A Systematized Literature Review of Mental Health and Racial Battle Fatigue in Early-Career Black Engineers

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Abstract

Research tells us undergraduate engineering programs have high attrition rates of underrepresented minorities (URMs), burnout, and students feeling unsupported in their engineering journey. Beyond the undergraduate experience, Black engineers in the United States face unique challenges in their professional and personal lives that impact their mental well-being, which can lead to Racial Battle Fatigue (RBF). Where research falls short is extending beyond graduation to the early career stage of engineers. For this paper, early career is defined as 0-5 years post-undergraduate graduation. This literature review explores the intersection of racial identity, well-being (mental health), and persistence in early-career Black engineers. This systematized review began with searches of the phrases "Black engineer," "mental health," "early career," and "racial battle fatigue" in the ERIC, ResearchGate, and EBSCOhost databases. Currently, sparce literature exists in isolation on these topics and does not examine how areas such as career volition, perception of the work environment, including facing microaggressions, the illusion of inclusion, and being passed over for promotions all impact the well-being of Black engineers. This paper summarizes current research and identifies the gaps in literature focused on early career Black engineers by asking the following question: ***What does existing literature reveal about how early career Black engineers cope with their racial battle fatigue?*** Our search for literature regarding racial battle fatigue amongst early career Black engineers yielded minimal results within our search parameters, leading us to expand our review. We found themes from literature surrounding the impact of racial discrimination on mental health and interventions. This necessitates further research understanding the intersection of race, mental health, and occupation which has implications for enhancing the prolonged engagement of Black engineers.

Keywords: early career, Black engineers, mental health, well-being

INTRODUCTION

The landscape of undergraduate engineering education in the United States is marked by concerning trends, notably high attrition rates among underrepresented minorities (URMs). Other trends include pervasive burnout, and a pervasive sense of inadequacy, lack of support, feelings of isolation, and other negative contributing factors (McGee, et. al., 2019). The attrition phenomenon underscores broader systemic issues within academic institutions, disproportionately affecting URMs within the engineering discipline. However, the challenges faced by aspiring engineers extend beyond the undergraduate education level. Particularly, Black engineers at the graduate level, and those within professional careers, continue to face distinctive hurdles, both in their workplace and personally, that significantly impact their mental health and well-being (Asghar, Minichiello, & Ahmed, 2023). Racial Battle Fatigue (RBF), a theory introduced by William Smith (2004), describes the psychological and physiological stress responses from being a racially oppressed group member within socially white spaces, including predominantly white institutions (PWI's). According to Smith (2004) RBF manifests itself as a cumulation of exposure to racial microaggressions, systemic oppression, and racism. While literature has made strides in understanding the experiences of Black engineers during their undergraduate and graduate years, a critical gap remains in furthering the knowledge of advanced education and early professional careers. To help contribute to the growing body of knowledge we advance the following claims.

The effects of Racial Battle Fatigue on Graduate and early-career Black professionals must be explored further because the current research focuses on undergraduate and graduate education. Numerous studies have concentrated on the experiences of underrepresented minorities (URMs), especially Black individuals, during their undergraduate and graduate education (Smith, 2004,). In Smith's comprehensive examination of Black faculty coping with racial battle fatigue (2004), the focus is primarily on the challenges faced within the campus racial climate during academic pursuits. Smith's work has been instrumental in highlighting the pervasive nature of racial microaggressions and systemic oppression in PWIs. These insights have significantly contributed to our understanding of the struggles encountered by underrepresented minorities, especially Black individuals, in educational settings.

However, despite the wealth of research on the educational aspects, limited attention has been given to the unique and specific challenges confronted by Black professionals in the initial stages of their careers and during post-graduate life. The transition from academia to the professional realm introduces new dynamics and stressors that have yet to be comprehensively explored. Our claim emphasizes the necessity of extending the research focus beyond educational levels, because we noticed in our research trends similar to McGee, Griffith's, and Houston's (2019) findings that showed Black doctoral students prioritized their success over their mental health. Their study further found that the participants imposter syndrome caused a tremendous emotional cost which was exacerbated by the racial makeup of their environment (McGee, Griffith, Houston, 2019).

