Article

Resilience in Action through Culture: Latinas Successfully Navigating STEM Spaces at an HSI

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Abstract: Though research on the perspectives and assets of communities of color in higher education has grown, understanding how underrepresented groups in STEM use those assets to navigate and succeed in STEM fields is still in progress. In this study, Latina students majoring in STEM fields in a Hispanic-Serving Institution (HSI) were interviewed about their college experience and persistence. A Latine resilience model and an HSI servingness framework guided the analysis. Qualitative methodology via case study served to understand this research. Evidence gathered in this study demonstrates how social climate experiences and cultural background influence resilience and success strategies among diverse Latina STEM majors in an HSI. The STEM social climate or culture seemingly clashed with participants' cultural backgrounds. Perhaps most pertinent to their cultural background and resilience as Latinas were the specific success strategies or assets that participants utilized to navigate the STEM experience. Participants gravitated to diverse spaces, desired more women and ethnic representation in their STEM departments, and practiced prosocial or communal motivations. Understanding STEM culture in conjunction with the assets and strategies that Latinas utilize as ethnic women is important for HSIs as they consider how they truly serve their constituents.

Keywords: Latinas; persistence; STEM; culture; HSI; resilience; undergraduate students

1. Introduction

Research over the last couple of decades has shed light on the perspectives and assets of communities of color in higher education. However, understanding how underrepresented groups in STEM navigate and succeed in STEM is still in progress. Understanding success and persistence is important for (1) equity through fair access to STEM opportunities and thus representation, and for (2) meeting the demands of competitive STEM workplaces. Latines* (* the authors use the gender-neutral "Latine" rather than Latinx/o because it is (a) gender inclusive and (b) phonetically inclusive in Spanish and used often among those with strong ties to Latin America) [1] are a growing force in the U.S. and currently represent 15% of the STEM workforce and 8% in occupations requiring a bachelor's degree [2]. Moreover, a greater proportion of Latina students are graduating from Hispanic-Serving Institutions (HSIs) when compared to their male counterpart [3]. Latines overall are also earning increasing numbers of STEM degrees in the U.S. [4,5], yet Latinas only represent 1.7% of the STEM workforce [6]. Therefore, Latinas present a unique opportunity for understanding retention in STEM.

The objective of this study was to understand how Latina students persisting in STEM majors navigate STEM and their institution through success strategies. STEM culture emerged as a key theme that influenced Latina students' persistence strategies. This study utilized a resilience model that is based on community cultural wealth (CCW) as it largely assumes an asset-based approach in the analyses of such strategies. Moreover, we consider the servingness framework as a post-traditional framework for serving students in HSIs.

The research questions were the following: (1) How do social climate experiences affect Latina STEM majors' resilience in a Hispanic-Serving Institution (HSI) in Texas? (2) How does cultural background define resilience among Latina students in STEM? (3) What resilience strategies are used to navigate STEM spaces? The ultimate purpose of this study is to inform HSI leadership (and perhaps other minority-serving institutions) of Latina resilience or strategies in STEM, as this information can guide how institutions tackle STEM retention and success.

2. Literature Review

Students that major in STEM fields typically do so because of their exposure to STEM subjects in high school and encouragement from teachers that strengthens self-efficacy before college [7]. Yet, Latine and Black students are more likely to leave STEM and switch to non-STEM majors [8].

2.1. Barriers in STEM: Culture/Environment and Social Climate

STEM fields are known to be characterized as unwelcoming and competitive, focusing on student deficits instead of addressing the "toxic" environment [9]. Latine and Black students' success in STEM education is indeed influenced by hostility throughout school and college as well as an overall lack of diversity among faculty [10]. Thus, college students of color and women may feel like they do not belong or uncertainty in STEM fields [11,12].

The culture of STEM expresses and/or values natural ability and objectivity which produces messages of who or who does not belong in STEM. STEM fields are known for having racial/ethnic stigmas and stereotypes that ultimately influence persistence [7,13]. Students of color face stereotypes associated with their race/ethnicity [14], which can cause students to doubt their academic achievements and abilities in college [15] and in STEM specifically [16]. Latine students have opted for potentially harmful strategies to overcome these setbacks, such as hiding their cultural identity by choosing not to speak Spanish and/or using their light skin complexion to blend in with the majority population [16]. More covert forms of racial/ethnic oppression in institutions of higher education are likely more difficult to tackle. Leyva et al. found that Black and Latine students encountered discouraging instructional messages in gatekeeper (calculus) courses for STEM majors that, though seemingly neutral, "intersects with exclusionary ideas of who is able and belongs in mathematics to produce a racialized instructional mechanism of communicating that Black and Latin* students lack ability" [17], page 801).

Furthermore, students of color are likely to come from cultures that are incongruent with STEM culture. For example, Black and Latine students come from cultural backgrounds that value family/community and collectivism which may be extended to meaningful others in college, such as faculty and staff [18]. However, a lack of collective values within STEM contradicts cultures that place great importance on seeking and maintaining connections with those around them, causing harmful outcomes such as academic and social withdrawal, feelings of isolation, cognitive fatigue, and ultimately, exiting STEM fields [19]. Latine students "oriented toward collectivism" have removed themselves from competitive spaces lacking community, such as STEM organizations [20], page 848).

Layers of Identity: Gender and Intersectionality

Gender can complicate one's place in STEM. In part due to cultural and sociodemographic factors, more women leave math-intensive fields [21]. Women perceive the need to exert more effort than their peers [22] and demonstrate lower confidence in continuing math (calculus) than men even when they have similar math strengths [23]. Britton [24] found that women faculty compartmentalized gender and would describe various examples or consequences of a "chilly" climate (for example, not wanting to be associated with a women-focused organization) in various STEM fields, including those with high female representation. Interestingly, participants often indicated that this was not necessarily indicative of a broader climate problem [24].

Intersectional identity for women of color (WoC) plays a role in STEM. In a study of women from various campuses pursuing STEM majors across the U.S., being a WoC was associated with having less sense of belonging [25]. Graduate and undergraduate students have experienced isolation and fragmented identities in a competitive, individualized, and exclusive atmosphere [26,27]. This is sometimes particularly salient in fields that have the least women/WoC, such as engineering [26] or physics and astronomy [28]. Similar intersectional experiences have been recorded in countries outside the U.S. [29,30].

2.2. STEM Assets within Communities of Color

To deal with challenges, students of color have demonstrated resilience by coming prepared to class, being hypervigilant, and/or going the extra mile in their STEM classes [16]. Moreover, students engage in resistance, for example, countering low expectations from leadership [31] or engaging in community building [15]. Yet, students are not the only ones that play a part in changing or challenging the status quo in STEM, nor should they be. Cues of kindness, prioritizing students' goals in STEM courses, quality mentorship, and integrating psychological support into the curriculum all reduce the effects of vulnerability in students of color [19]. These are important because "STEM learning can be viewed as a cultural process in which the practices and assumptions of STEM education reflect the culture, cultural practices, and cultural values of STEM professionals" [32], page 62).

