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Bridging Pathways: Empowering Latinx STEM Students Through Belonging, Support, and Equity

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The purpose of this Work in Progress paper is to examine sense of belonging, STEM career pathways, and gender equity amongst STEM students. In recent years, a number of institutions across the country have become Hispanic Serving Institutions (HSI) enrolling at least 25% Latinx students. In some instances, the institution has done nothing specific to reach this enrollment threshold, yet due to the demographics of the communities they serve, the campus qualifies for this designation. In California, where this study is conducted, HSIs represent about 50% of all institutions yet enroll nearly 90% of California's Latinx undergraduates and nearly 80% of undergraduates in the state overall (Excelencia in Education, 2022).

Community colleges serve a unique role in the higher education system as their mission is to provide academic programming and skills training to prepare students for jobs or to transfer to four-year colleges and universities. They also have a commitment to serving the needs of their local community by providing adult education and professional development opportunities. Community colleges also play a vital role in addressing the shortage of STEM students by offering accessible and more affordable opportunities leading to associate degrees, certificates, and transfer pathways to four-year colleges and universities.

This study is situated at one institution (Blue Lake College–a pseudonym) at the intersection of an HSI and community college institutional identity. It investigates the complex interplay of individual, institutional, and systemic factors affecting the experiences of STEM students. This study specifically focuses on first-generation college students, those who are Pell-eligible, students who intend to transfer, and Latinx students. The significance of exploring

these multiple groups is underscored by the increasing urgency to create equitable STEM educational pathways for underrepresented groups. Within this foundational context the study is guided by the following research questions:

1) Does a STEM identity influence the development of a sense of belonging for STEM students at Blue Lake College?
2) What resources allow for STEM students at Blue Lake College to perceive a clear path towards a STEM career?
3) Do STEM students at Blue Lake College recognize gender disparity in STEM?
4) Are there differences in outcomes among STEM students from marginalized groups?

Literature Review

Literature pertaining to STEM pathways in education is overtly situated within contexts of research-intensive institutions, male-dominated spaces, and capitalistic pursuits that dismiss matters of belonging for underrepresented students. In this study, we review literature pertaining to 1) STEM and sense of belonging, 2) STEM pathways with an emphasis on transfer of underrepresented students, and 3) gender dynamics experienced by STEM students. These focal points highlight the experiences we aim to amplify, providing deeper insight into the factors shaping community college students' journeys and their sense of belonging in STEM.

Sense of Belonging

For this section, we will discuss different dimensions of the literature surrounding students' sense of belonging in higher education settings. The literature surrounding sense of belonging that we focus on here centers around the programmatic support students receive on their campus, the institutional context, and how students' Pell grant status impacts their belonging. Sense of belonging is defined by scholars as the extent to which students feel

connected to their educational institutions and the people within it (Anh & Davis, 2023; Gillen-O'Neel, 2021; Pedler et al., 2022).

Program Supports

Intervention programs have historically captured the sense of belonging that students experience in undergraduate degree programs. These programs' activities range from providing services that facilitate student engagement with faculty members (Ackermann, 1990; Morrow & Ackermann, 2012), academic support such as tutoring that aid in student's coursework (Edmunds et al., 2010; Muraskin, 1998; Pan et al., 2008) or familiarizing students with campus opportunities and resources (Kuh et al., 2008). Literature about student support programs that serve students and measure a sense of belonging tend to capture the experiences of marginalized students (Chen et al., 2018; Escobedo et al., 2023; Hansen et al., 2024; Judson et al., 2015; Wilcox et al., 2024). However, there is a lack of literature specifically focused on students enrolled in STEM education programs at two-year institutions. The present study hopes to address this gap in scholarship.

Institutional Setting

Existing literature on the sense of belonging of STEM students does not focus solely on the racialized experiences of students at two-year educational institutions. Oftentimes, all marginalized students from different racial identities are grouped together in studies and their academic performance compared against Asian and white counterparts at their institution (Andalib, 2021; Chen et al., 2018; Escobedo et al., 2023; Foltz et al., 2014; Hansen et al., 2024; Xu & Lastrapes, 2022). The majority of these studies are solely focused on students who attend four-year institutions, with minimal research surrounding students at two-year institutions.

