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Latina college students’ experiences in STEM at Hispanic-Serving Institutions: framed within Latino critical race theory

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ABSTRACT
In the last 20 years, Latina undergraduate college students have increased their enrollment and degree attainment. However, in science, technology, engineering, and mathematics (STEM) disciplines Latinas remain highly underrepresented. The study aims to gain more insight into the roles that peers, faculty, and family play in Latina students’ persistence in STEM fields at two selected Hispanic-Serving Institutions (HSIs). Using Latino Critical Race Theory, Latinas reflected on their experiences in male-dominated STEM disciplines.

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KEYWORDS
Latina college students; STEM; social justice; Hispanic-serving institution

Latinos as a growing ethnic minoritized population are changing the current higher education panorama (Johnson & Lichter, 2016). In attending college, according to Rendón, Nora, and Kanagala (2014), Latinos feel that their ‘maturity, confidence, and independence’ (p. 4) have improved. However, Latinos’ college enrollment has also brought numerous challenges, including experiencing cultural and academic transitions, dealing with anxiety, and oftentimes, suffering from microaggressions (Rendón et al., 2014). The aforementioned is a reflection of patterns of systemic racism and racial oppression that people of color experience in America (Feagin, 2013). As such, Latino Critical Race Theory (LatCrit) informs diverse forms of oppression, in which the intersectionality among racism, sexism, and classism influence Latinos’ experiences in college. Accordingly, minoritized populations in college encounter a myriad of adversities associated with satisfying socially and academically constructed norms generated by empowered and privileged groups (Johnson, 2018), such as males and Whites. In particular, Latinas face simultaneous discrimination related to their gender and ethnicity (Malcom, Hall, & Brown, 1976); however, Latinas’ resilience as a way to succeed and persist is evident in their pursuit of STEM degrees.

Recent National Science Foundation (NSF) reports have addressed the low representation of Latino college students in science, technology, engineering, and mathematics (STEM)-related disciplines, which is even more chronic for Latinas (NSF, 2017; National Science Board, 2017). Latina college students experience such underrepresentation even at Hispanic-Serving Institutions (HSIs)—through federal funding—addressing concerns of Latino undergraduates’ retention and degree attainment (Excelencia in Education, 2015; Hispanic Association of Colleges & Universities, 2017). In 2017, 523 institutions met the federal enrollment requirement to be designated an HSI; nationwide, HSIs enroll 66% of Latino undergraduate students (Hispanic Association of Colleges and Universities, 2017).
Universities, 2019), demonstrating the importance of HSIs for Latina college students because they mostly graduate from HSIs.

The purpose of this study is to gain more insight into the different factors that influences the persistence of Latina students to pursue undergraduate STEM degrees while attending an HSI. The research questions that frame the study are:

Primary research question:

1. What roles, if any, do peers, faculty, and family play in the persistence of Latina undergraduate college students in STEM at HSIs?

Ancillary research questions:

1. What are the perceptions of Latina college students regarding the interactions with male peers in classrooms in STEM at HSIs?
2. What role, if any, does familial alignment within the culture of Latina college students assist in persistence in STEM at HSIs?

The study focuses on Latinas’ experiences; however, due to the lack of extensive research on Latinas in STEM, we decided to include literature on Latinos as a minoritized ethnic group. It is important to note that literature often frames research under the moniker of Latino to be inclusive of both females and males. As such, within this manuscript, the term Latino is inclusive of the entire population while the use of the term ‘Latina’ specifically addresses research that has been conducted only on females. An introductory section along with a brief literature review presents the importance of peers, faculty, and family for Latina students. Next, LatCrit introduces the systemic racism faced by Latinos from a social justice perspective. The next section addresses the method selected. Then, the findings precede the discussion section. Finally, the implications and conclusion provide insight into the actions and practice postsecondary institutions should implement to better serve Latinas in STEM fields at HSIs.

Literature review

Peers interaction and support

In college, peers are essential in the students’ learning process. Usually, students take advantage of peer interactions through ‘collaboration in and out of class, peer tutoring, and peer evaluation’ (Kuh, Kinzie, Schuh, & Whitt, 2010, p. 195). According to Gonzalez and Myers (2016), Latinas find support in peers who are similar to them in terms of ‘fields, gender, and family background’ (p. 21), finding easy to surpass long-lasting negative stereotypes related to the intersectionality associated with ethnicity, gender, and science roles (Rodriguez, Cunningham, & Jordan, 2019). It is more likely that Latinas get along with peers whose culture and language are similar because they perceive both as inseparable (Stevenson et al., 2019). Even more so, being surrounded by other minorities and females serves as a form of social acclimation resulting from a student developing friendly ties with his/her peers (Banda, 2012). These relationships are especially effective if such peers excel academically (Kuh, Kinzie, Schuh, & Whitt, 2010; Tinto, 1975). Banda (2012) argued the importance of Latinas’ relationships with classmates, in which they feel supported while simultaneously providing support for their peers to help mediate academic struggles. Therefore, Latinas considered it essential to be in contact with peers with a similar major, maintain a peer network, and help each other in the learning process (Banda, 2012).
Faculty meaningful connections

