





RESEARCH ARTICLE

Exploring engagement narratives among self-identified Hispanic women's experiences in engineering counterspaces

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Abstract

Background: Diversity, equity, and inclusion efforts in higher education are increasingly recognizing the importance of understanding students' lived experience. More research is needed to deeply and contextually uncover voices, meanings, and stories that are enveloped within the complex realities of Hispanic women in engineering.

Purpose: While the Latiné/x/a/o, Hispanic women population is one of the fastest growing ethnic groups in the United States, they receive only 3% of engineering undergraduate degrees. This research explored how self-identified Hispanic women experienced engagement outside of class.

Design/Method: This exploratory qualitative research employed narrative inquiry design using a paradigmatic analysis method. We conducted two in-depth interviews with five undergraduate engineering students who self-identified as international Hispanic women.

Findings: By examining the narratives through a novel synthesis of a socio-ecological framework of engagement and community cultural wealth, we identified three themes that tell the story of students' experiences outside of class: (i) Perceived benefits and level of involvement informed student dispositions and aspirational capital in counterspaces; (ii) Linguistic capital served as the entry point for receiving social and navigational capital; and (iii) Cultural and linguistic similarities provide a counterspace where students gained the drive, disposition, and aspiration to persist in engineering.

Conclusions: The findings identified the capital that drove students to engage outside of the classroom and capital they gained in return. Out-of-class activities provided a counterspace for Hispanic women in engineering that supported their sense of belonging, ability to navigate engineering, and professional development. Based on these findings, we provide recommendations for engineering education and research.

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KEYWORDS

co-curricular, community cultural wealth, engagement, Hispanic, Latina, narrative, women

1 | INTRODUCTION

There is a growing focus on disrupting the exclusionary culture of engineering education and increasing access for students from traditionally underrepresented groups, which include women, Blacks, Latino/Hispanics (The United States Census Bureau uses the terms Latino or Hispanic to describe ethnicity in the presentation of its data. However, we recognize the problematic use of *Hispanic*, which describes people of an ethnic background from Latin American countries who were once under the rule and dominion of Spain, and the term *Latino*, a Spanish masculine demonym [denoting racial or geographic origin] to describe an aggregated group [Revelo et al., 2024; Villanueva Alarcón et al., 2022].), and Native Americans/Alaska Natives (National Science Foundation [NSF], 2023). Despite these efforts and the fact that women are enrolling and graduating from university at higher rates than ever (OECD, 2021), women earned only 24% of engineering undergraduate degrees awarded in 2022 in the United States (ASEE, 2024). Additionally, while Latiné/x/a/o, Hispanic, Latin* (We recognize that the complexities and evolution of terms used to describe people with Latin American ancestry are an ongoing conversation led by scholars in the Latiné/x/a/o communities [e.g., Revelo et al., 2024; Villanueva Alarcón et al., 2022] and that some scholars are using the term Latin* to include Latiné/x/a/o and Hispanic groups [Lane et al., 2024]. However, we believe that it is important to allow the participants to self-identify the term instead.) women are one of the fastest-growing groups in the United States (Vespa et al., 2020) and represent 19.1% of the population (United States Census Bureau, 2022), they earn only 3% of engineering undergraduate degrees (ASEE, 2024).

There is increasing attention to not only disaggregate information about demographics but to pair these classifications with the lived experiences of Hispanic (It is important to note that “Hispanic” is used because all of the participants self-identified as such and we wanted to stay authentic to the participants’ desires.) women in engineering (e.g., Lane et al., 2024; Revelo et al., 2024; Villanueva Alarcón et al., 2022). In higher education literature (e.g., Núñez & Elizondo, 2013), several contextualizing factors have been attributed to the complex sociopolitical realities of these students’ experiences such as immigration, family, religion, language, gender, ethnicity, and country of origin. Recent work has begun to also explore the need for considering non-monolithic identities of Hispanic students in engineering (Revelo et al., 2024) and their connected student experiences (e.g., Lane et al., 2024). More research is needed that can begin to deeply and contextually uncover voices, meanings, and stories within the complex realities of Hispanic women in engineering, even if the participant numbers are small (Pawley, 2019; Revelo et al., 2024).

The present study used a qualitative research approach to explore the narrative knowledge of five self-identified international Hispanic women in undergraduate engineering. This research is framed through Lawson and Lawson’s (2013) theory of engagement and draws on Yosso’s community cultural wealth (CCW: 2015) to examine engagement outside of the classroom and the impact it has on the students’ experience. This exploratory work provides a methodological and theoretical framework for future research that can continue to deeply and contextually highlight the stories of international Hispanic women in engineering.

2 | LITERATURE REVIEW

2.1 | Hispanic women in engineering

A literature review on women of color in engineering identified 65 studies between 1999 and 2015 that examined this population, 43 of which included Hispanic and Latinx women (Ong et al., 2020). A more recent systematic literature review on Latiné/x/a/o students in engineering was conducted between 2005 and 2018; the authors identified 69 total articles, out of which 30 focused only on engineering, 14 focused on Latiné engineering students, 3 included Latinas in engineering with “women” being considered as a binary, and 5 were qualitatively focused studies, but not one of the articles captured the complexities of the use or selection of terms by participants (Revelo et al., 2024). Together, the relatively small number of studies points to the paucity of research on the experience of Hispanic women within and beyond the gender binary in engineering education with some notable exceptions (e.g., Garcia et al., 2020; Revelo &

Mejía, 2024; Rincón & Rodriguez, 2021), which is critical to developing the interventions and environments that can support their recruitment and retention.

Since 2018, there has been a rise in studies conducted on women who identify as Hispanic and Latinx in engineering (e.g., Banda & Flowers, 2018; Dika & Martin, 2018; Lane et al., 2024; Mejia, 2023; Tao & McNeely, 2019; Revelo & Baber, 2018; Revelo & Stepin, 2018; Revelo & Mejía, 2024; Rodriguez & Blaney, 2021; Rodriguez et al., 2020; Rodriguez et al., 2019; Wilson-Lopez et al., 2018). These studies, along with previous research (e.g., Banda & Flowers, 2016; Martin et al., 2013; Núñez & Elizondo, 2013; Peralta et al., 2013; Revelo, 2015a, 2015b, 2015c; Villa et al., 2016), point to various factors that negatively impact entry, retention, persistence, and development of an engineering identity among Hispanic and Latinx women in engineering. These factors include a culture of exclusion and “otherness,” lack of a sense of belonging, not feeling part of a single race or ethnic group, invisibility, and stereotype threat. Systemic social factors also play a role, including epistemic injustices, discrimination, colonialism, and imperialism. Additionally, sociopolitical factors such as immigration status and language barriers hinder the progress of Hispanic and Latinx women in engineering (Banda & Flowers, 2016; Banda & Flowers, 2018; Brown, 2008; Dika & Martin, 2018; Garcia et al., 2020; Martin et al., 2013; Mejia, 2023; Ong et al., 2020; Peralta et al., 2013; Revelo, 2015a, 2015b, 2015c; Revelo & Baber, 2018; Revelo & Mejia, 2024; Revelo & Stepin, 2018; Rincón & Rodriguez, 2021; Rodriguez et al., 2019, 2020; Rodriguez et al., 2022; Rodriguez & Blaney, 2021; Tao & McNeely, 2019; Villa et al., 2016; Wilson-Lopez et al., 2018).

2.2 | Hispanic women in engineering counterspaces

Research has shown that women of color in science, technology, engineering, and maths (STEM) higher education often seek out counterspaces, which are physical and/or ideological safe spaces for people outside the mainstream (Ong et al., 2017). Within academia, counterspaces can develop through engagement outside of class. Out-of-class activities include curricular (connected to coursework), such as working on group projects and studying; co-curricular (associated with their degree but not a particular course); and extracurricular (unrelated to their degree program; Simmons et al., 2018). Much of the research to date on out-of-class engagement has focused on understanding where students spend their time and what skills they acquire as a result. For example, engagement serves as the conceptual framework for the National Survey of Student Engagement to understand how experiences and activities connect to desired outcomes for university students (NSSE, 2021). NSSE collects annual data from first- and final-year students at hundreds of United States universities regarding their participation in programs and activities on campus. Out-of-class engagement has been linked with academic outcomes such as higher GPA and persistence (Wilson et al., 2014) and social support (Lee & Matusovich, 2016); however, participation in such activities and the benefits accrued through them can vary by student demographics, including race, ethnicity, gender, and family income (Simmons, Ye, et al., 2018; Simmons & Chau, 2021).

