

“I Want You to Know I’m a Scientist”: Fostering Sense of Belonging for Racially-Minoritized STEM Transfer Students

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Abstract

Despite ongoing efforts to highlight diversity and inclusion in higher education, transfer students of color continue to encounter unique obstacles and experiences that impact their sense of belonging at receiving institutions, specifically in science, technology, engineering, and mathematics (STEM) disciplines. Using thematic analysis, this study sheds light on the factors contributing to sense of belonging and community perceptions of 14 racially-minoritized transfer students pursuing STEM degrees and transferring into a four-year Hispanic Serving Institution. Findings indicated that these STEM transfer students perceived their sense of belonging as predominantly revolving around academic and disciplinary achievements rather than racial factors. These insights underscore the need for institutions to actively foster deeper relationships between faculty and transfer students that acknowledge students’ identities and interests inclusive of and beyond race. Findings also illuminate the need for creating spaces that address these students’ interpersonal needs, consequently enhancing their sense of belonging and academic success.

Keywords: transfer students, Transfer Receptive Culture, STEM majors, racial minority students, Hispanic Serving Institution

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Science, technology, engineering, and mathematics (STEM) educators recognize a growing need to increase their fields’ diversity of knowledge and professionals (Tsui, 2007). Longitudinal studies report that participating in clubs/organizations or undergraduate research programs can significantly increase persistence among underrepresented racially-minoritized students in STEM majors (Winterer et al., 2020). On-campus engagement with individuals or organizations can increase students’ sense of belonging, defined as their perception of on-campus social support, connectedness, and feelings of being respected and cared for (Strayhorn, 2018). Despite increasing efforts to enhance sense of belonging among racially-minoritized students, transfer students are frequently overlooked (Bragg, 2017; Castro & Cortez, 2017).

Transfer students make up more than 10% of the U.S. undergraduate college student body (National Student Clearinghouse Research Center, 2024) and often have unique experiences and perspectives that can support diversifying STEM disciplines. However, transfer students can struggle to navigate complex administrative processes and to adjust to new academic and social environments (Ogilvie & Knight, 2021). The present study builds upon an existing exploration of sense of belonging among transfer students of color entering into Hispanic Serving Institutions (HSIs) (Suh et al., 2023). This portion of the study explored the questions: How do racially-minoritized students transitioning into STEM disciplines at a HSI describe their sense of belonging at their new institution? What factors do they report as influencing their sense of belonging? Through thematic analysis, we uncovered how these STEM transfer students sought to establish their sense of belonging first and foremost through their academic and disciplinary rather than their racial identities. Further, while students were more likely to demonstrate their critical racial consciousness in relation to their positive sense of belonging, this level of belonging was basic, suggesting that students felt only a surface-level or mildly positive sense of connection to the institution based on their racialized identities.

Positionality and Theoretical Approach

We first acknowledge our own positionality’s impact on our engagement with the project and our analysis of the research phenomena. We are a six-person scholar-practitioner team focused on supporting postsecondary student success through a range of academic contexts. Five members identify as multilingual and racially-minoritized, five identify as female, three identify as transfer students, and two identify as STEM educators. Based on our intersectional identities and professional experiences in a racially and linguistically diverse region of the southwestern United States, we sought a theoretical framework articulating the racialized nature of transfer and college students’ developing sense of belonging therein.

Transfer Receptive Culture draws from a critical race perspective to promote “an institutional commitment by a four-year college or university to provide the support needed for students to transfer successfully” (Jain et al., 2011, p. 253). Transfer Receptive Culture theorizes transfer as: (1) a racialized phenomenon, (2) a two-way process requiring active support from the receiving institution, (3) a social justice tool, (4) best understood through individuals’ experiential knowledge, and (5) best theorized through interdisciplinary perspectives (Jain et al., 2011). The Transfer Receptive Culture (TRC) framework is highly appropriate for this study because it puts the focus on understanding and fostering racially-minoritized transfer students’ sense of belonging. These students may encounter both racial and academic challenges, impacting their sense of belonging. Thus, the theory’s acknowledgment of the racialized dimensions of transfer makes it an ideal lens for understanding the additional challenges faced by

racially-minoritized STEM students, such as lack of representation in the receiving institution, challenges accessing research opportunities, or lack of culturally relevant mentorship (Castro & Cortez, 2017; Kwik et al., 2018). This framing guides our daily practice with students, our engagement with the literature, and our analysis of transfer students’ sense of belonging.

Literature Review

Substantial numbers of college students from diverse backgrounds seek vertical transfer (i.e., from two-year to four-year institutions). Both sending and receiving institutions are responsible for helping students connect their racial, ethnic, linguistic, socioeconomic, and first-generation college student experiences to their academic success (Bragg, 2017; Castro & Cortez, 2017). However, additional scholarship is needed to understand intersecting factors impacting the experiences of transfer students of color in STEM. Below we explore challenges reported by transfer students of color and promising practices for their support in STEM disciplines. In particular, we examine scholarly recommendations for fostering a positive sense of belonging among STEM transfer students of color. Sense of belonging refers to the perception of having a relationship and feeling welcomed by a group (Hurtado & Carter, 1997). Although some scholars suggest this necessitates academic and social integration (Lester et al., 2013), Boeck et al. (2022) critique assumptions that transferring students of color must lose their identities, cultures, or experiences to experience positive sense of belonging. The position aligns with a Transfer Receptive Culture focus on the racialized nature of transfer, which is best understood through individual experiences.

