientific' racism has once again surfaced during the Trump administration, but this ideology was never truly dormant (Solomon & Maxwell, 2018). President Trump claims he is not a racist, despite referring to parts of Africa, Haiti, and El Salvador as 'shithole' countries (Graef, 2018). These and other comments President Trump has made about Blacks and other non-White people

have given racists greater legitimacy. For example, in the three-year period ending in 2017, the number of hate groups operating across the United States increased by 30% (Southern Poverty Law Center, 2019).⁵ Fueled by Trump's rhetoric and policies, White resentment of immigrants and the country's changing demographics is operationalizing the rage and paranoia of many White people, not only extremists, thereby demonizing difference (Inglehart & Norris, 2016). For example, David Duke, former Grand Wizard of the Ku Klux Klan, used President Trump's 'take America back' slogan to justify the deadly Unite the Right White supremacist rally in Charlottesville, Virginia, in 2017 (Estrada, 2017). These sentiments, which have evolved from centuries of institutionalized racism, are having an effect on all spheres of American society, including national and local policies that target minoritized racial and ethnic groups and a resurgence of nativism (Young, 2017).

Black intellectual thought in stem

One of the first Black scholars to publish on the role of race and racism in STEM education in the United States was Black historian Carter G. Woodson (1875–1950). Woodson (2006) provided strong evidence that race and racism are prevalent in most aspects of Black Americans' lives and that the education systems to which they have access are particularly inequitable. Woodson's major thesis was that Black Americans have been educated away from their values and traditions and toward European culture, which has been psychologically damaging. Woodson proclaimed, "Even in the certitude of science and mathematics it has been unfortunate that the approach to the Negro has been borrowed from a 'foreign method'" (p. 4).⁶

The late African historian Ivan Van Sertima once wrote that "the nerve of the world has been deadened for centuries to the vibrations of African genius" (1983, p. 12). Africans brought this spirit of ingenuity and innovation to America, where their mass enslavement stunted their full ability to innovate and to be acknowledged as innovators (Van Sertima, 2020). The rich history of African innovation is found in many fields—mathematics, astronomy, chemistry, engineering, medicine, navigation—and in many items in common use today—textiles, writing, calendars, libraries, universities, and so much more (Adams, 1979; Asante & Asante, 1983; Ehret, 2002; Joseph, 2010; Killick, 2015; Krupp, 2003; Nleya & Ndlovu, 2020; Van Sertima, 1983).

The ideologies of 20th-century science and technology were saturated with stereotypes of Black scientists as less intellectually capable than their White counterparts, which left their contributions grossly underrated and often unknown. For example, Dr. Charles Drew, known as the father of the blood bank, pioneered the preservation and use of blood plasma during World War II, which not only saved thousands of lives but led to the creation of the American Red Cross blood bank system. Ironically, the Red Cross excluded African Americans from donating blood, making Dr. Drew himself ineligible to participate in the very program he created. That policy was later modified to accept donations from Blacks, but the institution upheld the racial segregation of blood, which Drew openly criticized as lacking scientific merit and explicitly marginalizing African Americans. In 1957, Mary Beatrice Kenner designed a sanitary belt to make periods more tolerable and more comfortable for women. Kenner was contacted by a company that hoped to market her idea, but when it found out she was Black, communication ended (Tsjeng, 2018).

Dr. Robert P. Moses is a Black mathematics scholar and founder of the Algebra Project, an organization that builds on the Civil Rights Movement by collaborating with communities to build culturally affirming mathematics literacy to achieve a national impact for students in underserved schools. He has demonstrated that those who are mathematically competent are best positioned to reduce the structural barriers that lead to economic dependence and thus have more opportunities to increase their autonomy and self-determination (Moses & Cobb, 2001). Moses and his coauthor saw numeracy as a civil rights issue and urgently argued that mathematics literacy is the key to the future of the disenfranchised communities in which Black Americans

disproportionately reside. Because mathematics in general and algebra specifically serve as curricular gatekeepers, they argued further, success in these content areas would open up significant educational and economic opportunity for Black American youth. S. E. Anderson, a founding member of the Black Panther Party and an activist-teacher-writer, taught mathematics, science, and Black history courses at several colleges. He predicted in 1970 that liberation (meaning racial pride, economic empowerment, and the creation of political and cultural institutions for African American people in the United States), would be part of any serious analysis of Black intellectual thought in STEM. Anderson suggested that Black people "should learn mathematics not because American capitalism's advanced forms of technology require this background, but because Black Liberation Struggle against the American racist-capitalist system requires [this] knowledge" (Anderson, 1970, p. 25). Anderson noted that, as an identifiable group to be exploited, Black scientists, economists, architects, technicians, engineers, and doctors are a byproduct of living and learning in an oppressive capitalistic system. His work contrasts with traditional schools of thought that valorize STEM careers and celebrate the mere visual representation of Black and Brown bodies in the STEM college programs, for example on brochures and websites, but not much else.

In the last 20 years or so, Black STEM education researchers, led primarily by the critical mathematics education community, have challenged the perspective that failure and lack of persistence are normative in Black students who are learning and participating in mathematics. Black intellectual thought includes research scholars and activists such as Robert Berry, Erika Bullock, Chris Jett, Nicole Joseph, and Monica Cox, who challenge and critique the mainstream discourse and treatment of Black people in STEM, their purpose being to improve conditions and promote equity in the larger STEM community.

Although Black STEM scholars have approached justice orientated STEM education in different ways, a metasynthesis review of empirical studies by Black mathematics education researchers concludes that most of these studies advocate for the racial emancipation of Black students (Ridgeway & McGee, 2018). As a critical defense, these scholars form a strategic counter-resistance to mainstream mathematics education research. Science education researcher Eileen Parsons, for example, has argued for theoretical accommodations that include the positionality of African Americans in science and interpret data from their historical, contemporary, and cultural experiences (Parsons, 2008). This positionality involves the negotiation of three distinct and conflicting realms of experience that pertain to oppression, Africa-rooted Black culture, and the dominant culture in the United States. Operating from a pan-African perspective, science education researcher Jomo Mutegi (2019) maintains that the life conditions of African Americans are essentially the same as the life conditions of people of African descent around the globe. Mutegi charges that the salience of African American underrepresentation in the STEM disciplines is interracially connected to the systemic racism that impacts people of African descent everywhere. His work has advanced critical STEM research on the ways systemic racism shapes the African STEM workforce beyond unequal representation.

However, it is important to note that Black intellectual thought in STEM encompasses theory, epistemology, and existentialism (African centered, Afrofuturism; McGee & White, in press); research approaches; the purpose of STEM for Black people; and the forms and functions of STEM in relation to Black life. Black scholars concerned with racial justice in STEM have long articulated that the need to consider the broader social and structural constraints that limit Black representation in diverse STEM fields impedes Black progress, representation, and achievement in STEM.

Theory of structural racism

In light of the proposed changes to the funding of STEM education and realized changes in affirmative action programs that worsened racial equity and inclusion in higher education, it is

important to examine how Trump administration policies are influencing the career trajectories of Black STEM PhD students. As historic and contemporary racism continues to systematically disadvantage Black people and other people of color (Bonilla-Silva, 1997; Omi & Winant, 2014), the Trump administration, continues to reify racial ideologies through policies that threaten the advancement of Black intellectual thought in the STEM professions and in higher education in general. These ideologies are at the root of structural inequalities within and beyond STEM.