Pell Grant Status

Most research on sense of belonging among Pell Grant–eligible students has been conducted at four-year higher education institutions (Chen et al., 2018; Escobedo et al., 2023; Foltz et al., 2014; Judson et al., 2015; O'Connell, 2023; Patrick et al., 2023; Wilcox et al., 2024; Xu & Lastrapes, 2022). These studies emphasize that financial support from retention programs not only helps alleviate the financial stress associated with college but also fosters community by connecting Pell-eligible students with peers who share similar experiences. However, there is a notable gap in the literature regarding the sense of belonging among Pell Grant–eligible STEM students at two-year institutions. This distinction is critical, as community colleges and four-year universities differ significantly in their structure, available resources, and the career and educational pathways they offer (Clotfelter et al., 2013; Patterson, 2001). In response to this gap, the present study centers the experiences of Pell-eligible students at a two-year institution, with a specific focus on their sense of belonging in STEM education.

STEM Pathways

The path from initial interest in STEM (potentially since childhood), through successfully entering the STEM workforce is a long journey. Students in community colleges tend to follow a transfer pathway into a 4-year college and are also more likely to come from underrepresented and marginalized communities. We briefly touch on these sectors below.

Transfer Path

Research on the transfer pathways of community college students to four-year universities within STEM fields is central to understanding and facilitating successful transition (Blaney, 2022). The connection with STEM becomes more crucial for students belonging to marginalized groups as they may experience increased feelings of alienation and other barriers

that can negatively impact their progression in STEM fields (Santiago et al., 2022). It is however important to approach this work with an asset viewpoint rather than a deficit perspective as educators must recognize the various forms of capital (Yosso, 2005) that students bring into their educational journeys which are invaluable to developing their STEM identity and aid in the transfer process. Developing a STEM identity should not overshadow a student's other social identities; rather, it should strengthen their sense of belonging within both educational and social communities (Ortiz et al., 2019).

Underrepresented STEM Students

The formation of a STEM identity is vital for the pursuit of a STEM pathway and arises from the internal conceptualization of belonging within the field of STEM. It is fueled by the accumulation of human interactions and educational experiences within the student's pursuit of a STEM education. Additionally, recognition as a "STEM person" and ability to take part in STEM activities play a role in developing a sense of belonging (Carlone & Johnson, 2007). Underrepresented students especially, convey the importance of support received from family (Holland Zahner, 2023; Jaime-Diaz & Ramos, 2023), community, and the classroom itself as being integral to overcoming various barriers (Dounebaine, 2020).

The literature on underrepresented students also highlights barriers and challenges, and are often framed from a deficit perspective. Underrepresented students in STEM are more likely to not complete a degree in STEM and more likely to change their degree to a non-STEM major (Tsui, 2007). Flynn (2016) found that Black STEM students have a higher probability of not continuing their education in STEM compared to their white counterparts. Underrepresented racial and ethnic groups, such as Black, Hispanic/Latinx, Native American, and Indigenous communities, face unique challenges in accessing and succeeding in STEM education and

careers. Structural barriers, lack of resources, limited role models, and systemic racism contribute to lower representation and retention rates for these groups in STEM fields (Corbett & Hill, 2015). Overcoming these challenges requires concerted efforts to provide equitable opportunities, support systems, and inclusive environments that empower underrepresented racial and ethnic groups to thrive in STEM.

Gender Dynamics in STEM Education

Historically, gender dynamics have contributed to access disparities in STEM education. Informing this study, literature in this section addresses matters of masculinity and femininity in STEM education, and their effects across academic and career futurity.