***Therefore*, a nuanced exploration of RBF is needed for a holistic understanding of the effects on mental health and associated stressors.** The existing literature on Racial Battle Fatigue, as exemplified by Smith's study (2004), has primarily focused on the experiences of individuals during their educational tenures within the constraints of predominately white institutions (PWIs). According to Ray (2019) findings, we need to understand how organizational norms impact the well-being of Black engineers because organizational norms play a pivotal role in shaping the experiences and career satisfaction of Black engineers. To truly comprehend the impact of Racial Battle Fatigue, it is imperative to shift the

focus toward the professional realm. Works from Lukas and Goodman (2015) provide critical insights into the impact of organizational norms on the career experiences of underrepresented groups, including Black engineers. The study underscores that organizational climate significantly influences the trajectory of minority professionals, playing a vital role in shaping their experiences and career satisfaction. Lukas and Goodman's (2015) study link these organizational norms to crucial aspects such as leadership, well-being, and diversity. The research argues that understanding the organizational climate is essential for comprehending the challenges faced by underrepresented individuals, as they navigate their professional journeys. By examining the organizational climate, including norms, values, and practices, the study suggests that the experiences of Black engineers are shaped by the prevailing attitudes within their workplace. This includes the extent to which diversity and inclusion are embraced, the degree of support provided by leadership, and the presence of inclusive policies that consider the unique challenges faced by Black professionals (Lukas, Goodman, 2015; Ray, 2019).

Still, Black wellness is not prioritized. Research by Dobbin and Kalev (2016) sheds light on the persistent challenges related to diversity initiatives within organizational structures, particularly regarding Black wellness. The study identifies systemic shortcomings that contribute to the neglect of Black well-being, exacerbating challenges encountered by Black engineers within professional environments. In their comprehensive examination, Dobbin, and Kalev (2016) highlight that despite the implementation of diversity programs, there remains a considerable gap in prioritizing the wellness of Black employees within organizational structures. The research emphasizes that diversity initiatives often fall short due to a failure to address deep-seated biases, lack of accountability, and insufficient integration with broader organizational objectives. The findings underscore the significance of recognizing Black engineers' specific needs and challenges in the workplace. The failure to prioritize Black wellness within organizational structures contributes to an environment where the unique stressors associated with being a Black professional are not adequately addressed. This neglect can amplify challenges such as Racial Battle Fatigue, hindering the overall well-being and career satisfaction of Black engineers' career satisfaction of Black engineers.

Therefore, it is valuable to develop comprehensive and organizationally integrated intervention tactics to support Black engineers. A comprehensive exploration of the norms allows for the identification of factors that either support or hinder the well-being of Black engineers. Interventions to support Black engineers should not be mere standalone initiatives but must be intricately woven into the organizational fabric. The work of Kalev, Dobbin, and Kelly (2006) provides valuable insights into the effectiveness of organizationally embedded interventions in promoting diversity and inclusion. This research emphasizes that interventions aligned with organizational norms are more likely to be sustained and have a meaningful impact on the well-being of Black engineers. In their study, Kalev, Dobbin, and Kelly (2006) critically evaluate various corporate affirmative action and diversity policies to assess their efficacy. The research underscores the importance of moving beyond symbolic gestures and adopting interventions that are seamlessly integrated into the organizational structure. Such organizationally embedded interventions not only address systemic issues but also contribute to the creation of an inclusive environment where the well-being of Black engineers is prioritized. The findings suggest that interventions designed in harmony with organizational norms are more likely to garner support from leadership, increase employee engagement, and foster a culture that values diversity and inclusion. By incorporating these organizationally integrated intervention tactics, organizations can actively contribute

to the well-being of Black engineers, mitigating the impact of challenges such as Racial Battle Fatigue and promoting a more supportive and inclusive professional environment.

Our claims advocate for a deeper exploration of Racial Battle Fatigue in the professional context, recognizing that a more comprehensive understanding of the experiences of Black professionals is essential for addressing the mental health challenges associated with RBF throughout various stages of their careers. In the following section, we explore our approach to identify existing literature that may provide an overview of RBF for early-career, Black engineers.