Structural racism may be understood as the historical, institutional, and structural forces that work together to shape the everyday systems of privilege and inequality for advantaged and marginalized groups, respectively (Bonilla-Silva, 1997). Ideological narratives targeting minoritized racial and ethnic groups reinforce these systems of privilege and marginalization. The far-reaching consequences of structural racism for American society, including their effects on health disparities, educational spaces, politics, and crime, have been examined in various domains of social life (e.g., Bailey et al., 2017; Blaisdell, 2016; Lukachko et al., 2014; McGee & Stovall, 2016). For example, the unemployment rate for Black adults has been at least twice as high as White unemployment for all but seven years during the 53-year period between 1962 and 2015. In 1967, African American women made on average \$0.43 for every \$1 paid to a Caucasian man. By 2012, African American women made on average \$0.64 for every \$1 paid to a Caucasian man (Yearby, 2017). Between 1999 and 2015, White young adults ages 18 to 34 had the highest homeownership rate of any racial or ethnic group, at 42 percent, while only 18 percent of Black young adults were homeowners. Research points to parental wealth as the main contributor to the homeownership racial gap (Choi & Goodman, 2018). Racial ideologies structure the daily experiences and life trajectories of people who live in racialized societies. As something so deeply embedded in a society's history and social structure, including the political arena, racism and its effects require attention. The effects of structural racism have been proven to have a heavy influence on Black students' education and career trajectories, including their STEM educational experiences (Baber, 2015; Basile & Lopez, 2015; McGee, 2019). Therefore, it is critical to examine how racialized politics affect the academic and career decisions of Black PhD students. For example, structural racism created the White-Black gap, which should be positioned as an opportunity gap (Milner, 2012), in higher education degree attainment and created inequities in the career trajectories of Black students entering STEM professions, thereby depriving the nation and its schools and businesses of the innovation and creativity these individuals would bring to the field.

However, despite the recognition that racism and racial ideologies partially fueled Trump's rise to the presidency and influence his policies, there has not been sufficient research on how structural racism in the Trump administration influences the academic trajectories of Black STEM doctoral students, who often rely on the government for jobs and research funding. This study addresses this research gap by exploring the notion that structural racism negatively influences the funding opportunities of programs designed to reduce racial inequity. One of the biggest manifestations of structural racism is the disproportionate debt Black graduates carry relative to their White counterparts.

Debt inequities in stem are greatest for Black graduates

Although the student debt crisis is a national phenomenon, it hits Black STEM graduates particularly hard, as they leave college with more student loan debt per graduate than White, Asian, or Latinx students (Addo et al., 2016; Jackson & Reynolds, 2013). A well-articulated body of literature illuminates racial disparities in various dimensions of life that relate to higher education, such as educational attainment and racial/ethnic differences in student loan debt (Addo et al., 2016; Jackson & Reynolds, 2013; Scott-Clayton & Li, 2016). For example, using data from the National Longitudinal Study of Youth 1997, Houle and Addo (2019) found that the Black-White debt

disparity accumulates largely during the pursuit of postsecondary education. One potential consequence of this debt, when combined with the Trump administration's threatened cuts to higher education funding, is that Black Americans' progress toward educational and financial equity could be severely impeded.

Despite the increased focus in recent decades on encouraging the participation of Black Americans and other racially minoritized persons in STEM education and the STEM professions, (e.g., Latinx and Indigenous peoples), they continue to be underrepresented in this arena (Charleston et al., 2014; Estrada et al., 2016; Hrabowski, 2018; McGee, 2016). Although higher education institutions, as well as local and state government, continue to call for more students to pursue STEM degrees, underrepresented students often lack the financial resources to do so (Estrada et al., 2016). As noted, Black STEM PhDs graduate with more student loan debt than their White counterparts, which points to the disparate economic resources available to African American students who wish to pursue a postsecondary education in STEM (Zeiser et al., 2013). The differential impact of rising tuition and student loan debt, along with family histories of economic disadvantage, may curb many future Black students' desire to acquire STEM degrees. Therefore, it is imperative to recognize the racial inequities in STEM education and to illuminate the institutional and structural forces that cause the persistent underrepresentation of Black students in STEM.

Data and methods

This study is part of a larger project funded by the NSF, whose ultimate goal is to understand the experiences of Black, Latinx, Indigenous, and Asian doctoral STEM students, with a specific focus on the connections between their PhD experiences and post-PhD career outcomes. The project conducted a survey with Black, Latinx, Indigenous, and Asian STEM doctoral students and controls in nonSTEM fields about their racialized experiences and career aspirations. In addition to ongoing studies and other research on mentoring, the project will use the survey results to develop a mentoring program that helps Black, Latinx, and Indigenous doctoral students develop coping strategies to minimize the impact of their racialized experiences and negative outcomes, and to promote a balanced perspective on completing the PhD process and on faculty life in STEM.

The goal of this study, which was approached from a constructivist point of view (Miles et al., 2013), was to explore Black STEM doctoral students' perspectives on their career trajectories during the Trump administration. The results were guided by code enumeration—that is, counting and showing the frequency with which certain themes appear in participants' responses—which is integral to recognizing patterns in the data and describing responses across the overall sample (Sandelowski, 2001).

Data source

Data were drawn from a larger survey of Black, Latinx, Indigenous, and Asian STEM doctoral students ($N = 371$), who were asked about their education history, identity, future career plans, mentoring and support experiences, discrimination, psychosocial well-being, and background demographics. The survey primarily included quantitative measures, but it also posed several open-ended follow-up questions that asked respondents to explain particular answers on multiple-choice questions. The analyses focused on determining whether the participants' potential career trajectories had been influenced by the rhetoric and policies of the Trump administration, and the data selected were from Black respondents who replied to an open-ended question: "In what ways, if any, do the current United States executive branch's practices and policies influence your current (or future) career plans?" Out of 150 Black respondents, 113 provided a

Table 3. Participants descriptive ($N = 111$).

	N (%)
Gender	
Female	78 (70.3%)
Male	33 (29.7%)
Ethnic Background	
African American	65 (58.6%)
African or African Identified	21 (18.9%)
Multiracial	10 (9%)
Caribbean or Caribbean Descent (non-Latinx)	10 (9.8%)
Black (ethnicity unspecified)	3 (2.6%)
South American (non-Latinx)	1 (0.9%)
Latinx (Black Identified)	1 (0.9%)
Place of Birth	
U.S. Born	96 (86.5%)
Foreign Born	15 (13.5%)
University Type	
PWI	83 (74.7%)
HSI	14 (12.6%)
HBCU	11 (9.9%)
Collaboration of an HBCU and PWI	2 (1.8%)
School Not Listed	1 (0.9%)
Academic Discipline	
Engineering and Computer Sciences	49 (44.1%)
Social Sciences	22 (19.8%)
Education	22 (19.8%)
Natural Sciences	18 (16.2%)
Career Goals	
Faculty Teaching (likely or somewhat likely)	68 (61.3%)
Faculty Research (likely or somewhat likely)	71 (64.0%)

substantive response; all but two of the 113 were enrolled in STEM programs, thus the responses of 111 Black STEM participants were analyzed. Demographic and education background questions from the survey provided descriptive statistics for the study subsample (Table 3). Due to missing data on some demographic and educational background questions (a result of some participants not providing certain demographic information), Table 3 shows numbers and proportions for each theme. Note that all 111 Black STEM participants responded to some of the background questions (e.g., first-generation student status, institution type).