Masculinity in STEM Education

Literature generally emphasizes male identities in the representation of STEM careers and education. From that foundation, STEM programs are often populated by male students from all races, but they are overwhelmingly white; thus, institutional support services, programming, practices, and largely STEM program's organization revolve around masculinity (Jones & Sáenz, 2020; Garcia, 2017; Rincón & Lane, 2017). Scholars have reported outcomes in STEM for Latino males through curriculum and programming driven by college commitments to Latino degree completion and creating a culture of intentionality and servingness for Latino students (Jones & Sáenz, 2020). Further, STEM masculinity is a nuanced paradox diverted through the lens of intersectionality (Flowers III & Banda, 2015; Jones & Sáenz, 2020). Flowers III & Banda (2015) reframe the discourse of masculinity and masculinization of STEM curriculum by appealing to the differential experiences grounded on race/ethnicity, and not on gender.

Femininity and STEM Education

As gender parity emerges in STEM, more educational research signaling experiences of female STEM students is being theorized (Banda, 2012; Brown, 2008; Cunningham & Jordan, 2019; Frederick et al., 2020). For instance, Rodriguez, et al (2022) exemplify the essence of identity development in terms of family interactions, involvement in identity-based engineering organizations, and intersectional identities shaped through female Latina STEM students. Studies signal the criticality of identity-related systems of support on the academic trajectory of Latina students in STEM (Banda & Flowers III, 2018; Rodriguez et al., 2022). Fulfilling academic and social needs are a critical element in the experiences of Latina STEM students, as well as the positive effects on sense of belonging centered upon their intersectional identities (Banda & Flowers III, 2018; Contreras Aguirre et al., 2020; Garza et al., 2023; Rodriguez et al., 2020; Yap et al, 2024).

The literature in this section presents various influences that impact the STEM identity of community college students. In particular, research on STEM student pathways is situated in research-intensive universities, not community colleges, as this study's site. Thus, literature indicates that community colleges are positioned as a higher education pathway that underrepresented students pursue to access STEM education (Palmer & Wood, 2013). However, literature shows that financial and gender disparities further influence a student's access and belonging within STEM education (Rainey et al., 2018).

Conceptual Framework

The volume of research and initiatives that seek to better understand and support students' sense of belonging highlights the vital role it plays in students' educational success. Maslow (1954) lists belonging as one of the most basic human needs just above food, water, and

shelter. When applied to educational contexts, sense of belonging has also been correlated with a number of positive outcomes reflected in students' grades, retention rates, and satisfaction in school (Strayhorn, 2023). Considering college students more specifically, Stayhorn's (2019) framework emphasizes how students' ability to both reframe adversity and self-doubt as temporary obstacles and their ability to see themselves as members of the community contribute to their sense of belonging in the college environment. Strayhorn's (2019) work therefore highlights the role of self-recognition in the development of a sense of belonging.

This self-recognition also plays an important role in STEM students' conception of their science identity. Carlone and Johnson (2007) present a model of science identity for women of color in STEM that includes three key components of performance, recognition, and competence. Performance was conceptualized as the ability to perform the social practices of science (Carlone & Johnson, 2007). This included the ability to talk about scientific concepts and use the various tools of the field. Tonso (2006) highlights how engineering students performed through displays of technical skills, leadership, and interactions with peers as they worked on their projects. Recognition was conceptualized as either self-recognition or recognition by others as a "science person" (Carlone & Johnson, 2007). Tonso (2006) highlights the ways students received recognition for their abilities through knowledge of mechanical devices and opportunities to take part in real-world engineering endeavors. However, the author also highlights how the ability to find employment as an engineer post-graduation also plays into this recognition and engineering identity. Competence was conceptualized as the knowledge and understanding of science content (Carlone & Johnson, 2007). Tonso (2006) highlights how knowledge of engineering principles and application of these principles to real-world problems contributed to students' performance, recognition, and identities as engineers. These examples

highlight the ways in which the three dimensions of performance, recognition, and competence interact with each other and contribute to an overall identity as a person of science.

For this study, we extend the work of Carlone and Johnson's "science identity" (2007) to also follow the same framing (performance, recognition, and competence) when referring to a "STEM identity." Including the fields of technology, engineering, and mathematics to science (STEM), we argue, follows a similar trajectory. Therefore, we conceptualize recognition as the ways in which students were given opportunities to either recognize themselves as "STEM people" or received this recognition from peers or instructors. We conceptualize competence and performance as opportunities that students had at Blue Lake College to build a pathway toward a career in STEM. We examine the opportunities that students had to access resources and receive training in the theories and practices of STEM through their coursework along with opportunities to engage in scholarly discussion with their instructors and peers. We also examine the role of gender and recognition of gender disparities in the development of this STEM pathway and overall science identity.