METHODOLOGY

This literature review intends to identify and analyze existing literature that answers our research inquiry of how early career engineers cope with racial battle fatigue.

Our initial strategy was to utilize academic databases like ERIC, PsycINFO, and EBSCOhost. Utilizing the Boolean capabilities of these search engines, we used combinations of key words, such as “racial battle fatigue,” “Black engineers,” “mental health” and “wellbeing.” To make sure we are capturing more recent studies, we decided to bound the dates of publication to the early 2000s to the present day. For this review, we only wanted to focus on Black engineers who are early career professionals. Additionally, we aimed to focus solely on racial battle fatigue and searched for research that presented coping strategies. Due to the limited research on racial battle fatigue amongst early career, Black engineers, we expanded our focus to mental health more generally and contexts outside of engineering.

In our search, we documented the key information from each study, noting the authors names, key methodologies, and key concepts. From this scoping review, we will prepare and present our findings as well as include potential limitations and biases.

Quality assessment

To ensure the rigor and reliability of this systematized literature review, a comprehensive quality assessment of the selected studies was conducted. The assessment focused on various methodological aspects and reporting standards to gauge the trustworthiness and validity of the included literature. The inclusion criteria were established to capture studies that aligned with the research objectives and provided valuable insights into the chosen topic. To minimize bias, studies were selected based on predefined eligibility criteria, including publication date, study design, and relevance to the research question. The authors co-constructed the search and selection process, with support from our research mentors and experts within the fields of RBF. Each selected study underwent a thorough examination of its research design and methodology. The review considered the appropriateness of study designs, such as experimental, quasi-experimental, observational, or qualitative methods, based on the nature of the research question. Attention was given to the clarity and rigor of data collection procedures, sampling techniques, and analytical methods employed in each study. We considered the sampling populations, racial demographics, and theoretical frameworks applied.

Author’s Epistemological Statements

As authors of differing identities, lived experiences, and scholarly backgrounds, we believe in assessing our bias in the work conducted. We assess each of our positionalities, first broadly, and then focus on our epistemological positionality using the Secules et al. (2021) positionality framework. The

epistemological positionality statement asks: “How does your positionality impact how you know what you know?” The epistemological stance fundamentally shapes the way knowledge is produced, understood, and interpreted within a research study. Epistemological positionality refers to the researcher's philosophical stance regarding the nature of knowledge, truth, and how knowledge is acquired. With our differing identities, each of us living with what is ascribed as a marginalized identity (i.e., Black, or female or both), stating our epistemological positionalities allows readers to understand the philosophical foundations of the research, helping to contextualize the study within broader debates about the nature of knowledge and research methodology. We acknowledge that our identities may impact our approach to conducting the study. Particularly, we acknowledge that our positionalities influence the conceptualization of the research questions, the design of the methodologies, the interpretation of data, and the drawing of conclusions. Our individual and collective positionality statements are as follows:

First Author - As a Black male professional engineer with over a decade of industry experience, my positionality impacts, in unique ways, my outlook of the world. My lived experiences and intersectional identity inform my research because I experience what I know. My identities also inform my outlook on the research situated around early-career Black engineers navigating Racial Battle Fatigue and anti-Blackness in the engineering field. My journey in this industry has been marked by periods of frustration and exhaustion, fueling my desire to understand and address the systemic and organizational challenges faced by Black engineers. This personal connection to the research necessitates constant introspection and a critical change in thinking in my research approach. I am aware of the potential for blind spots and limitations in my outlook rooted from the intricacies and nuances of my identity. Due to my outlook on life, I actively seek diverse perspectives and engage in self-reflection throughout the research process. My commitment to inclusivity and self-awareness allows for me to contribute to knowledge creation that is accurate and critically reflective to the realities of Black engineers in the face of racialized adversities.