To our knowledge, only a handful of studies has explored the experiences of Hispanic undergraduate students in engineering in specified out-of-classroom spaces such as student organizations like the Society of Hispanic Professional Engineers (SHPE) (Banda & Flowers, 2016; Martin et al., 2016; Mejia, 2023; Revelo, 2015a, 2015b, 2015c; Revelo & Mejía, 2024). Less is known generally about how Hispanic women in engineering navigate counterspaces within their university and undergraduate education environments. For Hispanic women in engineering, counterspaces are not as straightforward to identify, as many Hispanic women find themselves in between immigration, familial, cultural, linguistic, racial, ethnic, and/or gender groups (Smith et al., 2023; Villa et al., 2016). Considering studies have reported that not all Hispanic women in engineering seek membership in student organizations (Banda & Flowers, 2016) and their sense of fit to a group is not solely based on race or ethnicity but rather other sociopolitical factors (Mejia, 2023; Núñez & Elizondo, 2013; Revelo et al., 2024; Villa et al., 2016), it is important to take a step back and identify other counterspaces to broaden our understanding of how Hispanic women engage with engineering, a typically exclusionary educational space. To better understand what these engagement experiences may look like and how institutions of higher education can better support them, our work integrates two frameworks, engagement and CCW.

3 | CONCEPTUAL FRAMEWORKS

Recent findings (Revelo et al., 2024) highlight the insufficient focus on Latiné students and underscore the need to explore these populations using culturally conscious frameworks, such as CCW (Yosso, 2005), which emphasize the

strengths individuals from diverse cultures bring to different contexts. We positioned our study using an empowering, asset-based approach (Harper, 2010), which rejects deficit models that unfairly place the burden of institutional shortcomings on the individuals navigating these spaces, and a liberative approach (e.g., Mejia et al., 2018) through the use of reflections, theories, and actions that strive toward freedom by igniting action and potential for change in this paper. We aim to highlight and leverage the inherent strengths that Hispanic women bring when engaging with engineering counterspaces found in out-of-class activities.

3.1 | Lawson and Lawson's model of student engagement

Across the many theories and disciplinary perspectives employed to understand student engagement, there is consensus among scholars that engagement is multidimensional, but there is less agreement about the constructs that shape it (Christenson et al., 2012). The specific framework underpinning this study is Lawson and Lawson's (2013) theory of engagement. Lawson and Lawson define engagement as the “conceptual glue that connects student agency (including students' prior knowledge, experience, and interest at school, home, and in the community) and its ecological influences (peers, family, and community) to the organizational structures and cultures of school” (Lawson & Lawson, 2013, p. 433).

Engagement extends beyond the classroom and includes students' interactions with their communities, families, and organizations and clubs associated with school (Christenson et al., 2012), all of which shape how students spend their time outside of class. This socio-ecological framework conceptualizes engagement as a synergistic process and system of behavioral, affective, and cognitive constructs that are intimately tied to context. Lawson and Lawson extend the traditional socio-psychological view of engagement to include sociocultural and sociological features to develop a systems-oriented mapping of engagement. Based on a synthesis across disciplines, Lawson and Lawson developed a “transactional model of student engagement” that includes “dispositions (will and skill students bring to activities) and drivers for engagement,” “conditions for engagement” (organizational factors that are external to the student), “acts of engagement” (experiences as students participate in activities), and “benefits and competencies of engagement” (outcomes from participating in certain activities) (p. 443). Their framework is rooted in the idea that engagement varies on the basis of population and context. This contextual view of engagement is appropriate for the current study because it does not assume a linear, one-size-fits-all model of engagement found in other work (Feinstein & Peck, 2008). Furthermore, engagement is not an immutable characteristic of the student, but rather a state that is influenced by the context (Christenson et al., 2012).

Researchers frequently study student engagement in relation to retention in school (Christenson et al., 2012). Most student engagement research in the United States focuses on students before they graduate high school, given the federal priorities of high school graduation (Lawson & Lawson, 2013). Across this body of research, engagement is associated with positive social, academic, and emotional outcomes (Klem & Connell, 2004).

3.2 | Community cultural wealth

Yosso's (2005) CCW model extends from Bourdieu's (1986) conceptualization of capital to include the notion of culture where the unique strengths of students of color are recognized as assets pivotal for navigating institutional challenges not originally structured with these communities in mind. Yosso's CCW framework (2005) centers around six forms of capital: aspirational (a person's hope for the future in face of challenges), linguistic (need for skills to communicate verbally and non-verbally), familial (family and community resources), social (instrumental and structural supports in the form of people and community), navigational (person's ability to navigate social institutions to maneuver unsupportive environments), and resistance (legacy of social justice from parents, community, histories to position them to solve societal problems).

CCW, rooted in a critical race theory (CRT) lens, highlights how the cultural assets of marginalized communities challenge dominant ideologies and systemic oppression. In education, CRT confronts dominant narratives, centers the lived experiences of people of color, and employs interdisciplinary approaches to bridge theory with practice. It shifts the focus from White middle-class norms to valuing the rich cultures and assets of communities of color, expanding traditional notions of cultural capital (Solórzano & Yosso, 2001; Yosso, 2005). By focusing on the lived experiences of underrepresented students in engineering, particularly self-identifying Hispanic women, CCW reveals the various forms of cultural capital these populations bring to their academic and personal success. Despite these strengths, their contributions are often undervalued in engineering classrooms, reflecting systemic power imbalances and the failure of

institutions to recognize or incorporate their cultural wealth. This devaluation perpetuates exclusion and reinforces systemic inequities.

Embracing CRT and CCW calls for more than surface-level discussions about race. It requires explicitly addressing systemic racism and its impacts, such as those experienced by Chicana graduate students (Solórzano & Yosso, 2001). By integrating the strengths of these women and their communities into engineering educational structures and practices, institutions can take meaningful steps toward equity and inclusion.

3.3 | Engineering counterspaces for Hispanic women in engineering: Synergizing frameworks

Since there is no existing conceptual framework to explore how Hispanic women in engineering experience different types of engineering counterspaces, we decided to find junction points between Yosso's (2005) CCW framework and Lawson and Lawson's (2013) theory of engagement. CCW allowed us to dive deeper into potential strategies these women employ to drive their engagement in various activities. Lawson and Lawson's (2013) theory of engagement allowed us to evaluate the dynamic and reciprocal relationship between students and their educational environments, focusing on how contextual factors such as school culture and relationships influence students' active participation in their learning processes. This integrative approach unraveled the complexity of participants' unique narratives, providing a rich, multidimensional understanding of their experiences in out-of-class activities and matriculation through engineering programs. CCW aligns with the drivers and dispositions component of the engagement framework (as shown in Figure 1), as the women in this study often drew on various forms of cultural capital (e.g., aspirational, familial, and social) to deeply engage in out-of-class activities. Further, the benefits and competencies of engagement from Lawson and Lawson's (2013) theory of engagement aligns with the wealth of cultural capital that students use to navigate their engineering programs.

3.4 | Contribution of the present study

The present study contributes to the small but growing body of research on the experiences of self-identifying Hispanic women in engineering. In particular, it explores their experiences outside of class, an area that has received growing attention in engineering education research given the role that counterspaces have in supporting the persistence and success of diverse students. This exploratory qualitative study uses narrative analysis to provide an in-depth approach to understand the story of each Hispanic woman in engineering and amplify their voices.

4 | RESEARCH QUESTIONS

This research addressed the following questions:

1. What drivers and dispositions for engagement are communicated by Hispanic women when narrating sources and paths related to their out-of-class engineering activities?
2. To what extent were community cultural forms of capital communicated by Hispanic women in engineering when narrating the outcomes of their out-of-class engineering activities?