Supporting STEM Transfer Students of Color

Transfer support networks and student-centered approaches are essential to the success of STEM transfer students (Bragg, 2017; Wang et al., 2017). Successful approaches include frequent and transparent communication, continuously engaging potential and recent transfer students, and developing support structures to help transfer students navigate institutional and social challenges (Davis et al., 2017; DiLeonardo et al., 2022). Many receiving institutions offer resources and opportunities specifically to support transferring students (Bragg, 2017; Wang et al., 2017); however, such supports may be insufficient if they fail to consider the unique experiences and needs of transfer students of color related to transfer pathways as well as culturally relevant resources (Taylor & Jain, 2017). Further, studies in non-minority-serving institutions have found that students of color face additional challenges in transferring compared to their white peers, resulting in fewer transfer students of color (Castro, 2017). The challenges can be particularly prevalent for female STEM students and STEM majors of color when the institution fails to consider issues of race, gender identity, or intersectionality (Wang et al., 2017). However, faculty and staff can ease students’ transfer challenges by intentionally connecting transfer students to other students of varying ages, ethnicities, geographical locations, and socioeconomic backgrounds (Kwik et al., 2018).

Cultivating a shared disciplinary identity among faculty and students can also support transfer students of color (Kwik et al., 2018). In surveying geoscience bridge program students, DiLeonardo et al. (2022) identified positive effects of extracurricular programs, such as undergraduate research and field opportunities, to encourage transfer students’ sense of connection to the disciplinary community. Shared disciplinary identity may be particularly

impactful for minority students in predominantly white institutions or other contexts where faculty and staff do not share students’ racial or cultural identities (Castro & Cortez, 2017). As demonstrated above, existing explorations of support for transfer students and students of color in STEM have not yet examined the intersection of these phenomenon (Bragg, 2017). Given the threat of multiple marginalization facing transfer students of color in STEM, additional scholarship is needed. Further, existing examinations of minoritized transfer students have focused on predominantly white institutions without examining how transfer into a Hispanic Serving Institution may shape racially-minoritized and particularly Latine students’ sense of belonging during transfer. (We use the term *Latine* as a gender-inclusive label for individuals of Mexican and Latin American descent.)

Developing Students’ Sense of Belonging

Intentional cultivation of a positive sense of belonging, or students’ perception that they matter to the university, can also support transferring STEM students of color (Kwik et al., 2018). Factors influencing students’ sense of belonging include race, gender, age, GPA, time of transfer, number of transferrable credit hours, familial and work obligations, place of residence/commuter status, and household income/financial responsibilities (Taylor & Jain, 2017; Walker & Okpala, 2017; Winterer et al., 2020). In contrast, financial constraints can also become pull factors, drawing students away from an institution’s social and academic culture (Castro & Cortez, 2017; Ogilvie & Knight, 2021). Institutions can promote students’ positive sense of belonging and sense of support through social and academic involvement such as interactions with faculty and peers (Boeck et al., 2022; Lopez & Jones, 2017). Cultural climate, another significant factor in transfer student success, refers to a combination of social, political, economic, and cultural environments (Kwik et al., 2018; Winterer et al., 2020). However, cultural climate and other institutional factors can compound marginalization for transfer students of color, particularly when their racialization is contextualized by limited engagement with the receiving institution’s academic or social environment. Scholars have called for further examinations of transfer students’ racialized and gendered experiences (Kwik et al., 2018; Mobley & Brawner, 2019); scholars must also explore the role of sense of belonging for these students.

Resulting from their mixed methods study examining students’ sense of community, Boeck and colleagues (2022) found students experienced positive and negative belonging, validation, and support which in turn influenced their feelings of community. In particular, the authors found that transfer students can report feeling supported by faculty and staff while still experiencing loneliness on campus, illustrating sense of belonging’s complexity and contextual nature. This study and others discussed above point to the need for additional exploration of how transfer students of color transitioning into STEM disciplines experience belonging. Further, previous belonging literature focuses on students of color in predominantly white institutions (Foxy, 2021) or sense of belonging among both white students and students of color (Kim et al., 2016; Museus et al., 2018), less is known about sense of belonging among STEM transfer students of color in Hispanic Serving or Minority Serving Institutions where institutional contexts may mitigate or otherwise impact threats of students’ multiple marginalization based on their racial identity, transfer status, and disciplinary major.

Transfer Students in HSIs

Hispanic-Serving Institutions (HSIs) are federally recognized colleges and universities with at least 25% Latine students enrolled full-time (U.S. Department of Education [USDOE], n.d.). Such designation provides the institutions with access to specific federal funding programs, such as Title V, especially for supporting economically disadvantaged Latine students. Aligning with Latine students' preference for proximity to family, HSIs are often located in urban and suburban areas and are expected to grow in response to the nation's rising Latine population (Hurtado & Ruiz, 2012; Lopez-Turley, 2006). Latine students at HSIs often have greater academic and financial needs (Núñez et al., 2016), yet few institutions have a clear agenda to improve academic outcomes specifically for these students, particularly related to incoming transfer students. Although HSIs provide access, they do not always foster equitable outcomes; compared to their peers, Latine students at these institutions have lower graduation rates in STEM fields, and many HSIs lack visible, mission-driven initiatives to support their Latine populations (Contreras et al., 2008; Contreras & Contreras, 2015). Thus, HSIs require deeper understanding of the challenges and affordances of these unique institutions in supporting their Latine, first-generation, underrepresented, and transfer students. In particular, additional research is needed to illuminate how racially-minoritized students perceive their transfer into such institutions, including students' perceptions of the factors that influence their sense of belonging in the receiving institution.