Faculty and students’ interactions that are relevant for students may result in improving their learning experiences (Kuh et al., 2010). These interactions can take many forms, including discussions about the degree plan, course-related information, grades, and working with professors on research projects or committees (Kuh et al., 2010; Tovar, 2015). Quality, meaningful relationships between Latinas and faculty members are influential role in that it positively contributes to Latinas’ persistence in science and engineering programs (Rosbottom, 2016). As such, Gloria and Castellanos (2012) pointed out the relationship between Latinas and faculty can validate cultural assets and cultivate a sense of community. Yet, Latinos’ lack of familiarity with higher education settings could overwhelm them in such a way that they find it difficult to interact with professors, especially for the ones who are first-generation students (Kuh et al., 2010).

Family emotional support

Family plays a fundamental role in Latinas’ lives as college students, since Latino culture deeply values family encouragement (Villa, Wandermurem, Hampton, & Esquinca, 2016). Consequently, Latinas perceive family as a resource to succeed in college (Banda, 2012; Cabrera & Padilla, 2004; Gonzalez, 2013; Gonzalez & Myers, 2016; Rosbottom, 2016; Villa et al., 2016; Yosso, 2005). As Gonzalez and Myers (2016) put it: ‘when family support is present, success is more attainable’ (p. 19); in other words, when Latinas feel supported by family members, their own expectations related to their academic performance are high. Moreover, Latinas’ ancestry and identity through family and community interactions fosters support systems (Gonzales, 2012), and encourages persistence in STEM education (Stevenson et al., 2019).

In addition, Gonzalez and Myers (2016) found that ‘culture, background, and family support’ (p. 19) prove to be influential for Latinas in motivation and persistence to STEM degree attainment. Through resilience, Latinas acquire the ability to manage and to conquer the most demanding obstacles (Greene, Galambos, & Lee, 2004), including STEM college degree attainment. Often, once Latinas become college students, members of their family and the community perceive them as role models. This is particularly true as Latinas seek to influence and motivate younger siblings (Cabrera & Padilla, 2004; Gloria & Castellanos, 2012; Gonzalez & Myers, 2016; Villa et al., 2016). Being a role model for Latinas, however, brings a bittersweet feeling, because there is a persistent and continuous mix of ‘rewarding and stress’ (Gloria & Castellanos, 2012, p. 88). These mixed feelings reveal both the satisfaction of being a college student and the stress that comes with the responsibilities of being a scholar, particularly as it relates to serving as a role model for the family.

Latino critical race theory

LatCrit undergirds this study to examine Latinas’ cultural influence regarding their perspective and the importance of family, peers, and faculty as it pertains to their academic performance to pursue STEM college degrees. As an extension of Critical Race Theory (CRT), Solórzano and Delgado Bernal (2001) noted that LatCrit addresses diverse forms of oppression which include racism, sexism, and classism. Such systemic racism influences the experiences of people of color, with LatCrit focusing on Latinos as a minoritized group. In addition, this theory provides insight into the importance of examining the influence of race on Latinas and understanding the motivation and strategies in attaining STEM college degrees at HSIs. Moreover, LatCrit contributed to a deeper understanding of the role of Latinas as female and minoritized students in STEM disciplines where most of the students are male and White. Therefore, the systems of privileges of whiteness and maleness (Johnson, 2018) and the oppressive environments in which oppressors and oppressed interact (Freire, 2000) seek to explain and to comprehend Latinas’ experiences as
students and minoritized students in college, where they face a double bind status because of their gender and race (Malcom et al., 1976). Such intersectionality may even become a threefold bind by adding their scientific role. In particular, women and minoritized students might find it difficult to display with pride and security (Ong, 2005) their multiple roles (i.e. gender, race and science), especially in STEM-related disciplines. Therefore, utilizing LatCrit offers a socially just lens in how we frame the experiences of Latinas to achieve equity in STEM disciplines.