Communities of color bring with them collectivist cultural tendencies to higher education institutions, something that has been pushed by diverse leaders [33–35]. Jackson and colleagues [36] found that underrepresented students, particularly first-generation college students, showed a positive association between the belief that science careers would allow them to meet prosocial goals with identity as scientists. This is important because a strong identification with one's discipline enhances academic engagement [13].

Among Latines, cultural wealth is indeed an array of assets. For example, English as a second language, at times considered a barrier, can simultaneously be presented as an asset or linguistic capital. Peralta and colleagues [37] found that 39% of their survey respondents viewed English as a second language as an advantage because of its semblance to learning scientific language. Latine students have also conducted "troubleshooting" and navigation of resources in college that they have then shared with incoming students, grounding their identity in community rather than individualism [38]. Giving back is one particular motivation for pursuing STEM degrees among many underrepresented in STEM, whether to family or the larger community. Latine students have reported specific examples on how to help their communities and families, showing "a greater connection between broader prosocial goals and their reasons for pursuing a science degree or career" [36], page 9) when compared to White or Asian students.

2.3. HSIs as Minority-Serving Institutions (MSIs)

HSIs enroll approximately two-thirds of the Latine population in the U.S. [39] and graduate over half of Latines [40]. HSIs are an opportune and appropriate context in which to promote the assets and development of minoritized groups due to their diverse populations. HSIs and other MSIs tend to have greater diversity both among students and leadership when compared to Predominantly White Institutions [32]. Indeed, graduates that attended HSIs more specifically dedicated to Latine success have reported better outcomes, such as higher job quality or more positive attitudes regarding their institutions [41]. Dedication to serving students in HSIs has been shown both broadly among STEM students [42] and in specific fields such as computer science [43]. Such dedication is demonstrated in various ways, including community engagement and redesigning of gateway courses [42].

2.4. Women of Color (WoC) Persistence and Assets in STEM

To meet the challenges of an isolating or unwelcoming STEM environment, WoC have utilized various strategies. First and foremost, their interest in STEM areas and

academic preparation prior to college are motivating forces [26,27]. WoC have engaged in code switching, adapted to masculine culture, and/or utilized opposing strategies to adaptation including self-affirming behaviors, such as calling out unfair treatment [26]. They have also sought environments that had "supportive attitudes toward women and underrepresented minorities" [28], page 179) in the workforce and in academia, such as programs that had high female enrollment. When they could not find spaces that allowed their full identities [28], they left their departments temporarily, such as studying abroad or having hobbies separate from their work. WoC have also sought or found recognition from others, enhancing their identity as STEM persons [44]. They frequently engage with peers to discuss STEM content and join major-related clubs or organizations, an activity that has enhanced WoC persistence to a greater degree than White women [45]. WoC have also sought peers from other fields and have ties to family members for social support [26].

Finally, WoC have not only sought forms of support but also *became* that support for other women as a form of activism. Promoting minoritized groups to join STEM fields "not only served as motivation for WoC to persist but also served as a way for them to change their existing departmental cultures" [28], page 187). WoC have also discussed "giving back" to describe their dedication to community and family as part of their identity [26].

Latina Assets and Cultural Considerations

Latinas are a growing female population graduating with college degrees [3] with strong character traits, experiences, and supports promoting their persistence in STEM [46]. Cultural congruity offers a way in which to examine retention of Latinas and potentially others. After all, a high level of cultural congruity is associated with actively seeking positive, planned actions [47].

Latina students engage in resilience in various ways. For example, they persist despite obstacles as well as through optimism, ultimately perceiving their academic outcomes as modifiable by their behaviors [48]. Latinas from different backgrounds in STEM navigate their degree programs through and with culture, manifesting or engaging various assets, including family support/motivation, positivity and self-reflection, engaging in peer communities, and STEM resources/experiences [46]. This is expressed in a variety of ways. Latinas seek other women and Latinas in White, men-dominated STEM classes to develop relationships and engage, as interactions have been found to be limited with others [49]. While peers provide both academic and emotional reinforcement, faculty members impart content and professional knowledge [49]. Beyond the college context, family can also be highly impactful to resilience. Family members promote college and career aspirations, though this can be complicated by gendered socialization, such as being discouraged to move far away from the family [50]. Familism also influences Latina STEM identity [51]. Overall, Latinas' motivations have strongly pointed to their parents as a driving force behind their pursuit of STEM careers [46,52,53].

3. Theoretical Frameworks

3.1. The Resilience Model

This study utilizes a resilience model [54] that centers Latina/e/o culture and how it interacts with multiple contexts (Figure 1). Through this model, resilience is defined as an asset-based approach in which to examine the experiences of Latina students in STEM and thus combat deficit perspectives.
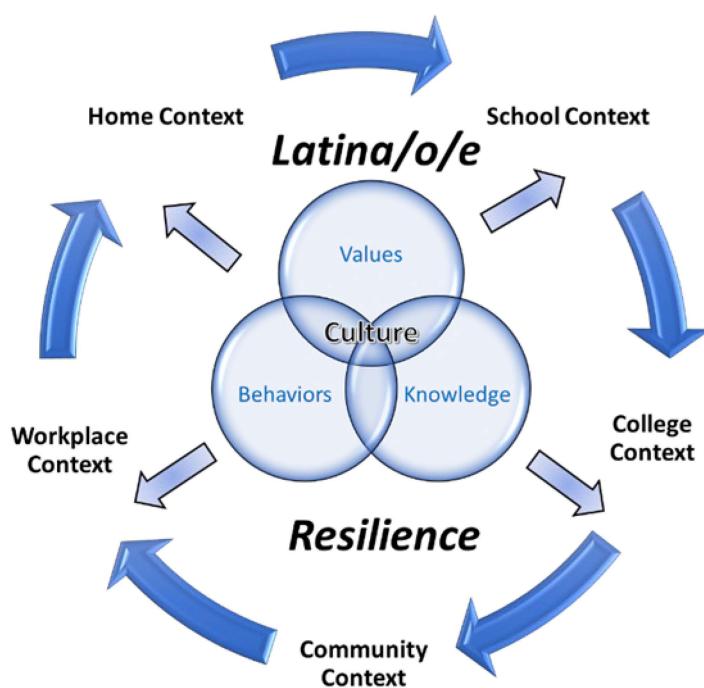
Figure 1. The Latina/o/e resilience model.

Resilience is a complex term because of the many pieces that contribute to this global concept, such as risk, vulnerability, adaptability, and protective factors; resilience is also dynamic, occurring across life stages and through person–environment interactions, or an ecological context [55]. Using evidence from cultures across the globe, ref. [56] defines resilience as having two key characteristics: (1) the capacity to navigate to resources and accessible opportunities for well-being, and (2) the community, family, or cultural condition that provides such meaningful resources and experiences. An asset-based and cultural perspective of resilience can be key to its understanding. That is why the resilience model embraces and continues the work of Yosso's [57] model of CCW, a model that centers the various forms of knowledge and abilities of communities of color through critical race theory. Critical race theory in education challenges presumed neutrality and objectivity in our systems and exposes structural racism [57,58]. It can be leveraged in the STEM context to expose oppressive systems embedded in STEM culture and facilitate the creation or transformation of spaces to create more equitable STEM environments [59].