Second Author - As a Black woman with many titles such as engineer, educator, researcher, and others, I have often found myself at a crossroads, specifically pertaining to my experiences in engineering spaces. Obtaining a degree in engineering has afforded me many privileges and opportunities such as a higher education, assumed intelligence from others, respect and admiration, and a high paying salary in various fields based on my education. However, my experiences have also exposed me to discrimination, microaggressions, stress, anxiety, and dissociation. The complexity of my identity along with the juxtaposition of my experiences have helped me develop a perspective in which I am an outsider within. As a Black Feminist scholar activist, my perception of the world has shifted to hold and understand multiple truths at once. The clash I have felt as a Black woman in spaces that were not built for me allows me to see people for who they are, their intersecting identities, and their multiple truths. Sitting in the discomfort of being an “outsider within” has required reflection and seeking guidance from others in similar spaces. In that reflection, I have noted and critically challenged the biases I have developed. Acknowledging and rejecting my previously indoctrinated beliefs surrounding hegemonic, colonialist ideals has been vital for fully understanding others’ experiences. I choose to understand through a lens of intersectionality and authenticity so that I can create inclusive, celebratory spaces for the many truths that someone may hold.

Third Author - I identify as a Black woman first. I also identify as an engineer. The convergences of those three intersectional identities undeniably influence my perspectives, motivations, and interpretations throughout the research process. My epistemological positionality is shaped by the confluence of

personal and academic experiences. Before the systematic review here proposed, I had experienced RBF in different contexts and occasions. Through my participation in research work conducted by RBF scholars, I have learned to identify and call out the phenomenon by becoming familiar with the theoretical framework. My academic and professional background in engineering education, considering myself as an early-career professional, has also equipped me with a deep understanding and relation to literature. The nuances of my Black womanhood inform my sensitivity to the complexities of this systematized review. I also recognize that my positionality may introduce biases and influence the framing of the research question, the selection of literature, and the interpretation of findings. To mitigate such biases, I adopt a reflective and self-aware approach by interrogating my assumptions and leaning on my collaborators by engaging in ongoing dialogue and honoring our diverse perspectives.

Fourth Author - I am a professional engineer with industry experience working in environmental engineering consulting. I currently serve as a faculty member and college administrator. I am a second-generation woman engineer; my mother was an industrial engineer who worked in the aeronautical industry in the 1950s. Being raised by her gifted me with an early immunity to the negative messaging most women hear and internalize about gender roles and engineering. My ancestors were European immigrants, and I know my fair skin has afforded me unsought privileges in this country. Nonetheless, as a member of the LGBTQIA community as well as being the sibling of a developmentally disabled sister, I have personally experienced and observed the effects of marginalization and othering. I am deeply troubled by the us versus them dualistic spirit that has captured our nation and our world, whether it is the politics of right versus left or oppressive systems of sexism and racism. In my work and in my personal life, I strive to be extravagantly inclusive, creating spaces for shared problem-solving, continued growth, and mutual flourishing.

Collective Statement - As researchers with diverse backgrounds and intersecting identities, we must acknowledge that our positionalities impact our perspectives and understandings of the world. Because of this, we recognize that our experiences of Blackness, whiteness, gender, and professional roles inevitably shape the research questions we form, our interpretations, and our contributions to knowledge. Through our lived experiences and identities, we bring insights that are unique to the challenges faced by early-career Black engineers navigating Racial Battle Fatigue (RBF) and anti-Blackness in the field of engineering. We are aware of our limitations and blind spots. Through our collaborative dialogue and reflection, we remain open to challenging our assumptions and biases. We strive to embrace our differences and are committed to conducting research that is conscientious and relevant.

Ethical Considerations

Efforts were made to identify and mitigate publication bias by systematically searching multiple databases and sources, including unpublished studies and grey literature. The review aimed to include a diverse range of studies, regardless of their outcomes, to minimize the impact of selective reporting on the overall findings. Transparency in reporting all relevant data, regardless of statistical significance, was a guiding principle. Ethical considerations were not static but rather an ongoing aspect of the review process. Regular checks and discussions among the research team were conducted to address emerging ethical issues and ensure the continued ethical conduct of the review. Any unforeseen ethical concerns were promptly addressed, and the methodology was adapted accordingly to uphold ethical standards.