LatCrit seeks to empower Latinos to be at the forefront of research and reduce the oppression they suffer from being more vocal. Similarly, LatCrit looks for strengthening Latinos’ identity by privileging feelings of pride in one’s Latino racial identity (Solórzano & Delgado Bernal, 2001). Universities exercise biased practices, in which factors such as color-blind fairness and race-neutral meritocracy tend to benefit Whites over Latinos (Villalpando, 2004). In addition, LatCrit seeks to achieve social justice by means of reducing any kind of oppression in higher education campuses. The ideal academic setting would generate a supportive and caring university environment for non-White students. In this sense, Freire (2000) highlighted how those vertical relationships allow the underrepresented, disadvantaged, and poor to become the oppressed in society. Thus, the oppressors are the ones with power and authority to manipulate the uneducated, ignorant, and alienated. The vicious circle generated by these human exchanges are more likely to end if the oppressed learn to discover the potential of self-awareness, develop critical consciousness, and find as well as define their identity (Freire, 2000). Moreover, the recognition of experiential knowledge and the historical context of Latino students could help reduce the prejudices toward and stereotypes of Latino students, whose academic deficiency often stigmatize them. As such, LatCrit emphasizes the importance of being conscious on the experiences and prior academic deficiencies of Latino students to help them succeed in college (Solórzano & Delgado Bernal, 2001; Villalpando, 2004).

Method
A naturalistic inquiry approach explains the methodological framework of this case study. A case study focuses on the existence of multiple realities according to the participants’ perceptions (Lincoln & Guba, 1985). According to Yin (2017), ‘the case study research method as an empirical inquiry investigates a contemporary phenomenon within its real-life context… and in which multiple sources are used’ (p. 23). To provide a complete picture of the overall study, Glesne (2011) noted the importance of presenting in detail relevant information for the study. In addition, it is important to consider the multiple views and struggles, if any, of individuals who participate in the study, resulting in a deeper understanding of the case study.

Data collection
To learn about Latina college students’ persistence and success in pursuing a bachelor’s degree in STEM at HSIs, the study examines the role of peers, faculty, and family. Therefore, the primary author interviewed 10 students based on the following selection criteria: (1) female students who identify themselves as Latinas; (2) pursuing a STEM degree in chemistry, computer science, electrical engineering, geology, mathematics, mechanical engineering, or physics; (3) in their senior year; and (4) at two specific HSIs. Table 1 provides demographic information of participants. The study was conducted at two Southern universities, hereafter referred to as MUQ and UTL universities (pseudonyms).

MUQ University has a legacy of quality, commitment, and development that has transcended through the years since its creation. MUQ University supports students who are pursuing a STEM major through a Student Support Service (SSS-STEM) program whose main goal is to increase the retention and graduation of students. The SSS-STEM program leads, among others, these two programs: (1) S. STEM whose goal is assisting students from high schools, community
colleges, and MUQ University to help them succeed in STEM disciplines. (2) Project G. which has the goal to retain traditionally underrepresented students such as Latinos, first-generation, and low-income students through faculty and advisor development, internship opportunities and students’ participation in research. Approximately, 35 student organizations are science and engineering (S&E)-related, two of them focused on Hispanics in S&E and one more on the advancement of women in sciences.

UTL university promotes excellent facilities to learn and live, enriching research experiences, better scholarships, and overall, a climate of support and success along their academic journey that guarantees students’ success in their professional lives. A federally funded program to support student support services (SSS) in STEM seeks to enhance students’ retention rates pursuing STEM majors. SSS-STEM program offers tutoring, mentoring, and cultural events to help students feel personal and academic support throughout their college journey. Other programs include the Educational Opportunity Center (EOC) that helps low-income first-generation students from specific counties with obtaining application assistance. Other services include, provide information to adults about returning to high school or college. In addition, UTL University offers other programs whose target is to keep middle and high school students in school and increase STEM undergraduate enrollment. In terms of student organizations, approximately 40 organizations are S&E-related. From these 40 organizations, one organization focuses on Hispanic students, two organizations target Hispanics in S&E, and two other organizations aim at females in S&E.

The collection of data consisted of using diverse sources (Erlandson, Harris, Skipper, & Allen, 1993; Lincoln & Guba, 1985). Besides conducting individual interviews, the triangulation of data included eight observations of academic settings and spaces in which participants study and socialize, such as classrooms and hallways, and analysis of documents in regard to students’ demographics and academic performance from university databases. Accordingly, the first author used a semi-structured interview protocol that lasted approximately one hour each and were audio-recorded with participants’ permission.

**Data analysis**

The analysis of data consisted of the following procedure. The primary author transcribed interview data verbatim with the use of Dedoose, an online platform that helps analyze qualitative data. Next, the primary author codified data through content analysis and constant comparative techniques, resulting in pieces of information to generate themes and categories (Lincoln & Guba, 1985). This codification follows patterns which helps presenting the information in an organized manner. When similar ideas were found, the primary author grouped patterns following the identification of themes. To protect confidentiality, participants self-selected pseudonyms to be used throughout the findings.