5 | METHODOLOGY

The qualitative approach for this study relied on narrative inquiry design using a paradigmatic analysis method where participant stories are used to describe their experiences (Polkinghorne, 1995). Polkinghorne's (1995) paradigmatic analysis of narratives positions knowledge schemas (mental constructs) that are abstracted from a repeated, embodied experience. It explores the source, the path, and the goal of these mental constructs of knowledge (Polkinghorne, 1986, 2015). Polkinghorne (1986, 1995, 2015) posits that narratives are positioned by the way that individuals cognitively recognize and make meaning of the events and actions that surround them. Since there is no consensus on what knowledge is, Polkinghorne (1986) states that "the use of concepts for ordering and interpreting particular situations usually

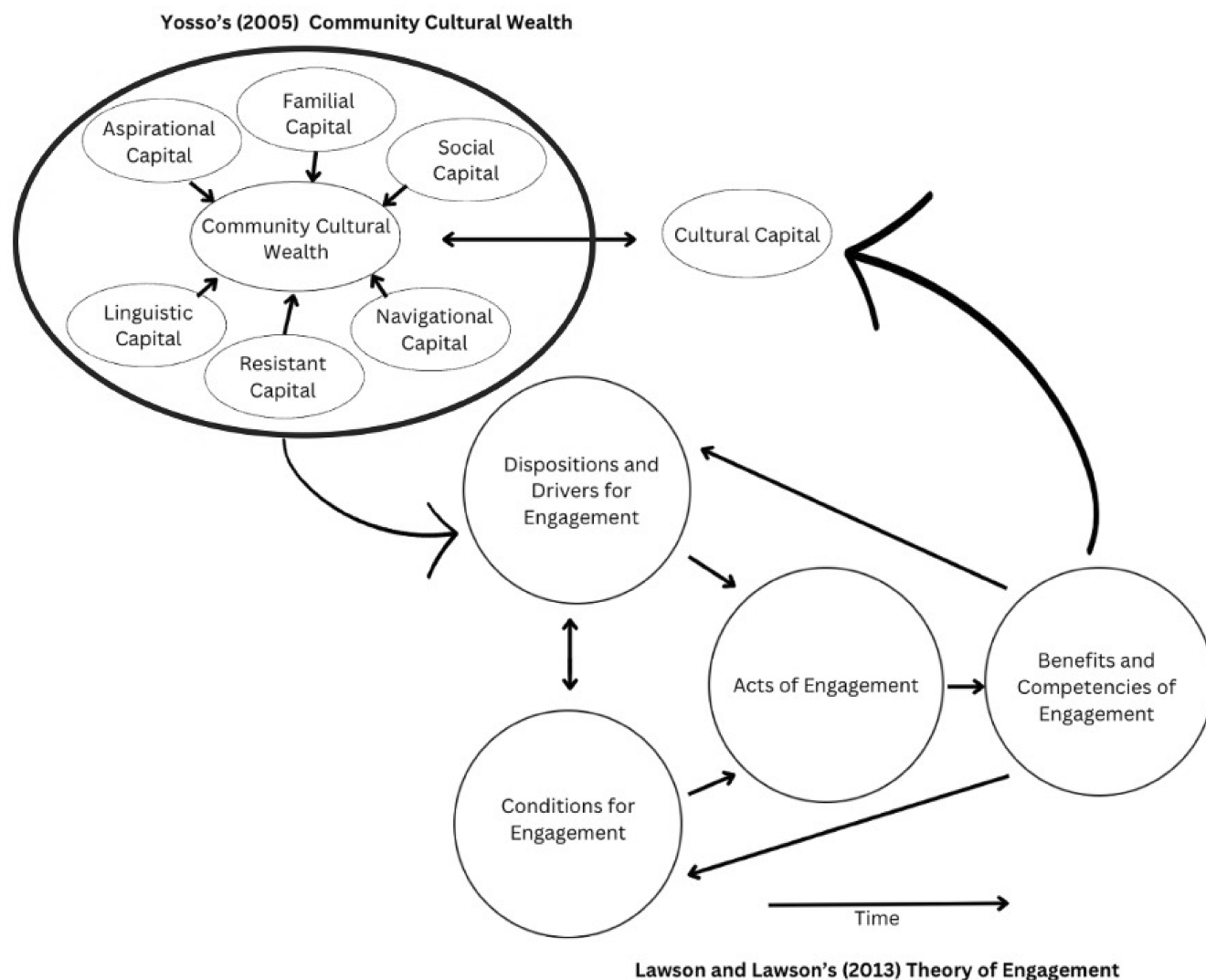


FIGURE 1 Model of student sociocultural engagement with engineering counterspaces (Lawson & Lawson, 2013; Yosso, 2005).

begins as the application of context-independent rules, maturation leads to the capacity to alter and attune the interpretative understanding of an event through the inclusion of the full contextual features of a situation” (p. 145). As such, exploration of these contextualized features requires deeper analysis via qualitative approaches to describe the elements of a lived experience from which knowledge was derived.

In this exploratory study, narrative inquiry involved collecting narratives through semi-structured interviews, transcribing the data, coding and categorizing segments to identify prominent themes, analyzing coded segments to discern patterns across narratives, and synthesizing the findings. The final synthesis used participant language and quotations to summarize and interpret the identified themes and patterns with a specific focus on sources, paths, and goals of the knowledge expressed by the participants (Polkinghorne, 1995).

We used interpretivism philosophies paired with a constructivist research paradigm, as Polkinghorne’s method situates the need for interpretive understandings of participants’ constructs (Polkinghorne, 1986, 2015). In this way, we were able to delve more deeply into how individuals create their perceptions of the world (Spector-Mersel, 2010). Narrative methods can consist of studying a small number of individuals, gathering their stories, reporting their individual experiences, and chronologically ordering the meaning of their experiences (Creswell, 2020; Riessman, 2008). Narrative paradigmatic knowledge analysis explores participants’ lived experiences to provide deep and lasting insights for understanding human experiences (Polkinghorne, 1995; Riessman, 2008) and was employed in the present study to illuminate how self-identified Hispanic women in engineering were cognitively understanding their engagement (knowledge source), their undergraduate experience (knowledge path), and the outcomes of their engagement outside of the classroom (knowledge goal).

5.1 | Data collection

This study was part of a larger mixed-method project centered on out-of-class participation of students in groups traditionally underrepresented in engineering. The first phase of the project was quantitative with an online survey distributed to undergraduate STEM students at five universities in the United States. In 2016 and 2017, 849 undergraduate engineering students completed the survey. Information on the survey development and dissemination has been published (Simmons, Van Mullekom et al., 2018). The survey results indicated engineering students gained social, affective, and academic outcomes from a range of out-of-class activities, and these experiences were not uniform across demographic groups (Polmear et al., 2023; Simmons & Chau, 2021b; Simmons, Van Mullekom et al., 2018). These quantitative results informed the following qualitative phase to further explore student engagement. As a note, the interview participants were recruited from one of the universities included in the survey sample, but the interview participants did not complete the survey. The survey was completed in 2016–2017 while the interviews were conducted in 2020.

Interview selection involved a purposeful sampling of self-identifying Hispanic women engineering students who were in at least their third year of study. All the students were recruited from one large public university in the United States. All participants self-identified as international bilingual Hispanic women in engineering. Table 1 outlines the participant information as disclosed by them. The students were informed that the study would involve a set of two interviews that would be conducted virtually in the summer of 2020. The participants received a \$50 Amazon gift card after completing the second interview. The interviews were recorded via Zoom and automatically transcribed. Members of the research team reviewed each transcript with the audio to clean and verify the accuracy.

We acknowledge that in academic research, racial and ethnic minorities and marginalized groups are often aggregated into one category. Aggregating the Latiné/a/o/x or Hispanic student experience in such a manner can over-generalize their experiences as monolithic or risk inadvertent forms of misrepresentations (Villanueva Alarcón et al., 2022). To move “beyond the monolith” and dive deeper into their unique experiences and engagement, we sought to explore individual student narratives and acknowledge their differences in country of origin, generational status, and discipline.