Methodology

We designed our study around the methodology of content analysis, which seeks to reduce phenomena into defined categories of interpretation (Harwood & Garry, 2003). We applied qualitative thematic analysis as a method, or specific analytical approach, to identify analytical categories and emerging conceptual definitions (Clarke & Braun, 2017). Thematic analysis' theoretical flexibility encourages the application of a perspective, such as Transfer Receptive Culture (Jain et al., 2011), that is inclusive of researcher subjectivity to examine participant language and experience, such as racially-minoritized transfer students' experiences as STEM majors at a Hispanic Serving Institution. Following Nowell et al. (2017), we describe our data collection and analysis processes below to maximize trustworthiness.

Data Collection

The study took place at Regional Star University (RSU; all names are pseudonyms), a large public four-year institution with over 38,000 students. RSU is a Hispanic Serving Institution: nearly 60% of the population are students of color (42.2% Hispanic, 11% Black, 7.6% Other). Further, 38.6% are first-generation, 35.3% are Pell grant eligible, 18.8% are pursuing a STEM degree and 6.9% are transfer students. The transfer population reflects general university student demographics: 60.6% are students of color, 38.2% are first-generation, 36% are Pell grant eligible, and 21.1% are STEM majors.

Students were selected through purposive criterion sampling (Creswell, 2013). Mirroring our previous studies (Suh et al., 2023; in press), we utilized the university database to identify STEM-major students who identify as racially-minoritized, undergraduate transfer students with 75 or more credit hours. Eligible students received an email invitation to participate in the study;

of 645 students meeting our selection criteria, 14 responded and completed an interview (Table 1). Participants were compensated with a gift card.

The research team conducted zoom-audio recorded interviews. Students self-identified their race, gender, and their sending institution (to identify vertical or horizontal transfer) and answered questions about their sense of belonging and experiences transferring to RSU through a semi-structured interview protocol (Jabbar et al., 2021).

Table 1

Participant Demographics

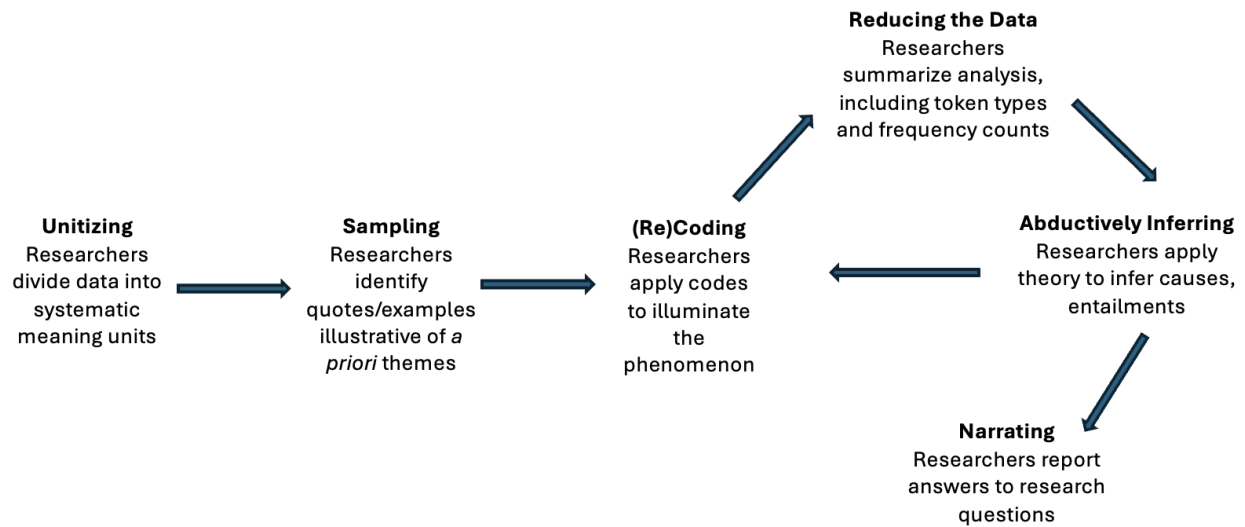
Pseudonym	Race	Gender	Vertical/Horizontal Transfer
Valeria	Hispanic/Latino	Female	Vertical
Raquel	Hispanic	Female	Vertical
Diego	Hispanic	Male	Vertical
Javier	White/Native American	Male	Vertical
Anthony	Black	Male	Vertical
Rosa	Mexican	Female	Horizontal
Taylor	Multi-racial	Non-Binary	Horizontal
Adrian	Hispanic	Male	Vertical
Anne	Vietnamese	Female	Vertical
Kim	Asian	Female	Vertical
Erik	Latino	Male	Vertical
Fernando	Hispanic	Male	Vertical
Leo	Hispanic	Male	Vertical
Martha	Hispanic	Female	Horizontal

The first and third author began by Unitizing the data (Figure 1), dividing interview transcripts into systematic meaning units and then identifying quotes among the units to act as illustrative examples of themes derived from previous studies of factors influencing sense of belonging among transfer students of color (Suh et al., 2023). Aided by the qualitative data analysis software MaxQDA for memoing and coding, the researchers then engaged in a reiterative process, (Re)coding, Reducing the Data, and Abductively Inferring, to apply codes to meaning units. The researchers considered coded units in relation to each other and based on their frequency, and then they applied the Transfer Receptive Culture and Belonging theory to infer causes and entailments of the transfer experiences of these STEM students of color. Memos in MaxQDA captured our reflexive journaling and audit trail of code generation. Both practices are documented means of establishing trustworthiness (Nowell et al., 2017). Throughout the analysis, we met regularly, checking each other’s coding to establish consensus. For instance, Author 3 initially coded Rosa’s praise for her instructor and lab assistants with the factor *Care for Academic Needs*; however, through Reducing the Data to compare coded units, we determined that *Care for Academic Needs* includes subthemes such as *Support in Classes*.