**Table 1. Demographics of participants.**

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Major</th>
<th>Expected Date of Graduation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sol</td>
<td>MUQ</td>
<td>Chemistry</td>
<td>Dec 2018</td>
</tr>
<tr>
<td>Celina</td>
<td>MUQ</td>
<td>Mechanical Engineering</td>
<td>May 2019</td>
</tr>
<tr>
<td>Emily</td>
<td>MUQ</td>
<td>Electrical Engineering</td>
<td>May 2019</td>
</tr>
<tr>
<td>Alyssa</td>
<td>MUQ</td>
<td>Mechanical Engineering</td>
<td>May 2019</td>
</tr>
<tr>
<td>Chrissy</td>
<td>UTL</td>
<td>Computer Sciences</td>
<td>Dec 2018</td>
</tr>
<tr>
<td>Isela</td>
<td>MUQ</td>
<td>Computer Science</td>
<td>Dec 2019</td>
</tr>
<tr>
<td>Karina</td>
<td>UTL</td>
<td>Electrical Engineering</td>
<td>May 2019</td>
</tr>
<tr>
<td>Sina</td>
<td>UTL</td>
<td>Electrical Engineering</td>
<td>May 2019</td>
</tr>
<tr>
<td>Brianna</td>
<td>MUQ</td>
<td>Computer Science</td>
<td>Dec 2019</td>
</tr>
<tr>
<td>Arianne</td>
<td>UTL</td>
<td>Electrical Engineering</td>
<td>May 2019</td>
</tr>
</tbody>
</table>
Trustworthiness

This study utilized the following techniques to assure trustworthiness. First, credibility using member checking, observations, and triangulation of data. The aforementioned techniques allowed participants to review interview transcripts and provided feedback, conducted observations at the universities’ facilities, and utilized triangulation of data to help collect information from different sources. Second, transferability employing demographic sheets and a purposeful sample enabled us to collect additional information of participants and have a homogenous group of participants according to the selection criteria. And third, dependability and confirmability by utilizing a reflexive journal, which permitted the principal researcher to document all phases of the project, as well as use it as a self-reflection instrument (Lincoln & Guba, 1985).

Findings

Two themes and five categories emerged from the data analysis and this section addresses them in detail. Below are some observations of the labeling of the themes and the categories based on the evidence provided in the text (Table 2).

Table 2. Themes and Categories Found throughout the Data Analysis.

<table>
<thead>
<tr>
<th>Themes</th>
<th>The legitimization of Latinas’ presence in STEM disciplines</th>
<th>The intersection of personal, family, and cultural values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Categories</td>
<td>Personal interactions in STEM classrooms</td>
<td>Influencing the lives of family members</td>
</tr>
<tr>
<td></td>
<td>Fighting for their place in STEM as females</td>
<td>Latino Culture’s Persuasion in Latinas’ attitudes toward academic performance</td>
</tr>
<tr>
<td></td>
<td>Crossing boundaries between gender and ethnicity in STEM</td>
<td></td>
</tr>
</tbody>
</table>

**The legitimization of Latinas’ presence in STEM disciplines**

Participants were aware of the diverse identities as women, Latinas, and scientists they represent on campus and society. This theme addresses three categories, which highlight Latinas’ difficulties encountered in the classrooms and their struggles to be recognized as serious and capable S&E students by others, especially male peers. In addition, Latinas shared multiple experiences related to race and gender crossing, in which they voiced positive and negative insights into such intersectionality. This theme consists of the following categories: Personal interactions in STEM classrooms, fighting for their place in STEM as females, and crossing boundaries between gender and ethnicity in STEM.

**Personal interactions in STEM classrooms**

In college, students spend many hours interacting with classmates, faculty, and staff in classrooms and laboratories. While most participants revealed to have developed a friendship with other classmates, they also contemplated some other experiences. For example, Emily reflected on the students’ composition of engineering classes. She highlighted, ‘Before I switched to electrical, I was mechanical, so I did see like two or three other women, other than that there are all men and predominantly White, sometimes there are Hispanics.’ Emily could recognize the disparities in regard to women and Hispanics in engineering classrooms. Specifically, she noted the overwhelming presence of White men. In addition, Emily highlights that being a minority in engineering comes with some advantages. One of the benefits she perceives is that male peers
allow her to lead group class projects. For the same reason, Alyssa and Chrissy, respectively, talked about a positive aspect of working with male peers for in-class projects. On the one hand, Alyssa noticed, ‘They [male peers] are easier … with ladies, it would be a little bit harder because we are more complicated … with guys, it’s just straight to the point … and it’s very simple to get together and get things done and have a plan.’ On the other hand, Chrissy observed, ‘In computer science, it was always like, you do this, you do this, will put it together and we’ll just figure out what we’re going to say … so it is a lot more like casual and laid back … but that was fine.’ Both Alyssa and Chrissy remembered positive experiences with their male classmates, as they have not felt treated differently because of their gender.