Recruitment and procedure

After receiving approval from the institutional review board to conduct this research, I used a multiple-mode recruitment strategy to solicit survey participants and ensure a multiethnic sample by (1) leveraging existing professional connections and (2) recruiting individuals directly at several national STEM conferences.⁷ This approach was appropriate because no sampling frame contains the contact information needed, including racial and ethnic identification, to recruit racially underrepresented and Asian STEM doctoral students in the U.S. All participants were offered a \$20 gift card for participating in the study.

Analytic strategy

Data from the 111 students' responses were downloaded, put into an Excel spreadsheet, and then analyzed. Responses were read multiple times each by the author and by a doctoral research assistant to develop codes and formalize emerging themes (Miles et al., 1994; Strauss & Corbin, 1998), and a combination of content and thematic coding strategies were employed (Saldaña, 2015). Content analysis was used to examine the similarities and differences in the participants' perceptions of their academic and career trajectories since the start of the Trump

administration. After conducting the content analysis and quantifying counts for each code, thematic analysis was used to create themes that reflected participants' responses (Saldana, 2015). The results indicate that three overarching themes underlie how these Black doctoral STEM participants thought about their career trajectories in the age of Trump. The first reflected participants' fear and concern about opportunities to work for a government agency or gain access to government funding (most STEM professors receive the bulk of their grant funding from the NSF). The second theme showed participants' anxiety about their ability to pay off their growing student loan debt and the disadvantages of choosing a career path based on financial compensation, which could limit their ability to seek a job they are passionate about. The last theme focused on the participants' newfound or reactivated desire to be an agent for social justice. These themes are highlighted below; all participant names are pseudonyms.

Positioning and subjectivity of the researcher

I am purposefully diverging from the typical researcher position statement to demonstrate my unrelenting motivation to challenge STEM educators and professionals to understand and appreciate how race and racism, as well as multiple compounding forms of marginalization, affect not only our fields but life itself. In 2013, a 9-year-old Black girl in London, Ella Kissi-Debrah, died after having severe asthma attacks for three years, which ultimately led to respiratory failure. New evidence brought by her legal team demonstrated that her death was caused by pollution in the air she breathed. She will likely become the first person to have air pollution listed as a cause of death in the United Kingdom (BBC News, 2019). This story tore me apart mentally and emotionally. I could not help but consider how STEM industries and technologies might have contributed to her untimely death. Are they creating a toxic world where our children and grandchildren won't be able to breathe? If the STEM community embraced and celebrated the full spectrum of the human genome, would Ella have been subjected to environmental torture and death, or could we have saved her? How will the powerful and mostly White male STEM leadership respond to make the environment healthier for our children to thrive, including the children who don't look like them? My subjective response is to acknowledge the harm we are doing to our planet and that the very survival of our great-grandchildren is uncertain at best. I am further disheartened because Black and Brown people are situated in disproportionately hazardous environments (mentally and physically) and are offered the solution of being resilient against omnipresent forces of anti-Blackness, racism (individual, economic, structural, environmental), and greed. All this while Black and Brown folks are being systematically excluded from conducting the research that could incorporate equity into STEM (McGee & Bentley, 2017) and create STEM-based solutions that allow their communities simply to breathe and exist. Rest in peace, Ms. Ella Kissi-Debrah; your suffering will not be forgotten!

Results

As society continues to question the intellect and STEM capacity of Black people, Trump's leadership and philosophies around STEM education continue to insult the scientific profession and provide further marginalization for Black STEMers. For students already in the STEM pipeline, concern about the administration's lack of a scientific belief system directly affects their future. In answering an open-ended survey question on the current administration's influence on their careers, ethnically diverse Black students detailed outrage and stress about pursuing a STEM career in the Trump era. They also demonstrated a greater sense of urgency to be change agents for racial justice in STEM and the greater society. These findings demonstrate how a Presidential administration can create uneasiness about pursuing a STEM career and unwittingly activate an activist spirit in these future STEM PhD holders.

Impact on participants' future research and work opportunities

Trump's administrative policies were very much on the minds of the Black doctoral students who participated in this study. Many were contemplating an abrupt and specific change in their career goals, turning away from working in government or academia because both depend largely on government funding. Participants repeatedly referred to government entities in which funding is competitive and tenuous, such as the NSF and the NIH. The majority expressed their fear that government funding might not be available at all in the future. Some also discussed how effective the Trump administration has been in stifling researchers' ability to conduct their research efficiently. Jalili, a Nigerian American man working in computer science, explained:

There is a perceived and largely effective move by the Trump administration and his powerful supporters in government to try to stifle the efforts of young and aspiring researchers like me not to have access to resources that help in advancing my career. The immigration and work policies of the government have made it harder to acquire skills that will help in having a good career.

Sixty-one (55.3%) of the students shared an ominous vision of the future of research and their decreasing ability to rely on the government as a source of innovation and equity. As a result, seven (6.3%) of the students have shifted from their choice of a career in government to work in industries that are not dependent on government funding. They expressed their feelings that the ideologies touted by the Trump administration are nothing short of an assault on scientific enterprise, which they believe placates the financial greediness that values wealth generation over the rights of their customers of some companies. For example, Nia, an African American woman working in public health, noted that

the economy has a lot to do with how the federal government funds public health research, education, prevention programs, and campaigns. One reason I'm not thinking about government as a career is because it's not as dependable as the private sector/corporate America with the current presidential administration. Trump and Republicans don't value prevention [in health care] or any program not putting money in the pockets of insurance companies or pharmaceutical companies, so it doesn't make sense for me to aspire to a career in government until the next presidential candidate is in office.

Michelle, also an African American woman working in public health, explained that, whether or not she works for the government, the field of public health depends on securing government funding. Seven other doctoral students debated the pros and cons of working for the government or in positions where governmental funding is essential; this included the current administration's lack of respect for them and their research. Destiny, an African American chemist, shared her anxiety about a potential decrease in NIH funding:

The biggest possible influence [on my career] would be the drop in NIH funding. The executive branch has brought up the idea of reducing research funding. This possible decrease in funding would decrease opportunities to be funded as a post-doc. Further down the line, it would decrease the possible funds I could obtain as a research professor.

Some students spoke of a direct connection between the Trump administration and whether they will consider taking a faculty position. Sabrina, an African American working in the field of neuroendocrinology, entered her doctoral program with the aim of becoming a faculty member. However, President Trump's policies and the reduction in federal funds have her rethinking that career path:

The current administration is pushing to reduce the amount of federal funding towards research. This is making it more difficult for researchers at universities to get funding. Therefore, I find it difficult to want to choose a career path as a faculty member because access to funds are being limited.

Trump administration policies have had the harshest effect on environmental engineering and other "green" areas of scientific research. Maia, an African American environmental scientist, said candidly, "If the government doesn't support my research, I have no job." Maia realizes that cuts to government funding under this presidential administration have had a direct impact on public

health research, education, and prevention campaigns. Many of the participants expressed a longing for the stability of working for STEM industries in the private sector (e.g., insurance and pharmaceutical companies), due to the current volatility in government-funded employment in STEM.