In alignment with narrative inquiry, data collection was designed to provide an extensive opportunity to understand the participants' experiences and stories (Polkinghorne, 1986) and occurred in a series of two interviews. The first interview was semi-structured and informed by the engagement framework. The interview began with participants describing the activities and organizations they participate in outside of class, with later questions focusing on the activity the participant considered most impactful on their university experience. The second interview included some questions that were the same across all interviews, but most questions differed for each participant to expand on or clarify previous comments. There were 2–3 months between the interviews, so both the interviewer and participant had time to reflect on the initial conversation. Additionally, during the second interview and in recognition of the implications of the use of terms to categorize people, the participants were asked to identify their race/ethnicity in response to an open-ended prompt. This is a recommended practice because assumed terms such as “Hispanic” can be problematic because of its misrepresentation of diverse populations and roots in oppression (Villanueva Alarcón et al., 2022). In the interviews and in this paper, we use the term that was selected by the participants.

5.2 | Data analysis

The analysis process began with the researchers familiarizing themselves with the data through the practice of repeated reading and listening (Polkinghorne, 1995). The first and second authors led the analysis; they individually read the

TABLE 1 Participant information.

Pseudonym	Country of origin	Family connection to engineering	Discipline
Marta	Panama	Not discussed	Computer engineering
Isabella	Venezuela	Father was an engineer	Industrial engineering
Emelia	Panama	Not discussed	Industrial engineering
Eva	Venezuela and Panama	Father and grandfather were engineers	Industrial engineering
Maya	International student—not specified	Father was an engineer	Mechanical engineering

transcripts and engaged in writing analytic memos to gain familiarity with the data and capture initial thoughts, observations, and reactions to the data (Birks et al., 2008). They then reread all transcripts to analyze the participants' stories through the process of re-storying (Creswell, 2020), which consisted of deeply diving into each participant's data, analyzing the key elements of their stories, and reorganizing them into chronological order. Once the re-stories were developed, the researchers then read the re-story and complete transcript through the lenses of engagement and CCW and began to thematically organize the story. The first and second authors met to discuss their thoughts, questions, and interpretations across both interviews for each participant until an agreed-upon re-story was developed for each participant (Saldaña, 2013). Example re-stories are available in Appendix B. General descriptive themes were developed across the participant narratives, peer-debriefed, and refined, and, lastly, the researchers stepped back from the data and looked across the participant narratives to develop a paradigmatic synthesis of the meaning of engagement and CCW across all five students (Saldaña, 2013).

As outlined in the researcher's positionality (see below), the first and second authors realized they likely had different experiences than the participants they were studying, as neither of them identify as Hispanic. Therefore, as recommended by Creswell (2020), the authors adopted a collaborative approach to further data analysis. The research team invited two self-identified Hispanic women engineering undergraduate research assistants into conversations regarding analysis. The authors played audio clips from the interviews to guide discussion and interpretation of the data. The authors took detailed notes on these conversations and weaved the insights into their development of major themes for this paper. The undergraduate students were part of a paid summer research experience and are included in the Acknowledgements. The third author, who identifies as Latiné, also debriefed on the methods and findings.

5.3 | Positionality

Within qualitative research, especially in narrative inquiry, researchers may construct meanings based on their own interpretations and through the lenses of their own lived experiences (Charmaz & Belgrave, 2015). For this reason, our team sought to be transparent in the analysis process and acknowledge that our own positions, identities, and experiences may shape the way in which we interpret the data. The author team includes two White women, one Latiné woman, and one African American woman. As noted in the preceding section, the initial analysis was primarily conducted by the first two authors who identify as feminists and strongly believe in improving DEI across engineering disciplines in the United States. The first author has lived and worked in multiple countries and teaches in a program for international students, so she has personal and professional interest in understanding and improving the experience of students studying outside their home country. While certain experiences of being a woman and feeling marginalized within the male-dominated culture of engineering were shared between the participants and first two authors, other experiences may not be. We recognized this as a potential limitation in terms of what we could see in the data and draw out as implications that would be meaningful for the community. We thus expanded our research team, and the third author self-identifies as Latiné or Puerto Rican although her birth country of origin has been under United States colonialist rule for centuries. Terms like "Hispanic," "Latino," and others have been imposed to identify women like her in engineering. As a Puerto Rican, she has experienced first hand being "othered" due to her multi-race, ethnic, cultural, linguistic, gender, and other backgrounds. While she is categorized as a United States citizen instead of "international," she has suffered cultural shocks, discrimination, and multiple forms of oppression due to her migration experience to the United States mainland (Mejia et al., 2022; Villanueva Alarcón et al., 2023). While she cannot equate her experience to that of an international student, her linguistic and cultural diversity allows her to be a trusted confidant to many international students and scholars, which has made her keenly aware of the challenges they face in engineering in the United States. The fourth author identifies as an African American woman and first-generation college graduate from the southeastern United States. Her work in engineering education focuses on the transformative potential of out-of-class engagement, emphasizing its role as a vehicle for personal and professional growth. Through a reflective stance, she seeks to contribute to a deeper understanding of how co-curricular opportunities foster belonging, professional identity, and ethical development. Drawing on professional experiences and prior research, she recognizes the systemic and structural barriers—including institutional constraints, time pressures, and perceptions of relevance—that often limit access to these opportunities. Grounded in a constructivist perspective, she develops frameworks to measure engagement's multidimensional impacts and strives to create equitable, inclusive environments that empower all students, particularly those from underrepresented backgrounds, to thrive.

5.4 | Limitations

One limitation is that the interviews were conducted in English. All the participants identified as international (We use the term “international” to identify students who were born outside of the United States and are currently studying in that country. Students self-identified as international in the study, and this part of their identity emerged in the conversation due to its salience related to factors such as language, family, and visa issues. We acknowledge the complexities of this term and the risks of treating international students as a monolith [Xu et al., 2023]. As recommended by Xu et al., we took an asset-based and qualitative approach to understand their experience within the context of their holistic identity.) and bilingual. Some of the students discussed finding belonging and comfort being able to speak Spanish in out-of-class activities because they could be their authentic selves (linguistic capital; Yosso, 2005). There is a possibility of misunderstanding and miscommunication when the participants are speaking in their second language. Native Spanish speakers were not intentionally sought through recruitment, so the study design was not designed to be bilingual. Translanguaging practices, the use of different languages together, based on a dual bilingual data collection and analysis (e.g., Di Stefano et al., 2022) could inform future work.

The study was designed to explore out-of-class engagement and thus the focus was not on SHPE. However, the participant narratives emphasized the important role of SHPE, and future work could more intentionally situate SHPE in the context of out-of-class engagements and explore the nuances of engagement in that organization. Finally, while country of origin was not initially explored to be ethical and mindful of participants' immigration status, cultural nuances may be present in the work that would need to be considered as part of the non-monolithic backgrounds of the participants. Future work could expand on the present findings.

6 | THEMATIC FINDINGS

Through analysis of the interviews and re-storied narratives, we identified three themes that address the research questions of how self-identified Hispanic women experience engagement and draw on CCW in out-of-class activities: (i) Perceived benefits (knowledge source) and level of involvement (knowledge path) informed students' dispositions and aspirational capital in engineering counterspaces; (ii) Linguistic capital (knowledge source) served as the entry point for receiving social and navigational capital (knowledge goal and driver); and (iii) Cultural and linguistic similarities provided a counterspace where students gained the drive, disposition, and aspiration to persist in engineering. The findings are represented in Figure 2, which is adapted from Lawson and Lawson's engagement framework and CCW.

6.1 | Theme 1: Perceived benefits (knowledge source) and level of involvement (knowledge path) informed participants' dispositions and aspirational capital in engineering counterspaces

All the students participated in multiple activities outside of class such as robotics club, campus job, service sorority, and identity-based engineering society. They were then asked to describe in detail the one activity they found most impactful. The experience of four of the five students indicated that engagement was perceived (knowledge source) as an investment (knowledge path), where one out-of-class activity in particular was communicated as paying off with tangible outcomes: the student chapter of SHPE.