Concerning the ambiance of classes as it relates to female engineers’ interactions, Sol commented, ‘once classes got smaller, you know, I was able to make friends with a few people in the class.’ Sol argued that for her it was easier to connect with some of her classmates because they shared some of her courses. Based on participants’ comments, the small-sized classes, on average 15-30 students, helped as well. In a similar view, Isela expressed her experience in classrooms,

I’m in computer science so everyone is really to themselves most of the time, but I came with a friend here, so I have interactions with her. In my first year, I didn’t really interact with anyone else, but now that I am in my third year here, I interact a lot with my other classmates because now we feel more comfortable with each other.

Despite commenting on better interactions with classmates in her third year in college, Isela emphasized difficulties to make friends. She stated, ‘I have been trying to make friends … but it can be intimidating when someone sits next to me and then I say hello and then they don’t respond at all and I’m like well this is awkward.’ In this regard, Isela thinks it is easier to interact with female classmates, as they are more willing to interact with her than her male peers. Similarly, Brianna observed how the classroom ambiance is when it comes to peers’ interactions. Brianna noted, ‘Within the classroom … we just talk academically … I’m in computer science with mostly males, White males, and … like a sprinkle of girls. So, we don’t usually hang out a lot. We just talk like in class or after class and nothing more.’ The interactions Brianna has with her classmates are only school-related, especially if they are males, who Brianna perceives as friendly but mostly in the classroom setting. Other females, the very few Brianna has encountered in computer science classes, are more willing to talk and share personal information.

Emily pointed out how small junior and senior classes equally help with the relationships between students and professors. Emily addressed this topic mentioning, ‘The professors have more personal relationship … they are able to work with us more, we talk more in class … because it’s a small class … the professor is right there, he sees everyone, he’s able to talk to everyone, he knows everyone’s names.’ Emily seems to enjoy the classroom environment when there is a more personal and close relationship with professors.

**Fighting for their place in STEM as females**
Participants shared interesting experiences as college students in STEM disciplines. Some of these experiences involve an ongoing struggle to demonstrate participants’ intelligence to both male peers and professors. Participants shared a myriad of experiences with male peers in classrooms, sometimes interacting with supportive peers and other times with discouraging individuals. Celina explained her experience,

They (male peers) think a female doesn’t know what she is doing or that if a girl asks a question in class or trying to get a point across that it’s okay to interrupt. Someone will interrupt to answer the question because they genuinely want to help, but there are others who just want to talk over you and try to explain it better.
As Celina noticed, the classroom setting is sometimes hostile towards females. This pattern was also found by other participants, including Karina who shared, ‘I feel like we get discriminated just because we are women, that’s never been expressed with me, but I’ve heard them speak about other women and it’s because they question women, they don’t think that they’re as smart as them.’ Similarly, Sina noted in her male peers’ behavior the following, ‘I think they underestimate us a little bit sometimes … because we are women … their expectation is wrong, just because you are a man does not mean that you’re correct all the time … because their intelligence is no better than mine.’

In turn, Emily revealed an interesting discovery she made when we conducted the interview. She discerned, ‘The Whites or Caucasians, they always have the need to be right, even when I give them the right answer.’ Emily discerned her experience with White students in the academic setting, which she noted is different from the way people from other ethnicities behave. She added, ‘Like even if I’m right … well, they’re going to say no, do the whole problem all the way over again … I still got the same answer … they just want to be right in their own way, I guess. It’s like a superiority conflict.’ Emily is conscious about how White students react when they work with a Latina female student, as they usually challenge her to prove that her arguments are right. She showed a conflictive relationship between them in which White male peers still exert power and perpetuate privilege. In a similar experience, Brianna revealed how male peers always try to explain class content without Brianna requiring any help from them. Brianna noticed, ‘They [male peers] explain things to me that I already know … but they want to explain it to me … We go over something maybe like a few slides, and they’ll be like ‘Oh, this is how you do this.’ Yeah. I know.’ In most cases, the situation experienced by Brianna comes from White peers with whom Brianna does not have exactly a very close relationship. She revealed she talks to and befriends more Hispanic male students than other peers, especially White peers with whom she does not feel quite comfortable.

