



## **Supported by the Sisterhood: Relationships With Black Women Science Professionals as Counterspaces for Black Woman's Pursuit of a Career in Science**

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**Abstract:** In this critical autoethnography, I explore the role of relationships with Black women science professionals in shaping my trajectory toward a career as a science education professor. Framed through the lens of Critical Race Feminism (CRF), this narrative highlights four distinct relational counterspaces that supported my academic and professional journey. These relationships functioned as sites of affirmation, mentorship, and resistance—providing emotional sustenance, professional guidance, and refuge from the racialized and gendered barriers often present in STEM fields. By centering my lived experiences, this work underscores how relational counterspaces foster identity development, cultivate belonging, and expand access to science careers for Black women. This autoethnography illuminates the transformative power of sisterhood in navigating and disrupting the structural inequities embedded in science and science education.

**Keywords:** science counterspaces, critical race feminism, mentoring

## **Problem Statement**

Stereotypical narratives about Black women impact their experiences in American society. Controlling images, like the angry Black woman, are not only dehumanizing but also creates barriers to understanding the true complexity and vulnerability of Black women. The intersections of race, class and gender create unique disparities and challenges for Black women to have to contend with in their lives (Malcom et al, 1976; Crenshaw, 1989; Collins, 1990; Cooper, 2018). Secondary schools attended by Black women are frequently under-resourced, lacking college preparatory or advanced placement offerings in STEM subjects. This absence of quality K-12 science education perpetuates a disconnect between Black women and these fields, leading them to perceive science as disconnected from their personal lives and ultimately uninteresting (Edwards and King, 2023; Pringle et al, 2019, Neal-Jackson, 2018).

Moreover, structural barriers like financial constraints, geographical limitations, and limited parental involvement further impede Black women's access to quality informal science programming outside of formal educational settings. As a result, their interest in pursuing science majors and careers can diminish over time. Even for those who manage to enroll in college in pursuit of a science degree, structural and institutional barriers persist. These barriers manifest in various forms, including but not limited to inadequate support systems, biases, and systemic inequalities, all of which hinder Black women's progression to earning a science degree and securing subsequent employment in the science field (Espinosa et al, 2011; Ong et al, 2011, Martin et al, 2016).

## **Purpose Statement**

Amidst all these mentioned barriers, there are Black women who manage to persist and secure careers in science. In this critical autoethnography, I share an analysis of my lived experiences of my matriculation into a career in science, specifically science education. I use Critical Race Feminism (CRF) as an analytical lens. I attribute much of my journey to the relationships cultivated with fellow Black women science practitioners. Joseph, Haliu and Boston (2017) discussed the unique camaraderie

shared amongst Black women that is accessible only to those who are both female and Black (p. 212). These relationships were vital to my socialization into the science field. Relationships with Black women science practitioners served as counterspaces as they supported my journey to and through my science education and ultimate employment in science education.

## **Introduction**

My journey to becoming a science teacher and eventually a professor of science education was certainly uncharted. As a child, the notion of becoming a scientist, science teacher or a professor of any kind was not in my purview when I considered my future. While I was keenly aware of my perceived intelligence thanks to both my family, teachers and trusted adults, I had limited knowledge of what careers were possible in the science field. I was raised in an urban, Midwestern city and received my K-12 education in the same city. As noted by many scholars, because of the type of schools I attended, I had limited exposure to STEM-related educational opportunities and career options (Oakes, 1990; Ireland, 2018). For example, I had my first science class as a junior in high school. I unfortunately was not close with my science teachers in high school, nor did I know any science teachers personally. Fortunately, I met and built friendships, mentorships and connections with Black women science practitioners. Through these relationships, my interest in science and a career in science was cultivated and nurtured. While I had a general interest in science, as many students identified as “smart” would have, over time I developed the confidence to pursue a science education and ability to persist due to the support of these Black women science practitioners. In this chapter, I recount a few integral experiences in my journey. I also provide specific information about these relationships that would qualify them as counterspaces, propelling my matriculation to and thorough my science journey.

## ***Literature Review***

Counterspaces, as described by Solorzano et al. (2000), are sites where deficit narratives about people of color are routinely challenged, fostering a positive racial climate. Brooms et al. (2021) call counterspaces sanctuaries that actively resist dominant stereotypical narratives about Black individuals, providing a protective buffer

against the challenges encountered within STEM learning environments. Within these sacred spaces, the experiences of Black students are not only validated but also celebrated, serving as a beacon of affirmation and empowerment (Luedke, 2019).