Some participants who once expressed a desire to go into the applied professions, including public health, are now concerned that the Trump administration threatens the financial future of such positions. Two participants worried that the whole public health sector is in jeopardy. Rochelle, who once aspired to a faculty position conducting public health research, is rethinking her career trajectory because of possible cuts to the funding she would need to do her research.

Material costs to PhD students caused by trump policies and ideologies

Black STEM doctoral students already carry more debt than their White and Asian counterparts; many have spoken out against this discrepancy, which puts them at a financial disadvantage (Jackson & Reynolds, 2013; Scott-Clayton & Li, 2016). Unfortunately, they likely will encounter income inequality at all stages of their STEM careers. The Trump administration's policies on graduate education have made them nervous about the financial struggles that would result from the imposition of additional taxes on graduate student incomes. Participants discussed how financial changes, including drastic cuts in government-funded research, would impede their ability to complete a graduate degree. As Noelle, an African American pharmacologist, said, "They are creating a mess for our future. The caps that they placed on financial aid and loans may keep most people from finishing their degree. They need to give more funding to any student who is working towards a doctoral degree."

One result of Black doctoral students having more debt than their counterparts is that some feel restricted to seeking jobs in companies or industries that have loan-paydown incentive policies. Chantelle, a Haitian American clinical psychologist, is taking a job that will help pay off her loans rather than taking one that would fulfill her passion: "Student loan policies may impact what career I go into. I will choose a path that includes student loan forgiveness over a similar position I am truly passionate about."

For Matthew, an African American studying biomedical engineering, the executive branch's lack of leadership in establishing STEM initiatives has him rethinking going into the biotechnology field:

Since I am interested in the biotech market, the executive branch not establishing the Office of Science and Technology Policy (OSTP) may have the biggest influence on my current career plans. By not establishing the OSTP, there is a lack of vision for the country in the sciences and biotech sphere, which may negatively impact the performance of biotech scientists/engineers ... at their positions, thus affecting the safety and efficacy of future biotech products.

A justice orientation and increased vigilance

A number of participants (14.4%) have developed a sense of urgency to engage in activism to counter the Trump administration's racist policies, in particular to work with marginalized communities. Some of this shift toward equity and ethics is emotionally charged by the need to fight their rising fears. Sixteen students expressed a desire to do social and racial justice work with marginalized communities in some capacity. Two students want their post-doc careers to include an involvement in politics and described having undergone a major ideological change—from not even reading the news to being intimately involved in efforts to challenge Trump's policies (e.g., immigration and the stereotyping of international STEM students). Most of the study participants were appalled by the policies, practices, and rhetoric coming from the U.S. executive branch and fear that the administration is attempting to return to an updated form of Jim Crow,

which spurred many of them to engage in racial activism. Amber, an African American woman in engineering education, detailed her new interest in politics, which coincided with the start of her graduate studies:

To be honest, since becoming a grad student last semester, this is the first time I actually care about what's going on. With that said, I'm still learning and trying to figure out what's happening and how that could potentially affect me. But as of now, I know that STEM is a focus right now and that fact gives me some sense of job security, so I know that as long as I stay within this realm, I should be okay, for the most part.

The respondents recognized that, as doctoral students, they get a close look at faculty life, which sometimes seems less than ideal. The tenure-track research path subjects new faculty members to persistent stress, a grueling workload, funding inequities, intense pressure to perform to one's highest capacity, and the uncertainty of obtaining tenure (McGee et al., 2019). This uncertainty is compounded by the Trump administration's stated intention to slash millions of dollars from higher education. Jerome, a Jamaican man who is involved in community research and action, was dispirited about the current administration and the competitive academic job market:

The state of education under this administration is discouraging. The already abysmal academic job market may be even worse by the time I am eligible to apply for positions. However, I see this as an opportunity to push back and galvanize others to create radical spaces that highlight these inadequacies and address the reasons why this administration exists. Hopefully, this swing in politics can act as a catalyst to mobilize academics to change the very structure of academia.

Respondents spoke about the current administration dismantling some of the policies that affect their communities of color. Bryan, an African American in engineering, revealed his disgust with how the administration treats racialized issues and characterizes people of color:

The inability to talk about the issues of race competently is indicative of the lack of progress that has been made in urban communities. Politicians simply do not want to know about the problems affecting POC [people of color] and low-income communities. These are simply made into talking points, and the needs of the community are quickly forgotten until the next election.

Kiara, an African American psychology graduate student, has similarly, shifted her plans "to pursue a research agenda focused on marginalized communities" because of the administration's racialized rhetoric; however, she wonders if there will be any federal funding to support such efforts. Several students admitted that they are terrified of the Trump administration's ability to galvanize White supremacists and nationalists to wage war against immigrants and people of color. Sabrina, an African American in counseling education, wanted to convert her terror into action:

It is all terrifying. White people in positions of power is always a scary thing for me. I cannot ever be sure that they have my best interest at heart. I desire to work for TRiO [federal college opportunity programs], and the current administration is trying to disband the program. I want to help students of color gain and maintain access to higher education, and this administration is doing all that they can to prevent students of color from having these opportunities.

Due to the existing political climate, as respondents consider the implications of social justice for their current and future selves, they are rethinking their traditional STEM career pathways. Tonya, an African American woman in engineering, is more encouraged than ever to "confront racism and teach intercultural competence." Deidra, another African American woman in engineering, used some critical racial justice language to change the narrative about Black people:

I am adamant about setting an example for others to follow. His [President Trump's] bigotry [and] racist, sexist, xenophobic attitude fuels my desire to work harder and change the negative narrative that has been given to African Americans.

Study participants articulated their many concerns about the Trump administration and the impact Trump's policies will have on their educational and career goals. Half of all participants

regarded these policies as disruptive of their future work and research opportunities. Although many participants discussed the potentially harmful impact of the Trump administration on their academic and career trajectories, for some it also stimulated a renewed sense of activism and a desire to achieve social justice for marginalized communities.

Discussion and implications

The Black STEM doctoral students who participated in this study entered their PhD programs with a distinct career pathway in mind, one dependent on government STEM programs and funding. The tenuous nature of the current government's relationship with STEM leaders makes a great number of STEMers of all racial backgrounds nervous. However, the student participants' concerns went beyond what one would usually have in a volatile funding landscape. These students responded candidly about their perceptions of President Trump's disrespectful behavior toward prominent Black intellectual leaders and his long record of making derogatory comments on issues involving Blacks and other marginalized people. This led many of the students to question what the federal government values in its role of delivering scientific value to their minoritized STEM communities. The majority of respondents view the president as hostile to STEM initiatives and resistant to international collaboration due to perceived and real threats against STEM intelligence, thereby creating great uncertainty about the future of STEM advancement and innovation in the United States. The Trump administration's behavior in this regard has intimidated many scientists and, for these participants, created both fear and a powerful commitment to fight for their places in STEM.

Their fear reflects the current administration's assault on STEM education and the direct impact it will have on the government funding opportunities they rely on to succeed. Their concerns about their debt reflect the widening Black-White wealth gap, and the narrowing STEM employment choices will further challenge their ability to reduce their loan debt. These future Black STEM doctorate holders are not overstating their debt concerns. When moving to a higher education level – for example, from a master's degree to a PhD – Black graduates have seen a smaller increase in wealth than Latinxs, Whites, or Asians. Moreover, researchers found that differences in education level, family structure, income shocks, or inheritance are not responsible for vastly different wealth outcomes among racial groups. They suggest instead that deeply rooted structural, systemic, or historical factors related to race or ethnicity are what most affect educational and, ultimately, wealth outcomes (Pfeffer & Killewald, 2018).

