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"It Was Hard, and It Still Is . . .": Women of Color Navigating HSI STEM Transfer Pathways

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Women of color (WOC) continue to be underrepresented in the fields of science, technology, engineering, and mathematics (STEM), where they often experience racism and sexism within disciplinary contexts that have historically privileged men and Whiteness. Participant narratives gained through focus-group and follow-up interviews illuminate the racialized and gendered STEM transfer experiences of 21 WOC who attended 2- and 4-year Hispanic-Serving Institutions (HSIs). Using a multidimensional intersectional approach, we explore the interplay between the complex identity experiences of WOC and the dynamic intersections of their transfer pathways across 2- and 4-year HSIs and within STEM disciplinary contexts. Findings underscore the inequities that continue to pervade STEM and highlight opportunities for transforming disciplinary and institutional cultures, particularly within HSI STEM transfer pathways, where there is great potential for these diverse institutions to support, validate, and benefit from the unique contributions of WOC.

Keywords: *community colleges, equity, higher education, qualitative research, science education, STEM education, women of color, women's issues*

Immersed in disciplinary cultures historically characterized as predominantly White and male, competitive, economic-driven, and prioritizing individual advancement (Carter et al., 2019), women of color (WOC) remain underrepresented in science, technology, engineering, and mathematics (STEM; National Center for Science and Engineering Statistics, 2021). As a result, WOC in STEM often experience a "double bind," encountering challenges in their field as women and as people of color (Malcom & Malcom, 2011; Ong et al., 2011), including gender and racial stereotypes, negative interactions, isolation, and discrimination within unwelcoming disciplinary contexts (Ong et al., 2018). Community colleges (CCs), Hispanic-Serving Institutions (HSIs), and, particularly, Hispanic-Serving Community Colleges (HSCCs) are vital in broadening participation and potentially increasing support for WOC in STEM (Herrera & Hurtado, 2014; Herrera et al., 2018), where greater visibility and representation create the possibility for cultivating supportive campus climates (Núñez, 2017). Still, these diverse postsecondary institutions face the greatest challenges in determining how to best serve students who have been historically oppressed and marginalized across the educational pipeline (Núñez et al., 2016). As such, our study examines how WOC navigate STEM disciplinary culture across multiple institutional contexts—specifically, those who attended one or more HSIs and successfully transferred from a CC to a 4-year university. By illuminating the successful journeys of these WOC, we are able to center their strengths and identify successful navigational strategies to further develop institutional supports. Furthermore, studying WOC's racialized and gendered experiences within these contexts is key to understanding how 2- and 4-year HSIs can better serve and retain WOC within STEM.

Situating WOC STEM Experiences Within Institutional Contexts

Institutional contexts matter for historically underrepresented, racially minoritized students and WOC, who, despite entering college with interests in STEM, often switch to non-STEM majors (Herrera et al., 2017; Herrera et al., 2018). Of the 569 HSIs and 362 Emerging HSIs (E-HSIs) in 2020–21 nationally, 235 are HSCCs, and 102 are Emerging HSCCs (E-HSCCs; Hispanic Association of Colleges and Universities, 2021), which serve as critical access points to STEM postsecondary education for Latinx and other students of color (SOC). Nationally, representative data show that most Latinx STEM students who begin at 2-year

institutions (81.2%) enroll in E-HSCCs and HSCCs (Herrera & Rodriguez-Operana, 2020). Similarly, 79.5% of Asian American students and 24.9% of African American students access STEM through E-HSCCs and HSCCs (Herrera & Rodriguez-Operana, 2020). Typically broad-access institutions (Crisp et al., 2019), many 4-year HSIs play an essential role in transfer access overall (Taylor et al., 2021), and for STEM specifically (Herrera & Rodriguez-Operana, 2020). HSI STEM transfer pathways are essential for WOC, as CCs offer more flexibility and affordability (Wang et al., 2017). Furthermore, HSIs typically provide greater geographic access due to their location near Latinx and other communities of color (Madsen Camacho & Lord, 2011). A growing body of literature centers on these critical institutional contexts in the STEM experiences of WOC, including first-generation, part-time, and low-income students (Contreras Aguirre et al., 2020; Gonzalez, Molina, & Turner, 2020; Packard et al., 2011; Reyes, 2011; Wang et al., 2017).

STEM Disciplinary Culture and the Experiences of WOC

STEM disciplinary culture tends to be "chilly" in that it fosters competitiveness and individualistic goals and values, often resulting in a lack of representation, lower retention rates, and blatant discrimination (McGee, 2016; Ong et al., 2018). Women experience benevolent (e.g., overly affectionate savior-complex behavior) and hostile (e.g., blatant degrading and offensive behavior) forms of sexism (Glick & Fiske, 1997; Ong et al., 2018; Swim et al., 2005; Wang et al., 2017), yet due to their intersectional identities (e.g., gender, race, first-generation status, low-income, married, caregivers, and so forth) the culture of intimidation within STEM is amplified for WOC (Arredondo et al., 2022). Gender and racial stereotypes fuel microaggressions that presume that WOC are incompetent in terms of their intelligence and academic merit, leading to adverse social interactions in STEM (Gutiérrez y Muhs et al., 2012; Ong et al., 2018). Although evidence shows that racialized and gendered experiences in STEM may be nuanced based on one's positionality (e.g., race/ethnicity, physical appearance), where race or gender may take on more salience (Ong, 2005), WOC generally experience a lack of support (Johnson, 2007; McGee, 2016; Reyes, 2011; Salazar et al., 2019; Simon et al., 2017). Consequently, WOC in STEM may struggle to form faculty (Salazar et al., 2019) and peer relationships (Contreras et al., 2020), and they may distance themselves from their culture(s) as they experience isolation and internalize notions of inadequacy (Cantú, 2012; Ong et al., 2018).