Methodology

This study was conducted at Blue Lake College, a Hispanic-Serving community college in California, to explore how institutional and individual factors influence STEM student outcomes. The "Culturally Contextual STEM Identity" (CCSI) tool was developed specifically for this campus and used to measure constructs related to STEM identity and sense of belonging. Survey responses were matched with institutional data to provide a comprehensive dataset. Quantitative analyses focused on regression modeling to investigate predictors of sense of belonging, STEM pathways, and gender-based differences. Additional details on the methods follow.

Blue Lake College

Blue Lake College is an HSI community college in California. The college has an approximate total enrollment of 20,000 students with about 80% identifying as Latinx. The majority of students (around 75%) attend college on a part-time basis. Additionally, about 90% of students receive financial aid, and over half of them qualify for a Pell Grant. The gender distribution is approximately 57% male students. An overwhelming majority (85%) enter with the intention to transfer to a 4-year college or university, and about 65% are first generation college students.

Participants

In collaboration with Blue Lake College's Institutional Research (IR) professionals, a list of STEM students was generated which included a combination of students who had already declared a STEM major, or were enrolled in one of the gateway courses in Math, Chemistry, Biology, Engineering, Computer Science, or Physical Sciences that would lead towards a STEM pathway. A link to the Qualtrics survey was emailed to 1,753 STEM students. As an incentive for completing the survey, each participant was offered a $10 Amazon gift card. A total of 448 unique responses were received from the invited STEM students. The respondents resemble the population of students at Blue Lake College. Approximately 83% of the participants identified as Latinx, 10% as Asian, 3% as White, and only 1% Black or African American. Almost half of the respondents identified as female, 64% were Pell Grant eligible, 70% were first generation college students, and 75% intended to transfer to a four year college or university.

Dataset

The data for this study came from a 40-item survey called the "Culturally Contextual STEM Identity (CCSI) measurement tool." This larger project considered STEM identity

development and diverse perspectives including culturally responsive practices. The CCSI was created specifically for the Blue Lake College campus as qualitative student focus groups and faculty interviews were utilized to develop the items in the measurement tool. Concepts of sense of belonging and developing a STEM identity were also considered in the development of the CCSI. The survey was laid out as 8 different matrix tables each including 5 survey items utilizing a 6-point Likert agreeance scale. The student IDs of the respondents were collected and matched up with institutional data provided by the IR personnel. The student data that was matched included race/ethnicity, gender, first generation college student, Pell Grant eligibility, age, GPA, zip code, term of first enrollment, cumulative credit hours, intention to transfer, and major.

Data Analysis

Guided by the research questions, this study utilized three primary regression models to examine (1) sense of belonging, (2) STEM pathways, and (3) gender discrepancies. To predict each outcome, a multiple regression model was optimized using all participants in the dataset, ensuring that the data met the necessary assumptions for regression analysis, including linearity, independence, and normality. A central focus was understanding how the experiences of marginalized students differed from the broader STEM student population at Blue Lake College. Accordingly, six additional subgroups were analyzed: (a) Latinx students, (b) students intending to transfer, (c) first-generation college students, (d) Pell Grant-eligible students (as a proxy for low income), (e) male students, and (f) female students. In total, 21 multiple regression models were conducted to explore the predictors of the three dependent variables across these groups.

Limitations

A few limitations should be considered when interpreting our results. First, the demographic characteristics were not included in the multivariate analyses models as independent variables. Some critics may argue that including them in the model and "controlling" for them would be a better option. Instead, the research team decided to generate a separate model for each group of interest to examine differences among predictor variables. Including demographic variables in a single larger model would have been easier, but the results more difficult to interpret especially amongst the groups of interest. While running independent models was more work in the analyses (21 models vs 3), it facilitated identifying the specific differences among the independent variables.