Structural racism is the major remaining barrier to the advancement of people of color in STEM. President Trump exacerbates this barrier, not simply by attacking the intellectual capacity of prominent Blacks and other minoritized folks but by condoning hatred and encouraging policies at the federal and state level that endanger people of color. His racial bias furthers a larger acceptance of racist ideologies that are harmful to Black STEM doctoral students. Moreover, many leaders in STEM and other arenas have not endorsed the proven fact that hiring a more diverse pool of STEMers leads to more innovation and creative solutions, a fact that would likely require them to rethink their own power, privilege, and wealth.

Close to 30% of the Black students in this study identified as African or Caribbean and the lack of nuanced results on their particular ethnic identities is a limitation of this study, and STEM educational researchers should vow to perform additional research towards this effort. For example, Sub-Saharan African immigrants have higher levels of educational attainment than the U.S. population as a whole and are more likely to have earned their degree in a STEM field. More than one in three African immigrants in the country with a college degree, or 33.4 percent, majored in a STEM field. The equivalent figure for the U.S.-born population is 25.2 percent.

The current social and political attitude toward immigration has the potential to jeopardize the continued flow of knowledge and expertise that diverse immigrants bring to this country (Wingfield, 2017) and institutions across the United States are already being affected.

Black PhD holders should consider starting their own STEM businesses and the STEM education community should support Black STEM entrepreneurs, which could create an ecosystem that stimulates innovation and fosters economic growth, particularly within communities of color. To profit from the participants' newfound entrepreneurship and activist efforts, they could partner with talented and dedicated STEM education professionals, who are tremendously committed and qualified to inspire equity and change toward inclusivity in and beyond STEM. Here I offer a few examples of organizations that challenge oppression, discrimination, and racism in STEM by embodying the Black intellectual tradition and by helping to build a vibrant and diverse future STEM workforce:

- The Annual Mathematics Education Scholars of Color Conference, or MESOC, brings together mathematics scholars of color "to leverage our individual and collective expertise in mathematics education; voice our ideas and concerns related to the field; conceptualize and locate ourselves in anti-oppressive and humane mathematics education agendas; and share self-care and leadership strategies to sustain and nourish ourselves in this justice struggle" (MESOC, 2018, p. 1).
- Black in AI (artificial intelligence) is an online site that hosts an annual workshop for sharing ideas, fostering collaboration, and discussing initiatives to increase the presence of Black people in the AI field.
- Black Girls Code seeks to increase the number of women of color in the digital space by empowering girls of color ages 7 to 17 to become innovators in the STEM fields, leaders in their communities, and builders of their own futures through exposure to computer science and technology. The group seeks to provide African American youth with the skills to fill some of the 1.4 million computing job openings expected to be available in the U.S. in 2020, and to train one million girls to excel in computing by 2040.
- Efforts are underway to build a National Black Tech Ecosystem Builder Association to support the tireless work of Black tech ecosystem builders in Black communities. This association will support organizations that are committed to strengthening Black tech entrepreneurs, tech innovators, STEM/CS educators and professionals, and tech startup policy advocates.
- Data for Black Lives, which calls discrimination a high-tech enterprise, is a group of activists, organizers, and mathematicians committed to using data science to create concrete and measurable change in the lives of Black people by mobilizing scientists around racial justice issues.
- Historically Black Colleges and Universities venture capital (HBCUvc) is a nonprofit organization that trains students attending HBCUs in venture capital and technology entrepreneurship. The first program of its kind, HBCUvc seeks to unlock and foster entrepreneurship at HBCUs and provide students with a unique learning experience that can jumpstart their career.
- Dr. James T. Kinard Sr., who specializes in theoretical and experimental electro-analytical chemistry, co-created the Rigorous Mathematical Thinking Laboratory, an analytical-critical thinking laboratory that engages people and organizations in rigorous mathematical thinking.
- Omoju Miller, a Black female senior machine learning data scientist with Github and former volunteer advisor to the Obama administration's White House Presidential Innovation Fellows, announced that Africa will soon be taking San Francisco's place as the global hub of technology. As of 2019, there were at least 618 active tech hubs on the continent in countries including Nigeria, South Africa, Morocco, Egypt, and Kenya, all of which were noted to be some of the most thriving locations for the development of technology centers

(Giuliani & Ajadi, 2019). These organizations largely partner with K-12 schools, colleges and universities, libraries, museums, tech hubs, and other community resources to build STEM ecosystems that broaden and enrich the journey of Black and other marginalized learners.

The work of these entrepreneurial organizations will enable communities of color to be better equipped to conduct thoughtful analysis, resolve problems, propose innovative solutions, and lead technological change, while also being better prepared to fight for racial justice and equity.

Conclusion

Although U.S. STEM products and innovation have generated massive wealth, primarily for White men in the United States (e.g., Apple, Facebook, Twitter, Microsoft, and just about every STEM company in Silicon Valley), the small number of Black people working in STEM-related jobs demonstrates that structural resistance to change permeated the field long before President Trump; nevertheless, the current president's racist positions and policies have reinforced that resistance. For many, Trump embodies White supremacy, greed, patriarchy, anti-Blackness, and general cruelty toward those who are othered by race, gender, sexuality, social economic status, and disability. These attitudes make the future increasingly daunting for Black PhD holders and the marginalized who aim to become leaders and innovators in STEM. This in turn stifles innovation, ingenuity, and creativity among aspiring scientists. The nationwide teacher shortage in STEM and the unwelcoming nature of STEM higher education departments, which often position students of color as interlopers in their academic communities, are exacerbating inequities in the STEM arena and blocking the possibility for Black women and men to complete STEM degrees. This is particularly true at the highest academic levels, where the racism and sexism fueled by Trump's election are causing angst and frustration among Black STEM doctoral students, as well as providing ammunition for radical change. Black STEM PhDs are among the ranks of knowledge-makers and innovators who are positioned as inspiring role models for other minoritized students who want to pursue a STEM academic trajectory. The Trump administration may have unintentionally started a much-needed revolution in STEM, in which students desperate about their future careers are increasingly determined to reimagine STEM as an arena in which they will fight for their rightful place.

Notes

1. But beyond such academics lies a whole world of active critical Black scholars, fondly called organic intellectuals, who were not formally trained in traditional institutions of higher education but who had a critical understanding of their world and led Black liberation efforts in their communities (e.g., Sadie Roberts-Joseph, founder of the Baton Rouge Odell S. Williams Now & Then Museum of African-American History and Community Against Drugs and Violence; activist Tamar Manasseh, founder of Mothers Against Senseless Killings; Manning, 2000).
2. Fields in which no Black students were awarded a doctoral degree in 2017 include soil sciences, agricultural sciences, planet genetics, wildlife biology, medical physics, radiological sciences, atmospheric physics, meteorology, oceanography, chemical and physical sciences, astronomy and astrophysics, plasma high-temperature physics, geometry, geometric analysis, logic, topology/foundations, number theory, robotics, and structural engineering.
3. American Society for Engineering Education had a different sample size for graduate enrollment and faculty for engineering schools.
4. See <https://climate.law.columbia.edu/Silencing-Science-Tracker>.
5. The Southern Poverty Law Center defines a hate group as one that has "beliefs or practices that attack or malign an entire class of people, typically for their immutable characteristics (Southern Poverty Law Center, 2020)." Those characteristics include race, religion, ethnicity, sexual orientation, and gender identity.
6. These comments are reminiscent of W. E. B. Du Bois's self-identified racial awakening, which occurred in 1899, and his need to connect his research to racial justice. When Du Bois learned that Sam Hose, a Black man who

had killed his employer in self-defense, had been burned alive by a lynch mob, he was shaken by the realization that "one could not be a calm, cool, and detached scientist while Negroes were lynched, murdered and starved" (Mullen, 2007, p.85). The death of Mr. Hose forced Du Bois to admit that the type of scientific work he was engaged in would need to be complemented with social struggle and the liberation of Black people (Du Bois, 1935).