Through Recoding and Reducing, we also Abductively Inferred students’ level of *Racial Consciousness* as a theoretical entailment of Transfer Receptive Culture (Jain et al., 2011), refining the codebook, and combining and collapsing codes to generate the subthemes within each factor until no new meanings emerged and we were able to narrate answers to the research questions. The first author maintained the team’s research journal (Nowell et al., 2017) to support naming themes and reporting reasons for theoretical, methodological, and analytical choices throughout the study.

Figure 1

Data Analysis



Findings

This thematic analysis explored racially-minoritized transfer students’ sense of belonging as they transitioned into STEM disciplines at a four-year HSI. We also sought to illuminate the factors these students reported influencing their sense of belonging. This section presents the findings in two main parts. The first part outlines general findings regarding transfer students’ sense of belonging and influencing factors. The second part provides in-depth analysis of the role of race in shaping transfer students’ sense of belonging.

Sense of Belonging

Interviewed STEM transfer students reported experiencing both positive and negative sense of belonging. *Positive Sense of Belonging* largely referenced students’ sense of connection to the institution:

I've gone to like seven or eight different universities. But coming to RSU, it's the first time I felt like I've wanted to excel and like really finish, you know what I mean? [...] Hey, I'm in the internship, sticking here for grad school and I haven't even looked at other grad schools. I'm just like, I want to I want to stay here, and I want to go here. (Leo)

Leo’s comment exemplifies a *Positive Sense of Belonging* in which students feel connected to the institution by highlighting how RSU has provided him with a supportive and motivating environment unlike any of the multiple universities he previously attended. His statement about "want[ing] to stay here" and not even considering other graduate schools reflects a deep connection to the institution, suggesting that he feels valued, included, and invested in their academic journey at RSU (Suh et al., 2023). Students made 296 mentions of a *Positive Sense of Belonging* in their interviews. Despite these instances of *Positive Sense of Belonging*, every student also described instances of *Negative Sense of Belonging* (145 mentions), or their sense that they did not matter at RSU:

If I wasn't paying tuition, would they care for me as a person? I don't know. Maybe it's hard to say someone cares for me as a person when I'm dishing out a large sum of money for them, too, right? It feels to me more like a business relationship... My school is not my loving father. (Diego)

Diego, for example, exemplified students’ sense of emotional distance from and distrust of the institution.

Factors Influencing Sense of Belonging

Echoing previous studies (Boeck et al., 2022; Museus et al., 2017), sense of belonging, whether positive or negative, was influenced by multiple factors, frequently varying by context (Table 2). For instance, *Care for Academic Needs* often promoted positive sense of belonging; however, students experienced negative sense of belonging in the absence of that care. Table 2 shows an example of each factor impacting students’ sense of belonging in positive and negative ways.

Table 2

Factors Impacting STEM Transfer Students’ Sense of Belonging

Factor influencing Sense of Belonging (Frequency Count)	Student Example of Positive Sense of Belonging	Student Example of Negative Sense of Belonging
Level of Care for Academic Needs (327): Positive (199), Negative (128).	“I felt like I was going somewhere, like I was doing very important things.... I feel like it’s opened doors, and how I actually think about my major, and allows me to narrow down my focus.” (Taylor)	“I feel bad because [the faculty are] very lovely people, they're wonderful. It's just that I think some representation would be greatly appreciated. And also, I think a lot of them were used to dealing with students that came from a lot of privileges and didn't necessarily have to worry about the financial aspect of school. I know for a fact that like for a lot of Latinos, like we have to worry about that... and [professors] not fully understanding
	(continued)	

		being away from your community and not really fully being around other Latinos.... And sometimes being the only Latino in your class was difficult.” (Valeria)
Level of Care for Interpersonal Needs (204): Positive (131), Negative (73)	“I think it is like how much I have grown since coming here, like watching myself develop and conquer all these obstacles like classes that I thought I wouldn't be able to do. Being able to do them and have my community support around them. Getting plugged into all these different social events or organizations. I'm starting to feel more at home.” (Taylor)	“Since as a transfer student, you don't come in with a big group of other transfer students where there's a sense of like, ‘Oh, we're all going through the same thing.’ It was like you were thrown by yourself. Then you got to figure things out as compared to incoming freshmen. They basically come from the same graduating class. They have a lot of things in common and it's easier for them to form relationships because they've been going to new student orientation or living on campus together.” (Javier)
Level of Racial Recognition (135): Positive (122), Negative (13)	“My abuelitos, my abuelitas, they're dark, my mom. So going back just a generation, it means a lot to have somebody in the family who was an engineer or a doctor. I guess coming from a Hispanic Latino household is like titles like that are a really big deal. So it's a two-fold thing. I wanted to be challenged and I want to make my family proud today.” (Erik)	“I don't look like your traditional STEM, white man settings. I did not fit that. I think a large part of my experience at [RSU] is learning to break away from this imposter syndrome. I didn't look—I looked different, so I must not be it.” (Taylor)
Level of Campus Community Accessibility (159): Positive (126), Negative (33)	“I've had the biggest success in groups that are really diverse. Like they've got a really diverse group of people like my honors fraternity is really culturally and racially diverse. There's a good portion of Latinos in our honors fraternity, as well as black people, Asian people. I mean, there's a lot of white people. It's like there's a little bit more diversity in regards to minorities in those settings.” (Valeria)	“They [other students] invited me a couple of times to join the microbiology club. But I live all the way in [another town], and they wouldn't meet until five or six. And by that time, I would either have classes... or I was already tired from the whole day being at school and driving back home.” (Javier)
(continued)		