Next, we must also acknowledge that the original intention of the survey that was utilized in these analyses did not intentionally include the three outcomes analyzed in this study. Due to this secondary level of analysis, the variables included in the models may have weak influences on the outcomes. In other words, the CCSI was not created to assess the outcomes of interest for this study (sense of belonging, STEM pathways, gender differences). If it were, the independent variables could have had more predictive statistical explanatory power on each of the dependent variables. Finally, in merging institutional data with the results of the survey, the research team was limited to the information that the institution gathered and the IR office at Blue Lake College was willing to share with the researchers.

Results

There were three primary dependent variables of interest that guided the study. They are developing a sense of belonging, examining STEM pathways, and highlighting disparate perceptions based on gender dynamics.

Sense of Belonging

Table 1 summarizes the multiple regression models for all 7 groups reporting the standardized Beta coefficient and level of significance. The only independent variable that was significant for every group in the sense of belonging analysis was “In the future, I see STEM as part of my job.” If we consider the nature of this correlation, it makes sense that it is statistically significant for all groups. Viewing STEM as part of one’s job in the future will also influence the sense of belonging on their campus. Interestingly, this was the **only** independent variable that was predictive of this outcome for female STEM students in the sample. There are 3 survey items that emerge as predictive for all groups except female students. These items captured: being sought out for their expertise with STEM activities, making their parents proud (reverse coded), and applying STEM ideas to solve challenges (interestingly has a negative effect on the outcome). Spending time on campus outside of class predicted a higher level of sense of belonging for all students, Latinx, transfer, first gen, and males. Keeping in mind that Blue Lake is a community college, and the majority of students attend part-time, spending time on campus beyond class is meaningful and has direct benefits on a sense of belonging. For all students, as well as transfer students, and first gen students, the ease of accessing resources on campus was predictive of feeling a part of the STEM community. Finally, it is also important to note that there were 3 survey items for this analysis that were unique to one group. For students eligible for Pell Grant, “I enjoy learning about STEM” was predictive. For first generation college students, “Instructors value my scholarly thoughts” was influential. And for all students, having conversations about STEM with friends and family yielded a higher sense of belonging.

Across all student groups, seeing STEM as part of their future career strongly influenced their sense of belonging, highlighting the importance of career-oriented support and mentorship in STEM education. Spending time on campus outside of class and having easy access to

resources significantly contributed to students' sense of belonging, emphasizing the need for institutions, especially community colleges, to create welcoming spaces and improve access to support services. Different student populations had unique factors influencing their sense of belonging, such as faculty recognition for first-gen students and STEM-related conversations for all students, suggesting that targeted interventions should be designed to meet the distinct needs of diverse student groups.

Table 1. DV1: I am a part of the STEM community at Blue Lake College.

	All (n=417)		Latinx (n=346)		Transfer (n=313)		First Gen (n=287)		Pell Grant (n=266)		Male (n=213)		Female (n=201)	
	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.
I enjoy learning about STEM.	0.050		0.059		0.028		0.057		0.142	*	0.016		0.097	
I spend time on campus outside of class.	0.178	***	0.150	**	0.185	***	0.116	*	0.082		0.233	***	0.117	
I can apply STEM ideas to solve challenges.	-0.126	*	-0.135	*	-0.144	*	-0.157	**	-0.141	*	-0.180	**	-0.035	
Making my parents proud is not important to me.	-0.147	***	-0.168	***	-0.178	***	-0.153	**	-0.139	**	-0.203	***	-0.113	
I feel more confident when I am in a class where the majority of students share my race/ethnicity.	0.034		0.045		0.001		-0.001		-0.007		0.038		0.014	
Others ask me for help with STEM activities.	0.195	***	0.199	***	0.266	***	0.243	***	0.151	*	0.265	***	0.104	
STEM is a way for me to serve my community.	0.071		0.070		0.044		0.096		0.028		0.066		0.110	
I have conversations about STEM subjects with friends and family.	0.106	*	0.084		0.058		0.084		0.117		0.137		0.053	
My background (culture, heritage, etc.) does not align with the concepts covered in my classes.	0.063		0.048		0.037		-0.017		0.064		0.021		0.099	
Instructors value my scholarly thoughts.	-0.081		-0.084		-0.071		-0.136	*	-0.114		-0.073		-0.097	
Having an individual mentor who shares my STEM interests would benefit my career.	-0.109	*	-0.113	*	-0.065		-0.095		-0.053		-0.147	*	-0.051	
Concepts learned in my STEM courses are applicable to other classes.	0.110	*	0.133	*	0.137	*	0.098		0.080		0.164	*	0.018	
Resources are easy to access at my college.	0.102	*	0.087		0.125	*	0.115	*	0.100		0.118		0.123	
In the future, I see STEM as part of my job.	0.261	***	0.252	***	0.195	***	0.286	***	0.303	***	0.190	**	0.402	***
There is a need for STEM professionals in my community.	0.049		0.069		0.026		0.101		0.085		0.004		0.042	
r^2	0.369		0.361		0.366		0.388		0.376		0.408		0.396	