**Crossing boundaries between gender and ethnicity in STEM**

By reflecting on their experiences, participants provided examples regarding positive and negative views due to being both Latina and female. Alyssa reflected on how difficult it is for her to get along with White male peers. She expressed, ‘I relate more toward … people from other parts of the world, not much to the White culture … I do talk to people and classmates who are White …, but in my group of friends I don’t think any of them is White.’ In this comment, Alyssa revealed issues related to both gender and race in engineering classes.

Similarly, participants shared their thinking regarding the intersectionality between race and gender in finding Latina female professors in S&E programs. In particular, a common characteristic of both HSIs has to do with the absence of Latina professors in all STEM disciplines where participants are majoring. These disciplines included chemistry, computing science, electrical engineering, and mechanical engineering. In this regard, most participants voiced their opinion. Chrissy noticed the situation in her computer science field in this subject, ‘There are no Hispanic teachers in computer science, in Biology, there were a few.’ Isela noted, ‘There are connections with the female professors like friendly communication I guess like less formal, but I don’t have that relationship with my male professors.’ Karina phrased, ‘I would always look for females in my field because I want that advice, there is one student, she’s getting her Ph.D. in electrical engineering and I have approached her … she is not Latina.’ Brianna remarked, ‘I haven’t had any Hispanic female Professors. So, I have never got to experience as if they would be a better mentor how that would be. I’ve never had the opportunity.’ Arianne expressed, ‘A female professor that probably will be easier to talk more about like personal stuff, like I didn’t go to class because of this personal issue, she will understand more … there will be fewer boundaries.’ When it comes to finding a male or female mentor, Celina revealed, ‘I think the gender definitely does matter.’ Participants considered the absence of Latina professors in their S&E programs
problematic and verbalized their interest in having someone who looks like them in the learning space.

The intersection of personal, family, and cultural values

Participants reflected on the different reasons and people that have played critical roles in their persistence in college as STEM students. As senior students, they acknowledged how the motivation to inspire others was key to achieving their goals, which aligns with the Latino culture; an asset in the life of Latina college students. The categories composing this theme consist of the following topics: Influencing the lives of family members and Latino culture’s persuasion in Latinas’ attitudes toward academic performance.

Influencing the lives of family members

In particular, participants feel the moral obligation to give back the support they are receiving from their families. Participants’ behaviors disclosed different ways in describing how they plan to contribute to their families. In this sense, Celina remarked her unique and most important motivation to attain her mechanical engineering degree, ‘I decided to pursue a degree in STEM, specifically engineering, because I felt I had a duty to my family, specifically my mom … to support her the way she supported her three kids.’ Celina reflected on the important role her mother has played not only in her life but also in the whole family. In particular, Sol revealed that her father, who also has a STEM college degree, was one of her sources of inspiration. In turn, Emily also shared how motivated she was for making both a difference in the lives of her parents and in her own. She expressed, ‘The only reason why I am getting my education, is my family, for my family, for my future kids … I’m doing this, so I can take care of them, so I can make them proud, make myself proud.’ Emily was convinced that her college education could trigger huge benefits for all members of her family, including herself. Furthermore, Emily thinks that her family is not only her emotional support but also her motivation to attain her engineering college degree. Likewise, Alyssa recognized how her younger siblings closely follow her academic college performance. In this sense, Alyssa opined,

My parents tell me all the time, oh ‘your sister, she is always watching everything you do, and she sometimes asked about you or what you’re doing about your school, about your job’ … My brothers … they also notice how involved I am with my education and other activities … I’m kind of the one setting the standards or setting the example of being a ‘good student.’

Alyssa perceives how she is influencing the future academic choices of her sister and brothers and fears to fail before her siblings’ eyes. She serves as the role model in her family and her success might influence her siblings to repeat that same pattern, that is, to become successful college students. Therefore, Alyssa is constantly under pressure to meet high personal and academic standards for her siblings. Additionally, Isela is conscious of the positive impact she is generating in her family and relatives as a college STEM student. In particular, Isela’s experiences in childhood facing poverty seem to be another strong motivation to attain her bachelor’s degree and improve her family living standards. Similarly, Brianna’s motivation in attaining her STEM college degree lies in living in a low-income area throughout childhood. She expressed, ‘Because I came from there, it motivated me to just be better, so that way I can have what other people have … So that motivates me like my past. Whenever I think about that, it motivates me to do better.’ Brianna expressed her wish to break the family poverty cycle. Through education and determination, she plans to offer a better life for herself and her parents.
In terms of the participants’ culture, they show strong signs of Latino culture’s influence. In this regard, the family’s influence includes the decision even to choose a college major. Emily added, ‘My motivation for pursuing engineering, well growing up like I said my father was an electrician, so my grandparents, some members of my family were in the electrical field as well.’ In this sense, Emily shared the role that her father and some members of her family played in the decision to choose electrical engineering. As some of Emily’s relatives have electrical engineering-related jobs, they represented a strong influence in her academic choices and future professional opportunities. In turn, Arianne and Celina respectively shared what their Latina mothers have always said to them regarding reaching goals in life.