The Latine resilience model [54] defines resilience as an element that Latine individuals use in challenging and other contexts, though not necessarily through grit. Instead, the model highlights an asset-based approach by emphasizing how culture-connected experiences met with resilience promote positive outcomes, such as success in STEM spaces. It also defines resilience as both a collective *and* individual response, whereby Latines draw on their culture and contexts as they navigate college and beyond. The model provides a way to define how Latines live and think, which "privilege[s] local knowledge about aspects of resilience" [56], page 233).

The resilience model demonstrates how the Latine individual's culture, defined here as a set of values, knowledge, and behaviors, influences five contexts which in turn influence each other (from Gonzalez, E., Foreword: Understanding Latina/o Resilience, https://doi.org/10.1080/09518398.2020.1783016 [54]. Copyright 2020 by Taylor & Francis, https://www.tandfonline.com (accessed on 15 January 2024). Reproduced with permission from E. Gonzalez, International Journal of Qualitative Studies in Education; published by Taylor & Francis, 2020).

3.2. The HSI Servingness Framework

This study is additionally guided by "servingness" in HSIs. We consider the multidimensional conceptual framework for understanding servingness in HSIs [60] because we seek to understand Latina experiences from a post-traditional framework for serving students in HSIs, institutions in which the majority of Latines are educated in the U.S. [40]. Therefore, as we consider individual forces (the participants), we recognize organizational forces that play a role in servingness of students in HSIs.

One must consider the normative structures of an institution to advance equitable educational outcomes through its mission, purpose, membership, infrastructure, and governance [61]. Such structures have historical foundations, whereby "racialized knowledge and white ways of knowing are continually transferred from faculty, white and of color, to students of higher education, who go on to be leaders" in society [62], page 21). Given the diverse demographics of HSIs and their histories, these institutions are well positioned to understand and serve their constituencies.

As institutions look to transform themselves to consider a servingness framework, they need to understand the state of the current STEM environment to then address servingness in their institutions. Yet, it will be difficult to address servingness if the institution does not understand the identities and assets of their constituents, including Latinas. Garcia's [61] Transforming HSIs Framework provides ways in which to enact servingness at various levels of an organization to make it a more equitable and liberatory space. This study, in part, examines how the social climate of the institution, particularly STEM spaces, affects Latina resilience. Therefore, the influence of the HSI's purpose, membership, and infrastructure (and other organizational levels) matter in how they affect Latina persistence in STEM.

4. Method

Qualitative research methodology was utilized to understand and gain a rich understanding of perspectives and experiences that influence Latina students' resilience in STEM. Qualitative methods allow researchers to focus investigation on the meanings constructed by people through rich description and translation of phenomena in the social world [63].

This research is a case study as it is composed of a bounded system with finite data collection [63], specifically, undergraduate Latina students in STEM at an HSI. It contains multiple pieces of empirical evidence (multiple individual interviews and demographic information) to further develop theoretical propositions (resilience model), somewhat analogous to generalizability in quantitative research [64]. While predominantly a qualitative study, a few data presented here are quantitative. Namely, given the number of participants in this study (n = 28), the use of frequency measures (percentages and counts) of certain data allows one to observe patterns in the context of this study (Section 4) and among participants (Section 5).

4.1. The HSI Context

All participants attended one institution, a public metropolitan university that was designated as an HSI and as a university with very high research activity for over a decade at the time of the study. It has been known as a highly diverse HSI (at least at the undergraduate level), with approximately one third of the student population currently identifying as Latine (see Table 1 for more HSI context details).

Table 1. Characteristics and demographics of the Hispanic-Serving Institution context.

Institutional Data		Percent
Student enrollment	Latine	33%
	Female	52%
	First-generation students (undergrad)	45%
	Full-time status	69%
Degrees awarded	Latine	31%
	Female	55%
	First-generation students (bachelor's)	47%
	Total STEM	29%
Faculty	Latine	10%
	Female	43%
	Full-professor Latine	7%
	Full-professor female	26%
Total student enrollment (undergraduate)		34,588

Note: This information was obtained from the institution's research reports for spring 2022, the semester in which the majority of interviews occurred.

4.2. Participant Demographic Data

All but one participant completed multiple advanced courses in high school. Of the 23 participants that were first-generation college students, 6 of them held this status in the U.S. only, meaning that they had one or both parents with a college degree attained from a Latin American country (Table 2). Most participants were born in the U.S. and had both parents ($n = 22$) or at least one parent ($n = 2$) born in a Latin American country. Only a few participants were born in Latin America but some of them were 1.5-generation immigrants, meaning they spent formative years in the U.S. [65]. Therefore, participants who did not immigrate themselves were typically second-generation immigrants (daughters of immigrants). Latin American background or heritage included: Mexico ($n = 14$), El Salvador ($n = 5$), Honduras ($n = 3$), Colombia ($n = 2$), Venezuela ($n = 1$), Cuba ($n = 1$), or not mentioned ($n = 3$).

Table 2. Participants' demographic data.

Demographic Information		Number	Percent
Advanced courses in high school	Multiple courses	27	96%
	None	1	4%
First-generation college student (FGCS) status	FGCS overall	17	61%
	FGCS in the U.S. only	6	21%
	Non-FGCS	5	18%
U.S. birth status	Born in Latin America	5	18%
	Born in U.S.	23	82%
Parent(s) birth status	Born in Latin America	24	86%
	Born in U.S.	4	14%

Note: Total of $n = 28$ participants. Percentages are rounded to the nearest whole number.

4.3. Recruitment, Data Collection, and Analysis

Participants were recruited by contacting faculty networks/colleagues from STEM departments for recommendations and by contacting student STEM organizations within the HSI to share our study. We recruited from engineering, computer science, mathematics, and life and physical sciences departments/colleges. Purposeful sampling was utilized to gain rich data in a specific site [66]. Participants were contacted after meeting eligibility criteria: self-identifying as Latina, over 18 years old, and pursuing a STEM major. As the goal of the study was to examine the experiences of persisting students, students classified as junior (third year) or above were selected for an interview.

The primary methods for data collection were a demographic questionnaire followed by an in-depth, semi-structured interview per participant, conducted in person on campus or virtually through Zoom. Participant characteristics and demographic results are reported in the Section 5. Semi-structured, open-ended interviews were conducted and analyzed to explore the experiences of 28 persisting Latina STEM majors. Questions included thoughts about the social climate of STEM spaces, STEM interests, belonging, family involvement, peer interactions, involvement in college activities, and supports during college (particularly academic and social). Each interview was audio-recorded and then transcribed verbatim for analysis. Follow-up and clarification questions (member checking), data from demographic questionnaire, and observations were used to triangulate findings from data shared by participants during the interview [67,68]. Though conducted in English, interviewers additionally spoke Spanish and made all participants aware of this in case they wished to contribute any thoughts in Spanish (native language for some), an important consideration when working with multicultural participants [69]. The quotes reported in the Section 5 are participants' verbatim responses.