Various entities, ranging from Black student organizations to cultural centers, emerge as key architects of counterspaces, offering essential support, resources, and a sense of community for Black students in STEM disciplines (Brooms et al., 2021; Tichavakanda, 2021; Solorzano, 2000). For instance, Tichavakanda's (2021) investigation into a National Society of Engineers (NSBE) chapter illuminates how such organizations were counterspaces for Black engineering students. Similarly, Wade-Jaimes et al. (2021) shows how after-school STEM clubs provide a nurturing environment for Black girls to navigate their intersectional identities with STEM pursuits, fostering a sense of belonging through engaging in hands-on science activities.

While much of the discourse surrounding counterspaces has centered on their physical manifestation as spaces of refuge, Luedke (2023) offers a nuanced perspective, suggesting that relationships characterized by affirmation and restoration can also function as counterspaces for Black students. These relational counterspaces serve as sites for nurturing and establishing a sense of belonging and resilience, transcending physical boundaries to provide needed support and validation for Black students in their academic pursuits (Luedke, 2023, p. 82).

### ***Conceptual Framework***

**Critical Race Feminism.** Critical Race Feminism (CRF) is a framework designed to illuminate the intersectional oppression encountered by Black women within science classrooms and research environments, domains which are often dominated by White males. Through the lens of CRF, the intricate interplay of the intersecting identities of Black women is laid bare within the overarching system of White male patriarchy and pervasive racial oppression (Wing, 1997; King and Pringle, 2017). By contextualizing the lived experiences of women of color, CRF elucidates the multiplicative dynamics where race and gender synergistically shape both the self-conception and the discriminatory treatment of Black women (Hilal, 1998).

At its core, CRF is derived from the rich tradition of Critical Race Theory (CRT).

Central to this framework is the recognition and active engagement with the unique experiences of Black women, diverging from the perspectives delineated by both Black men within the realm of critical race theory and White women within the realm of feminist theory (Berry, 2010, p. 23). CRF thus serves as a potent vehicle for amplifying the voices and experiences of Black women, often marginalized and obscured within broader discourses on race and gender.

Within science classrooms and research environments, the application of CRF unveils the intricate power dynamics at play, where Black women navigate not only the barriers imposed by gender norms but also the insidious effects of racial biases. By interrogating the ways in which race and gender intersect, CRF exposes the systemic inequalities that shape the experiences of Black women, from the microaggressions they endure to the structural barriers that impede their advancement. Moreover, CRF offers a framework for understanding how the intersectional identities of Black women inform their sense of self and agency within these spaces, highlighting the importance of creating inclusive and equitable environments that recognize and affirm their multifaceted identities.

Using CRF as an analytical lens illuminates the pivotal role of relationships among Black women science practitioners as counterspaces, fostering not only positive science identity construction but also bolstering persistence within the field for Black women science professionals. Through the prism of CRF, these relationships emerge as sanctuaries where Black women navigate and negotiate their identities within the often hostile landscape of science disciplines dominated by White males (Jackson & Mensah, 2019).

CRF unveils how counterspaces serve as incubators for the cultivation of a robust science identity among Black women. Within these supportive networks, Black women find affirmation, validation, and solidarity, countering the pervasive narratives of exclusion and marginalization that pervade traditional science settings. By engaging with peers who share similar intersecting identities, Black women are empowered to embrace their unique perspectives and contributions to the field, fostering a sense of belonging and agency crucial for their persistence in science careers.

## Methodology

### Critical Autoethnography

Adams, Holman Jones and Ellis (2015) describes autoethnography as the process of looking inward into our identities, thoughts, feelings and experiences, and outward into our relationships, communities and cultures (p. 47). Chang (2008) describes autoethnography as a “qualitative research method that utilizes ethnographic methods to incorporate the cultural interpretation of the autobiographical data of researchers with the intent of understanding self and its connection to others” (p. 49). This method uniquely combines ethnography, biography and self-analysis qualitative data method that integrates understandings of self and the social to illuminate the nature of the relationship between the two (Chang et al, 2016).

Critical autoethnography is a form of autoethnography in which the qualitative researcher attempts to connect their own personal experiences to wider cultural, political and social constructs. This method allows qualitative researchers, particularly those hailing from marginalized groups, the opportunity to explore how their individual experiences are shaped by and contribute to broader societal structures. For Black women qualitative researchers, critical autoethnography is a tool to reveal the nuanced ways in which systematic oppression operates at the complex intersections of race, gender and identity.