There is great potential for promoting a culture of inclusivity in STEM through HSI transfer pathways, as increased representation is associated with academic success in CCs (Hagedorn et al., 2007) and STEM outcomes at HSIs (Rincón, 2020). Unfortunately, Latinx representation among faculty and administrators at 2- and 4-year HSIs remains inequitable compared to the student demographics (Contreras, 2017). Moreover, some challenges come with navigating CCs and 4-year institutions. WOC in CC often cope with financial burdens and ineffective advising, and barriers within STEM persistence even after students successfully transfer to 4-year institutions (Packard et al., 2011). Research shows that WOC in STEM who transfer often begin enrollment in 4-year institutions motivated and well-prepared (Cunningham, 2017; Zamudio, 2015), but many do not anticipate the competitive nature of STEM courses and the intensity of the "chilly" climate (Valenzuela, 2006), including isolation and limited social networks (Reyes, 2011).

WOC Achieving Success and Persistence in STEM

Despite several barriers, studies illuminate how WOC successfully navigate STEM. Generally, results reveal that WOC who excel in STEM develop a sense of agency, find sources of motivation, and build strong support networks made up of peers, family, and faculty (Carbajal, 2015; Cunningham, 2017; Espinosa, 2011; Gonzalez, Aguirre, & Myers, 2020; Ong et al., 2018; Tancredi-Brice Agbenyega, 2018; Yap, 2018; Zamudio, 2015). WOC reclaim agency by embracing their unique experiences as underrepresented members of their STEM field, cultivating intentional connections, and engaging in activism (Hodari et al., 2016; Ong et al., 2016). Other sources of motivation include an internal drive to succeed, altruistic goals, and job-market prospects (Carbajal, 2015; Zamudio, 2015). Further, researchers emphasize the importance of creating diverse counterspaces and building essential networks among WOC to support their STEM persistence (McGee & Bentley, 2017; Ong et al., 2018). Ideally, void of the racism and sexism typically experienced by WOC, counterspaces involve physical spaces to create community, along with ideological and mentoring relationships that exist within and outside STEM. Campus networks of support, including faculty, student organizations, and resources (e.g., advising, tutoring, career centers), that are inclusive of their intersecting identities provide the academic and motivational support (e.g., faculty diversity, research experience) critical for degree attainment among WOC (Carbajal, 2015; Ong et al., 2018; Salazar et al., 2019; Zamudio, 2015).

Although the majority of prior research about WOC in STEM has focused on 4-year and predominantly White institutions (PWIs), research has increasingly focused on HSIs (Contreras Aguirre et al., 2020; Gonzalez, Molina, & Turner, 2020). Much of this work specifically examines Latinas' STEM experiences at 4-year institutions (Aguirre et al., 2020; Contreras Aguirre et al., 2020) and among the most selective, research-intensive universities (Gonzalez, Molina, & Turner, 2020). Our study uses multiple qualitative methods to focus on the intersections of HSIs and CCs by

exploring WOC's STEM transfer experiences across 2- and 4-year HSIs.

Theoretical Perspectives

Multidimensional Intersectional Approach

Critical mixed methodologies and intersectional frameworks are important in advancing how we study STEM participation (Metcalf et al., 2018). In our study, this means (a) being inclusive in our research design with our study criteria and language and by thoughtfully engaging our participants; (b) analyzing data from an intersectional approach and being attentive to the complexity of the multiple identities represented in our sample and their experiences at the intersections of HSI and CC institutional contexts; (c) examining how individual experiences connect to larger systemic issues; and (d) incorporating a multi-method approach to deepen understanding. As Rodriguez et al. (2017) suggest, using intersectional frameworks is "critical to avoid oversimplifying or ignoring complex identity experiences for WOC in science disciplines" (p. 233). Accordingly, we consider how power relates to identity, social practices, institutional arrangements, and cultural ideologies (Davis, 2008; Hurtado et al., 2015) and how this relationship influences STEM trajectories.

Núñez's (2014) multilevel model of intersectionality prompts the examination of WOC's STEM transfer experiences through multiple levels and dimensions, including the dynamic relationship between people's social identities, the power dynamics of structural oppression, and inequality at individual and institutional levels (Choo & Ferree, 2010). At the micro-level, WOC sit at the crossroads of various oppressed identities and acknowledge the power present within social structures (Yuval-Davis, 2006). Thus, WOC's experiences in STEM are affected by racialized and oppressive societal, disciplinary, and structural forces. STEM disciplines have been historically shaped by a culture of competition and individualism and a prevalence of White males (Carter et al., 2019; Ong et al., 2018), contributing to the exclusion and underrepresentation of WOC in STEM (Rodriguez et al., 2017). Moving beyond the individual level, Núñez's (2014) multilevel model of intersectionality guides a deeper consideration of the organizational identities and dynamics at the intersections of the CC sector, institutions with HSI designations, and the cultural-historical contexts of STEM disciplinary environments. These perspectives allow us to tease out the nuances within various institutional settings (CCs, HSCCs, 4-year HSIs, and non-HSIs) that our participants encountered in their trajectories.

HSI Servingness

Along with taking an intersectional approach (Crenshaw, 1989; Núñez, 2014) that examines intersectional identities and the dynamics across institutional contexts, the study is informed by Garcia and colleagues' (2019) multidimensional framework of HSI servingness. As we uniquely center the role of HSI contexts in WOC's STEM transfer pathways, this framework shapes our understanding of what it means to move from enrolling Latinx students to intentionally serving them (Garcia & Koren, 2020). HSI servingness involves institutional structures for serving (e.g., diversity of faculty, staff, administrators; culturally relevant curriculum; programs and services for minoritized students; and so forth), which contribute to validating experiences and academic and non-academic outcomes (Garcia et al., 2019). This lens allows us to situate the ways that WOC's individual experiences in STEM are connected to structures for serving (i.e., how policies, practices, and structures at HSIs contribute to the gendered and racialized experiences of WOC in STEM). Consequently, this paper explores the interplay between the complex identity experiences of WOC and the dynamic intersections of their transfer pathways across 2- and 4-year HSIs and within STEM disciplinary contexts.