The goals of the study required inductive analysis to dive into social and cultural aspects of Latinas studying in STEM fields (specific majors are reported below). Content analysis was utilized, particularly the conventional approach, or inductive analysis which allows codes and insights to "emerge", and the direct approach by using the resilience model to "validate or extend conceptually a theoretical framework or theory" [70], page 1281). Therefore, the study also utilized deductive analysis using the resilience model (Figure 1) to guide analysis. Data were unitized and coded using content analysis and constant comparative methods [66,67]. Preliminary codes, specifically the contexts outlined in the resilience model (Figure 1), were used as a starting point for analysis. Most categories were developed with what Saldaña [71] describes as structural and descriptive coding. The first author performed all coding, but agreement of identified categories and themes were examined by members of the research team through debriefing sessions. Guided by the research questions and the scope of this paper, categories and themes were selected and reported.

4.4. Researcher Positionalities

As qualitative research relies on the human as the instrument, we briefly reflect on the perspectives and backgrounds of the researchers, particularly in terms of identity and cultural background to give context to the interpretation of data [67]. We provide positionality statements to identify potential shortcomings, biases, and assets [72]. All authors of this paper identify as Latina women, two of whom were born and raised in Latin American countries and the other a child of Latino/a immigrants. The first author was a first-generation college student, and her educational background is in STEM with a terminal degree in the life sciences. She currently works in higher education and her current research interests include underrepresented racial/ethnic groups in STEM and cultural influences in STEM pathways. The second author was born and raised in Mexico but has lived and worked in the U.S. for over two decades. She is a faculty member at a large R1 university and focuses on access, retention, graduation, and success of Latina students in STEM. The third author was born and raised in different Latin American countries

and recently received her bachelor's degree in STEM. She has been involved in Latine organizations or groups throughout her undergraduate career.

The first and last authors bring direct experience as Latinas in STEM. Both have worked in laboratories within life science and interdisciplinary sciences. Both authors have reflected on the incongruency between STEM culture and their own as Latinas (with heritage from Mexico, Peru, and Venezuela). All authors engaged in this study in part due to our passion and dedication to impact the educational success of Latinas and other communities of color.

5. Findings

The analysis of interviews was led with a focus on the research questions mentioned above in addition to reporting patterns and/or re-occurring findings among participant interviews. The following are descriptions of findings by themes; at the end of the section, a summary is presented (Table 3).

Table 3. Summary list of findings.

Theme/Subtheme
Interest, Curiosity, and Passion for STEM
An Early Interest in STEM
Exploring or Establishing STEM Interest
The STEM Environment
Rigor of STEM
STEM Culture is Exclusive and Unwelcoming
Potential Strategies/Assets: Resilience in Action
Gravitation to Diverse Spaces
Desire for More (or Any) Ethnic and Female Representation and Support
Prosocial, Altruistic, and Community-based Motives and Values

5.1. Interest, Curiosity, and Passion for STEM

A likely asset that was significantly developed prior to college was an interest in STEM. All participants described in various ways how they landed on a STEM degree. Categories that emerged under this theme are presented chronologically.

5.1.1. An Early Interest in STEM

Many participants described an interest or curiosity for STEM subjects that began in high school or earlier, in different ways. For at least 11 participants, getting exposed to STEM through programs or specific STEM experiences in their schools was key in piquing their interest. For example, Levi (physics major) described how a program in her high school had an impact on her pursuing a STEM degree:

> "You know the only community that drove me into a STEM field was actually being in the STEM program in high school. I remember a lot of the kids there. We were in an engineering program called [STEM Academy]. That was the only atmosphere I had that pushed me into getting a STEM degree."

She went on to describe how she was able to see and feel science in action through hands-on activities. Others also mentioned involvement in STEM programs or other STEM activities, such as field trips, when asked about why they pursued their major. Eleven participants specifically discussed STEM programs or related activities/experiences that occurred in high school or middle school.

For several other participants (and some of the same individuals above), their interest in STEM first began through courses taken in high school (some of these were advanced

courses; see Table 2). This partly resulted in the category "Identity, experience, and confidence as a STEM person", a category created to describe how 20 participants identified as early scientists, *if* they did. Participants described a limited identity as a STEM major/person but more frequently talked about being good at math and science in high school or gravitating to STEM in college due to previous experiences in K–12. Melissa, a math major, for example, said that while her high school promoted STEM and she wanted to pursue it, she never considered it as "Yes, this my identity". Overall, these findings demonstrate the importance of the school context (Figure 1) for STEM interest development and identity.

5.1.2. Exploring or Establishing STEM Interest

For others, an interest developed while taking classes in the HSI or specific college experiences. As STEM classes may be relatively limited for some during high school (outside of the core math and science), it may come to no surprise that several participants had the opportunity to understand or capture their area of interest during college. Therefore, the subcategory "Learning/narrowing specific STEM interest" emerged during analysis with high frequency (at least nine participants discussed at least once). This was described by Ana, a computer science major, whereby a specific STEM course led her to investigate more about the field:

> "I was like, getting into computer science. So, there was a lot of information about it. Like I started getting into like building your PC and things like that. So, I was like, 'This is so cool. Like I had never built a PC before'. [Interviewer: During college?] Yes, during college, right when I was taking that coding class."

Rosa (chemical engineering major) talked about how a research internship prior to transferring to the HSI sparked her interest in her major, particularly how it was a mix of two fields (chemistry and engineering).

Some participants (at least 11) surmised that STEM was their interest because they did not "fit" anywhere else, resulting in the category "Lack of fit or interest in anything not science/STEM". Emely, a chemistry major, described this conception:

> "I was like, 'If I can't do this, what can I do?' ... Yes, because I didn't see any other major fit for me. I would be even bored, probably switch multiple majors. Like biology, out of the question, geology, out of the question, any other [STEM] that we offer here, it was like out of the question. I was like, 'I know I'm not going to enjoy that. Like I'm going to be bored'."

Other participants similarly described a process of elimination in narrowing down their specific STEM field in this HSI. The college context (Figure 1) is thus key to establishing one's STEM interest.

Increasing time spent in STEM seemed to be associated with belonging, resulting in a separate category "Belong in STEM, confident, competent". Those that described feeling like they belonged in their major often did so in terms of competence, because they "have more experience", will be "able to graduate", or tutored others along the way. The dominant pattern was that participants felt they belonged particularly because they had advanced in their degree program or "gotten this far" even though there was sometimes "still a little doubt here and there". Participants were asked if they felt they belonged in their major at the time of the interview and while 24 of the 28 said yes, many said yes with some reservation or that the feeling of belonging in STEM wavered at times (Table 4). Moreover, those who did not have reservation did not necessarily start that way in college.

Table 4. Interview findings.