Through critical autoethnography, Black women researchers can engage in a form of scholarly activism, using their personal narratives to critique and resist structural inequalities. This approach not only validates their individual experiences as sources of knowledge but also fosters a deeper empathy and understanding among audiences who might be unaware of these realities. Moreover, critical autoethnography facilitates a form of storytelling that is both personal and political, highlighting how personal narratives are intrinsically linked to larger societal issues. This method aligns with Black feminist epistemology, which emphasizes the importance of personal experience and storytelling as critical to understanding and addressing social injustices.

In the article, I utilize critical autoethnography methods to connect my lived experiences and CRF to show how relationships between Black women science practitioners have functioned as counterspaces, cultivating a sense of belonging and

resilience necessary for Black women science practitioners to advance in their science career journeys.

## Reflections

When I reflect on pivotal moments in my life, there is often a song that serves as a time-stamp—anchoring me to a specific moment in time. The melody becomes a portal, helping me return to that space with vivid clarity. As the song plays in my mind, I can recall how I felt, what I saw, and sometimes even the scents that lingered in the air. Similarly, Littleton (2021) discussed the use of songs as integral elements in respondents' stories and cultural histories. My memories of key moments shared with more experienced Black women science practitioners along my journey are just as vivid. I have described a few of those moments below.

### ✿ I Believe the Children Are Our Future - Whitney Houston

*In order to become something, you need a visual. My science journey started with my Auntie Yvie when I was 4 or 5 years old. She was my mom's best friend from high school. I could count on seeing my Auntie Yvie every Friday for dinner and on Sunday for church. My Auntie Yvie was a neonatologist, a doctor specializing in caring for premature babies. At the time, she did not have children of her own but since she loved children so, she would have me with her quite often. She took me with her to the health club. She took me shopping. Instead of toys, she would buy me books. She rewarded me for earning good grades. She bought me my first pair of Jordans in 5th grade. Most importantly, she took me to work with her. I remember visiting the hospital as a young child. Observing with child eyes, everything looked large and white. White people with white shirts and walking and talking wearing long, white jackets. I remember meeting her co-worker friends. They were also doctors. Even though I was young, I could tell that most of them were foreign born. None of them Black, like her. My Auntie Yvie was my first exposure to real science. Our familial connection gained me access to the exciting world of medicine, hospitals and doctors. From her, I learned about medical specialties. I became aware of the schooling and experiences needed to get into medical school and become a doctor. Thanks to my Auntie Yvie, I had a first hand account of the lifestyle of a medical doctor. Also thanks to her, I believed in my heart*

*that it was attainable. Through our relationship, an interest in science was cultivated and nurtured.*

I excelled academically in secondary school. I enjoyed television shows and movies with medical themes, two of my favorites were House and Outbreak. During my summers in high school, I completed enrichment programs for students who wanted to go to medical school. Without any question, I understood that if I put in the work, I could become a medical doctor. I was prepared to do just that in college. My future was bright.

### **🎵 Make It (science) Funky! – James Brown**

*I attended my state's flagship university for my undergraduate studies and majored in microbiology. This institution was well known for its science and engineering programs. At this Predominantly White Institution (PWI), Black science majors were certainly in the minority. Typically, I was one of two or three Black students in my major science courses. Often, all the Black students in the class would form study groups, meeting after hours to do homework and to talk through course material. This was also our time to fellowship. Over time, these two classmates became consistent study buddies, even after we stopped taking classes together. It was our routine to meet at the engineering library each night. We fellowshipped, and studied for our science classes every night. Noemi and Kandi were both biochemistry majors. They were smart, Black girls from the suburbs. We got along and extended moral support to one another while we prepared for ridiculously hard physics exams, crazy math tests, tedious class presentations. I recall studying biochemistry with my study group. We were learning biochemical pathways and we burst into song. "Yo C double bond O breaks and links with...". We made up a song to help us remember biochemical pathways. We laughed out loud and talked in our "rapper voices", repeating our song while marking up the diagram in our textbook. Days later during the test, I was able to recall the lines to our song, and remembered how the pathway worked. My daily meetings at the library morphed into a space we got to play around with science content and make it our own. Mixing science with fellowship and fun helped me to realize that learning science at high levels was within my reach and could even be fun with my girls. The meetings were safe spaces where we could be our cultural selves and still learn and use science. We also*

*had opportunities to lament about raced and gendered discrimination we experienced as Black women science majors. It was a comforting and healing space for us. My study group would go on to enjoy many more successes in science, as Noemi now has a PhD in Cellular and Molecular Biology and is a research scientist and Kandi earned an MD and is a family medical physician in our hometown.*

I attended graduate school in-state to be near my family. Positive college experiences teaching, learning and doing research in science awakened an interest in teaching science at the university level. I enrolled as the program's first Black direct-entry Ph.D. student and while completing coursework, I worked part-time at a neighborhood middle school as cheer coach and substitute teacher. It was there that my interest in teaching secondary science developed. After three years of graduate work in microbiology, I switched to the Curriculum and Instruction master's program at the school. I was given a provisional teaching certificate with the idea that if I lasted a year, I would earn an initial teaching license. I excitedly gave secondary teaching a try.