Level of Care for Basic Needs (8): Positive (0), Negative (8)	N/A	“Social sources, legal sources, healthcare sources. None of that was communicated to me.... I didn't know about their psychiatric counseling or their support groups until maybe about a year into my time here because I registered with ODS because I have autism as well... but I had already been here for like a year-and-a-half by the time I was invited to the support group. So it was just a little bit odd, like, why weren't these resources communicated to me originally?” (Valeria)
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Level of Care for Academic Needs

Care for Academic Needs, i.e., validation of students’ academic identities (Boeck et al., 2022), influenced students’ positive and negative sense of belonging more than any other factor. All 14 students mentioned the factor in the context of both positive and negative sense of belonging. Students were more likely to describe the factor as promoting positive sense of belonging (Table 2). For instance, Rosa described the significance of other students’ positive perceptions of her as a teaching assistant:

They were telling me that I’m such a good teacher and how I was the best and how I was funny and I knew how to teach them. And that's when I'm like, ‘Wow, this is for me, Chem is for me, like the science major’s for me.’ I think that's the best experience I've had.” Others similarly oriented their sense of belonging around their disciplinary identity rather than a broader sense of connection to RSU.

Despite these relationships, students were more likely to attribute *Care for Academic Needs*, and thus their positive sense of belonging, to faculty rather than classmates:

[Professors] will help you with any questions you have. They’re really open about discussing topics that you didn't understand in class. They will help you find resources. If you didn’t understand how they were lecturing, they would point you to different videos you can find online with somebody else explaining the lecture of that the same topic. They will do what they could so you would succeed. (Javier)

When students felt unsupported in classes, they similarly focused on perceived lack of support from faculty rather than lack of connection to other students. Although some students (Table 2) associated faculty or classmates’ acknowledgment of students’ racial or cultural identities with *Care for Academic Needs*, the factor centered upon students’ perception that they were being supported in their disciplinary or professional goals.

Level of Care for Interpersonal Needs

Every student mentioned *Care for Interpersonal Needs*, or personal connections to others on campus, as influencing their positive sense of belonging. *Care for Interpersonal Needs* demonstrated the personal support which Boeck et al. (2022) attributed to time and people. This support, or *Care*, frequently resulted from relationships that began through in-class friendships and then extended beyond a focus on academics as students joined classmates in Greek life, campus clubs, or sports events within the broader RSU campus community (Table 2). Students also described experiencing *Unmet Interpersonal Needs* on-campus which most attributed to challenges arising from living and working off-campus, child or elder care, being nontraditional students, or starting their postsecondary career at a different institution. These experiences and responsibilities distinguished the transfer students from non-transfer RSU students and made it challenging to connect. Although intersections of race and socioeconomic class may make it more likely that racially-minoritized students would have *Unmet Interpersonal Needs*, students attributed their negative sense of belonging almost exclusively to what Valeria described as “missing out on those academically driven social opportunities that eventually led to other social opportunities.” Missed opportunities included living in the dorms, taking part in first-year experience activities, or participating in the Undergraduate Research Conference. Valeria’s comment echoed students’ recognition of the intersection of *Interpersonal Needs* and *Academic Needs* in shaping students’ sense of belonging. In fact, these students rarely connected their racial identity and their interpersonal needs. Instead of creating relationships with others based on shared racial background, students were much more likely to note the general diversity of campus or their friend groups.

Level of Campus Community Accessibility. The factor of *Campus Community Accessibility* more frequently contributed to positive sense of belonging, such as when students felt that on-campus events and programming were accessible based on scheduling and location or when students were familiar and comfortable navigating the physical campus. In these instances, students appreciated RSU’s ability to accommodate their out-of-school lives. This theme nuances how theorizations of the role of proximity to campus—such as living on or off campus—affect belonging (Boeck et al., 2022). Importantly, the factor may produce negative sense of belonging due to challenges accessing or navigating the physical campus or groups/events. In 24 mentions, students described negative sense of belonging due to not knowing about engagement opportunities until the last minute; being unable to attend events because of studying, work, or familial obligations; or challenges associated with commuting. The knowledge that such opportunities existed but were out of reach contributed to students’ negative sense of belonging. Taylor recognized the value of getting involved in student organizations but struggled as a financially independent student to balance work and extracurricular activities: “I remember coming to [RSU] and really being promoted like get involved in student orgs. All that. I’m like, ‘How do people have enough time for this? How do you have enough time for this?’ That was hard to conceptualize.” Of the 13 students who attributed their positive sense of belonging to *Access to Events*, six also described how the events’ inaccessibility also promoted a negative sense of belonging. Importantly, there were no overlaps between the theme and students’ references to their racialized identities.