Pseudonym	Major	Felt She Belonged in STEM	Credits a STEM Mentor and Leader in HSI	Requested/Desired Ethnic and/or Female Presence in HSI
Amanda	Biochemistry	No	No; HS STEM teacher	* Yes
Sandra	Biology pre-med	Yes, with reservation	Yes, STEM faculty	* Yes
Belinda	Biology pre-med	Yes, with reservation	Yes, STEM faculty	No
Nina	Biology	Yes, but wavers	None/no mention	* Yes
Valerie	Mathematics	Yes	no mention	Yes, hire URG faculty/staff
Erica	Biomed engineering	No, but wavers	No; STEM peer	No
Bibi	Environmental science	Yes	Unknown	Yes, hire URG faculty/staff
Lily	Mechanical engineering	Yes	No; STEM Latine peers	* Yes
Claudia	Mechanical engineering	Yes, with reservation	Yes; STEM faculty/staff	* Yes
Michelle	Biochemistry	Yes	No; grad student in higher education	Yes, hire URG and WoC
Valeria	Chemical engineering	Yes	Yes, STEM faculty	Yes, hire WoC
Cassandra	Biology	Yes, with reservation	No	* Yes
Alejandra	Biology	Yes	No; STEM graduate student	No
Virginia	Biology and Nutrition	Yes	No	No
Mari Jose	Civil engineering	Yes	No	No
Jasmin	Computer science	Yes, with reservation	No; STEM alumnus/peer	* Yes
Ana	Computer science	Yes	No; STEM peer	* Yes
Aliyah	Mathematics	No	No; social science faculty and HS STEM teacher	* Yes
Maria	Mathematics	Yes, with reservation	No	Yes, hire WoC
Amy	Biology	Yes	Yes, STEM faculty	Yes, hire URG and WoC
Melissa	Mathematics	Yes	no mention	* Yes
Emely	Chemistry	Yes, with reservation	Yes, STEM program staff	* Yes
Rosa	Chemical engineering	No	Yes, STEM faculty and staff	* Yes
Levi	Physics	Yes	Yes, STEM faculty	* Yes
Lucia	Computer science	Yes	No; STEM alumni	No
Amadis	Industrial engineering	Yes, with reservation	No	No
Elvira	Biology/biotechnology	Yes, with reservation	Yes, STEM faculty	* Yes
Diana	Mathematics	Yes	No	* Yes

Interview findings that could be tallied are included in this table, particularly those that demonstrate a high or low frequency of a certain phenomenon. *Note*: STEM mentor and leader = non-student within their STEM department or college (social sciences were contained in separate college). HS = high school. In the final column, * Yes = broadly expressed desire for more female or ethnic presence or support in STEM/HSI. URG = underrepresented group (ethnic group and/or women). WoC = women of color.

Finally, "STEM as a path to financial security" was stated as a motivation by some for pursuing or persisting in their STEM degree, mainly for engineering students. These findings are discussed in Gonzalez and Perez [73].

5.2. The STEM Environment

Though this paper is focused on assets, the following subthemes "Rigor of STEM" and "STEM culture is exclusive and unwelcoming" are important to present here. They are described here because the overall STEM context and the institution's social STEM climate contribute or directly influence participants' strategies and assets applied during college.

5.2.1. Rigor of STEM

The category "STEM is difficult academically" emerged as participants described the general difficulty in understanding STEM material, advanced math courses, or other specific courses. For example, "weed out" courses were described by six participants as especially difficult for performing well, causing them to consider dropping the course or even question their belonging in STEM. Moreover, the majority (at least 16) of participants described "Struggling academically in STEM courses", occasionally failing a class. This subcategory included mentions such as failing or dropping a class (typically for the first time), wondering whether they might lose a scholarship, and/or juggling extracurriculars (eg. STEM student organizations). Consequently, "Not belong in STEM" emerged as a separate category largely in result of poor to mediocre performance or comparing themselves to others (10 participants). However, this should be interpreted with caution as mediocre to one person can mean good for another, and grades or GPA were not examined in this study. A related category called "STEM is time-consuming, all-encompassing, hard" was created to describe how many participants (at least nine of them) discussed studying or spending plenty of time on their STEM courses. Bibi, an environmental science major, summarized this well:

> "It's really challenging. It takes a lot out of your day . . . It requires you to put in a lot of work to be not the best but to be good at what you're studying."

Emely, a chemistry major, mentioned how studying was her primary daily life activity while relating this to her ethnicity: "I'm a Latino. It's like I felt like my purpose was just to study, basically".

Finally, "STEM requires plenty of individual effort" is a category that came up in at least 10 interviews, particularly in terms of having to self-advocate (six participants). Ana provided the following observation:

> "If you really want something done, you really have to also push for it . . . I just feel like you can't just send one email and expect like a response. Unfortunately, that's not how it works . . . Yes, you just have to really advocate for yourself. You really have to get your voice out there if you really want it to be heard. You really have to push. That's something that I had to like forcefully learn, because I was not like that."

Participants who described this way of being seemed to have done so in terms of a strategy. That is, being assertive and insistent is a strategy (or perhaps an adaptation) for navigating STEM spaces. This adaptation may be considered necessary as the ensuing findings will demonstrate.

5.2.2. STEM Culture Is Exclusive and Unwelcoming

While the majority of participants noted the difficulty of pursuing a STEM major because of its rigor, the category "STEM is intimidating/competitive/pretentious" was created to describe the social challenges that interact with and complicate academic rigor. Here, subcategories with quotes from a high number of participants (at least eight to nine in each) include "Competitive" and "Condescending/entitled/ego". Amanda, a biochemistry major, described these particular aspects of STEM culture in a broad sense:

> "Everyone just wants to be the best versions of themselves, better than one another, and just do as much as they can—which wouldn't be exactly so bad, but it becomes

bad when like, when like others look [down on] you, when others feel like better than you. And they won't say it, rather their actions will demonstrate it."

Two other subcategories with fewer participant mentions but relevant in describing STEM contexts were "Prestige, advantaged, ambitious people" and "Strict and unforgiving". For the former, three participants used terms such as "posh", "privileged", and described classmates that had family members that were in STEM (e.g., doctors) as well as socioeconomic differences. The latter (four participants) was solely used to describe strict professors that showed little to no flexibility, for example, with assignment deadlines.

"STEM lacks community/reciprocity/is unwelcoming" is another category that describes the culture encountered. Subcategories that fell under this were "Lack of interaction or teamwork", "Unapproachable/lack warmth/aggressive", and "Transactional/superficial interactions or relationships" with at least 5 to 8 participants reporting in each. "Lack of interaction or teamwork" was primarily described as lacking group activities in class, quiet/introverted classmates, and sometimes feeling isolated. STEM spaces were also described as unapproachable, lacking warmth, and sometimes aggressive (occasionally hostile), both among students and faculty. Nina, a biology major, described this category well:

"The culture can be kind of little bit individualized, every man for themselves, a lot less community—you don't really feel like you're a part of a community, you can join student organizations that are women in science, people who want to do physical therapy, things like that, but in your lectures, in your laboratories, it doesn't feel that way."