Methodology

This paper was part of a larger research project focused on the STEM pathways of underrepresented, racially minoritized students at HSIs, and the broader project included a more extensive team of researchers of color (primarily WOC). Authors of this paper include three Latinas, one Latinx, and one Filipina-CHamoru woman who navigated HSIs and/or E-HSIs as students at some point in their educational journeys. As such, from a student perspective, we have experienced the supportive environments that can be found within HSIs as well as the challenges. Additionally, we have all served in professional capacities within HSIs, championing student-centered efforts while confronting systemic and institutional barriers that hinder this work. Lastly, several authors initially pursued STEM fields and experienced unwelcoming disciplinary environments. Thus, our research is informed by our gendered and racialized experiences in various contexts, allowing us to provide unique contributions and perspectives to this topic.

Research Setting and Participants

Data were collected in a West Coast region where students have geographical access to nearly a dozen public HSIs, most of which are HSCCs. Of the 21 WOC participants, five were former transfer students who recently completed a bachelor's and/or graduate degree in STEM, two were enrolled graduate students who were former transfer students and completed a bachelor's degree in STEM, and the remaining 14 were transfer students currently enrolled in a 4-year college and pursuing a bachelor's degree in STEM. At the time of the focus-group interviews, most of the undergraduates were in their first ($n = 5$) or second year ($n = 6$)

TABLE 1
Participant transfer pathways through HSIs, E-HSIs, and non-HSIs

Pathway	College #1	College #2	College #3	College #4	College #5	College #6	# of participants
1	HSCC	HSI 4-year					6
2	HSCC	HSCC	HSI 4-year				5
3	HSCC	HSCC	HSCC	HSI 4-year			2
4	HSCC	Non-HSI 4-year					1
5	HSCC	HSCC	HSCC	E-HSI 4-year			1
6	Non-HSCC	HSI 4-year					1
7	Non-HSCC	HSCC	HSI 4-year				1
Reverse transfer pathways							
8	Non-HSCC	Non-HSI 4-year	HSCC	HSCC	HSCC	HSI 4-year	1
9	HSI 4-year	HSCC	Non-HSI 4-year	HSCC	HSCC	HSI 4-year	1
10	Non-HSI 4-year	HSCC	HSCC	HSCC	HSI 4-year		1
11	Non-HSI 4-year	Non-HSI 4-year	Non-HSCC	HSCC	HSCC	HSI 4-year	1

Note. E-HSI = Emerging Hispanic-Serving Institution; HSCC = Hispanic-Serving Community College; HIS = Hispanic-Serving Institution.

as transfer students. Several STEM majors were represented: engineering/computer sciences (n = 5), life sciences (e.g., biology, premed; n = 8), math/physical sciences (n = 2), and behavioral sciences (e.g., psychology, neuroscience; n = 7). One double major (life sciences and behavioral sciences) was counted under both categories.

Participants' transfer pathways across HSIs (defined as > 25% Latinx enrollment) varied, with 11 different pathways represented among our sample (see Table 1). Most participants (n = 15) started at an HSCC; 13 eventually transferred to a 4-year HSI, one transferred to a 4-year non-HSI, and one ultimately transferred to an E-HSI university. Overall, 20 of the 21 participants attended a 4-year HSI (n = 19) or 4-year E-HSI (n = 1) as their final undergraduate college of attendance (either obtaining a bachelor's degree or still being enrolled at the time of the study). Several (n = 13) attended more than one CC prior to upward transfer, and many (n = 10) only attended HSCCs. Four participants had reverse transfer pathways, with three who started at a 4-year college and reverse transfered before transferring back to a 4-year college and one participant who started at a 2-year college and upward transfered to a 4-year college and then reverse transfered before making an eventual second upward transfer.

Accounting for every institution of attendance, we observed 48 instances of transfer (lateral, upward, and reverse) across 22 unique institutions. Nearly all participants (n = 19) had the same 4-year HSI as their final undergraduate college of attendance (either obtaining a bachelor's degree or still being enrolled at the time of the study). One of the remaining two participants was enrolled at this HSI for her graduate program. Therefore, many of the HSI experiences were in relation to this one specific HSI, which at the time of the focus groups and interviews had only recently attained official federal HSI designation and acquired minimal federal HSI funding. Based on fall 2021 data, this HSI has an undergraduate student population of nearly 60% SOC (30% Latinx, 14% Asian Pacific Islander, 4% African American, less than 1% Native American).

Participants included 21 WOC (see Table 2), who identified as Latina (n = 12), Asian American (n = 6), Black (n = 4), White (n = 4), Middle Eastern American (n = 1), and Pacific Islander (n = 1), including various subgroups within these categories (e.g., Mexicana, Salvadoreña, Indigenous, Filipina, Japanese, and Vietnamese). The demographic questionnaire allowed participants to identify themselves under as many racial/ethnic categories as applied. Six participants marked multiple racial/ethnic identities, of whom four multiracial WOC included White as one of their racial identities and the other two identified with multiple non-White racial/ethnic identities (Black/Japanese; Mexicana/Iranian). In this study, the term *WOC* is inclusive of Asian American, Black, Latina, Middle Eastern American, Pacific Islander, and multiracial women, acknowledging the implications of a shared experience, while considering the power/privilege intersections across these racial/ethnic and mono-racial/multiracial/biracial identities, which can influence the spectrum of oppressive experiences in STEM (Miles et al., 2021). Most women were first-generation college students (n = 18), and the median age was 25 years old.