My mother will always like saying I’m giving you this, as a parent I would be really proud if you make better, like as a parent we want you guys to do better than us we want you guys to take the best out of you, that’s something that helped me and has traced my career to try my best.

From my mom, I have always gotten that anything you do, you have to do your best. If you have a goal, you should work towards it and it doesn’t matter if other people tell you can’t do it, if you have the willingness to work, you can do it.

Despite Arianne’s mother and grandmother not being convinced of seeing her as an engineer because they thought this was a male-only field, they changed their mind, and now, they are very proud of her. Regarding Celina’s situation, her mother was highly committed to Celina’s education. As a child, she remembered how strict and diligent her mom was with school homework. Both, Arianne and Celine were told from childhood the importance of discipline and persistence regardless of the context and other people’s negative comments. Alike the aforesaid participants’ experiences, Sina expressed the importance of education for her Latino family, saying, ‘We are lucky enough to have our school paid for by our father... he said if there’s anything I can give you in this world before I leave is an education.’ The statement of Sina shows her father’s commitment to his children and the value of education for him. Education, according to Sina, can improve their socioeconomic status and it is an aspiration to a better life. Similarly, Karina expressed the great value of education and the importance of attaining her bachelor’s degree for her family. She noted, ‘They [family] definitely want to see me succeed, all my brothers and sisters... it’s kind of like we are all getting this degree together, it’s not just me getting the degree because I wouldn’t be why I’m staying without them.’ Karina’s statement is inspirational, revealing how valuable family is for her college experience.

Discussion

This study demonstrated Latinas’ experiences and perceptions as STEM undergraduate students. Based on the findings, participants revealed the need to break the oppressive cycle that society has imposed over minoritized populations (Freire, 2000), especially in settings with high underrepresentation such as Latinas in STEM. In particular, participants noted that they are confident as a result of the support and care different stakeholders have showed them to succeed at the two regional HSIs. Overall, the study found that peers and faculty provide sound academic support, a positive climate to learn, and guidance to perform better in college and beyond. In addition, peers and family influence their academic success and emotional well-being. Participants’ peers and family support seems critical for participants who are often under high levels of stress, not only because of the need to meet high academic requirements but also due to the ongoing struggle to succeed in male-dominant fields.

In particular, most participants highlighted the need to develop a peer support network inclusive other Latina female which is deemed necessary to positively influence participants’ success in college. In this sense, Stevenson et al. (2019) noted that Latinas get along better with peers
with similar culture and language. Several scholars (Banda, 2012; Gonzalez & Myers, 2016; Tinto, 1975) highlighted such a strong bond with peers and pointed out the importance of friendship among college students. While a few participants developed friendships with female classmates easily, others perceived their camaraderie with male peers as favorable. When it comes to professors’ support, participants highly appreciated professors who could advise and guide them. Goonewardene, Offutt, Whitling, and Woodhouse (2016) supported the idea of the importance of having sympathetic faculty in college, who guide students to attain academic goals, accomplish their college degrees, and perform well professionally. This close interaction with professors may improve students’ learning, as students perceive professors to genuinely care about them. In this regard, this study discovered that finding professors who take the role of informal mentors is not always an easy task as both participants and faculty must develop a connection based on care, trust, and respect. All participants opined that in STEM fields gender matters, especially in classrooms where low female representation is high. More representation of female faculty, especially Latina Faculty may trigger in Latinas’ a sense of belonging by adopting a more resistant character and persisting until attaining their college degrees despite their lack of representation.

A secondary research question aimed to answer participants’ interactions with their male peers in classrooms. Overall, participants noted their ability to get along well with classmates, both male and female, as well as with their professors. A few participants, however, shared about their difficult to build authentic friendships with male peers. Some participants observed that some of their male peers were self-focused and did not engage in conversation with their classmates. Some other peers just focused on school and did not show interest in communicating with their female classmates. This supports the work of scholars (Schulze & Tomal, 2006; Smyth & McArdle, 2004) who have examined the unwelcomed ambiance female students experience on campus, which seems to be exacerbated in STEM classrooms. As such, attending classes with mostly male peers—a reality of continued gender inequity—can be sometimes stressful, especially within hostile environments. In addition, doubts of women’s intelligence persist in STEM-related disciplines whereby females are aware of their need to validate their intelligence (Banda, 2012; Stevenson et al., 2019); experiences that affects the self-esteem of Latinas. On other occasions, White males demonstrate their thinking toward minoritized students in executing actions that involve the maintenance of power and privileges. As such, to counteract inequity, Latinas must be aware of their intellectual capacity and work to illustrate the value of their ethnic, racial background as well as their gender representation (Solórzano & Delgado Bernal, 2001). Such intersectionality can be a strength if Latinas learn to capitalize on their personal characteristics (Ong, 2005) and convincedly, advocate for a real change in STEM disciplines. Being a minoritized student in STEM disciplines comes with the challenge for females to find a place where they can also lead, propose, and innovate.