Note: ***p < .001, ** p < .01, * p < .05

STEM Pathway

The second model in the analyses summarized in Table 2 considers the journey towards a STEM career beginning at Blue Lake College. The most predictive item (at the highest level of significance for all groups) for this dependent variable is agreeing with the statement that Blue Lake College offers a wide range of STEM courses. The next most influential item predictive of all groups is agreeance with "Community colleges are a great place to start a STEM career." All

of the 7 groups (except males) report that ease of access to resources at Blue Lake College can help see a clear pathway towards a STEM career. For 5 of the 7 groups, parental support is important for the outcome yet there appeared to not be any difference between male and females in the sample. In other words, parental support does not affect a STEM student's pathway when considering gender. Instructors not understanding the challenges of students negatively affected all students, Latinx students, transfer students, and female students. The unique independent variables also emerged for 3 groups. "I enjoy learning about STEM" was predictive of a STEM pathway for transfer students. Similar to the first model (sense of belonging) feeling that instructors value their scholarly thoughts was also negatively predictive for first gen students. Interestingly, the r^2 for first gen is the highest across all of the analyses for this study (r^2 = 0.575). Finally, the unique predictor for female STEM students is feeling a part of the STEM community at Blue Lake College. Ironically however, this variable has a negative effect on STEM pathways.

The strongest predictor of seeing a STEM pathway from Blue Lake College was the perception that the college offers a wide range of STEM courses, alongside the belief that community colleges are a great starting point for STEM careers, emphasizing the importance of course availability and institutional perception. Access to resources significantly influenced most student groups (except males) in envisioning a STEM career, while parental support played a key role for the majority, suggesting that institutions should strengthen resource accessibility and family engagement efforts. Students who felt their instructors did not understand their challenges were less likely to see a STEM pathway, and for female students, a sense of belonging in the STEM community negatively predicted their career trajectory, highlighting the need for faculty development and more inclusive, supportive STEM environments.

Table 2. DV2: There is a clear pathway towards a STEM career beginning at Blue Lake College.