Data Collection

Participants who met the study criteria, based on a screening survey (i.e., STEM undergraduate, graduate student, or alumna with a successful transfer from CC to a 4-year institution), completed an online demographic questionnaire and engaged in focus-group interviews (~90 minutes), with three to four participants on average and one or two research team members facilitating the groups. Before the interviews, an

TABLE 2
Participant demographic characteristics

	Focus group sample WOC ($N = 21$)	Follow-up interview subsample ($n = 7$)
Race/Ethnicity		
Latina	12	4
Multiracial	6	1
Asian American	6	3
African American/Black	4	—
White	4	1
Middle Eastern American	1	—
Pacific Islander	1	—
Born outside the U.S.	5	2
Age	$M = 25.14$, $SD = 4.93$ Range: 19–43	$M = 26.71$, $SD = 7.87$ Range: 19–43
First-gen college students	18	7
# of CCs attended prior to transfer	~2–3 Range: 1–6	3 Range: 1–6
STEM discipline		
Engineering / Computer sciences	5	2
Life sciences	8	3
Math / Physical sciences	2	
Social / Behavioral sciences	7	3
STEM student status		
Undergraduate students	14	3
Graduate students	2	1
Alumni	5	3

Note. Because the survey allowed participants to identify themselves with as many racial/ethnic categories as applied and several identified as multiracial ($n = 6$), the frequencies for racial/ethnic categories do not add to 21. CC = community college; STEM = science, technology, engineering, and math; WOC = women of color.

online demographic questionnaire gathered sociodemographic characteristics (e.g., ethnicity, parent education, and so forth), academic (i.e., major), and enrollment information. The semistructured interview format ensured that we asked participants the same questions while offering some flexibility for targeted follow-up questions (Daniel & Harland, 2017). Informed by previous research (Herrera et al., 2017; Herrera et al., 2018), the interview questions prompted participants to share their STEM transfer experiences across multiple institutions and sources of on- and off-campus support. The composition and structure of the focus groups allowed participants to engage and reflect deeply and critically on their experiences in relation to the research purpose/questions (Daniel & Harland, 2017). In focus groups, participants clarified their ideas and built collective knowledge based on their shared STEM experiences through dialogue with others (Stage & Manning, 2003). Follow-up interviews (~90–120 minutes) with a subsample of participants ($n = 7$), selected based on their initial narratives related to key themes, allowed us to have closer communication to gather more nuanced narratives (Morgan, 1996; Ortiz, 2003). Individual interviews provided the opportunity to advance our understanding of emergent themes from the focus groups with more specific follow-up questions (Morgan, 1996) and strategic interview techniques (i.e., photo/artifact elicitation) to engage participants in more in-depth discussions (Clark-Ibáñez, 2004). All interviews were audio-recorded, transcribed, and verified for accuracy.

Analysis

Authors 1, 2, and 3 co-led the research team, data collection, and coding/analysis in NVivo qualitative software. We employed a narrative approach (Jones et al., 2013) and conducted thematic analyses of interview data (Riessman, 2008). Initial analyses involved open coding to identify salient themes, solidify emerging patterns, and build the coding structure. A constant comparative approach allowed for narrowing from particular text segments to larger themes and subthemes,

TABLE 3
Themes and subthemes

Themes	Racialized and gendered experiences in HSI STEM transfer pathways	Responses to oppressive STEM environments
Subthemes	Representation across contexts	Challenging stereotypes
	Gendered microaggressions	Women mentors and support networks
	Intersections of race and gender	

Note. HSI = Hispanic-Serving Institution; STEM = science, technology, engineering, and math.

until the research team reached saturation (Creswell, 2007). To maintain the reliability of data collection and coding, we relied on informant feedback and independently coded interviews to establish interrater reliability among five coders (Miles & Huberman, 1994). Pairs of coders independently agreed on 95% of the codes and resolved the remaining disagreements by consensus. The current authors performed additional coding and employed a theoretically driven critical analysis to determine intersections between themes and attributes in NVivo (Crenshaw, 1989; Metcalf et al., 2018). In particular, we holistically engaged these narratives with attentiveness to the many dynamic nuances and power dynamics at the intersections of WOC's racialized and gendered experiences in STEM, the structural influences within HSI contexts, and participants' movement across various institution types in their STEM transfer process.

Results

Using a multidimensional intersectional approach (Crenshaw, 1989; Núñez, 2014) and the HSI servingness framework (Garcia et al., 2019), we examine the racialized and gendered STEM experiences of WOC at 2- and 4-year HSIs. The following research questions are addressed: *How do WOC STEM majors describe their racialized and gendered experiences while navigating multiple institutional contexts, including CCs, 4-year institutions, and HSIs? In what ways did they respond to oppressive STEM environments?* Table 3 provides the two overarching themes—(a) racialized and gendered experiences in HSI STEM transfer pathways and (b) student responses to oppressive STEM environments—and subthemes.

Racialized and Gendered Experiences in HSI STEM Transfer Pathways

Representation Across Contexts. Our analyses sought to understand the gendered and racialized experiences of WOC within multiple institutional contexts, explicitly outlining the commonalities and differences across institutional contexts. All participants attended an HSI at some point, and most began college at an HSCC (see Table 2). Several students attended non-HSIs in their transfer pathways and compared their experiences among various institution types and across the 2- and 4-year sectors. Although incidents of gender and racial discrimination were less common at HSCCs, where faculty and student populations were more diverse, some participants encountered gendered experiences within CC STEM contexts. More often, gendered experiences occurred within the 4-year university context or post-4-year contexts, including in graduate school and in the STEM industry as participants worked as interns and research associates. Navigating multiple institutional contexts throughout their STEM pathways, many participants recognized a lack of representation of women, and specifically WOC, in STEM. WOC were noticeably underrepresented in the STEM student population and STEM faculty positions. For some, the absence of other women in their discipline led to a sense of isolation or intimidation. Participants observed this lack of representation across CC and university contexts, especially within STEM courses (e.g., "Most of my engineering professors have been men.").

Several pointed out that the composition of STEM faculty at 4-year institutions was less diverse compared to CC STEM faculty. The lack of WOC and faculty of color in general was evident at PWIs, E-HSIs, and HSIs alike. Nicole, a Black woman majoring in biology, detailed her STEM experiences while attending a non-HSCC, but still diverse CC, with 65% SOC, on the East Coast compared to her experiences at a 4-year HSI: "At community college, I definitely had a lot more non-White science professors but here at the [HSI] university, everyone is White." She also mentioned that there were more WOC faculty at her CC and specifically called attention to the absence of Black faculty at the 4-year HSI.