Level of Care for Basic Needs

Care for Basic Needs referred to students’ sense of belonging as a result of RSU’s attentiveness to financial aid or food/housing (in)security/issues. Notably, no student indicated that this factor contributed to their positive sense of belonging, although five students made eight mentions about negative sense of belonging because of *Lack of Care for Basic Needs*, mostly related to financial constraints (Table 2). Valeria, for instance, expressed frustration over lack of communication about available resources, illustrating how availability is not access and how positive sense of belonging requires access that was timely, relevant, and personalized. Importantly, this *Care* differed from academic-oriented validation (Boeck et al., 2022) to instead validate students’ innate humanity; thus, the finding aligned with Transfer Receptive Culture’s focus on the individualized experiences of transfer students (Jain et al., 2011). At times, students also acknowledged how *Care for Basic Needs* intersected with their racial identity:

I feel bad because they're [science and engineering academic advisors] all very lovely people, like they're, they're wonderful. It's just that I think that some representation would be greatly appreciated. And also I think a lot of them were used to dealing with students that came from a lot of privilege and didn't necessarily have to worry about the financial aspect of school. Or like, I know for a fact that like for a lot of Latinos, like we have to worry about that... and them not fully understanding the being away from your community and not really fully being around other Latinos. And trying to find that [sense of being around other Latinos]. And sometimes being the only Latino in your class was difficult. Just people that were more aware of how that played into actually receiving our education. (Valeria)

Valeria’s sense of negative belonging resulted from a lack of racial and ethnic representation among science and engineering academic advisors, as well as the need for advisors who could understand her experiences as a student of color navigating financial hardship. Her comments exemplified how RSU’s lack of understanding of the basic needs of racially-minoritized students contributed to a negative sense of belonging at the institution. Valeria’s comment also hints at her *Critical Racial Consciousness*, a subtheme of the final factor which we explore below.

The Role of Race

Students’ tendency to highlight factors other than—or in addition to—race as influencing their transfer experience requires additional explication. Echoing the literature (Castro, 2017; Taylor & Jain, 2017), race mediated students’ sense of belonging in complex and nuanced ways. Further analysis through a Transfer Receptive Culture’s critical theory lens (Jain et al., 2011) uncovered distinctions in students’ level of racial consciousness which we have summarized as students’ critical awareness of the impact of race on their transfer experience and resulting sense of belonging (Suh et al., in press; see also Strayhorn, 2018). Students’ racial consciousness aligned with their need for validation of their innate humanity (Boeck et al., 2022).

In our analysis, we first distinguished between levels of *Racial Consciousness* (Figure 2). We coded these as *Uncritical Perspectives on Race* (i.e., actively claiming that race is irrelevant to students’ learning or experiences on campus, or claims that a student does not consider race; 6 mentions among four students); *Underdeveloped Racial Consciousness* (while not *Uncritical Perspective*’s overt denial of race as a factor, still not demonstrated awareness of race/racism;

unawareness of race as a social construct or its impact on students’ access to resources; 9 mentions among seven students); *Developing Racial Consciousness* (limited awareness of race as a social construct in that the student may perceive race/racism as related to individual factors rather than a systemic issue; 50 mentions among 14 students); and *Critical Racial Consciousness* (understanding of race as a social construct relating to issues of access or power; 31 mentions among eight students).

After determining the level of racial consciousness of each unit of student talk that mentioned race, we examined each unit’s level of belonging (negative and positive). Overlap between racial consciousness levels and belonging levels is shown in Table 3. Figure 2 further presents interaction between the levels of *Critical Racial Consciousness* and sense of belonging with a scale of belonging moving from negative to positive belonging along the x-axis and levels of racial consciousness moving from negative to positive up the y-axis.

Table 3

Racial Consciousness and Belonging

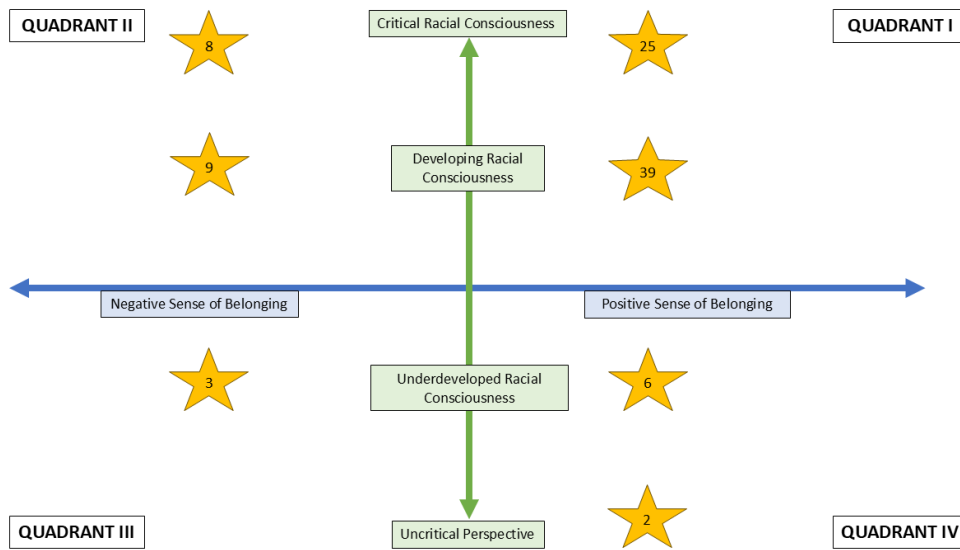
Levels of Racial Consciousness and Sense of Belonging	Negative Sense of Belonging	Positive Sense of Belonging
Uncritical Perspective on Race	N/A	I don't really think in terms of races or ethnicities like Americans do. (Diego)
Underdeveloped Racial Consciousness	Example: Interviewer: Did you feel like you were a part of the [school mascot] community? Leo: No. But I mean, part of it was like I said, not really getting that [HSI] welcome and not really knowing [That RSU was an HSI] kind of deal. But also, it was just me personally, I wasn't very wanting to be open and welcoming kinda deal. (Leo)	I really enjoy during Hispanic Heritage Month and when they have like the ballet folklorico by the arch and then it had a little like market. And they're selling a lot of like Hispanic knick-knacks. That was fun. But I'm not quite sure [it impacts how I feel about campus] I guess. (Javier)
Developing Racial Consciousness	For O-Chem II, I had to take him because there was no other teacher.... I don't learn anything with him. But most of all, because he only looks up upon the smart white people that are on top of me. (Rosa)	Well, there are a lot of people of color in the classroom. So my professor haven't been rude to any of the colored students so I think I do belong in the classes. (Kim)

