

The factors affecting the persistence of Latina faculty: A literature review using the intersectionality of race, gender, and class

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Abstract—This literature review explores the state of research on the factors affecting the persistence of Latina faculty. Although its focus is on engineering, it also draws from research on Latina faculty in other areas of science. The results are analyzed through Intersectionality Theory, which considers overlapping identities related to gender, race and class and their interactions to promote or hinder the advancements of Latinas in academia. The synthesized research identifies the influence of factors such as group identity, *familismo*, value of community, resilience, availability of role models and mentors, financial barriers, as factors most affecting Latina faculty during their education and academic careers. Although current literature explores factors and paradoxes surrounding strategies for and barriers to Latina success in STEM careers, this synthesis finds a lack of literature examining the multiple identities of Latina women, and few reports considering the intersectionality of identities as it pertains to Latina underrepresentation in Engineering. This critical literature review concludes with opportunity areas for future research to be conducted.

Keywords—*Latina faculty; intersectionality; persistence; challenges; strategies*

I. INTRODUCTION

The underrepresentation of Latino/a faculty in engineering departments at U.S. universities is striking, especially for Latinas, who hold less than 1% of engineering faculty positions at any rank. This severe underrepresentation poses a challenge for the advancement of Latinas in engineering as they lack the availability of role models and mentors of similar ethnicity, gender, and background, which has been linked to persistence in engineering for Latinas and other women of color [1], [2]. In addition, Latinos are the fastest-growing ethnic group in the United States, and are not represented either in engineering or in engineering faculty, which cycles to further affect recruitment and retention of Latinas into engineering career pathways. Other reasons for increasing representation in engineering include social justice, engineering solutions to be

most useful to the population using them, and the importance of diversity in thought [3]. Therefore, critically exploring the factors affecting the persistence of Latina faculty in engineering will help to identify institutional strategies that enable them thrive in engineering, traditionally dominated by White males; inform policy; and direct future research avenues.

A. The numbers

According to the U.S. Census Bureau, the term Hispanic or Latino refers to people "from Cuban, Mexican, Puerto Rican, South or Central American or other Spanish culture or origin regardless of race" [4]. Despite "Hispanic" often used as a synonym of "Latino," it is important to note the difference. The term "Hispanic" describes Spanish speakers, including people from Spain, whereas "Latino" includes people having heritage from all countries in Central and South America regardless of language [5], therefore including non-Spanish countries like Brazil. In this work, the words "Latino/a," "Latinos," or "Latino origin" will be used when referring to the whole group, and "Latino" and "Latina" will describe men and women respectively.

Latinos are the largest minority group in the U.S. and have the highest projections of growth within the next decades. Population projections predict that by 2060, almost one-third of the U.S. population will be of Latino origin [4]. This poses challenges to all areas of education and especially to engineering where Latinos are still underrepresented. Data from the American Society for Engineering Education (ASEE) reports an increase in engineering degrees (bachelors, master's, and doctorates) granted to Latinos in the last decade; from 5.8% in 2005 to 10.1% in 2014 [6]. However, these numbers are still far from the population proportion of Latinos, which in 2014 constituted 17% of the total population in the U.S. [6].

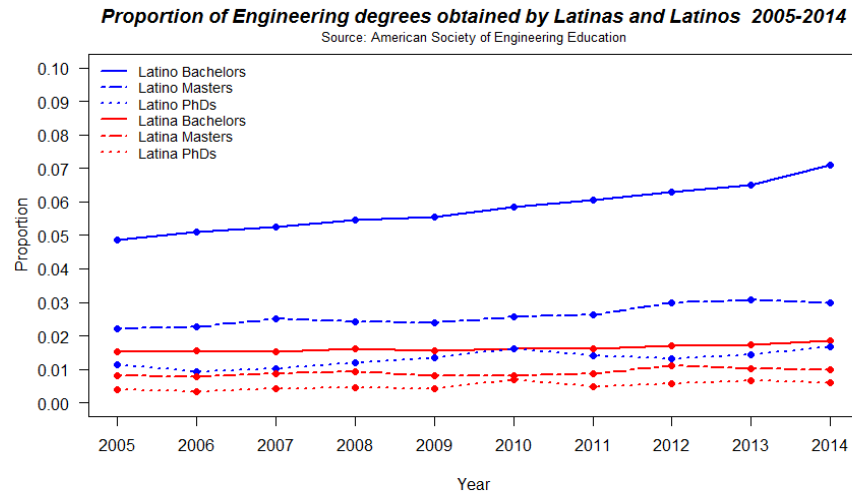


Figure 1. Proportion of engineering degrees obtained by Latinos and Latinas from 2005 to 2014.

At the baccalaureate level, Latinas obtain approximately 20% of the engineering degrees granted to students of Latino origin, which is in line with the national proportion of women in engineering fields. However, at the Master's and Ph.D. levels, Latinas earn degrees at lower rates than their male counterparts. Figure 1 depicts ASEE data [6] showing the trends in the proportion of Latino/a bachelor, masters and doctoral degrees granted in engineering during the last ten years by gender.