In addition to fewer women and people of color in STEM faculty positions, participants noted a sense of disconnect from university faculty and peers. This lack of connection to others in STEM and decreased sense of belonging were evident even among students who transferred from HSCCs to 4-year HSIs. Some expressed that few university professors understood their CC and transfer-student experiences and at times created competitive and intimidating STEM classroom environments, especially in spaces largely comprising White students. For example, Nicole recalled negative interactions with a male professor at a 4-year HSI:

> [W]hen I went to his office hours, I noticed he wouldn't help me, and then I ended up going with my Asian friend. . . . [H]e helps [her], but I can't ask the question, she has to ask the question. . . . He didn't treat me the same way as he treated the Asian and White kids.

Although Nicole recognized the differential treatment she received compared to her Asian and White peers, she also acknowledged that not all STEM professors were dismissive and discriminatory in their teaching and mentoring practices. Still, Nicole reiterated that the absence of STEM faculty whom she related to and identified with was problematic. With mostly male faculty in engineering, Elizabeth, a Latina (Mexican American) mechanical engineering major shared similar interactions with professors: "You always get that professor every now and then that's like, 'I'm not going to help you. You should know this on your own.'" Several explained that it was easier to relate to HSCC faculty and peers, as many were from similar backgrounds (e.g., students/faculty of color, from surrounding neighborhoods) and had personally navigated the CC system and transfer process.

Ana, a multiracial (Mexican American/White) graduate student specializing in cell and molecular biology in a joint doctoral program at an HSI and E-HSI, similarly reflected on her experiences while attending two HSCCs prior to transferring to the 4-year PWI where she earned a bachelor's. She recalled that "community college was much more diverse," but as a doctoral student, Ana acknowledged that the diversity seen in the undergraduate population at her current HSI was not as pronounced within her graduate program: "I'm in the doctoral program. . . . [T]here's definitely more guys around than there are girls. . . . [W]hen I'm out in my field . . . I see mainly male White ratios. . . . [W]hen I come back to [HSI university] . . . it's extremely diverse." Ana further described her graduate-school experiences, distinguishing the diversity and collaborative efforts she was accustomed to at [HSI university] compared to what she observed among other graduate students in cell and molecular biology at an E-HSI. This elite research-intensive, public university had only recently begun to increase its Latinx enrollment to become an E-HSI. She asserted, "My internal lab [HSI university] is very collaborative. . . . [E]verybody's there to help each other and support each other. . . . [O]ver there [at E-HSI], it's super competitive. There's no such thing as collaboration." Along with competitiveness among peers, Ana also believed that "some of the [E-HSI] faculty were extremely welcoming, [but] others were extremely standoffish, like, 'I don't care what you're doing, don't talk to me.'" As a graduate student in a joint doctoral program at two different universities (HSI and E-HSI), Ana had a unique perspective in terms of navigating multiple institutional contexts within STEM. Her experiences across several HSIs/E-HSIs underscore the sense of competitiveness and isolation that WOC often experience even within diverse institutions, particularly once they reach graduate school.

Gendered Microaggressions. Some participants described experiences with covert or subtle forms of sexism or gender discrimination in their pursuit of STEM degrees and careers. Such forms of discrimination involved interactions with professors, colleagues, or classmates who uphold the patriarchy by excluding women from positions of power and undermining women's experiences of gender discrimination (Wang & Degol, 2017). Underlying these covert, subtle forms of sexism is the connotation of male dominance, including hostile or benevolent views and behaviors toward women (Wang & Degol, 2017). Mary's (Filipina; first-generation college student; cell and molecular biology major) narrative centered on her experiences as a graduate student and lab technician in an all-male medical research lab and department at a PWI, in contrast to the support she received as an undergraduate at 2- and 4-year HSIs. Although she recognized that her colleagues at the PWI valued her thoughts and contributions, she said that they also subjected her to benevolent forms of gender discrimination by treating her as the "lab mom."

Mary also encountered other covert forms of gender discrimination during graduate school. For example, although she went into a master's program with the intent to apply for PhD programs and believed that she was a strong candidate, given her work experience and educational background, her mentors undermined her academic and career goals in STEM. Mary remarked, "It was competitive. . . . I was disappointed because I had spent all this time getting more experience, working on publications, preparing my portfolio . . . [and] I didn't have the same support." Instead of advocating for her pursuit of a PhD in biomedical sciences ("You don't necessarily have to go for a PhD"), mentors encouraged her to seek lab management positions. Mary questioned why her mentors did not support her in ways consistent with her male peers: "Maybe they looked at me as a woman of childbearing age. . . . [C]ertainly I didn't have the same kind of mentorship as I did [through HSI programs]." In describing her STEM journey, Mary explained that although she felt well supported in targeted campus programs as an undergraduate, others at these HSIs often discouraged her from pursuing a STEM doctorate.

Other examples of covert, subtle forms of sexism experienced by the WOC in our sample involved notions of presumed incompetence. Participants' narratives illustrated how professors and colleagues in STEM made assumptions about and constantly questioned these WOC's competence. Elizabeth reflected on her experiences with male classmates in her engineering courses at HSIs: "They think that you don't know anything. . . . 'I'm in the same class. I kind of have a better grade than you. Why do you think I don't know this?'" She clarified that although many of her male classmates were nice, at times it was difficult for her to get help from them for more challenging problems and assignments because of these assumptions about her engineering knowledge and competence: "They'll try to explain everything to

you. You'll ask them a simple question, super simple. They don't answer it. They go on into a different rant and think you don't know it. I mean, mansplaining."