In the same vein, Freire (2000) highlighted that to achieve social justice, individuals must discover the potential of self-awareness and critical consciousness which might help dismantle oppressive environments. Hence, the importance of discovering and valuing Latinas’ personal, cultural, and communal assets is key for liberation. The multiple strategies and resources Latinas need in college make evident the struggles faced and barriers overcome to succeed in STEM disciplines. In particular, females in STEM disciplines need to adjust certain habits to better fit a male-dominated environment. When it comes to classroom interactions, participants reflected on themselves as females with Latino heritage and narrated the struggles they have faced to get along with White male peers due to cultural differences. Participants shared some examples, such as not having any White male peers as friends or observing White male classmates’ preference to talk to other White female peers. In particular, participants voiced their opinion regarding a disconnection between White males and minoritized students. On the one hand, White male students, members of privileged groups frequently, do not understand the struggles of others, especially the oppressed. On the other hand, Latinas who were raised within a different
culture, often in adverse conditions and limited resources, were unable to relate to the White males.

The second ancillary research question addresses the importance of family and cultural values in participants’ persistence as STEM college students. The study found that participants with younger siblings want to be perceived as role models by their brothers and sisters. As supported by other scholars (Cabrera & Padilla, 2004; Gloria & Castellanos, 2012; Gonzalez & Myers, 2016; Villa et al., 2016), Latinas seek to become positive and inspiring models for the youngest members in their family. For participants who are the youngest in their families, they encompassed a different perspective. In such cases, participants’ motivation consists of taking care of their family members, especially parents, who on several occasions suffered because of limited access to better jobs or hostile environments in which minoritized populations are often the target (Freire, 2000). In addition, several participants pointed out the motivation of improving their living socio-economic status, as some of them grew up in poverty. Therefore, participants who faced challenging childhood experiences feel that a STEM degree can economically improve both themselves and the lives of their family.

As such, strengthening Latinos’ identity by privileging feelings of pride in one’s Latino racial identity (Solorzano & Delgado Bernal, 2001) might reinforce participants’ mindset to face life adversities, set goals, and fight to reach such goals, are clearly traits of the Latino culture. In the study, this form of resistance can be perceived in the priority and importance of education for parents. Sina provided a great example of what education means for their parents when she remarked her father’s thinking that there is no better inheritance in life than education. This is only one of multiple examples participants provided in which they accentuated the value of education for their families. In general, participants perceive Latino culture as an asset; therefore, the values inherited from their parents make participants proud to be who they are, as individuals and to be where they are, as college students. Overall, the implication of all family members with participants’ academic goals shows the family’s importance in Latina students’ college resilience.

**Implications for practice**

Based on the findings, the following implications for practice attempt to help Latina STEM undergraduate students improve their college experiences:

1. **STEM departments should support peer-mentoring programs within student professional organizations.** STEM departments should promote and support peer mentoring programs within student professional organizations, where junior and senior students could mentor freshmen and sophomore peers. Such a peer-mentoring program could develop in freshman and sophomore students a sense of belonging to the campus community and persist throughout their college journey. Having that sense of belonging is extremely important for college students and their persistence. Students can even improve their self-confidence by feeling welcome and accepted (Gloria & Castellanos, 2012).

2. **STEM departments should promote among faculty an inclusiveness culture in classrooms through informative sessions as it relates to women and Latina’s assets.** Classrooms in which every student shows respect and perceive value in others regardless of their gender, race, political affiliation, and disabilities, to mention a few, should be promoted at every institution. Even at HSIs, where the majority of Latinas attain their bachelor’s degrees, they have been the target of microaggressions (Perez Huber & Cueva, 2012) and questions in regard to their intelligence has been challenged (Banda, 2012; Stevenson et al., 2019). Such informative sessions by the S&E colleges would take place every year at the beginning of the semester for all students and faculty, either in the form of online training or face-to-face meetings. The content would consist of various topics inclusive of asset-based lens to view Latina success in STEM fields.
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