- These included the National Society of Black Engineers, American Education Research Association, American Society of Engineering Education, Collaborative Network for Engineering and Computing Diversity, Critical Race Studies in Education, Tapia, Grace Hopper Celebration, and the Society for Advancement of Chicanos and Native Americans in Science.

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References

Adams, H. H. (1979). African observers of the universe: The Sirius question. *Journal of African Civilizations*, 1(2), 1–20.

Addo, F. R., Houle, J. N., & Simon, D. (2016). Young, Black, and (still) in the red: Parental wealth, race, and student loan debt. *Race and Social Problems*, 8(1), 64–76. *Race and Social Problems*,

American Institute of Physics (2019, October 22). *Trump Reconstitutes the President's Council of Advisors on Science and Technology*. Retrieved from: <https://www.aip.org/fyi/2019/trump-reconstitutes-president%2080%99s-council-advisors-science-and-technology>

Anderson, S. E. (1970). Mathematics and the struggle for Black liberation. *The Black Scholar*, 2(1), 20–27. <https://doi.org/10.1080/00064246.1970.11430993>

Asante, M., & Asante, K. (1983). Great Zimbabwe: An ancient African city-state. *Journal of African Civilizations*, 5(1/2), 84–91.

Baber, L. D. (2015). Considering the interest-convergence dilemma in STEM education. *The Review of Higher Education*, 38(2), 251–270. <https://doi.org/10.1353/rhe.2015.0004>

Bailey, Z. D., Krieger, N., Agénor, M., Graves, J., Linos, N., & Bassett, M. T. (2017). Structural racism and health inequities in the USA: Evidence and interventions. *The Lancet*, 389(10077), 1453–1463. [https://doi.org/10.1016/S0140-6736\(17\)30569-X](https://doi.org/10.1016/S0140-6736(17)30569-X)

Basile, V., & Lopez, E. (2015). And still I see no changes: Enduring views of students of color in science and mathematics education policy reports. *Science Education*, 99(3), 519–548. <https://doi.org/10.1002/sce.21156>

BBC News. (2019, May 2). Ella Kissi-Debrah: New inquest into girl's 'pollution' death. Retrieved from: <https://www.bbc.com/news/uk-england-london-48132490>

Blaisdell, B. (2016). Schools as racial spaces: Understanding and resisting structural racism. *International Journal of Qualitative Studies in Education*, 29(2), 248–272. <https://doi.org/10.1080/09518398.2015.1023228>

Bonilla-Silva, E. (1997). Rethinking racism: Toward a structural interpretation. *American Sociological Review*, 62(3), 465–480. <https://doi.org/10.2307/2657316>

Charleston, L., Adserias, R., Lang, N., & Jackson, J. (2014). Intersectionality and STEM: The role of race and gender in the academic pursuits of African American women in STEM. *Journal of Progressive Policy & Practice*, 2, 273–293.

Check Hayden, E. (2015). Racial bias continues to haunt NIH grants. *Nature*, 527(7578), 286–287. <https://doi.org/10.1038/527286a>

Choi, J. H., Goodman, L. (2018, November 20). *What explains the homeownership gap between black and white young adults? Urban Wire: Housing and Housing Finance*. Urban Institute. Retrieved from: <https://www.urban.org/urban-wire/what-explains-homeownership-gap-between-black-and-white-young-adults>

Clauset, A., Arbesman, S., & Larremore, D. B. (2015). Systematic inequality and hierarchy in faculty hiring networks. *Science Advances*, 1(1), e1400005.

Dennis, R. M. (1995). Social Darwinism, scientific racism, and the metaphysics of race. *The Journal of Negro Education*, 64(3), 243–252. <https://doi.org/10.2307/2967206>

Du Bois, W. E. B. (1935). Does the Negro need separate schools? *The Journal of Negro Education*, 4(3), 328–335. <https://doi.org/10.2307/2291871>

Ehret, C. (2002). *The civilizations of Africa*. Charlottesville, VI: University of Virginia Press.

Elfman, L. (2018). April 19). Black intellectuals tasked with forging connections. Retrieved from: <https://diverseeducation.com/article/114726/>

Estrada, S. (2017). August 14). David Duke to Trump: "Remember it was White Americans who put you in the presidency." Retrieved from: <https://www.diversityinc.com/david-duke-trump-remember-white-americans-put-presidency/>

Estrada, M., Burnett, M., Campbell, A. G., Campbell, P. B., Denetclaw, W. F., Gutiérrez, C. G., Hurtado, S., John, G. H., Matsui, J., McGee, R., Okpodo, C. M., Robinson, T. J., Summers, M. F., Werner-Washburne, M., & Zavala, M. (2016). Improving underrepresented minority student persistence in STEM. *CBE—Life Sciences Education*, 15(3), es5.<https://doi.org/10.1187/cbe.16-01-0038>

Favors, J. M. (2019). *Shelter in a time of storm: How Black colleges fostered generations of leadership and activism*. Chapel Hill, NC: University of North Carolina Press Books.

Fleming, C. M. (2018). *How to be less stupid about race: On racism, White supremacy, and the racial divide*. Boston, MA: Beacon Press.

Funk, C., Parker, K. (2018). Diversity in the STEM workforce varies widely across jobs. Retrieved from <https://www.pewsocialtrends.org/2018/01/09/diversity-in-the-stem-workforce-varies-widely-across-jobs/>

Gerrard, M. (2020, March 31). Silencing science tracker. *Columbia University, Sabin Center for Climate Change*. Retrieved from: <https://climate.law.columbia.edu/Silencing-Science-Tracker>

Ginther, D. K., Schaffer, W. T., Schnell, J., Masimore, B., Liu, F., Haak, L. L., & Kington, R. (2011). Race, ethnicity, and NIH research awards. *Science (New York, N.Y.)*, 333(6045), 1015–1019.