Intersections of Race and Gender. Another important theme that emerged from our interviews with WOC in STEM involved experiences at the intersections of their gender and racial/ethnic identities (e.g., a Mexicana engineering major). For example, Melissa described how her experience in industry during her first environmental engineering internship contrasted with her HSI experiences. Interactions with colleagues were degrading at times because of her identity as a woman and as a Latina in engineering:

> I was always kinda, like, in the bubble being at [HSI university]. It was so diverse. . . . I was very lucky. And at [HSCC], same, there was, like, a big Latino community. It was not until I went out into the workforce . . . [that] it was just mostly males and White people. And it just felt overwhelming. . . . People would sometimes be racist . . . like, "Oh, you're an engineering intern?" Like, they wouldn't believe it . . . just the way they would say it. Is it because I'm female, or is it because I'm Latina? . . . [I]t was hard, and it still is sometimes.

She continued to discuss her reasons for persisting in a field where she felt marginalized as a WOC: "[T]hat part was hard . . . being in a field where there w[ere] no women and no Latinas . . . but I knew I could do it."

For Elizabeth, her identity as a woman was at the forefront of her STEM experiences at a 4-year HSI:

> For me, [being Hispanic is] kind of second to being a woman in engineering because I don't necessarily feel when I walk into a room, it's like, "I'm feeling Hispanic here." . . . I felt like that in [a Midwestern PWI], but here, it's like I'm the only woman in this room. It's hard.

As one of the few women in engineering classes composed almost entirely of men, Elizabeth acknowledged the salience of her gender identity. Conversely, her Latinx identity was less pronounced, given the racial/ethnic diversity of the 4-year HSI she attended compared to the PWI university she attended (before reverse transferring to an HSCC), where Latinx undergraduates made up less than 6% of the student population. Luisa, a Latina (Salvadorian American) premed first-generation college student, similarly expounded the prevalence of gender in shaping her STEM experiences: "I actually haven't experienced some things most Hispanics have, because . . . I'm light-skinned. . . . People never know what I am, so . . . the race thing is not a[s] big [a] factor for me as it is to be a woman in the field." Distinct from Elizabeth's experience, Luisa disclosed how her physical appearance and racial ambiguity might have contributed to her experiences as a WOC in STEM. More specifically, she perceived being a woman as much more central to her experiences in STEM because she had not encountered the same racial discrimination as other Latinxs in STEM.

Esmeralda (Mexican American/Puerto Rican; first-generation college student; psychology major), who attended an HSCC and transferred to a 4-year HSI, articulated that her intersecting identities often resulted in tokenism, professors calling on her to be a spokesperson for the experiences of other students who similarly identify with several marginalized identities:

> [F]or me, that's definitely a salient identity . . . not just being a woman, a woman of color, or Latinx specific[ally], but being a gay woman. Something I have to constantly think about all the time . . . "Look at all these marginalized identities Esmeralda has. Let's just plug her in everywhere."

Esmeralda's narrative reiterated the mental and emotional exhaustion she endured while being constantly regarded as the teacher rather than a student.

Responses to Oppressive STEM Environments

Challenging Stereotypes. WOC in our study persisted and successfully navigated HSI STEM transfer pathways despite the obstacles they faced in STEM. In sharing their narratives of success, participants described their efforts to combat gender and racial stereotypes as they were confronted with a lack of representation, feelings of isolation, and competitiveness within the STEM disciplines. Many acknowledged that these STEM ideals conflicted with society's perceptions of how WOC should behave. Esmeralda described dual expectations of "cutthroat" competitiveness in STEM, while simultaneously experiencing hostility when she displayed assertiveness or other characteristics that did not meet others' expectations of women and particularly WOC (e.g., "[D]on't be assertive, don't speak louder than anybody else, don't cause conflict."). With this conflict between gendered and racialized stereotypes and characteristics valued in STEM, some described how their pursuit of particular majors and career paths challenged stereotypes about WOC in STEM. Jasmine (Mexicana; first-generation college student; civil engineering major) stated, "I've always been the kind of person who likes to do things that are different to the standards of what typically society does, and I feel like I'm achieving that as far as being an engineering woman." She explained how overcoming racism/sexism in STEM was essential to remaining a strong role model for other WOC in the field. Melissa's narrative as a Latina engineer similarly reflected her desire to persist: "I just wanted my sister to see that she could do whatever she wanted . . . to set that example for her that she could do it." Despite the racism/sexism she faced as an environmental engineering intern, Melissa wanted to show her sister that Latina women could succeed in any field. Nicole described how her mother had helped prepare her for the discrimination she eventually experienced as a Black woman in STEM at a 4-year HSI: "My mom always taught me you have to work harder than the

next person because they might not look like you, or they have other advantages." She further explained how she challenged these gender/racial stereotypes:

> [T]he other two girls that I started studying with, they don't look like me. . . . [T]hey have other resources. . . . [B]ecause I was able to utilize them, I was able to understand the textbook more, because this is biochem with the professor that don't like me, right, and doesn't help.

By building relationships with STEM peers who had access to financial resources for tutoring and other supports, Nicole found ways to excel in STEM despite the discrimination she experienced from professors.

Importance of Women Mentors and Support Networks. Given the challenges they face as WOC in STEM, several emphasized the value of having women mentors and a strong support network of women within and outside STEM. Establishing supportive relationships with other women, specifically WOC, was integral to their successful navigation of higher education. For example, although Nicole had few interactions with STEM faculty who were WOC, she recalled interacting with a Black woman who was an administrator at her 4-year HSI in charge of a campus support program for Black students in STEM. Similarly, Bianca, a Filipina first-generation college student studying clinical psychology and statistics, spoke about her support network of women at the multiple institutions she attended. She highlighted an HSCC psychology professor and two student affairs professionals at her 4-year HSI who connected her with campus support programs in STEM that prepare underrepresented students in biomedical and behavioral sciences for PhD programs. She remarked, "[T]hey're just amazing women . . . very empowering, passionate, and dedicated to help[ing] students succeed. . . . I wouldn't have achieved this much without their support, especially them believing in me." When asked why she was able to connect with her mentors so well, Bianca stated:

> Melanie because she's Filipino, so that helped a lot. . . . [T]hey're mainly approachable people, and they're just passionate in helping students. They see the students' strengths and abilities, and they don't hesitate to tell the student what the student's capable of and providing them with the resources that the students need to grow and succeed. Just that dedication . . . when you talk to them, they listen to you.