### **✿ We all we got! – T-Pain**

*I showed up at the science teacher professional development on a whim. I remember getting a notice about the meeting the day before. It was a Saturday morning and a bit far for me but I was desperate. I was a brand new science teacher. I was newly hired to a high school and did not have a real curriculum or materials to teach my students. The professional development was sponsored by a local university. The curriculum they developed and was studying came from a research grant. When the meeting started, the professor and graduate students introduced themselves. Then, they introduced the science teacher who had been working with them on the project. Nia was a Black woman and had been teaching for six years in the district. Later during the meeting, we were able to talk and discovered that we were from the same neighborhood and that she knew several of my older cousins. We had an instant connection. The next day, I was at her house with her family. Her toddler son introduced me to his pet fish and puppy. She ordered food. We ate while she walked me through what would be my first units for my environmental science class. Nia and I would meet frequently over my first year of teaching. She shared lessons, tests, equipment...*

*everything I needed as a new science teacher. Whenever I thanked her, she would say, “Girll [sic] it’s nothing. We all we got. We gotta stick together”. The next summer, she recommended me for a science teacher vacancy at her school and I was hired. When I started, she was officially assigned as my mentor teacher. We shared everything... a classroom, curriculum, equipment, materials, books. We taught the same course, environmental science at the school. She observed my lessons often as my school-based mentor and one day after one of the many observations of my teaching she completed, she gave me some unofficial feedback that I would never forget... she looked up at me, smiled and said... “now that’s a real science teacher” referring to me. As a novice teacher, I was honored to receive such an endorsement from my mentor, who was a seasoned vet in the game. She gave me physical and mental support as I developed my teaching chops. I could ask questions and lament to her. Her feedback and support with planning was invaluable to my development as a science teacher. Her endorsement solidified my science teacher identity. Together, we taught science in non-traditional ways, exposing our urban students to science as inquiry. Like her, I learned how to model excitement about science and science concepts and have fun while doing it.*

My teaching career was off to a fast start. I remained close to my teacher mentor to get all the great nurturing and support she rendered. Advice on classroom management, best practices for teaching science, etc. were jewels given to me, unselfishly, by this Black woman. The nurturing paid off. Still a young teacher, I soon became the teacher whose class administrators brought school guests to. Hired as an instructional coach in year 4, I served in a large metropolitan school district as a science teacher leader. Highly motivated to be at the top of my field, I got serious about finishing my doctoral program, this time in science education.

### **✝ God said it. I believe it and that settles it! – Patrick Riddick**

*When I was close to being done with classes in my doctoral program my advisor said “you need to come to the SEC conference, it is here this year”. I was still a classroom teacher at the time, so I had to find a substitute and take the day off. I caught the bus downtown to the hotel where the conference was held. As I approached the*

*hotel, I grew nervous as I did not know what to expect when I entered. When I got to the registration table, I was greeted by a woman, she had an upbeat, spunky demeanor and was dressed in African attire. She handed me my badge and I was off. Later that evening, I attended a session and to my surprise the woman with the African outfit was there. In this session, we were placed into small groups and were asked to introduce ourselves. As she shared about herself to the small group, I was taken by how unapologetic she was about her culture, heritage and faith. She spoke confidently with her regional accent, proudly wore her natural hair and acknowledged God for divine support through her doctoral program, and in her current role as an Assistant Professor. After the session, I walked up to her and said to her “I like how you talk, please be my mentor”. She laughed, and replied, “of course, chile”. That night, she prayed with me and after the prayer she said to me, “God said you will graduate with your PhD, it's already done”. It would take four long years from that moment for me to finish. Years of encouragement and almost constant reminders that God had already ordained the completion of my degree and my future as a university professor. When I taught my first science methods course, she shared her past syllabi and rubrics with me. When I needed to vent about students and their antics, she shared strategies she used with hers.*