(continued)

Critical Racial Consciousness	There's some diversity in there [engineering classes]. Not as much as I would like there to be. There could definitely be more people of color in there, more female presenting people of color in there as well. Yeah, I also feel like it kind of gives me a purpose for when I am in there. Mind you, I don't want it to be like that, but I feel like the seat that I'm holding right now is very significant. (Taylor)	Most of the professors that I've had, they've been people of color.... And then teaching at a diverse institution like [RSU], I'm pretty sure they understand the differences that people of color experience going to college. Because most of them talk about how they come from really white states, where they wouldn't ever see a black person or a Hispanic person. So sometimes they talk about how it was a big shock and they really love [RSU] because of how different it is and how it made them open their eyes. They change their perspective on certain things. (Javier)
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Figure 2

Racial Consciousness and Sense of Belonging



Racial Consciousness and Sense of Belonging

The most significant overlap between racial consciousness and belonging occurred in Quadrant I which includes the intersection between basic or positive sense of belonging and positive levels of racial consciousness (*Developing Racial Consciousness* and *Critical Racial Consciousness* (Figure 2). In general, students showed some level of *Racial Consciousness*

through which they articulated the impact of race on their college experience, and this supported their developing positive sense of belonging. The themes *Positive Sense of Belonging* and *Developing Critical Racial Consciousness* had 39 intersecting mentions among all 14 students, followed by *Positive Belonging* and *Critical Racial Consciousness* with 25 mentions.

In an example of *Developing Racial Consciousness* and *Positive Sense of Belonging* (Table 3), Kim described her *Belonging* in class as influenced by her *Developing Racial Consciousness*. Although she acknowledged the role of race, her sense of belonging was due simply to not being targeted by racist remarks. Many students shared this perspective, frequently noting how their racial identities mattered on campus; however, their standards for mattering were often relatively low. Diego noted, "The student body in general comes from everywhere in the world. So, they're [faculty] used to seeing different people, right, than themselves. So yeah, I have felt like I'd been understood, treated well, and that's always appreciated." While describing faculty's openness to diversity, Diego's comment illustrated how students' positive sense of belonging was attributable to surface-level inclusion.

Less frequently, although still more than in any other quadrant (Figure 2), every student also made comments evidencing *Critical Racial Consciousness* intersecting with *Positive Belonging* (25 comments). An example of *Critical Racial Consciousness* and *Positive Belonging* can be found in Table 2 in Javier's explanation of the significance of racially diverse professors to the students' developing feelings of being understood. Javier's comment evidenced *Critical Race Consciousness* in articulating the significance of race/racial representation in educational environments and the value of having faculty of color share their experiences.

Seventeen coded segments from nine students illustrated the overlap between *Negative Sense of Belonging* and *Developing* and *Critical Racial Consciousness* (Quadrant II, Figure 2). These mentions illuminated how students who did not develop a positive sense of belonging related to their racial identity could still develop a negative sense of belonging based on race (Quadrant II in Figure 2). For instance, Rosa's negative sense of belonging resulted from negative racialized experiences with a professor (Table 2). Most students perceived that their racial identities distinguished them from others. Nine of the 14 students mentioned limited on-campus racial representation, negative experiences with teachers, feelings of isolation/desires to blend in or not be singled out, and the absence of discussions of race in STEM classes.

In many instances, students were reluctant to focus on race in negative or divisive ways; in such cases, students displayed *Developing Racial Consciousness* (39 mentions), minimizing the systemic nature of racism and its effect. This occurred through critiques of accent or language, and references to the campus' general racial diversity, whitewashing racial diversity or its significance—all of which served to undercut their recognition of racism at the institutional level. These examples of *Developing Racial Consciousness* were more prevalent than *Critical Racial Consciousness* (29 mentions). For instance, a student commented, "Most of the time, I find myself wanting to blend in as much as possible, and I don't like to be singled out for being different, even though it's impossible not to be recognized as different [in class]" (Anne).

Uncritical Perspectives on Race

Initially, our team struggled to make sense of when STEM transfer students of color denied or were unaware of the relevance of race (Quadrants III and IV, Figure 2). Such comments were represented by *Underdeveloped Racial Consciousness* (3 mentions for *Negative*

Sense of Belonging and 6 mentions for *Positive Sense of Belonging* respectively). Two students also developed *Positive Sense of Belonging* through an uncritical perspective in which they refused to address race as a factor in shaping their sense of belonging. For instance, Diego rejected American conceptualizations of race:

The feeling of like being a [school mascot] comes from the people you interact with, which come, come from everywhere in the world. So, yeah, that I don’t really think in terms of races or ethnicities like Americans do, which is a very [unintelligible] concept in their worldview. Where I come from it’s not really a big deal.