Bianca stressed how her mentors, all WOC, were beneficial as she transitioned from an HSCC to a 4-year HSI and as she completed the graduate-school application process. Bianca's mentors focused on her strengths and assets as a STEM student while simultaneously supporting her development as a budding scientist and scholar.

Mary spoke about the importance of having women principal investigators and women in leadership positions within what she described as an "old boys club" in STEM disciplinary culture, where women were seldom given the same opportunities as their male peers:

> [I]t was chauvinistic, but it was the culture, and it came from the top down . . . inappropriate things that were said. . . . [A]s a woman, it was challenging to try to pursue your career and your education. . . . [There were] different tiers as far as who'll be given opportunities to succeed.

Mary further discussed her experiences transferring from the school of medicine to the school of public health, which was more culturally diverse and had women in positions of authority (i.e., vice provost, department chair, her direct supervisor/principal investigator). Because the vice provost provided a space for students to voice their concerns, Mary wrote a letter describing her challenges as a woman in STEM, which resulted in departmental changes:

> [B]eing vocal initiates change. . . . I was very vocal, too, because I had transferred from an all-male lab and department to one that was probably equal genders. . . . [I] felt more comfortable about vocalizing my experiences. . . . [I]n the former one, I just had to be quiet because you don't want to be . . . teased.

As evidenced through the narratives of such participants as Bianca, Melissa, and Mary, on-campus women mentors significantly influenced the STEM educational trajectories of several WOC in our study.

Along with key relationships with women mentors on campus, participants expressed the importance of developing connections with other WOC in their classes. The value of having a support network of women classmates in a field with so few was evident in Carla's (Mexican American; first-generation college student; math major) experience at her HSCC: "That was really inspirational, just knowing that there were other women in the field of STEM, because mostly we see guys, so that was kind of intimidating." Elizabeth similarly commented on her connections with women in her engineering courses, especially because there were so few: "[T]hey want to group together because there's not that many girls in the classes. . . . [W]e're united on that . . . it would be nice to have more women in STEM, but we're not quite there yet." She also spoke about her friendships, specifically with WOC in STEM:

> I knew about the National Science Foundation's . . . REUs [Research Experiences for Undergraduates] because my friend, she had done one the previous summer. . . . She's half Mexican, half Filipino, and she is a dark-skinned girl as well. . . . We share the same difficulties. There's also two of the other girls that transferred from [HSCC]. They're both Hispanic. . . . They also encountered struggles in STEM.

These relationships provided counterspaces where the women could share STEM opportunities for advancement and connect to others who understood the barriers they faced

as WOC in STEM. Several WOC in our study also underscored the support received from women off campus and how it contributed to their success and persistence in STEM.

Discussion

Findings from this study highlight the narratives of WOC who successfully navigated HSI STEM transfer pathways within disciplinary cultures historically characterized as predominantly White and male, competitive, economic-driven, and prioritizing individual advancement (Carter et al., 2019). Using a multidimensional intersectional approach (Crenshaw, 1989; Núñez, 2014) and the HSI servingness framework (Garcia et al., 2019), this study contributes to a growing body of literature that centers the HSI context in examining the experiences of WOC in STEM (Aguirre et al., 2020; Contreras Aguirre et al., 2020; Gonzalez, Molina, & Turner, 2020). Scholars have argued that the structural diversity of HSIs may decrease isolation and promote a culture of inclusivity to better support Latinx and other underrepresented students in STEM (Madsen Camacho & Lord, 2011). However, the foundational premise for HSI servingness asserts that the presence of Latinx students is not enough (Garcia & Koren, 2020). Even so, this representation (across gender and race) was often absent from STEM-specific environments within HSIs and dwindled as WOC moved up in their STEM trajectories (Riegle-Crumb & King, 2010). Many indicated that, compared to university settings, HSCC settings were better reflections of their backgrounds and experiences and positively influenced their sense of belonging. Despite a large Latinx and SOC representation on their HSCC campuses, once enrolled in STEM-specific courses, participants noted a lack of racial diversity and gender parity, which contributed to their feelings of isolation and their experiences of discrimination (McGee, 2016). This lack of diversity worsened at the university level—even at HSIs and E-HSIs—as participants described their experiences in undergraduate STEM courses, graduate school, and industry positions. Considering the empirical evidence supporting the need to bolster faculty diversity at 2- and 4-year HSIs overall (Contreras, 2017), more STEM-specific efforts are needed to truly affect institutional and disciplinary climates.

Coping with the consequences of too few WOC in STEM within their transfer pathways, participant narratives reflected the multiplicity and complexity of challenges that WOC confront within these fields (Gutiérrez y Muhs et al., 2012; Nadal et al., 2015; Rodriguez et al., 2017). In spite of their experiences combating racism and sexism in STEM across multiple institutional contexts, several WOC in our study described their resilience in navigating STEM at HSIs by challenging racial and gender stereotypes and by establishing relationships with women mentors and strong support networks of women. Such affiliations effectively provided participants with the validation they needed to navigate STEM pathways through CCs and universities, especially amid the sexism and racism they faced in the STEM disciplines. Aligned with previous research demonstrating the instrumental role of counterspaces (Ong et al., 2018), participants centered on the value of having relatable women mentors on campus, within and outside the STEM disciplines. WOC in faculty positions were individuals whom participants felt comfortable approaching to ask questions and address academic concerns. Likewise, other women mentors and support networks on campus (e.g., through campus support programs) were key in encouraging participants to persist, connecting them with work-related experiences and networking opportunities. Mentors and support networks are critical to the STEM transfer process (Villasenor et al., 2021), and participants noted the significant role of these WOC networks in navigating their CC experiences and the transition to 4-year colleges and in providing STEM-specific resources. WOC in this study felt especially supported by those within CCs (HSCCs and non-HSCCs), as these individuals often shared similar identities (e.g., faculty/students of color, from the surrounding neighborhood/community, experienced navigating CCs and the transfer process), whereas STEM faculty at 4-year institutions, including HSIs, were primarily White and male. Our participants' experiences are consistent with those in earlier studies demonstrating the influence of having role models and faculty of the same ethnicity on Latinx students' academic motivation during college (Dayton et al., 2004). Strong support networks of women and WOC also extended beyond CC and university campuses, as participants in our study highlighted their reliance on support from women family members and peers from their community.