	All (n=417)		Latinx (n=346)		Transfer (n=313)		First Gen (n=287)		Pell Grant (n=266)		Male (n=213)		Female (n=201)	
	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.
I enjoy learning about STEM.	0.049		0.055		0.095	*	0.018		-0.005		0.021		0.066	
Race/ethnicity are discussed in my courses.	0.018		0.030		0.026		-0.010		0.020		-0.041		0.058	
I can apply STEM ideas to solve challenges.	0.062		0.079		0.059		0.022		0.055		0.061		0.113	
Instructors don't understand my challenges as a student.	-0.100	*	-0.103	*	-0.127	**	-0.038		-0.037		-0.081		-0.122	*
My parents support me in my education.	0.089	*	0.119	**	0.105	*	0.128	**	0.118	*	0.091		0.084	
Community colleges are a great place to start a STEM career.	0.233	***	0.157	**	0.253	***	0.188	***	0.223	***	0.247	***	0.192	**
My background (culture, heritage, etc.) does not align with the concepts covered in my classes.	-0.027		-0.034		-0.017		-0.069		-0.036		-0.016		-0.042	
Instructors value my scholarly thoughts.	0.002		0.001		-0.056		-0.096	*	-0.049		-0.036		0.064	
Having an individual mentor who shares my STEM interests would benefit my career.	-0.044		-0.060		-0.057		0.015		0.001		-0.052		-0.027	
Blue Lake College offers a wide range of STEM courses.	0.304	***	0.314	***	0.306	***	0.395	***	0.263	***	0.398	***	0.212	***
I am a part of the STEM community at Blue Lake College.	0.031		0.017		0.076		0.006		-0.027		0.099		-0.141	*
I do not see any specific role models and mentors that resemble me at Blue Lake College.	-0.018		-0.062		0.017		-0.076		-0.041		-0.074		0.090	
Resources are easy to access at my college.	0.141	**	0.146	**	0.125	*	0.168	***	0.211	***	0.049		0.246	***
Setbacks will happen, but I know I can overcome them.	0.098	*	0.074		0.135	*	0.115	*	0.060		0.042		0.154	*
In the future, I see STEM as part of my job.	0.014		0.034		-0.041		0.041		0.100		0.020		0.087	
r^2	0.496		0.472		0.505		0.575		0.492		0.527		0.533	

Note: ***p < .001, ** p < .01, * p < .05

Gender Dynamics

The 3rd research question led the research team to examine gender dynamics, particularly in STEM where there are large discrepancies in gender representation across many fields. Table 3 summarizes the findings predicting agreement with the sentiment “Women are treated the same as men in STEM” across the 7 subgroups. Only one variable was predictive for all groups with a negative relationship with the outcome, and this was the statement “I believe there are groups who experience privilege.” Explained in a different way, those who believe some groups have privilege would disagree that women are treated the same as men in STEM. It is important to note that the largest standardized Beta coefficient (-0.302) for this outcome is found in the female model. For all groups (except male) being sought out to help with STEM activities also increases the perception of gender discrepancies in STEM. Interestingly, Blue Lake College offering a wide range of STEM courses correlates with gender equity for all groups (except

males). Discussing concepts of identity amongst friends also brings more awareness to gender differences. Agreeing with the statement "It is too confusing to remember everyone's pronouns" yields to also not seeing gender differences for all groups except the male and female sub groups. Expressing a colorblind [race-evasive] ideology (Bonilla-Silva, 2010) also predicted a gender neutral stance for the following groups: all, Latinx, transfers, first gen, and female students. Specifically, those students in the sample that are Pell Grant eligible and reported higher levels of enjoyment learning about STEM were also more likely to identify gender discrepancies. Transfer students who felt a higher sense of belonging at Blue Lake College also did not report gender differences. Finally, it should be noted that the male model for this dependent variable was the lowest of all the 21 models ran for this study with the r^2 for this group at 0.277.

Students who acknowledge that certain groups experience privilege are less likely to believe that women are treated the same as men in STEM, with this effect being strongest among female students, highlighting the need for institutional efforts to address privilege and bias in STEM education. Being sought out for STEM expertise and discussing identity with peers increases awareness of gender disparities, while expressing colorblind [race-evasive] ideology correlates with a belief in gender neutrality, suggesting that institutions should foster discussions on identity, privilege, and systemic barriers in STEM. The availability of an array of STEM courses at Blue Lake College is associated with perceptions of gender equity (except among males), and transfer students with a stronger sense of belonging are less likely to perceive gender differences, emphasizing the importance of inclusive curricula and community-building efforts to promote gender equity in STEM.

Table 3. DV3: Women are treated the same as men in STEM.