The participants described joining SHPE in their first year and how their involvement with SHPE increased over time. As they participated in SHPE student chapter activities, the participants indicated having received both personal and professional development support. Examples of personal development support received were friendship and belonging, while examples of professional development support were resume help, networking, access to internships, and mentorship. As they witnessed and experienced an increase in these benefits, their drivers and dispositions to engage with SHPE began to grow. Thus, their engagement with the SHPE student chapter provided a reinforcing loop in terms of the time and energy they put in and the personal and professional development they got out.

For example, Isabella described SHPE as an “established organization,” saying, “I’ve never seen people that are as committed as they are in SHPE.” Isabella shared how the stability of SHPE and its commitment from its members encouraged her to invest time and effort in SHPE, which she felt was paid back in the benefits she received. The

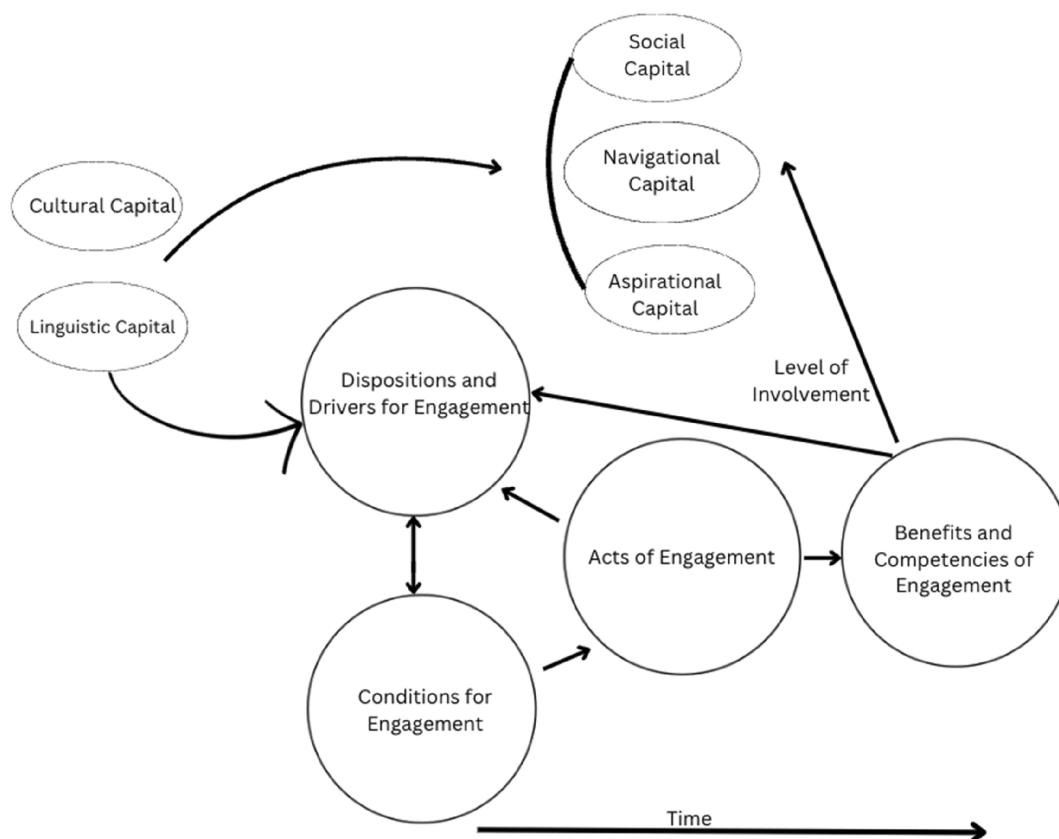


FIGURE 2 Summary of findings in the context of engagement and CCW.

women described that this investment was not just in themselves, but in their peers and the future of the chapter, resulting in community-informed but personally driven aspirational capital. At a certain point, all the students described they had gotten personally out of SHPE what they wanted. They had friendships, internships, job offers, and leadership roles to put on their resumes. Yet, they continued to be in the organization and on the executive board. As an example, Isabella noted:

The reason why I'm still in there because I kind of already have most of my personal friendships, relationships, all the professional opportunities that it offers and because of me wanting to return back to people what I received in even a better way ... I want to be the person that offers the opportunities more, not the one that's searching.

The desire to give back to other people resonated throughout the interviews, which created another reinforcing loop in which members continued their engagement so benefits could be shared by younger students, in the same way the participants benefited in their first 2 years from the guidance, engagement, and mentorship of more senior students.

Engagement in SHPE for the students required a significant investment of time, and that could come at a cost. All students described spending 6–12 h per week on SHPE events, meetings, activities, and tasks. That commitment coupled with their engineering courses, on-campus jobs, internships, relationships, and other out-of-class activities created a delicate balancing act. Four of the five students mentioned feeling “overwhelmed” at times, especially when they had a position on the SHPE executive board. In describing the challenges that she encountered while serving in her leadership positions, Eva said:

My grades were not great the last two years being part of the executive board ... It was harder because I dedicated so much time to the organization. It was harder to dedicate time to school. Nevertheless, I thought that I was growing so much more from going to SHPE's events or being involved with SHPE than what I would have done getting straight As.

Maya explained how one time this feeling of being overwhelmed caused her to question if she should drop her responsibilities with SHPE.

My fourth year when I was treasurer and I had like 1000 responsibilities with people to manage and being part of the executive board, there was one time that I was not doing that well in my classes. And I was just getting overwhelmed because I had five different classes. They were pretty hard. And then I had to be responsible for that, I was trying to find a job. I was preparing for my Master's, which I had to [take] the GRE and like it was so much work that I feel a little bit overwhelmed and I even talked to the president about dropping out of SHPE and like the responsibility. Not about more dropping, it's like a thought of, I'm getting overwhelmed. I don't know what to do, I don't want to drop the team because I will leave the team behind. And that's not something that I want to do. But there's too much on my plate right now.

Marta noted a similar experience but commented she did not seriously consider dropping or scaling back as "I didn't think it was an option for me to be honest, even if it was overwhelming." She continued to say, "I think when I got overwhelmed, I was trying to think about why was I doing what I was doing. I think that was my main thing, understanding why I was doing what I was doing just made it happen. Like just remembering 'I'm doing it because of the impact. I can help a lot of people.'"

The feeling of being overwhelmed or making sacrifices in other areas of their lives, such as grades, was shared across the participants. However, all the participants described the investment of time and energy in SHPE as one that paid off, for their personal and professional development, the growth of the chapter, and its impact on their peers. For Eva, "SHPE also helped me grow as a person" while Isabella said, "I've grown so much thanks to SHPE." For each of the participants, this growth was multifaceted and "helped me to develop myself as a human being" (Marta) and become "a lot more complete person" (Isabella). The participants' engagement in SHPE granted them opportunities to learn and develop skills such as self-advocacy and confidence in a safe space, which they could then transfer to the larger environments of engineering.

Participants recognized that the personal and professional benefits far outweighed the time commitment. Marta's narrative described SHPE's strong focus on professional development and how she gained interpersonal and intrapersonal skills through her engagement with SHPE. Becoming more confident and being more vocal helped her overcome her shyness and feel more confident in classes where no one else looked like her. She described, "I don't think I look like any of my classmates, which can be a little I think demoralizing." This idea of not fitting in with her classmates was part of why she said: "I think that's why SHPE was such an important part of my life like my feeling comfortable in my school." The other members looked like her and understood the feeling of being a woman in engineering and being an international student at the university. She also noted that her engagement allowed her to further develop leadership, teamwork, conflict resolution, and communication skills. Marta described how the development of these skills through SHPE allowed her to transfer the knowledge into the larger White, male-dominated space of computer engineering and navigate being one of the only Hispanic students or women in her major.

Emilia described a similar experience, stating that her engagement in SHPE helped her develop confidence:

[SHPE helped me] become more confident in the classroom and then like projects and not being afraid to ask whether it is to professor, or TA, or just like someone who's sitting next to me. My freshman year, I would have never been able to do that. I would have been scared.