Implications and Future Directions

Our results illuminate the importance of considering intersectionality, and the ways in which WOC combat racism and sexism have significant implications for research, policy, and practice. Moving beyond deficit perspectives, which focus on the number of WOC who switch out of STEM majors or pursue non-STEM careers, we challenge HSIs to consider the institutionalized practices and STEM disciplinary culture that continue to invalidate WOC's experiences in STEM. Moreover, we offer several suggestions for enhancing structures for servingness at HSIs by improving institutional policies and practices (Garcia & Koren, 2020) to encourage inclusion for WOC in STEM. Such measures could potentially increase access to higher education and careers in STEM for WOC and improve their experiences within the STEM disciplines.

Generally, participant experiences indicated the need for professional development activities focused on classroom-inclusion strategies among STEM faculty as well as

departmental and campus-wide policies that would explicitly address and enact consequences for discrimination. The classroom setting within HSCCs needs to be emphasized, as instructors have a greater responsibility to build a sense of community within their course activities for students who are largely commuters and may not spend much time on campus or have the opportunity to participate in other college programs. Additionally, providing culturally relevant content in STEM is a potentially effective way to create inclusive spaces for WOC, who remain significantly underrepresented in the STEM disciplines and commonly contend with multiple forms of racism and sexism. Despite research establishing the importance of culturally relevant curricula grounded in critical perspectives, especially for SOC at HSIs (Cole, 2011; Dowd et al., 2013; Garcia & Cuellar, 2018; Garcia & Okhidoi, 2015; Jackson & Laanan, 2015), the need for these types of advances remains pertinent. Further substantiated by the WOC we interviewed, many continue to experience marginalization in STEM courses, as their experiences as WOC are essentially absent from STEM curricula. Because faculty typically determine course content and classroom practices, they should play a central role in developing culturally relevant curricula inclusive of students' perspectives and experiences (Garcia & Cuellar, 2018), particularly at CCs and HSIs that primarily serve SOC.

Our findings also call for the development of more comprehensive campus support programs tailored to meet the needs of WOC as they navigate STEM transfer pathways and transition across multiple institutional contexts. Considering the benefits of transfer support programs specifically designed to aid underrepresented, racially minoritized students' transition from CCs to universities (Dowd et al., 2013; Jackson & Laanan, 2015), collaborations with existing STEM support programs targeting these populations can provide more holistic support within their respective STEM disciplines throughout the transfer process (Herrera & Rodriguez-Operana, 2020; Herrera et al., 2020). Akin to the value of providing culturally relevant STEM curricula, some researchers also argue in favor of incorporating critical race pedagogy within campus programming for transfer students (e.g., Summer Transfer Enrichment Program; Jain et al., 2017), which can provide a safe space to prepare underrepresented and minoritized students to recognize, name, and confront the racism/sexism they may experience within STEM environments (Villasenor et al., 2021).

Although our study explores the experiences of WOC attending diverse 2- and 4-year HSIs—institutions that are theoretically the ideal higher-education contexts to support the academic success of Latinx undergraduates (Jain et al., 2017; Núñez et al., 2015)—participants noted the lack of diversity within STEM, where faculty and students remain predominantly White and male. Thus, participants frequently dealt with feelings of isolation and intimidation typical of the experiences of WOC at PWIs, ultimately revealing a missed opportunity for HSIs to harness the potential for more inclusive STEM environments by drawing from the strengths of their diverse population. HSIs and Minority-Serving Institutions (MSIs) are uniquely positioned to cultivate opportunities for WOC to interact with institutional agents (Pérez, 2018), potentially through HSI-funded programs specifically targeting WOC and opportunities for connecting with WOC mentors in STEM. To bolster these efforts of inclusion, institutions and STEM departments need to also engage in intentional recruitment of diverse faculty to match the experiences and backgrounds of the students they serve as well as faculty focused on diversity initiatives for WOC in STEM (Garcia et al., 2019; Salazar et al., 2019). This goal can be a significant challenge at CCs with an overreliance on contingent faculty and where an overall cultural shift to equity-centered hiring practices is needed to yield a more diverse faculty at HSCCs (Lara, 2019) and HSIs more broadly (Villarreal, 2022).

Overall, the implications of our findings align with previous research urging HSIs to promote policies and practices that are truly "Hispanic-serving" and "minority-serving." Along with promoting students' academic success, MSIs should focus on nurturing a sense of belonging among SOC by creating a positive, welcoming campus climate equipped with targeted programming for students and engaging the surrounding community (Garcia, 2017). Overall, institutions of higher education, particularly MSIs, should purposefully create programs, plan curricula, and recruit faculty in STEM to embrace student diversity across multiple intersectional identities.

Conclusion

Our study demonstrates the pervasiveness of inequitable experiences for WOC navigating HSI STEM transfer pathways across multiple institutional contexts. By applying an intersectional perspective, we offer a glimpse into the variability in WOC experiences in STEM across these institution types. This insight calls for more research on WOC, adopting an intersectional perspective that acknowledges their gendered and racialized experiences with STEM disciplinary contexts and teasing out the nuances within various institutional environments. Despite the opportunity for HSIs to create supportive campus climates with potentially greater visibility and representation of diverse students, faculty, and administration, the interview data elucidate the inequities that continue to permeate STEM fields. By drawing attention to the powerful stories of WOC who have successfully navigated transfer pathways, countered racism and sexism in STEM, and developed strong support networks of women and women mentors, we illuminate the opportunities for transforming disciplinary and institutional contexts, particularly HSIs, to support, validate, and benefit from the unique perspectives and contributions of WOC.

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