	All (n=417)		Latinx (n=346)		Transfer (n=313)		First Gen (n=287)		Pell Grant (n=266)		Male (n=213)		Female (n=201)	
	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.
I enjoy learning about STEM.	-0.076		-0.064		-0.086		-0.075		-0.107	*	-0.019		-0.106	
Certain words/statements that may not offend me may offend others with different identities.	-0.091	*	-0.082		-0.074		-0.113	*	-0.096		-0.052		-0.138	*
I can apply STEM ideas to solve challenges.	0.088		0.058		0.045		0.071		0.077		0.076		0.078	
Others ask me for help with STEM activities.	-0.155	***	-0.159	***	-0.182	***	-0.157	**	-0.139	*	-0.124		-0.204	**
Everyone has the same opportunities to succeed. If they do not, then they just didn't work hard enough.	0.097	*	0.100	*	0.048		0.056		0.105		0.103		0.048	
I believe there are groups who experience privilege.	-0.247	***	-0.274	***	-0.264	***	-0.211	***	-0.244	***	-0.222	**	-0.302	***
I discuss the concept of identity (race, gender, class, etc.) with my friends.	-0.152	***	-0.113	*	-0.182	***	-0.143	**	-0.128	*	-0.148	*	-0.102	
When it comes to race, I don't see differences. I just see people.	0.123	**	0.126	**	0.150	**	0.122	*	0.034		0.104		0.134	*
When things get tough, I usually give up.	-0.078		-0.101	*	-0.071		-0.133	**	-0.137	**	-0.143	*	0.002	
Instructors value my scholarly thoughts.	0.111	*	0.079		0.062		0.055		0.117	*	0.071		0.180	**
It is too confusing to remember everyone's pronouns.	0.148	***	0.150	**	0.136	**	0.206	***	0.184	***	0.115		0.075	
Blue Lake College offers a wide range of STEM courses.	0.130	**	0.146	**	0.167	***	0.194	***	0.145	**	0.104		0.159	*
I am a part of the STEM community at Blue Lake College.	0.088		0.055		0.103	*	0.077		0.080		0.089		0.117	
My parent's preferences matter in choosing a STEM career.	0.078		0.067		0.087		0.120	*	0.132	*	0.084		0.130	*
There is a need for STEM professionals in my community.	-0.097	*	-0.113	*	-0.061		-0.094		-0.106		-0.130		-0.080	
r^2	0.381		0.390		0.390		0.423		0.421		0.277		0.446	

Note: ***p < .001, ** p < .01, * p < .05

Conclusion

STEM students at Blue Lake College developed a sense of belonging by enacting elements that Carlone and Johnson (2007) identified as a science identity. Seeing STEM as part of their future career, external validation from others seeking their expertise, and applying STEM concepts to their everyday lives are all examples that embody the elements of competence, performance, and recognition. In order for students to see a clear pathway towards a STEM career, they need to feel able to navigate the resources available at their college. Blue Lake College offering a wide range of STEM courses was a powerful predictor for all of the groups considered in these analyses. Instructors understanding challenges students face and parental support were additional predictors of a clear STEM pathway. Finally, differences by gender in STEM were observable in two ways. First, for each of the 3 multiple regression models, the male and female predictors were noticeably different. In the sense of belonging analysis, only one variable was significant for females while there were 7 for males. In the STEM pathway analysis, only two variables were significant for males, and 6 for females. In the final outcome

model, 3 variables were significant for males while there were 7 for females. The other way we observed gender discrepancies was in how students answered other survey items in the final model. Those who recognized privilege, discussed concepts of identity, differentiated racial experiences, and utilized correct pronouns were all also more likely to agree that women are treated differently than men in STEM.

This study highlights the importance of a comprehensive approach in understanding the academic journey that STEM students endure particularly those that begin at HSI community colleges. By addressing the interconnections between individual sense of belonging, institutional STEM pathways, and systemic gender dynamics, we highlight the need for developing more inclusive STEM programs and support systems that address the needs of underrepresented and marginalized student populations. From this analysis, we can ascertain how integral instructors' understanding and supporting students was to a student's STEM pathway, something that could be replicated at other institutions by nurturing a culture of care for students from STEM faculty. This also reduced potential harm students may face as instructors develop culturally responsive ways of thinking and mentoring their STEM students. This research explores the unique experiences of STEM students at an HSI, including underrepresented subgroups often overlooked in higher education literature. By sharing these insights with their institution and others, the goal is to help implement strategies that support historically minoritized, transfer, first-generation, and Pell-eligible students, ultimately fostering greater diversity and innovation in the field of STEM.

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