Across the narratives, participants indicated they were applying the lessons learned in SHPE (usually in their most challenging years in SHPE) in the classroom and their careers. Though many participants described their second or third year of engagement in SHPE as "overwhelming," they noted the most overwhelming and time-consuming periods of engagement were when they developed key professional skills such as time management and communication. Further, the participants indicated SHPE offered a strong sense of professional development through access to career fairs in which they were given one-on-one opportunities to speak with employers. These experiences contrasted their perceptions of university career fairs, which were described as competitive and impersonal. Maya shared of the university career fair, "it is so difficult to get a job because everyone is so competitive around you." Isabella shared:

I got my job 100% because of SHPE. [My company] had one booth on campus, and the line was huge, wrapping around the building. SHPE secured one-to-ones with the representatives, who would leave the booth to speak with someone from SHPE and then return. It was through this that I first talked to the recruiter.

Through the access and opportunities SHPE provided, participants were able to obtain internships and develop valuable professional skills. Thus, their engagement in SHPE granted them not only a sense of social belonging and family but also a means to develop and build professional skills and advance their careers as underrepresented students operating in the competitive majority-dominated spaces of engineering.

6.2 | Theme 2: Linguistic capital (knowledge source) served as the entry point for receiving social and navigational capital (knowledge goal and driver) for their career aspirations

The participants indicated that participation in out-of-class activities at times did not allow them to bring part of themselves to these spaces. While some were engaged in other engineering-related activities, they indicated feeling at times like they did not fully belong. Marta reflected on not fitting the stereotype of computer engineering students in these spaces: “I wasn’t a boy who doesn’t like to shower and be on computers all day long.” It was interesting to note that while not explicitly asked, the participants continued to excitedly expand upon their experience with SHPE. For example, Isabella contrasted her involvement in SHPE with two other on-campus organizations she had joined but dropped. She described the other organizations as not having a good “time to results relationship” meaning she perceived that she did not get out of it what she put in, as related to time and effort.

As they expanded upon their involvement with SHPE, it was evident that the participants felt having a student organization with similar linguistic capital as them messaged belongingness in ways that the other out-of-class activities did not. In the process of acquiring knowledge about engineering, the participants understood that this knowledge source could not be disconnected from their linguistic or cultural contexts. Rather, they viewed language as an entry point to this knowledge source, which led to the acquisition of important social and navigational capital that they sought. In other words, while they understood that other out-of-class activities could provide important social and navigational capital, they understood that the context behind these capitals are better understood from individuals who have experienced oppression in similar ways as them.

As they formed social bonds, there were additional drivers that motivated them to stay. For example, as friendships formed, they discovered that these same sources of social capital can serve as important sources of navigational capital to meet their professional aspirational goals. Friendships in SHPE suddenly became study groups across classes and exams, professional support (interviewing and resume help), and connections to internships (via SHPE recruiters at national conventions or regional meetings). Maya expressed:

I don’t know what I would be doing without SHPE. So it has impacted my university in a such a great way. I found all my group of friends are mostly like 80% of them come from SHPE. So I found my social life in SHPE. I found my internship in SHPE. So I found my professional side in SHPE. And then in terms of culture, it is pretty good to have somewhere like, you know, I’ve been speaking English all the time, but like, it’s good to be back and be your real self and speak Spanish for a couple hours. So I really like that, too, and they are more like my culture than Americans. In that sense, I feel more belonging. So yeah, they impact all those.

6.3 | Theme 3: Cultural and linguistic similarities provide a counterspace where students could gain the drive, disposition, and aspiration to persist in engineering

Many of the participants recognized that their “otherness” in engineering spaces is also contingent upon their international status in the United States. Maya described that as an international student, “... there’s a limited number of companies that hire international students and second one, when you’re competing with [university] students in the conference that we have in [university] it is so difficult to get a job because everyone is so competitive around you.” The challenge of getting an internship as an international student due to visa considerations was echoed by several participants, and SHPE

events helped overcome this challenge by providing access to companies that were hiring international students. Maya also contrasted this limitation with the unique opportunities that SHPE, contrary to other student organizations, offered:

So once we go there [SHPE National Convention], mostly about 70% of the people end up with a job in that conference. And actually I had two jobs and, both of them, I found them at the SHPE national conference. So thanks to that, I found my internships and now my full-time job.

The participants further highlighted how the cultural and linguistic similarities within the SHPE community helped facilitate a deeper sense of belonging. With the exception of Emilia, who was involved in a small service sorority, the participants largely dis-identified with these other communities and cultures across campus. Even Emilia noted her involvement in “Greek life” differed from the sororities and fraternities on campus, since it is a smaller organization and focused on service. Whereas the broader campus community had leadership roles mainly for people in the Greek social sororities and fraternities, which Marta described as “problematic,” SHPE had its own culture and leadership opportunities.

Isabella described SHPE as warm and having a culture “that’s really supportive. I feel like everybody’s always available to help you because they know exactly what you’re going through. Because we come from very similar backgrounds.” She described that sharing the identity of being Hispanic, and for many members being international, provided a common work ethic and commitment that was not as common for American students in the campus community, where it is cheaper and easier for domestic students to go to the university. Marta and the other participants identified characteristics of SHPE (e.g., the primary language spoken was Spanish, a community of international students, and a sense of family) that made it more inclusive for them.

The participants recognized that among SHPE members, there were intersecting points of being “othered” within the broader engineering program that were viewed as pivotal to forming important social bonds and connections needed for them to navigate. Thus, cultural and linguistic similarities provided counterspaces by which participants could gain the drive, dispositions, and aspirations to persist in engineering. The participants talked about the value of having pieces of themselves by which they can form a shared identity. These shared elements included cultural components such as food and language, despite being in a different country.

The threading together of the social, cultural, and professional elements was apparent when the participants linked their growth, development, and success in engineering. Participants further described their engagement as providing more than just a sense of belonging but resembling a family or a home away from home. The participants were deeply invested in the family aspect and culture of SHPE, noting that members of the organization refer to themselves as the “familia.” Emilia shared, “We’re like a family, that’s like a big thing.” The participants described their engagement with SHPE as more than just a co-curricular activity or school engagement but a personal and social commitment to a family of peers. Participants emphasized the role of SHPE in social aspects (e.g., parties) and cultural events (e.g., annual cultural celebration) as well as professional events (e.g., career fairs) as a part of their engagement with the organization. These comments reflect the national ethos of SHPE, which lists its top value as “familia.” The national SHPE website states, “We take responsibility for our collective strength and passion by developing communities, building a diverse and inclusive membership, and challenging each other to be our best” (SHPE, [n.d.](#)). The SHPE chapter at these participants’ university clearly highlights the importance of this “familia” as a counterspace and community where members in our study were able to cultivate a deeper sense of belonging.

7 | DISCUSSION

This research examined the out-of-class engagement and community cultural wealth of five self-identified Hispanic women in undergraduate engineering at one university in the United States. Through a series of two in-depth interviews with each participant, we sought to understand the story of their experiences outside of the classroom. This work contributes to the small but growing research on Hispanic women, as the experiences of individual students can illuminate the structural barriers they face, the strategies and spaces they use to navigate them, and the benefits they acquire inside and outside the classroom through their engagement, all of which can inform opportunities to make engineering education more diverse, inclusive, and equitable.

Lawson and Lawson’s (2013) framework describes the extent to which students feel their social-cultural identity is supported while participating in an activity. Findings across all five participant narratives indicated that the culture of SHPE starkly contrasted with the larger university and engineering culture. Participants described their university’s

engineering culture as highly competitive and masculine. Situating our data in Lawson and Lawson's (2013) engagement framework and CCW indicated the following: (i) Perceived benefits (knowledge source) and level of involvement (knowledge path) informed students' dispositions and aspirational capital in engineering counterspaces; (ii) Linguistic capital (knowledge source) served as the entry point for receiving social and navigational capital (knowledge goal and driver); and (iii) Cultural and linguistic similarities provided a counterspace where students gained the drive, disposition, and aspiration to persist in engineering. The focus on professional development, identity, and celebration of culture provided a unique opportunity for students to find community while gaining skills that helped them in the classroom and experiences that were crucial to getting engineering internships and jobs.