Nina notes the separation between community-based spaces, such as student organizations, and more individualized spaces like classes. The subcategory "Transactional/superficial interactions or relationships" is similar and best represented by Elvira's (biotechnology major) description about students primarily helping because they "always want to get something in exchange when they help someone . . . It is something that in [Latin American country] wouldn't happen". High competition, lack of community, and superficial interactions contribute to this chilly climate.

Related to the aforementioned categories is "Non-STEM is welcoming and interactive", referring to instances in which four participants specifically compared STEM spaces to those outside STEM. Cassandra, a biology major and sociology minor described the sociology department as "completely different" because her professors were approachable: "I feel like I'm talking to a person right now. It's very different and they're very considerate and very great". Amanda, who had a second major in Spanish said that the Hispanic studies department was a "welcoming, friendly environment" specifically in contrast to STEM.

Finally, it is important to note that gendered and racialized experiences were also reported but much more apparent among engineering majors. This is reported in Gonzalez and Perez [73], where we discuss how those in male-dominated fields may engage in high levels of resistant capital, particularly in terms of their gender identity.

5.3. Potential Strategies/Assets: Resilience in Action

A few themes emerged in which participants demonstrated resilient ways in which they navigated their college experience with cultural assets. Findings represent potential success strategies that they utilized to deal with STEM spaces, particularly in ways external to STEM classes/departments (as mentioned above) but within the HSI.

5.3.1. Gravitation to Diverse Spaces

Participants found comfort in and gravitated to diverse spaces or those where they could find others with similar characteristics. First, the category "Tendency to look for others like self" showed a high frequency with at least 11 participants. They described gravitating to like-minded individuals or looking for others that they could relate to or sharing background characteristics. Amy, a biology major, describes this:

"I like having professors that are immigrants from someplace else or that are not first language English speakers either and stuff. For me, that feels good, and also as an aspiring scientist, it makes me feel that I can also be like them. Like if they did it, I can do it as well."

Shared qualities included having the same/similar major, a shared personal characteristic, immigrant status, and generally seeing or looking for others that look like them (including other women and Latinas). Sense of belonging is likely at play as participants describe connectedness and the interaction of social identities.

Consequently, two categories also stood out within this theme both in terms of frequency and minoritized identities: "Gravitate to women peers and faculty/staff" and "Gravitate to Latine peers and faculty/staff". The latter had a greater number of participants reporting than the former, but with more references to Latine *students* than faculty/staff. Nonetheless, over half (at least 15) of participants discussed gravitating to Latine individuals. Nina, a biology major, said:

"Yes. I don't know if that would be relatable to that question but there's some psychology behind that too. [Laughter] Because I swear, I'm not doing it on purpose but—Everywhere I go, it's like I find a group of all Hispanics and that's where I stick to and that becomes my close group of friends, of peers, of coworkers, things like that."

Similarly, a few references were made about appreciating Latina/o faculty/staff for "sense of comfort" or being drawn to a "similar culture". This may have enhanced the academic trajectory of some students, as it did for Rosa (chemical engineering major), who, when seeking help, noticed receiving straightforward advice from a Latino professor who was familiar with her situation, but discouragement from a White professor who lectured her about "merit".

In terms of gravitating towards women, at least 12 participants discussed some form of appreciation for presence of female faculty/staff or spending significant amounts of time among female peers. Valerie, a mathematics major, mentioned:

"Just something I've noticed is most of the professors for like the harder math— like I only had 2 female professors. And it was um in Cal 1 and Cal 2. And then everybody else has been male. Which I was like, that's interesting, I didn't realize that. Um meant—I think one of them was Hispanic at least."

She went on to say that while this did not hinder her learning, the homogenous representation of professors was something that stood out to her. This stood out to others as well. Sandra (biology major and pre-med), who was doing research in a lab, said the principal investigator was not Latina but was "at least a woman".

5.3.2. Desire for More (or Any) Ethnic and Female Representation and Support

Extending on the previous theme, the "Desire for more (or any) ethnic and female representation" is one that was developed to describe the participants' requests for more diversity and inclusion. This was largely in response to an interview question requesting any suggestions they had for their department to help increase ethnic female success.

Participants made clear that "STEM is not diverse", describing a low level of diversity among STEM departments in this (overall) diverse HSI, with at least eight exceptions (comments about some diversity being present). At least 22 of the 28 participants discussed a lack of diversity in STEM, noting men-dominant trends and/or a lack of racial/ethnic diversity (Black and Latine faculty in particular).

At least eight participants specifically mentioned a need for certain groups, resulting in the category "Organizations needed for underrepresented STEM groups", networks geared towards ethnic and female participation. Some noted a need for increased awareness of such groups that already exist in the HSI as some discovered these networks late in their undergraduate careers. (Many participants were involved in or were previously in

a STEM organization.) A few of these participants also requested a network or group for minoritized women or Latinas in STEM specifically. Michelle, a biochemistry major, said:

> "So, like with [Latina mentoring program], I wish there was something like [that] for STEM . . . [knowing] oh there's a community for you. Cuz I know there's like—I know for business, they have like uh Asian Business Student Association and we have like a Hispanic Business Student Association. And so, I feel like—I don't think there's any for [science college], except for like predental society, prepharmacy society."

Additionally, though most participants had developed close networks and peer bonds, a few discussed still searching for such a community and support network from other Latines/women.

The category "Requests to hire underrepresented groups" emerged or developed because a few participants specifically expressed a need for the HSI to have more faculty and staff from underrepresented racial/ethnic groups or women and/or WoC/Latinas specifically (four participants). In response to the interview question requesting suggestions for their department, Valeria, a chemical engineering major, explicitly said, "Hire minority females as professors". Moreover, to better understand current STEM faculty/staff support in the HSI (regardless of racial/ethnic background), participants were asked if they considered anyone a mentor/role model. Some did, but only a few were STEM mentors (Table 3). Given the participants' comments, one can surmise that very few of these were Latinas or women of color.

Within the resilience model, "Desire for more (or any) ethnic and female representation" is a theme that is probably best represented by the arrows pointing from the inner part of the model (culture) outward to the contexts (Figure 1).

5.3.3. Prosocial, Altruistic, and Community-Based Motives and Values

This theme particularly describes values and behaviors and thus is best represented by the inner portion of the Latine resilience model, particularly the "values" component shown in Figure 1 [54]. It was created because a few participants demonstrated or described prosocial motives or approaches in their efforts to attain a STEM degree in various ways, sometimes broadly (at least five participants). For example, Lucia (computer science major) thought about pursuing business in high school but pursued STEM to be more "fulfilled as a person" and "make a change" in society.

This theme also included the category "Being a role model, mentoring youth/others", (seven participants) a category created to describe participants' involvement and/or desire to be a positive example for others. Several participants described wanting to be a role model after attaining their STEM degree. Alejandra specifically described this in terms of persistence, that is, as part of her "identity in science [and] being that role model for the next [generation]". Diana, a mathematics major, described being a Latina role model to elementary students at a school she would visit and where her parent was a teacher. She gave the following example about this context:

> "He'd be like, 'Where is [participant] going?' They're like, 'College'. Then, he makes it a point to show them my work. So, he'd be like, 'This is what you're going to do when you get here, when you get to college', because he's always telling them like I'm Hispanic and on my own."