Recent data from the 2014 Survey of Doctorate Recipients from the National Science Foundation suggests that although the number of Latino doctoral recipients has almost doubled in the past 20 years, Latino doctorates were concentrated in non-engineering areas such as the humanities and social sciences [7]. In engineering specifically, only 15% of Latinos holding a Ph.D. in engineering report plans to work in academia. Interpolating these estimates within the low number of Latina doctorates in engineering, the numbers of Latina engineering faculty become marginal. Figure 2 illustrates the proportion of

engineering professors of Latino origin by gender across the last fourteen years. The figure shows how that the proportion of Latina faculty is considerably lower than the proportion of Latino faculty in engineering at all levels. In addition, the group of Latina engineering professors with the highest proportion is at the assistant level, which might be interpreted as the result of recent efforts to promote recruitment and retention of Latinas into the engineering "pipeline" or due to factors affecting persistence of Latina faculty into the associate and full professor ranks.

B. The role of Hispanic Serving Institutions (HSIs)

Hispanic Serving Institutions (HSIs) are institutions of higher education with at least 25% of Hispanics or Latinos in their undergraduate student enrollment [8], which serve an important role in the advancement of Latinos at the undergraduate, graduate, and faculty levels. HSIs are typically located in geographical areas with a high concentration of Latinos, such as California, Florida, Texas, and Puerto Rico.

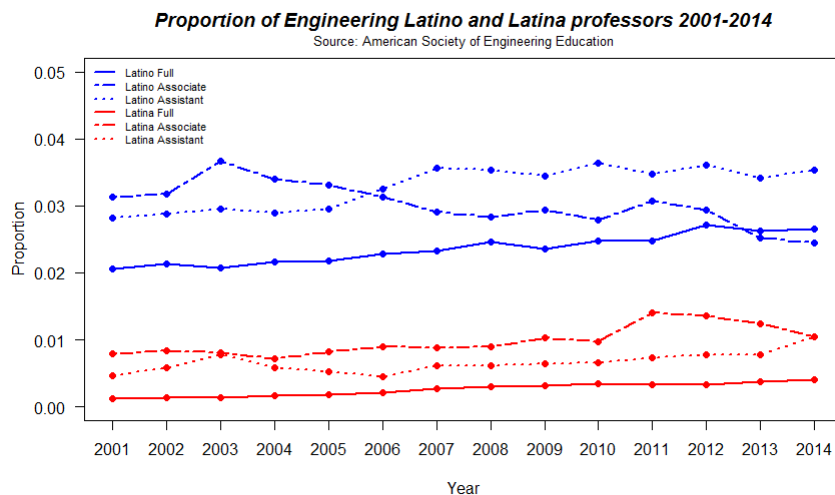


Figure 2. Proportion of Latino/a engineering professors by gender 2001-2014

The impacts of HSIs on Latino students are profound. Research indicates that low-income Latino students in Science, Technology, Engineering and Math (STEM) identified faculty at HSIs as institutional agents that helped them become integrated to their institution [9] which facilitates persistence in STEM disciplines at the student level. However, it has been suggested that faculty of color experience marginalization at HSIs at similar levels to what they experience at Predominantly White Institutions (PWIs) and other non-HSI institutions [10]. Related literature explored the expectations of Latina faculty at an HSI, finding that cultural expectations influenced the academic aspirations and success of Latina faculty more than their Anglo or international faculty colleagues [11]. Therefore, although HSIs play an integral role in supporting Latinos through their academic career as students, Latina faculty at HSIs are not exempt from marginalization because of their intersecting identities as Latinas.

C. Objective of the Literature Review

The objective of this review of the literature is to synthesize findings in the existing works exploring challenges faced by Latina faculty and documented strategies Latinas have employed to thrive in faculty positions. A critical synthesis of documented difficulties and success strategies could inform the implementation of success structures and policies. Analysis of the literature through Intersectionality Theory uncovers large gaps in the body of knowledge concerning the experiences of Latina faculty relating to gender, race, and class; and motivates large opportunities for future rigorous research.

II. METHODS

A thorough, but not exhaustive, literature review was conducted through a variety of databases; including ERIC, Compendex Index; Education Source; Educational Administration Abstracts; Education Full Text; Google Scholar and the totality of issues of the Journal of Women and Minorities in Engineering and The Journal of Latinos and Education. Search terms for this literature search included a variety of terms that are related to the U.S. census definition of "Hispanic or Latino," including the terms "Latino," "Latina," "Hispanic," "Hispanic female," "Chicano/a" and "Mexican American" (which refers to people of Mexican descent born in the U.S.) The extra elements in our search, included "faculty" or "professors" and "engineering," "technology," or "science."

We identified a total of 130 publications of which 69 were thoroughly reviewed. Articles excluded from the review were rejected because of their focus was far from the Latina faculty experience or their pathway. Of the 69 reviewed publications, 22 focused on Latina faculty in non-engineering areas, four focused on Latinas in STEM and four focused specifically on Latinas in the area of engineering. The remaining literature reviewed included some works on women of color in STEM and engineering, which included Latinas. Many of the works studying the experiences of Latina faculty

also considered their academic paths, acknowledging the challenges they faced during their undergraduate and graduate preparation.