## **Discussion**

Black women have historically fostered deep connections with one another through shared experiences with intersectional oppression as the only woman or person of color (Collins, 1990; Joseph et al., 2017; West, 2019). The enduring motto “Lifting as We Climb,” championed by the National Association of Colored Women (NACW) since its founding in 1896, encapsulates the ethos of support and mentorship Black women offer one another. This spirit of solidarity enables them to face new roles and responsibilities in the workplace together, advancing in their careers with collective empowerment (Gailani, 2020). Such networks of support serve as potent mechanisms for career advancement, particularly in STEM fields where Black women remain underrepresented. My own journey—from inquisitive child to scientist, science teacher, and now professor of science education—has been profoundly shaped through relationships with Black women. Conceptualizing these connections as relational

counterspaces underscores the powerful guidance and support embedded within them, illuminating their role in fostering resilience and success for Black women in STEM. Drawing from previous literature, relational counterspaces have been shown to be powerful sites of identity construction (Case and Hunter, 2014; Edwards and King, 2023), healing spaces for victims of racialized and gendered trauma (Case and Hunter, 2012; Ong et al, 2018; Lopez-Leon and Casanova, 2024) and locus of culturally responsive vertical career advancement (West, 2018).

### **Relational Counterspaces: Site for Identity Construction**

Case and Hunter (2014) highlight the significance of counterspaces in fostering identity construction, especially for BIPOC individuals navigating environments where they remain underrepresented. These counterspaces serve as intentional affirmations of non-traditional identities, challenging dominant hegemonic norms. Harmon and Horn further emphasize an “insider connection” among Black women, which fosters an understanding not only of shared experiences but also of anticipated experiences, choices, beliefs, and challenges unique to their group identity (p. 120).

In my own relational counterspace, my mentor teacher and I had frequent discussions about preferred teaching strategies, effective science teaching practices, and approaches to handling issues in the classroom as they emerged. This space became a supportive environment for developing science teaching skills. Through similar exchanges, individuals can form “a cohesive identity in a culture that does not reflect or respect people who look like them” (Ong et al., 2018, p. 233). Consequently, these shared experiences and constructive feedback can foster science identity development for those historically marginalized in the field.

### **Relational Counterspaces: Healing from Social Isolation and Microaggressions**

Case and Hunter (2012) describe counterspaces as “radical sites of well-being promotion in the face of oppression and marginalization” for people of color (p. 268). In college, my study group counterspace offered a vital refuge—a place of comfort and affirmation during times when I felt isolated as the only person of color in science classes and labs. This group became a supportive space where we could openly share and process our racialized experiences within academic settings. Together, we

celebrated one another's achievements, from acing exams to earning prestigious program acceptances and scholarships, building a collective resilience and pride in our successes.

As a novice science teacher, my mentor teacher furthered this sense of support by sharing her own experiences with gendered racism, creating a bridge of understanding between us. When I encountered similar challenges in my teaching role, our relationship counterspace provided solace—a safe environment where I could process my emotions, gain support, and discuss strategies to navigate these experiences.

### **Relational Counterspaces: Locus of Culturally-Responsive Career Advancement**

West (2019) demonstrated that professional counterspaces for Black women empower them to "visualize themselves in leadership roles within their respective fields" (p. 10). The camaraderie and support cultivated in these counterspaces create safe environments for culturally responsive career advancement. For instance, as a newly minted Ph.D. entering the job market, I benefited immensely from the guidance of Black women in my professional counterspaces. These experienced science education professors provided critical support, including identifying job opportunities, participating in mock job talks, offering constructive feedback, and advising on professional presentation, such as appropriate attire for faculty interviews.

Through my relationships with more senior Black women professors, I gained firsthand insights into their preparation for tenure and promotion. As a novice, I not only learned the practical steps required to succeed in the field but also observed what career advancement looks like through their experiences. These mentors provided a model for success and helped me prepare for my own professional growth.

### **Conclusion**

Relational counterspaces play a vital role in advancing diversity within STEM fields. These environments serve as critical platforms for identity formation, career advancement, and healing from the racialized and gendered traumas often encountered in these disciplines. For individuals historically underrepresented in STEM, counterspaces offer much-needed sanctuaries—empowering them to flourish despite the challenges posed by hostile or exclusionary spaces.

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### **Author Biography**

*Dr. Olayinka Mohorn-Mintah's research focuses on science identity development among students and science teachers in urban PK–16 classrooms and informal learning environments. She also studies science teacher professional development within these contexts. Her work emphasizes community-centered approaches that connect science learning to local contexts and learners' lived experiences. Grounded in her experience*

*as a secondary science teacher and district science coach, Dr. Mohorn-Mintah is committed to expanding access to and participation in science education and strengthening pathways into science careers, including positioning science teaching as a meaningful and viable STEM profession.*