The same seven participants plus an additional four participants specifically described role modeling for loved ones, resulting in the subcategory "Being a role model for Latine family/loved ones". Sandra provides a fitting example of this:

> ". . . one more thing that I think contributes to how I made it this far, what kind of motivated me to keep going in STEM—was also that I'm the oldest um of my family. Because I think that with me, I always wanted to be a good role model for my siblings, and not just my siblings but younger cousins cuz I'm the oldest of everyone."

At least 11 participants expressed a desire for serving others, resulting in the category "Serving others, outreach". Melissa was involved in multiple organizations/clubs geared towards community service in addition to her STEM activities. Others expressed a desire to simply help others in the future, particularly with their career. Jasmin, a computer science major, discussed the possibility of merging her two main career interests:

"I was like, 'If I could open a community center where I bring people in . . .' like it's a community center, like if I were to do social work, but I'll also teach them about CS, technology. Technology is the future . . . Like your phone, even like data, like collecting data. Anywhere you go, like any store, any medical company, any insurance, you need to collect data, and that's all about technology. So, I've thought about that. I thought maybe a center like that and maybe get people in who are maybe not exposed to that, because I know a lot of the minority groups don't know."

This category was similar to "Pursuing STEM to help others and/or the environment" (which could also be categorized under the theme "Interest, curiosity, and passion for STEM"). For example, Lucia said:

"I hope to achieve my passion of wanting to help people . . . [and] have it be something I'm good at. So, I chose computer science just because it aligned with everything I wanted to do. My goal is to help identify disease better with machine learning and AI."

The category was created to describe participants' reasons for pursuing a career in STEM in terms of prosocial motives (at least five participants). Similarly, the category "Uplifting the Latine community, image" was created to describe the comments of at least six participants. This included "serving [their] community back home" with their degree, the ability to speak Spanish to future patients (for pre-medical students, as we have similarly found in Deis et al. [74]) and promoting/inspiring other Latinas in STEM. Valeria spoke about this at length:

"It's important for us to support each other—to help, and that's why I did this interview because I think it's important and I've also done volunteering with Latino communities or just minority communities throughout college."

Prosocial motives indeed may have been behind why participants completed an interview for our study as well.

6. Discussion

Though research on the perspectives and assets of communities of color in higher education has grown, understanding how underrepresented groups succeed in STEM is still in progress. Evidence gathered in this study demonstrates how social climate experiences and Latinas' cultural background affect and define resilience among diverse Latina STEM majors in an HSI, particularly in terms of identifying their success strategies.

In terms of the research questions, (1) how do social climate experiences affect Latina STEM majors' resilience in a Hispanic Serving Institution (HSI) in Texas? and (2) how does cultural background define resilience among Latina students in STEM? the subthemes of "The STEM Environment" theme provide an examination of the STEM culture in an HSI, both in terms of academics (rigor) and social climate (unwelcoming), the latter of which clashed with participants' cultural and socioeconomic backgrounds. Their sense of belonging was tested (Table 3), which might be expected given the conditions needed for belonging in STEM, such as mattering and intersectionality of identities [75] which directly contrast with unwelcoming environments. However, resilience may have been bolstered early on in their career trajectories through their interest in STEM, i.e., passion for science as an asset, as described in "Interest, Curiosity, and Passion for STEM". Most participants described a keen interest or curiosity for STEM topics that began prior to college and/or further developed during college.

In terms of the research question, (3) what resilience strategies are used to navigate STEM spaces? (and again RQ #2), perhaps most pertinent to their cultural background and resilience as Latinas were the specific success strategies that participants utilized during college to navigate STEM, as described in "Potential Strategies/Assets: Resilience in Action". First and foremost, participants demonstrated a "Gravitation to Diverse Spaces" whereby they gathered with and/or looked for others with similar characteristics or backgrounds to their own. Not surprisingly, many of our participants were involved in identity-based organizations or socialized with other women and Latines and appreciated such groups among faculty and staff as well (Table 3). This appreciation extended into a "Desire for More (or Any) Ethnic and Female Representation and Support" in their STEM departments. While this is not a strategy that translates into immediate action, such a desire is a value that can be perceived as an asset. Finally, "Prosocial, Altruistic, and Community-Based Motives and Values" was a theme developed to describe how individual cultural background influenced or determined participants' success strategies. That is, prosocial nature and actions were a culturally relevant strategy in which they navigated STEM because of its familial and overall collective essence.

6.1. Evidence Informing the Theoretical Frameworks
The Resilience Model

As STEM learning is a cultural process [32], it is crucial that we consider students' cultural backgrounds. The resilience model [54] centers Latine culture through an asset-based perspective of resilience.

The findings demonstrate that resilience is part of the participants' culture (values, knowledge, and behaviors) which they bring to different contexts, such as college and likely as they continue to the workplace. The participants persisted or navigated college in various ways, through their early curiosity or growing passion for their field, prosocial or altruistic motivations/behaviors, and their desire for more underrepresented groups in STEM in the university and beyond. Similar motivations have been shown among Latinas in medical school through their desire to serve their communities and accomplishment in doing so already, such as volunteer work in healthcare facilities [74].

Previously, we found home (family), college, and community contexts to be significant sources that fed resilience among persisting Latina STEM students at an HSI [74,76]. These are important contexts that inform the resilience model for Latina students, as this model is one of "contextual, lifelong resilience that is found in the Latina/o culture" [54], page 791). This paper particularly informs the inner part of the resilience model, or culture (made up of behaviors, knowledge, and values; Figure 1): Latinas perceived (values, knowledge) their contexts and selves, and they took action through success strategies or assets (knowledge, behaviors). For example, participants perceived a chilly STEM climate, as it perhaps clashed with their cultural background of family and community-based values and took action by forming bonds with other Latines and women and taking part in community-based activities.

Moreover, the findings in this study further support the use of CCW [57], a foundation of the resilience model. Through prosocial and collective behaviors/motivations, participants utilized resistant and aspirational capital. They engaged in assets recognized among Latine students in Texas HSIs delineated by CCW [34], including role modeling (aspirational capital) and peer support (social capital).

6.2. The Meaning of "Resilience in Action"

An awareness of racial/ethnic disparities, or desire for more people of color and women among faculty/staff, was also shown in this study, demonstrating how the participants (and others like them) seek aspects of their culture (values, knowledge, behaviors) in college and beyond.

As a form of resilience in accordance with the Gonzalez [54] model, they found spaces that reflected these aspects in their college context, as many sought or engaged in groups

(namely, student organizations) that were ethnic- or gender-oriented. Women of color at various career stages have indeed engaged in similar strategies, seeking places that enabled success and/or where they could bring their "whole selves" [28]. This is essentially a form of counterspaces, spaces which women of color have reported as "havens" of peer support and mentorship, such as STEM diversity conferences, campus groups, and sometimes departments [77]. Seeking counterspaces by desiring and gravitating to diverse people and spaces is a strategy that participants were likely engaging in due in part to their STEM experiences. It is reasonable to conclude that such strategies promote a sense of belonging, a basic human need, because these strategies fulfilled criteria for belonging in STEM, such as taking into account intersectional identities and feeling that one matters to others [75].