Giuliani, D., Ajadi, S. (2019, July 19). 618 active tech hubs: The backbone of Africa's tech ecosystem. GSMA. Retrieved from: <https://www.gsma.com/mobilefordevelopment/blog/618-active-techhubs-the-backbone-of-africas-tech-ecosystem/>

Graef, A. (2018, January 15). Trump: "I am not a racist." Retrieved from: <https://www.cnn.com/2018/01/14/politics/donald-trump-racist/index.html>

Green, P. E. (2003). Theory, praxis, and community service: Cornerstones of political, social, and intellectual achievement in Black America. *Peabody Journal of Education*, 78(2), 76–87. https://doi.org/10.1207/S15327930PJE7802_05

Guthrie, S., Rincon, D. R., McInroy, G., Ioppolo, B., & Gunashekhar, S. (2019). Measuring bias, burden and conservatism in research funding processes. *F1000Research*, 8(851), 851–859. <https://doi.org/10.12688/f1000research.19156.1>

Gutiérrez, R. (2018). When mathematics teacher educators come under attack. *Mathematics Teacher Educator*, 6(2), 68–74. <https://doi.org/10.5951/mathteaceduc.6.2.0068>

Harper, S. R., Patton, L. D., & Wooden, O. S. (2009). Access and equity for African American students in higher education: A critical race historical analysis of policy efforts. *The Journal of Higher Education*, 80(4), 389–414. <https://doi.org/10.1080/00221546.2009.11779022>

Harris, A. (2019, March). *The Trump administration really wants to cut education funding: Congress doesn't*. The Atlantic. Retrieved from <https://www.theatlantic.com/education/archive/2019/03/trump-administration-would-cut-education-budget-again/584599/>

Hoppe, T. A., Litovitz, A., Willis, K. A., Meseroll, R. A., Perkins, M. J., Hutchins, B. I., Davis, A. F., Lauer, M. S., Valentine, H. A., Anderson, J. M., & Santangelo, G. M. (2019). Topic choice contributes to the lower rate of NIH awards to African-American/black scientists. *Science Advances*, 5(10), eaaw7238.<https://doi.org/10.1126/sciadv.aaw7238>

Houle, J. N., & Addo, F. R. (2019). Racial disparities in student debt and the reproduction of the fragile Black middle class. *Sociology of Race and Ethnicity*, 5(4), 562–577. <https://doi.org/10.1177/2332649218790989>

Hrabowski, F. A. III, (2018). Broadening participation in American higher education: A special focus on the underrepresentation of African Americans in STEM disciplines. *The Journal of Negro Education*, 87, 99–109.

Huber, L. P. (2016). Make America great again: Donald Trump, racist nativism and the virulent adherence to White supremacy amid US demographic change. *Charleston Law Review*, 10, 215–248.

Inglehart, R. F., & Norris, P. (2016). *Trump, Brexit, and the rise of populism: Economic have-nots and cultural backlash*. Cambridge, UK: Cambridge University Press.

Jackson, B. A., & Reynolds, J. R. (2013). The price of opportunity: Race, student loan debt, and college achievement. *Sociological Inquiry*, 83(3), 335–368. <https://doi.org/10.1111/soin.12012>

Joseph, G. G. (2010). *The crest of the peacock: Non-European roots of mathematics*. Princeton, NJ: Princeton University Press.

Kaleem, J. (2018, July 3). Trump administration rescinds Obama-era policies encouraging affirmative action and backs race-neutral school admissions. Retrieved from: <https://www.latimes.com/nation/la-na-affirmative-action-20180703-story.html>

Keaton, J., Cheng, M. (2020, Apr 15). *WHO, allies lament Trump cut to US funding as virus rages*. AP News. Retrieved from: <https://apnews.com/article/bill-gates-asia-pacific-europe-china-travelf49b0be2bca44de0bf045cd9a95b69c6>

Killick, D. (2015). Invention and innovation in African iron-smelting technologies. *Cambridge Archaeological Journal*, 25(01), 307–316. <https://doi.org/10.1017/S0959774314001176>

Krupp, E. C. (2003). *Echoes of the ancient skies: The astronomy of lost civilizations*. Chelmsford, MA: Courier Corporation.

Lukachko, A., Hatzenbuehler, M. L., & Keyes, K. M. (2014). Structural racism and myocardial infarction in the United States. *Social Science & Medicine* (1982), 103, 42–50.

Manning, M. (2000). Black studies and the racial mountain. *Souls: Critical Journal of Black Politics & Culture*, 2(3), 17–36.

Martin, D. B. (2009). Researching race in mathematics education. *Teachers College Record*, 111, 295–338.

McGee, E. O. (2019). "Mentoring underrepresented students in STEMM: Why do identities matter?" In A. Byars-Winston & M. L. Dahlberg (Eds.), *National Academies of Sciences, Engineering, and Medicine, The science of effective mentorship in STEMM*. Washington, DC: The National Academies Press. <https://www.nap.edu/catalog/25568/the-science-of-effective-mentorship-in-stemm>

McGee, E. O., Naphan-Kingery, D. E., Mustafaa, F., Houston, S., Botchway, P., & Lynch, J. (2019). Turned Off from an Academic Career while in the Academy: Doctoral Engineering Students and the Reasons Behind their Dissuasion. *International Journal of Doctoral Studies*, 14, 277–305. <http://ijds.org/Volume14/IJDSv14p277-305McGee5150.pdf> <https://doi.org/10.28945/4250>

McGee, E. O., & Bentley, L. C. (2017). The troubled success of Black women in STEM. *Cognition and Instruction*, 35(4), 265–289. <https://doi.org/10.1080/07370008.2017.1355211>

McGee, E. O. (2016). Devalued Black and Latino racial identities: A byproduct of college STEM culture? *American Educational Research Journal*, 53(6), 1626–1662. <https://journals.sagepub.com/doi/abs/10.3102/0002831216676572?journalCode=aera> <https://doi.org/10.3102/0002831216676572>

McGee, E. O., & Stovall, D. O. (2016). Reimagining critical race theory in education: Mental health, healing, and the pathway to liberatory praxis. Republished as the center-piece article in the. *Harvard Journal of African American Public Policy*, 16, 41–60.,

MESOC (2018). *Registration and planning questionnaire*. MESOC, Champaign-Urbana, IL.

Miles, M. B., Huberman, M. A., & Saldana, J. (1994). *Qualitative analysis: An expanded sourcebook*. Thousand Oaks, CA: Sage.

Miles, M. B., Huberman, A. M., & Saldana, J. (2013). *Qualitative data analysis: A methods sourcebook and the coding manual for qualitative researchers*. Thousand Oaks, CA: Sage.

Milner, H. R. IV, (2012). Beyond a test score: Explaining opportunity gaps in educational practice. *Journal of Black Studies*, 43(6), 693–718. <https://doi.org/10.1177/0021934712442539>

Moses, R. P., & Cobb, C. E. (2001). *Radical equations: Math literacy and civil rights*. Boston, MA: Beacon Press.

Mullen, B. V. (2007). Blacklist Redux: W. E. B. Du Bois and the price of academic freedom. *Social Text*, 25(1), 85–103. <https://doi.org/10.1215/01642472-2006-018>

Mutegi, J. W. (2019). A critical examination of the influence of systemic racism in shaping the African STEM research workforce. In E. O. Author & W. H. Robinson *Diversifying STEM: Multidisciplinary perspectives on race and gender*. New Brunswick, NJ: Rutgers University Press. Retrieved from: <https://www.rutgersuniversitypress.org/diversifying-stem/9781978805675>

National Science Foundation, National Center for Science and Engineering Statistics. (2017). *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2017*. Special Report NSF 17-310. Arlington, VA. Available at www.nsf.gov/statistics/wmpd/

National Science Foundation (2019). Women, minorities, and persons with disabilities in science and engineering. Washington, DC: National Center for Science and Engineering Statistics. Retrieved from <https://ncses.nsf.gov/pubs/nsf19304/data>

National Science Foundation (2017). *Survey of doctorate recipients: Survey year 2017*. Retrieved from <https://ncses-data.nsf.gov/doctoratework/2017/index.html>

National Science Foundation (2011). *Women, minorities, and persons with disabilities in science and engineering*. Washington, DC: National Center for Science and Engineering Statistics. Retrieved from https://www.nsf.gov/statistics/archive-goodbye.cfm?p=www.nsf.gov/statistics/wmpd/archives/wmpd_2011.zip

Nhemachena, A., Hlabangane, N., & Matowanyika, J. Z. Z. (2020). *Decolonising science, technology, engineering and mathematics (STEM) in an age of technocolonialism: Recentring African indigenous knowledge and belief systems*. Langaa RPCIG, Cameroon.