All participants in this study were motivated by various forms of community cultural capital to engage in out-of-class activities, which provided them with numerous benefits and additional accumulation of cultural wealth. These included support, networking opportunities, professional development, and safe spaces that helped them navigate their academic challenges. Each participant exhibited a strong sense of aspirational capital through ambitious career goals that fueled their engagement in these activities. Linguistic capital also played a significant role, as participation in activities conducted in Spanish offered a reprieve from constantly speaking English. Furthermore, linguistic capital was enhanced through out-of-class activities that focused on enhancing communication skills, allowing these women to feel more confident speaking up in engineering classes and workplace settings. Participants found familial capital in out-of-class activities, as they provided welcoming and supportive communities that felt like family. Engagement in these activities facilitated the development of social capital through networking at events and conferences, leading to academic and professional opportunities such as internships and jobs. Lastly, participants drew upon and developed navigational capital to maneuver through their academic and professional journeys, balancing heavy engineering course loads, leadership roles, and job searches while maintaining their engagement in out-of-class activities. Thus, participants not only relied on community cultural wealth as a driver and disposition that facilitated their engagement but also accumulated more cultural wealth as a result of their engagement in out-of-class activities.

The findings indicated that engagement in out-of-class activities that are linguistically and/or culturally similar provides a means of accessing and activating social capital and other forms of capital necessary for students to navigate and persist in engineering. Social capital, as defined by Lin, is "how individuals access and use resources embedded in social networks to gain returns in instrumental actions or preserve gains in expressive actions" (Lin, 1999, pp. 31–32). Analysis of the participants' narratives indicated that these women were gaining access to a vast social network of other Hispanic engineers, students, women, mentors, and industry professionals through their engagement with specified out-of-class organizations like SHPE but that traditional out-of-class activities (with some exceptions) were not attuned to their needs or identities. Furthermore, they activated this capital by staying heavily engaged by attending career fairs, speaking with mentors and industry professionals, and pursuing leadership opportunities within their organizations. Through this engagement, participants were able to gain capital in the form of knowledge, leadership competencies, internships, and job offers. In Martin et al.'s study of Hispanic women in engineering majors, it was found that, "facilitating opportunities for students to develop sustained social capital may have potential to attract and retain underrepresented students in engineering" (Martin et al., 2013, p. 227). Engineering faculty members, researchers, and advisors should consider the social capital opportunities and benefits that out-of-class organizations and activities may offer undergraduate students.

The community built through out-of-class engagement also supported the students' sense of belonging. Belonging is connected to a range of academic outcomes, such as persistence (Hausmann et al., 2007; Marra et al., 2012), performance in the classroom (Davis et al., 2019), and motivation (Neel & Fuligni, 2013), and is particularly insightful to consider for gender and racially minoritized students (Patrick et al., 2023). In our study, the students developed a sense of belonging outside of class through shared identity and culture and a counterspace that contrasted with the engineering and university culture. Zooming out from the organization and institution, culture can help explain some of the discontinuities between the students' experiences outside of class versus their classroom experiences. Building on decades of international-level data, culture clusters from the GLOBE study (Gupta et al., 2002) identify groups of societies that are similar based on cultural practices and values. These 10 clusters, which are based on nine dimensions such as gender egalitarianism and uncertainty avoidance, help explain intercultural similarities and differences. Looking at the Anglo cluster (which includes the United States) and Latin America cluster (which comprises Argentina, Bolivia, Brazil, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Mexico, and Venezuela) illuminates striking differences between these two cultures. One of the defining features of the Anglo cluster is its high scores for performance orientation, in which high performance and competitiveness are valued (GLOBE, 2020). On the other hand, the cluster is defined by lower scores for in-group collectivism, which is marked by its tendency to favor individualistic behavior. The

opposite is true for the Latin America cluster. This cluster has high scores for in-group collectivism, with high value placed on family connection, and low scores on performance orientation (GLOBE, 2020). The culture of engineering at the participants' university aligns with the Anglo focus on performance and competition, which stands in contrast to the culture of identity-based out-of-class organizations that value family and group connection and is reflected in Latin American culture more broadly.

Out-of-class engagement served as a counterspace, which is on the margins of established spaces within education and offers "safe spaces" for underrepresented groups (Solórzano et al., 2000). In this case, the participants noted feeling different and even "demoralized" in their engineering majors. Their engagement in specified student organizations like SHPE offered a space to feel safe to be themselves, speak their native language, and engage in activities that reflected their culture, rather than hide themselves in an attempt to fit into the dominant White masculine culture of engineering. Counterspaces can be crucial to a student's ability to navigate and complete an engineering degree, as they can help students combat feelings of isolation and microaggressions that they may experience in their majors (Ong et al., 2018). In existing literature on counter-stories framed through CRT and LatCrit theory, Chicana students expressed struggles with self-doubt, impostor syndrome, and invisibility within dominant educational spaces (Solórzano & Yosso, 2001). These issues reflect broader systemic challenges in environments that undervalue their identities and cultural experiences. Counterspaces or places where marginalized voices are centered may offer a refuge where these challenges can be alleviated. Within such spaces, these women can bring their full selves, allowing them to thrive by leveraging their cultural capitals. These spaces may validate their experiences, reduce feelings of isolation, and provide opportunities for them to succeed both academically and personally, ultimately challenging the oppressive structures within mainstream engineering culture. Engineering educators should consider the larger impacts of the persistent dominant culture of engineering that continues to marginalize or isolate underrepresented students. Further, educators should recognize the importance of counterspaces and encourage and support organizations that are service-oriented and are aligned linguistically and culturally with marginalized groups.

Recent literature highlights the existing stress culture of engineering, which presents significant challenges related to mental health in engineering students, particularly for women and first-generation students (Jensen & Cross, 2021). Women of color face additional layers of pressure that contribute to burnout and mental health struggles (Ong et al., 2020). For international students, this can include the demands of navigating the visa application process, a new culture and country, and the stress of constantly trying to fit in. While our findings indicated that informal spaces and engagement in out-of-class activities, such as identity-based organizations, can offer vital support and help students manage these challenges, they also present their own set of difficulties. The findings illuminated that balancing these commitments with heavy engineering class loads, part-time jobs, internships, personal responsibilities, and professional development can lead to feeling overwhelmed. Future research should explore how out-of-class activities might be a privilege not accessible to every student, particularly those with demanding schedules or nontraditional responsibilities such as full-time work or caretaking. Understanding these dynamics can help identify ways to make opportunities more inclusive and accessible, and to address the broader implications of these activities on students' well-being.

8 | IMPLICATIONS

These findings have implications for how engineering educators, advisors, and departments can support student engagement. The narratives in this study demonstrated the sustained engagement of the participants, which provided personal, relational, academic, and professional benefits. All the students joined activities in their first year of university in a linguistically or culturally situated organization (i.e., SHPE), which allowed them the space to bring pieces of their identities and/or interest (e.g., service), thus helping them to form a community on campus. The students also took on leadership positions as early as in their first year, which provided peer mentoring and a leadership pathway for them to pursue other roles in their organizations.