Similarly, three students showed an *Underdeveloped Racial Consciousness* that overlapped with feelings of negative belonging or positive belonging to the institution (6 comments from 5 students). In such instances, students described race as irrelevant to their experiences in college or their disciplinary knowledge, like Javier’s confusion about how Hispanic celebrations can impact his feelings toward the campus community (Table 2). Others similarly saw limited relevance between racial diversity and science:

[Biology classes] are not classes where there's more of a social aspect.... So, I have a minor in Sustainability Studies.... Those classes tie more into culture and science and the environment. They’re more intertwined, those two spheres. But now this class [biology] is just straight up, you know, evolution. We're learning about the population, genetics, and stuff like that. Not much about people. I mean, we did learn about the evolution of people like some concepts there. But that applies to everybody, not just a particular race. Well, I guess that's a good thing. He didn't say anything off the wall during that or nothing and I'll just end it there. (Raquel)

Instead, STEM transfer students of color commonly noted the importance of other factors on developing their sense of belonging. For instance, Adrian identified faculty’s age (as a proxy for their up-to-date knowledge) and competence were more important than their understanding of racially-minoritized students’ experiences. Others emphasized disciplinary, rather than racial, identity for developing sense of belonging:

That's [race] not the part of my identity I want you to look at. I want you to know I'm a scientist, I'm an engineer. I'm, you know, I'm doing this versus this. It's there. We all see each other[’s race], and we know, but that's not always what we want to bring up or we want other people to notice. (Anne)

Anne's statement was a powerful testament to her efforts to shape her identity by explicitly deemphasizing race. Anne oriented her sense of belonging in her chosen identity rather than in response to her perceptions of faculty, classes, or the larger program. Given the transfer receptive focus on honoring perspectives of students from marginalized communities (Jain et al., 2011), we affirm Anne's claim to a disciplinary identity even as we acknowledge the significant role race plays in many racially marginalized STEM transfer students’ experiences.

Most students demonstrated either *Developing* or *Critical Racial Consciousness* in combination with a positive sense of belonging. Further, some students developed a negative sense of belonging more frequently related to *Developing* and *Critical Racial Consciousness* than underdeveloped or uncritical perspectives. Such findings were significant because they illustrated that some students need additional support to feel their racial identity is included in and relevant to the campus community. However, overlaps of racial consciousness and negative

sense of belonging (Quadrant II, Figure 2) included an avoidance and minimization of the role of race as a systemic issue. Finally, some students held *Underdeveloped* or *Uncritical Perspectives* on race yet still developed a positive sense of belonging. We propose that such an overlap occurs when students prioritized factors beyond race, such as disciplinary competence and disciplinary identity. Another reason could be due to students' limited opportunities to learn about race in their chosen discipline.

Discussion

This study utilized Transfer Receptive Culture (Jain et al, 2011) to understand factors influencing racially-minoritized transfer STEM students' sense of belonging. While students primarily sought sense of belonging in their academics and disciplinary identity, meeting interpersonal needs, racial recognition, and campus accessibility were also relevant factors.

Disciplinary Belonging

Our study confirms previous findings that positive interactions with STEM faculty, classmates, and tutoring services support academic success and positive sense of belonging (Lopez & Jones, 2017). Meaningful interactions with discipline faculty can lead to research and teaching opportunities (DiLeonardo, 2022), thus meeting students' inherent need to both belong and reach their professional goals. In contrast to preservice teachers, STEM students were more motivated by academic and career success and sought ample opportunities to connect to their discipline (Suh et al., 2023).

The Nuanced Role of Race

The relative frequency of overlap between *Developing* or *Critical Racial Consciousness* and sense of belonging (positive and negative) confirms previous literature about the racialized nature of belonging (Castro & Cortez, 2017). However, the impact of race on sense of belonging may be more complicated than previously hypothesized (Strayhorn, 2018). Our data illustrated how *Underdeveloped Critical Consciousness* and *Uncritical Perspectives* were more likely to promote positive, rather than negative, sense of belonging. For these students, acknowledging disciplinary identity through *Care for Academic Needs* was a much more frequently noted factor than race in impacting belonging. Our data suggest that racially-minoritized STEM students do not see race as relevant to STEM. However, STEM students of color benefit from affirmations of disciplinary identity as members of the academic community, particularly when working with white faculty (Castro & Cortez, 2017; DiLeonardo et al., 2022; Kwik et al., 2018). Significantly, our findings do not suggest that race is an unimportant factor but rather that racial recognition on-campus alone is insufficient to establish positive belonging.

Co-Creating Community: Implications for Research and Practice

These interviewed STEM transfer students of color were highly motivated and successful within their cohorts: applying to graduate school, presiding over student organizations, and holding internships and teaching assistantships. Based on our findings, we conclude with recommendations for receiving institutions to work in tangent with incoming transfer students to create community and a positive sense of belonging.

Echoing previous literature, we argue that transfer students would benefit from additional opportunities to connect with faculty within their academic departments early in the transfer process (Bragg, 2017; Wang et al., 2017). At orientation, departmental faculty advisors could provide information about various majors’ research opportunities and professional organizations. This early engagement could foster relationships with faculty partners thereby expediting opportunities for undergraduate research, teaching assistantships, and mentoring earlier in the transfer student journey (Kwik et al., 2018).

Faculty can play an important role in the success of STEM transfer students (Castro & Cortez, 2017) but require additional training to support transfer students and students of color. Faculty can invite campus partners into their classrooms to share transfer-specific resources via the course management system or a syllabus section on commonly used resources/offices. Institutions must also consider students’ interpersonal needs. STEM transfer students can have unique and extensive familial, work, or financial responsibilities that complicate their efforts to become fully engaged within the university (Castro & Cortez, 2017; Wang et al., 2017). Receiving institutions can create discipline-specific transfer cohorts during orientation so that students have an opportunity to meet others who share their major and transfer student status. Orientations can also introduce paid on-campus jobs and research or internship opportunities. Enacting a Transfer Receptive Culture requires acknowledging racially-minoritized STEM transfer students’ academic and interpersonal needs in addition to acknowledging their racial identities (Jain et al., 2011). Institutions can create a multifaceted community and sense of belonging which incorporate racial diversity and disciplinary expertise to support students’ success in class and future careers.

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