Nleya, S. M., & Ndlovu, S. (2020). Audit of Mathematical Concepts in Pre-colonial Africa. In A. Nhemachena & N. Hlabangane (Eds.), *Decolonising Science, Technology, Engineering and Mathematics (ST EM) in an Age of Technocolonialism: Recentring African Indigenous Knowledge and Belief Systems*. (pp. 125–146). Langaa RPCIG. <https://doi.org/10.2307/j.ctv10h9fqz>

O'Donnell, G. (2018, October). *Trump's tense relationship with HBCUs: Insight into diversity*. Retrieved from <https://www.insightintodiversity.com/trumps-tense-relationship-with-hbcus/>

Oh, S. S., Galanter, J., Thakur, N., Pino-Yanes, M., Barcelo, N. E., White, M. J., de Bruin, D. M., Greenblatt, R. M., Bibbins-Domingo, K., Wu, A. H. B., Borrell, L. N., Gunter, C., Powe, N. R., & Burchard, E. G. (2015). Diversity in clinical and biomedical research: a promise yet to be fulfilled. *PLoS Medicine*, 12(12), e1001918.

Omi, M., & Winant, H. (2014). *Racial formation in the United States*. London, UK: Routledge.

Parsons, E. R. C. (2008). Positionality of African Americans and a theoretical accommodation of it: Rethinking science education research. *Science Education*, 92(6), 1127–1144. <https://doi.org/10.1002/sce.20273>

Pfeffer, F. T., & Killewald, A. (2018). Generations of advantage. Multigenerational correlations in family wealth. *Social Forces*, 96(4), 1411–1442. <https://doi.org/10.1093/sf/sox086>

Plummer, B., Davenport, C. (2019). December 18). *Science under attack: How Trump is sidelining researchers and their work*. New York Times. Retrieved from <https://www.nytimes.com/2019/12/28/science/trump-administration-war-on-science.html?searchResultPosition=2&login=smartlock&auth=login-smartlock&login=email&auth=login-email&login=email&auth=login-email&login=smartlock&auth=login-smartlock>

Ridgeway, M. L., & McGee, E. O. (2018). Black Mathematics Educators: Researching toward Racial Emancipation of Black Students. *The Urban Review*, 50(2), 301–322. <https://link.springer.com/article/10.1007%2Fs11256-018-0452-2>

Ridgeway, M. L., & McGee, E. O. (2018). Black Mathematics Educators: Researching toward Racial Emancipation of Black Students. *The Urban Review*, 50(2), 301–322. <https://link.springer.com/article/10.1007%2Fs11256-018-0452-2>

Romm, T. (2017, March 31). How Donald Trump crippled U.S. technology and science policy. Vox.com. Retrieved from <https://www.vox.com/2017/3/31/15139966/trump-white-house-technology-science-policy>

Saldaña, J. (2015). *The coding manual for qualitative researchers*. Thousand Oaks, CA: Sage.

Sandelowski, M. (2001). Real qualitative researchers do not count: The use of numbers in qualitative research. *Research in Nursing & Health*, 24(3), 230–240. <https://doi.org/10.1002/nur.1025>

Scott-Clayton, J., & Li, J. (2016). *Black-White disparity in student loan debt more than triples after graduation*. Washington, DC: Brookings Institution. Retrieved from <https://www.brookings.edu/research/black-white-disparity-in-student-loan-debt-more-than-triples-after-graduation/>

Solomon, D., Maxwell, C. (2018). January. 52 Harms in 52 Weeks: How the Trump administration hurt communities of color in 2017. Washington, DC: Center for American Progress. Retrieved from <https://www.americanprogress.org/issues/race/reports/2018/01/10/444806/52-harms-52-weeks/>

Southern Poverty Law Center (2020, March 18). *Methodology: How hate groups are identified and categorized*. Retrieved from: <https://www.splcenter.org/news/2020/03/18/methodology-how-hate-groups-are-identified-and-categorized>

Southern Poverty Law Center (2019). *Hate groups increase 30 percent in four years*. Montgomery, AL: Southern Poverty Law Center.

Strauss, A., & Corbin, J. (1998). *Basics of qualitative research techniques*. Thousand Oaks, CA: Sage.

Toldson, I. A. (2017). Drivers and barriers of success for HBCU researchers submitting STEM proposals to the National Science Foundation [editor's commentary]. *The Journal of Negro Education*, 86, 415–421.

Toldson, I. A., & Preston, D. (2015). *How HBCUs can get federal sponsorship from the National Science Foundation*. White House Initiative on Historically Black Colleges and Universities, Washington, DC: U.S. Department of Education.

Tsjeng, Z. (2018, March 8). The forgotten Black woman inventor who revolutionized menstrual pads. Retrieved from https://www.vice.com/en_us/article/mb5yap/mary-beatrice-davidson-kenner-sanitary-belt

Turk-Bicakci, L., Berger, A., & Haxton, C. (2014). The nonacademic careers of STEM PhD holders. *American Institutes for Research*. Retrieved from www.air.org/sites/default/files/downloads/report/STEM%20nonacademic%20careers%20April14.pdf

Van Sertima, I. (1983). The lost sciences of Africa: An overview. *Journal of African Civilizations*, 5(1-2), 7–26.

Van Sertima, I. (2020). *They came before Columbus: The African presence in ancient America. African classics*. New York, NY: Penguin Random House Inc.

Wingfield, N. (2017, November 3). The disappearing American grad student. *New York Times*. Retrieved from <https://www.nytimes.com/2017/11/03/education/edlife/american-graduate-student-stem.html>

Woo, J. H., & Choy, S. P. (2011). *Merit aid for undergraduates: Trends from 1995-96 to 2007-08 [Stats in Brief, NCES 2012-160]*. Washington, DC: National Center for Education Statistics.

Woodson, C. G. (2006). *The mis-education of the Negro*. San Francisco, CA: Book Tree.

Yearby, R. (2017, December 17). The Impact of Structural Racism in Employment and Wages on Minority Women's Health. American Bar Association. Retrieved from: https://www.americanbar.org/groups/crsj/publications/human_rights_magazine_home/the-state-of-healthcare-in-the-united-states/minority-womens-health/

Young, J. G., (2017). Making America 1920 again? Nativism and U.S. immigration, past and present. *Journal on Migration and Human Security*, 5(1), 217–235. 2.<https://doi.org/10.1177/233150241700500111>

Zeiser, K., Kirshstein, R., & Tannenbaum, C. (2013, May 13). The price of a science PhD: Variations in student debt levels across disciplines and race/ethnicity. *Center for STEM Education & Innovation at American Institutes for Research*. Retrieved from <https://www.air.org/sites/default/files/downloads/report/AIRPriceofPhDMay130.pdf>