Being a Token Black Female Faculty Member in Physics: *Exploring Research on Gendered Racism, Identity Shifting as a Coping Strategy, and Inclusivity in Physics*

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Although the United States is becoming racially diverse, the representation of marginalized groups in physics still remains low.[1] Historically Black Colleges and Universities (HBCUs) have been successful in graduating Black physicists, such that HBCUs are nine of the top 10 physics departments in the United States that produce bachelor degrees.[2] Despite these outcomes, Black women are disproportionately underrepresented in physics. In 2016, only 4% and 3% of Black women earned bachelor's degrees and doctorate degrees in physics, respectively.[3] Among faculty, Black women made up only 2% in physics doctorate programs and 3% in bachelor's-only physics departments in 2016.[4] Though the percentage of Latinas in physics has increased, the percentage of Black women in physics has not grown.[5] Therefore, Black female physics faculty are often tokenized and experience gendered racism (intersection of racism and sexism).[6,7] In this paper, we used an intersectional approach to examine the psychological discourse on Black female physics faculty's experiences of gendered racism, identity shifting as a coping strategy, and we provide recommendations for creating an inclusive physics environment.

An intersectional approach: Experiences of Black female faculty in physics

To understand the double bind of being Black and a woman among Black female physics professors, the intersectional theory is critical. Intersectionality theory suggests that intersecting systems of oppression and privilege make up the unique experience of an individual (e.g., race, gender, class, sexual orientation, ability).[8] The intersectional analysis of Black women's experiences suggest that they are subject to the interplay of both racism and sexism in physics.[9,10] Research on the importance of intersectional identities suggests that Black women's success in STEM is dependent upon the development of an identity that integrates their race, gender, and science identity.[11,12] Dr. Evelynn Hammonds, a physicist and department chair of History of Science at Harvard University, spoke in an interview about how her racial and gender identities are inseparable and her experiences of discrimination because she is Black, a woman, and wants to do science.[13] Additionally, a senior physicist stated, "I don't know very many people who can write an article that combines diversity and [physical properties of light]. But it is because I am a Black woman...."[14] Though credible, these interviews illustrate the lack of empirical data on Black women in physics and how diverse perspectives can only enrich the field of physics.

Impact of gendered racism on Black female faculty in physics

Black women physicists may be prone to experiencing gendered racism, which may manifest implicitly (unconsciously) and explicitly (overtly).[15] Research has shown that well-meaning individuals are not immune to unconscious generalized beliefs (stereotypes) about individuals or implicit biases.[16] In an interview with Dr. Chanda Prescod-Weinstein, an assistant professor of physics and astronomy at the University of New Hampshire, she stated, "I would say, 'Oh, I'm going to do physics,' and people would say, 'You don't look like a physicist.'"[17] Implicitly associating physicists with White men creates a toxic environment to navigate. Prescod-Weinstein examines White empiricism, the idea that physics is only suitable for White men, and its detrimental effects on Black women in physics.[18] These stories reinforce stereotypes that physics is a place reserved for White men.[19]

Black women in physics may also experience explicit bias. LaNell Williams, a physics PhD candidate at Harvard, stated in an interview that "[w]hen I tried to apply to Harvard, despite everything I had—a 3.93 GPA and a National Science Foundation fellowship—I was told I was reaching too high. And if you asked any Black woman in this field…they'll tell you similar stories."[20] Also, Adrienne Stiff-Roberts, a Black applied physics professor, explained how she "has been 'second-guessed' more often than her White counterparts."[21] Moreover, Lewis and colleagues note that isolation and lack of community lead many to leave the academy.[22] Discouraging Black women from continuing in physics perpetuates the disparity of diversity in the field.

Identity shifting as a coping strategy

Being underrepresented in a given field can result in various negative consequences for being the "token" or only one.[23] Tokenism theory posits that the rarity of the "token" creates barriers to success and negative psychological symptoms (e.g., anxiety).[24] In fact, Black women experience hypervisibility, which may lead to altering their behaviors to mitigate experiences of discrimination.[25] For Black women in physics, this includes attempting to appear less physically feminine, appearing more masculine verbally, or behaving in an acceptable manner to be accepted.[26] These behaviors are referred to as identity shifting, the unconscious or conscious altering of one's language and cultural behaviors to counteract discrimination.[27,28]

Specifically, Black women may engage in shifting by assimilating to the predominantly White male culture to confront gender and racially based stereotypes (e.g., overly aggressive).[29] For example, they may change the tone of their voice to not sound "threatening." Shifting has some benefits such as building networks; however, there are psychological costs to engaging in such shifting strategies, which can compromise one's physical and mental health.[30,31] The authors of this article are currently constructing a validated scale that measures identity shifting among Black women in STEM, including physics. This research on identity shifting can inform physics cultures of how Black female faculty are navigating these spaces and how to cultivate inclusivity.

Recommendations for creating an inclusive physics culture in academia

Changing the cultural landscape of physicists in the academy will take action-oriented strategies by those in positions of power. There must be a systemic commitment to recruiting, retaining, and supporting Black women in physics. According to African American Women in Physics (AAWIP), fewer than 100 Black women have earned a PhD in physics, and two-thirds of those PhDs were earned after 2000.[32,33] According to the American Institute of Physics Workforce Study, less than 1% of U.S. women faculty in physics are Black.[34] If Black women with PhDs in physics are choosing not to enter the academy, or to leave the academy, this should be an undeniable call to action for more research in this area and a cultural shift (or resocialization) in the field.

It is imperative to consider the broader social context of why Black women faculty in physics persevere as this may serve as a point of intervention for a cultural shift. One of the main findings from the longitudinal study of Black women was the connection between being a scientist and their values such as social justice and community empowerment.[35] LaNell Williams noted in an interview with AFROTECH that "I want to be a scientist and impact my community at the same time. And I think I can do that as a professor."[36] Also, Hill, Corbett, and St. Rose found the motivation to persist in physics supported Black women's sense of self and intersectional identities.[37] Providing opportunities for Black women to connect physics to wider social contexts may help create supportive environments. Being intentional in reimagining and reshaping these environments is important to progress; otherwise, the field will continue to see abysmal numbers of Black female faculty in physics.

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