RESULTS AND DISCUSSION

Despite the increasing focus on mental health in professional settings, we found a noticeable gap persists in understanding the challenges early career Black engineers face. Our initial search yielded minimal results within the search parameters, prompting our team to broaden our exploration of the literature. We did not abandon the original approach to this literature review. We push for research on racial battle fatigue amongst black engineers. It is important to note we did not abandon our original mission or core concept of racial dissemination's impact on the mental health and wellbeing of early career Black engineers.

By expanding our search criteria, we were able to extrapolate a more comprehensive body of research. This expanded focus allowed us to not only glean from the findings of other scholars but also led us to consult with field experts on the topics of racial battle fatigue, well-being and mental health. During the development of our review, we consulted with Drs. Stephen Quaye, Monique Ross, Brooke Coley, and Kerrie Wilkins-Yel, we broadened our search brackets to include the weight dimensions of wellness, including the absence or presence of it, psychological safety, and differences between mental health and well-being, retention and continued matriculation in engineering of college-trained Black engineers. Due to the breadth and complexities of each topic, we chose to maintain our search to focus on the impact of mental health amongst professionals. In future works, our collaborative work will seek to dive deeper into the intricacies of the differences between defining the layers of the support social and psychological systems available to Black engineers throughout their career development. We are also seeking to fill in the gap by conducting qualitative research centered around Racial Battle Fatigue and the impact it has on the experiences of early-career Black engineers. We invite other researchers to provide recommendations and guiding directions to help us develop our study.

The following section will discuss our key thematic findings from our expanded search where we focused on the impacts of the endemic nature of racism on mental health and intervention techniques we found in our expanded literature review.

The Impact of Racial Discrimination on Mental Health

The impact of racial discrimination on the mental health of Black professionals is multifaceted and deeply ingrained within various aspects of their lives. McGee et al. (2019) highlight the prioritization of success in training, employment, or career advancement over mental and physical well-being among Black graduate students and postdocs in engineering and computing. This emphasizes the societal pressure and cultural norm in engineering and computing spaces faced by Black individuals to excel in professional spheres, often at the expense of their own health.

Racialized experiences serve as significant stressors, contributing to anxiety, strain, and academic performance anxiety (McGee et al., 2019). Moreover, Smith et al. (2011) found that as educational attainment increases, so does the experience of racial microaggressions, leading to higher levels of mundane stress among Black individuals. The cumulative effect of these stressors is reflected in physiological responses, with Jackson et al. (2017) linking perceived discrimination to elevated cortisol levels, indicative of heightened stress responses. This is significant considering the potential of these findings to have transferability from academia and other spaces to engineering workplaces. Racial microaggressions against Black people have been well documented in engineering spaces, making a

compelling argument for further research to be done investigating the impact of racialized experiences on the mental health of Black engineering professionals.

Additionally, gender intersects with racial discrimination, impacting mental health differently among Black men and women. Chandler et al. (2021) found that Black women reported increased anxiety, depression, feelings of loneliness or isolation, and disrupted sleep patterns, exacerbated by the COVID-19 pandemic. Furthermore, Black men and women may respond differently to racial discrimination, with Black women more likely to perceive correlations between gender and racial discrimination and their mental health. Conversely, Black men may internalize violence and manifest it through mental health issues, substance abuse, and risk-taking behaviors. These disparities underscore the complex interplay between race, gender, and mental health outcomes within the Black community.

In essence, addressing the mental health impact of racial discrimination on Black individuals necessitates a comprehensive approach that acknowledges the systemic and cyclic nature of these stressors. Deady et al. (2022) identified anxiety, depression, and comorbidity as predictors for work performance and absenteeism among professionals of various ages and industries. Demographic information regarding race was not collected. However, it seems a vicious cycle could occur for Black engineers considering mental health is impacted by racial discrimination. Because of the endemic nature of racism, Black engineers will continue to experience anxiety, depression, and potential comorbidity, affecting their work performance. Because engineering culture sustains and perpetuates the idea that Black engineers must work twice as hard, they may receive a negative response as a high standard of performance is expected. Therefore, Black engineers' mental health will continue to suffer, sustaining racial battle fatigue.