As indicated in the findings, the out-of-class activities had various knowledge sources, paths, and goals that became drivers and promoted their dispositions in the forms of linguistic, aspirational, social, and navigational capitals. The findings put into consideration two factors: the role that colleges of engineering and departments play in "othering" students, and the role that out-of-class activities have in retaining students in their chosen fields. It seems that both drivers and dispositions, from a structural and systemic standpoint, could offer important insights into why these Hispanic women opt to pursue external means for support. Future work will explore these

nuances further. What is clear, however, is that in majority-dominated engineering spaces, assumptions about the norms, values, and beliefs of what makes a successful student are misaligned with the lived, linguistically, culturally, ethnic, racial, gender, and other identity-based realities of minoritized students. To our understanding, this is one of the first papers to explore engagement of Hispanic women in undergraduate engineering spaces in out-of-class activities. While participants described SHPE and previously explored benefits such as community, familial supports (familia), navigational capital, and social capital (Revelo, 2015a, 2015b, 2015c; Revelo & Baber, 2018), our study is the first to position drivers and dispositions in relation to the forms of capital these Hispanic women acquire. Based on the implications of the findings, we offer some general recommendations for the field of engineering education:

1. *Practice cultural and linguistic humility*: Most engineering programs come with an “adapt to us” mentality rather than taking the stance that they should learn from the students first. Engineering departments and university programs can consider intentional onboarding procedures and ongoing support activities that seek to understand and attend to the culture, linguistic, and identity-based needs of students. This can be particularly important for international students who are experiencing “othering” in both the academic and national culture they are being surrounded by.
2. *Support and partner with identity-based organizations*: The frequent and unprompted mention of SHPE by participants underscores the significant role such organizations play in students’ experiences. Additionally, some participants indicated having to fund-raise to make sure they could travel to the SHPE National Convention. Institutions can strengthen ties with organizations like SHPE by inviting members to serve on advisory boards, co-sponsoring events, and providing logistical or financial support for chapter activities.
3. *Remove deficit-based assumptions*: There are numerous epistemic and other forms of injustices that Hispanic women in engineering face from being “othered” by their gender, their race and/or ethnicity, language, culture, immigration, and other sociopolitical factors. Yet, the fact that they are in engineering, and persisting in spaces that were never created to support them, and that their resourcefulness leads them to seek counterspaces, is a testament to their strengths and assets. Removing deficit-based assumptions requires reflections about what it took for these students to get there and see the potential that they bring if narrow-minded assumptions of their value are removed. Leveraging asset-based theoretical frameworks such as CRT and CCW, alongside sharing counter-stories and amplifying the voices and strengths of underrepresented individuals in engineering, can help challenge and mitigate the deficit-based assumptions that often persist in these fields.

9 | CONCLUSION

This paper provided a novel synthesis of student engagement and CCW to explore the narrative knowledge of five self-identified international Hispanic women in undergraduate engineering. We aimed to contribute an understanding of these students’ experiences through a deep and contextual approach that illuminates the assets they bring to engineering education and cultivate in activities outside of the classroom. Based on these findings, we recommend that engineering research and practice adopt cultural and linguist humility, learn from and partner with others, and remove deficit-based assumptions, all of which can support the journeys of individual students and make engineering more inclusive.

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APPENDIX A: INTERVIEW 1 GUIDE

Background

- What activities are you involved with outside of the classroom?
 - Are these activities similar to any you participated in previously (e.g., high school)?
- Which activity that you are involved in is most impactful or beneficial?
- Can you describe your involvement?
 - Length of time, time commitment, responsibilities, leadership roles?
- What motivated you to become involved in [activity]?
 - Did anyone influence your decision to become involved in [activity]?
 - Did you consider joining any other activities? Which ones and why not join?
 - What is an activity you started but dropped?

Describing experiences

- Can you describe how being a part of [activity] impacted your college experience?
- Can you describe a time when you applied something you learned in [activity] to the classroom?
- Can you describe a time when you applied something you learned in [activity] to an internship, job interview, etc.?
- Can you describe a time when [activity] made you feel prepared for life after graduation?
- Can you describe a time when you experienced a benefit of participating in this activity?
- Was there a time you considered ending your participation in this activity?
 - Why did you decide to continue?
- Can you describe any challenges you have encountered while participating in this activity?

Closure

Based on what we discussed today:

- What does out-of-class engagement mean to you?
- How has participating in out-of-class activities impacted your college experience or professional development?

APPENDIX B: EXAMPLE PARTICIPANT RE-STORIES

Maya

Maya, an international fourth-year mechanical engineering student minoring in computer science, was inspired by her father's career as a civil engineer and her own passion for math and science. Initially interning at a large airline company, she realized aerospace was not her interest and pivoted to technology, leading her to take up a computer science minor. Her subsequent internship at a large tech company resulted in a full-time job offer, and she planned to work remotely for 2 years before pursuing her MBA, with ambitions to move into management.

Maya was actively involved in her university's robotics club during her second and third years, applying classroom theory to practical projects. She was also engaged with the Society of Hispanic Professional Engineers (SHPE), where her involvement, spurred by a friend's encouragement, spanned all 4 years of her undergraduate study. She held several leadership roles, including recruitment chair, mentor, and treasurer, where she developed crucial skills in time management, delegation, and communication.

SHPE provided Maya with significant professional and personal benefits, including internships, networking opportunities, and events like the SHPE national conference and cultural celebration. She described SHPE as a vital part of her college experience, offering a safe and supportive community for women with her shared identity outside of the larger competitive engineering academic environment. She shared, "Once I started going more to the meetings, and

seeing the great job that SHPE was doing. That's when I decided to join and be part of the leadership. Got more and more involved."

Reflecting on the impact of SHPE, Maya noted:

Classes are just classes, and then SHPE gave me that professional side that I didn't obtain in my classes, the social side that I didn't have in my classes, that cultural side that I didn't have in all my classes. Yeah, classes prepare you to be academic, prepare you on the academic side, but then the rest of the activities show you how to grow personally, professionally, culturally, and give you that overall well-rounded experience. How to manage leadership, how to manage people, like you know those types of things, some classes that, for example, SHPE really helped me to get over that.

Maya emphasized the personal significance of SHPE, saying:

I think SHPE in general has been my family, if I'm being honest. Like, I don't know what I would be doing without SHPE. So it has impacted my university in such a great way. I found all my group of friends; mostly like 80% of them come from SHPE. So I found my social life in SHPE. I found my internship in SHPE, so I found my professional side in SHPE. And then in terms of culture, it is pretty good to have somewhere like, you know, I've been speaking English all the time, but like, it's good to be back and be your real self and speak Spanish for a couple hours. So I really like that too, and they are more like my culture than Americans. In that sense, I feel more belonging. So yeah, they impact all those three areas, both the professional and educational and cultural, in such a great way.

Maya also shared the challenges she faced balancing her engagement in leadership positions in a large SHPE chapter, social life, challenging course load, preparing for and taking the GRE, applying to graduate programs, and job searching. She shared, "I felt a little bit overwhelmed, and I even talked to the president about dropping out of SHPE and the responsibility." She continued, "Not about dropping, it's like a thought of, I'm getting overwhelmed. I don't want to drop the team because I will leave the team behind, and that's not something that I want to do. But there's too much on my plate right now."

Emilia

Emilia was entering her fourth year as an industrial engineering major. She described being heavily involved with community service throughout high school. Her mom originally sparked her interest in engineering by showing her a video about what industrial engineers do. Emilia shared her career intentions were to in some way be able to give back and work in service in Panama.

When she arrived at her institution to study industrial engineering, Emilia got involved in SHPE, hoping to meet more people like her. She became a marketing chair in her second year and organized the cultural event in her junior year. She felt SHPE was helpful for finding and connecting to people with shared identities and for professional development. In her sophomore year, Emilia joined a service sorority. After having been so involved in service in high school, she felt this was a piece of her life that was missing during her first year at college. She shared she felt connected with this smaller group in her service sorority and had a strong interest in the work they were doing for different communities. Emilia said while SHPE felt like a family to her, she really enjoyed her involvement with her service sorority as she became immersed in a different culture among a small group of women who shared the same interest in service. She also appreciated the benefits of making more connections with domestic students and practicing English.

Emilia reported that she gained confidence and time management skills through SHPE and that her service sorority and was able to apply these skills in the classroom setting. She shared:

they both [SHPE and my service sorority] have in common is that they both like really helped me academically [...] that definitely has helped me become more confident in the classroom and projects and not being afraid to ask whether it is to professor or TA, or just like someone who's sitting next to me. My freshman year I would have never been like then able to do that. I would have been scared.

Emilia described a welcoming culture that both her service sorority and SHPE had in comparison to the very competitive culture of her institution overall. Emilia described the SHPE community as feeling a family, but noted at times SHPE could be a large time commitment as she also worked two on-campus jobs and was heavily involved in her service sorority. In her sophomore and junior years, her responsibilities in both organizations started to become quite time consuming as she also undertook two internships in industrial engineering during her time in college.