Another display of resilience through culture was participants' prosocial or altruistic values and behaviors. Prosocial goals positively influence interest in STEM careers for underrepresented students, and in terms of family, such goals can be particularly key for Latine STEM majors [36]. Participants in this study demonstrated prosocial motives or goals, whether to address a problem within their community or perform service work to improve the world around them. This evidence is in line with McGee and Bentley's [78] findings on Black and Latine students' "equity ethic" in STEM, or their collectivist and altruistic motivations/goals that were perceived as difficult to practice in STEM careers. Congruently, quantitative analyses find positive associations between non-White students in STEM and altruistic affordance [79] and the importance of social change [80].

We argue that such prosocial or collective and community-based perspectives are both a way of life (a part of culture), as well as an individual motivation to persist in one's STEM degree and beyond. In the same light, it is how family is both a significant part of Latine students' lives and not simply an individual motivation to do well in college [76]. For example, a preference for forming deeper bonds with Latina peers [49] or familial connections with faculty and staff [18] underscores the significance of community and family within the Latino culture. These concepts of community and family have been recorded for over a decade. In a 2012 study, Latina faculty saw their success in part through their family, and as a way of uplifting the Latino community rather than their individual goals [81].

A Clarification on the Resilience Model

A key part of resilience is interpretation of one's surroundings or environment. Resilience can be understood in at least two ways: (1) dealing with an adversity, adapting, and/or bouncing back, and (2) interpreting an adversity as a challenge and not as a negative event (the experience of overcoming the challenge may even be positive itself). Consequently, the latter does not consume cognitive and emotional resources in the way that the former does. While we recognize that the former is a traditional definition of resilience whereby Latine students are resilient by *coping* with problematic STEM programs and departments [82], we emphasize the latter to promote an asset-based perspective, particularly to support the understanding and strategic use of this reality in practice.

6.3. Servingness within STEM

In terms of the HSI servingness framework [60,61], the findings demonstrate a need to understand the state of STEM departments in HSIs. For institutions of higher education to transform themselves, they need to consider a servingness framework, to understand the state of the current environment within STEM, and then consider it to plan actions to address servingness in their institutions. According to participants, the STEM culture in a highly diverse HSI (though primarily through student body), lacks community, collaboration, and flexibility. Students in this study described their STEM surroundings as competitive and unwelcoming, with faculty who offered little flexibility, and a curriculum that overemphasizes an individualistic culture. It does not seem to cater to students whose cultural backgrounds may have opposing values and behaviors, such as those of Latine students (and other students of color). Cultural mismatch may be at play which aligns

with what Rendon et al. [34] calls *choque* or cultural collision. Such a mismatch is known to occur among Latines [83] and first-generation college students overall [84], groups that possess an interdependent cultural disposition within universities in the U.S. that largely institutionalize cultural norms of independence. This mismatch can be reduced by interventions that increase awareness of cultural values among historically underrepresented students [85]. However, such interventions (and others, for example, STEM programs) tend to focus primarily on the student. Diverse values and strategies also need to be adopted by leaders at all levels in the institution if they are to be a truly serving one.

6.4. Recommendations for HSI Leaders

The ultimate purpose of this study was to inform HSI leadership of Latina resilience or strategies in STEM culture, as this information can guide how institutions tackle STEM retention and success. Based on the above findings and the respective literature, we propose the following recommendations which also closely align with recommendations from previous work [49]. Most (if not all) recommendations require frequent and targeted outreach to address diverse audiences.

6.4.1. Create and/or Establish Counterspaces

The first recommendation is to create and establish counterspaces, due to participants' gravitation and desire for diverse people and places in this study. Many participants in the study found diverse communities through student organizations. While these organizations are a great resource for students, we encourage institutions to develop counterspaces that include faculty and staff in addition to student-run groups. For example, departments can serve as a structure or parent organization for this. It may seem unexpected that participants sought diverse spaces in a highly diverse HSI, but recall that the student body is primarily diverse here, not faculty/staff in STEM departments and the institution overall, as Table 1 confirmed. Groups or spaces that foreground individuals' race/ethnicity or intersectional identity are thus needed and are perhaps one expression of critical race theory in STEM education [59].

6.4.2. Champion STEM Pathways through Prosocial/Community Perspectives

The second recommendation is to advertise STEM majors and careers as not only financial opportunities but also as potential ways in which they can practice values to serve and give back to the community. When students perceive a mismatch between communal goals and insufficient opportunities to pursue those goals in STEM, lower intentions to pursue STEM have been found [86]. Perhaps to promote STEM effectively, institutions should seek connections to companies and organizations (for example, through job fairs) that practice communal or prosocial values as part of their mission. This caters to their cultural strengths and increases the visibility of their STEM degree utility. When underrepresented students have opportunities to reflect on the utility and value of their STEM degree early on, they are more likely to persist [87]. HSIs are well-poised for making these connections and can perhaps additionally inform companies of a need for a community-based or service mission if they are looking to recruit diverse students.

6.4.3. Seek and Hire More Competitive Women and Ethnic Groups in STEM

The third recommendation is to intentionally bring to the institution more highly qualified women and people of color, particularly for STEM departments, as pointed out by participants in this study. Again, this is important for HSIs where the majority of Latine students pursue their postsecondary education. Scholars have previously shown students' awareness of a lack of Latina role models and advocated for their presence in enhancing sense of belonging [49]. In a broader sense, committees should seek faculty and staff that demonstrate service and outreach, or values and practices that demonstrate community and equity in their mission, in addition to excellence in research and teaching expertise.

6.5. Future Directions

6.5.1. Identities in STEM Culture

Identity as a STEM person is a likely contributing factor to persistence in these fields. Indeed, identity for WoC in STEM is influenced by recognition from other scientists [44], which is likely to affect belonging. Additionally, a STEM identity for Latinas can be initially developed through one's family and further affected by peers and faculty during college [51].

Moreover, the influence of racial/ethnic and gendered identity may play a role in resilience. Heightened awareness of racial/ethnic identity is influenced by the political context, language, and involvement in curricular or cocurricular diversity activities across different institution types [88]. The salience or awareness of intersectional social identities as women and Latines in STEM for our participants is not fully clear, as this was not a specific target of the study. Not all participants showed keen awareness or a direct approach to their intersectional identity playing a role in STEM spaces. An examination of STEM identity could be further explored to understand how resilience in STEM relates to their multiple social identities.

6.5.2. Moving Forward: An Asset-Based Approach to Support Inclusivity in STEM

Asset-based research has grown in recent years, elucidating the importance of how communities of color persist or manage within STEM. Nonetheless, perhaps in greater need is research and its application in understanding how to modify STEM culture and its systems. This can be accomplished through integrating assets that diverse populations bring to the table to enrich institutions, particularly among HSIs. This approach brings to STEM (and in a broader sense, higher education) the benefits of a culturally diverse student population and thus future workforce.

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