Interventions

In addressing employees' mental health in the workplace, various interventions have been explored with mixed results. One promising approach is the implementation of online training programs such as HeadCoach, as advocated by Gayed et al. (2018). HeadCoach focuses on building managers' confidence in supporting team members experiencing mental health issues, thereby fostering a culture of mental health support and awareness within the workplace. Although this approach is promising, evidence regarding the impact on Black employees is lacking. Black employees experience higher levels of discrimination, impacting their mental health and wellbeing. Black engineers are also often subjected to cold work environments in which they are made to feel invisible, suggesting that online training programs may not offer the same positive impact as they can be performative and lack the level of criticality needed to address mental health associated with various intersections of identity. Therefore, investigating the impact of online training programs for Black employees, specifically Black engineers, is recommended. Other findings underscore the importance of targeted interventions that address specific risk factors for the onset of mental disorders proactively. Fernandez et al. (2018) identified predictors such as age, history of mental disorders, satisfaction with health, lack of confidence, and feelings of being 'pushed around' in life. Similarly, this research is not specific to Black employees. Investigating and expanding these factors to include people of color, specifically Black people, could ensure a deeper understanding of how mental health issues manifest in a diverse employee population.

While eHealth interventions have shown some positive effects on reducing anxiety, depression, and stress among employees, as indicated by Stratton et al. (2022), the impact has plateaued despite technological advancements. This highlights the need for continuous evaluation and innovation in mental health interventions tailored to the unique challenges of the workplace environment. Employers

should strive to integrate a holistic approach that combines training, risk assessment, and innovative eHealth solutions to promote employee well-being effectively.

As discussed, mental health trainings and interventions exist, however, more effective interventions specifically geared towards Black engineers must be developed to broaden and retain participation in engineering. Although self-care is a short-term option for Black engineers coping with racial battle fatigue, it is not going to provide sustainable healing for a healthy mind and the best work performance. As Okello et al. (2020) state, ways of healing are hard to find and access while battling constant racism. Interventions should encompass not only professional support but also community-based resources, culturally competent mental health services, and efforts to combat societal inequalities that perpetuate racial discrimination.

Limitations

Despite the valuable insights garnered from this systematized literature review, it is important to recognize some limitations inherent in the available research and the scope of this study. Firstly, the identified studies may differ in methodology, sample size, and geographical location, potentially introducing heterogeneity into the conclusions. The use of precise search terms may have omitted relevant studies that used alternative language or were not expressly covered by the selected phrases. Furthermore, the absence of literature on the confluence of racial identity, well-being, and persistence, particularly among early-career Black engineers, reveals a critical gap in existing studies. The scarcity of studies addressing this intersectional focus highlights the need for further empirical research in this area. Furthermore, the lack of literature on career volition, views of the work environment, and the influence of microaggressions, the illusion of inclusion, and advancement inequities limits the study of these topics. As a result, the findings' generalizability, and relevance to the larger community of early-career Black engineers may be limited. Finally, the changing nature of workplace dynamics and cultural influences may have resulted in changes since the publication of the examined papers. Recognizing these limitations is critical for understanding the findings in a nuanced perspective and pointing to potential future research directions.

CONCLUSION

From our scoping review of the literature, we found that a conversation around this topic is underway, but more can be done. As researchers continue to explore how Racial Battle Fatigue impacts the experiences of Black early career engineers, we urge the community to take on this clarion call from McGee and Stoval to reimagine mental health in the engineering space. We believe there is a chasm that exists in literature, but a tremendous opportunity to bridge these by leaning into workforce development research, mental health and psychology and even organizational research.

This initial review highlights there is a need for more thorough and in-depth research. We feel it is important to address the gap in literature by tackling the issue with multiple approaches for this topic. We believe that using existing data, qualitative studies and collaboration with Black professional organizations can aid in the advancement of this topic. We can then move from awareness and platitudes to proactive research and concrete action implementing strategies and policies which will aid early career Black engineering professionals.

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