A limitation of this literature review is the predefined and limited list of search terms and databases used for the literature searches. Because of the exceptionally limited selection of literature works, a considerable proportion of the literature came from non-engineering areas. While this distribution of publications focusing on Latinas may be derived from a higher representation of Latino/a faculty in these fields, the inclusion of these works does support a broader analysis of elements that may reflect challenges of Latinas in higher education more generally. In addition, the limited amount of literature addressing Latina faculty in engineering confirms the need to explore experiences and challenges further.

III. THEORETICAL FRAMEWORK

Intersectionality recognizes the multiple dimensions of oppression experienced by minority women, which are simultaneously marginalized by means of their gender and their race [12]. Originally introduced by Crenshaw [13] and enriched by Hill Collins [14] as an entity within Critical Race Feminism, Intersectionality has been extensively used to explore the experiences of Latinas in academia [15], [16]. Furthermore, the specificity of ethnically aligned Critical Race Theory (CRT) such as Latino/a CRT have allowed the exploration of issues related to the particular challenges experienced by Latinos, such as discrimination due to their proficiency in English language or their accent as well as their immigration status. Intersectionality can also be related to other movements such as Chicana feminism which recognize additional levels of discrimination experienced by Latinas within a male-dominated Latino culture. This review of the literature is sorted initially by gender, race/ethnicity, and class, and concludes with a critical analysis of the gaps within the body of knowledge as a whole through intersectionality theory.

IV. THEMES FROM LITERATURE REVIEW

A. Gender

1) Expected roles of women in Latino culture influence Latina professional goals

The Latino culture has been traditionally perceived as male dominated [17] with stringent expectations for women about marriage and motherhood. Conflicts between their expected roles as mother and wife, can pose challenges to the success of Latinas engaging in tenure-track positions. Espino, Muñoz, and Kiyama [18] presented the authors' own narratives as Latina faculty who were strongly influenced by the roles they were expected to have in their families. Being expected to follow the traditional standards of motherhood was one of the elements described as a challenge to find their own identities as scholars [18]. These tensions between social and cultural norms and the commitments of academia contribute to see this as a challenge to choose one or the other [19] which is not easy to conceal.

Soto [20] studied the factors contributing to the career advancement of African American females and Latina STEM faculty from the assistant to associate professor levels. She found that even though all of them experienced difficulties balancing their work and personal lives, the experiences of Latinas were more impacted by their culture than Black female faculty, and they were expected to put family first, and comply with traditional domestic gender roles, such as being at home and the main caregiver to their children. Her findings corroborate previous research on Latinas feeling expected to excel in both their personal and professional lives [18, 19], dealing with the expectations of being the primary care givers at home while keeping their professional productivity, which often resulted in feelings of guilt or selfishness [21]. Other studies also showed that the support of family, and in particular of a spouse that would be flexible about these expected roles was key to the advancement of minority women faculty and in particular of Latina faculty in the areas of science and engineering [11].

2) Availability of role models and mentors affects academic achievement of Latinas

The availability of role models and mentors is documented as having a positive effect at all levels of the educational path of Latinas [2, 22]. In science and engineering, Brown [1] reported that Latinas recognized the influence of mentors during their undergraduate education more than their Latino counterparts. In addition, it has been documented the motivation of Latina students to pursue a Ph.D. can be enhanced by their interactions with women faculty of color, in particular by interactions with Latina faculty [15]. The availability of role models at the undergraduate level also increases their success in applying to graduate school [23]. Therefore, mentorship plays a crucial role in supporting the “pipeline” model of recruitment and retention of Latina engineering faculty in academia.

Within academic careers, mentorship is equally crucial in the development of female faculty [20] and faculty of color [22, 24]. Ryabov and Witherspoon [11] documented the mentorship experiences of successful Latina scientist and engineers, identifying the importance of having multiple and varied mentors to provide support and encouragement in different areas. The lack of effective mentoring was identified as one of the main challenges faced by women of color faculty in STEM as they aim to advance in academia [25].

B. Race and Ethnicity

Identity as a member of Latino culture influence their experiences individually and as a group, such as their racial background. Other characteristics can help them thrive through challenges, such as their value of family and community. In this section we address these different factors influencing the experiences of Latinos and how these interplay with the success of Latina faculty.

1) Diversity within Latino ethnicities shape experiences

Latinos may identify with any race, including White, Black and mixed races. Many Latinos identify with the mestizo phenotype, which includes mixed heritage from the indigenous South Americans and Spaniard colonizers. Other

types racial and ethnic combinations have resulted from the historical reach of Spaniards to other countries and other migration phenomena, such as those that produced Asian Latinos [26]. The diversity of races among Latinos shape their collective and individual experiences; for example, Latinos identifying as White or Black Latinos could experience more similarities with their White and Black identities than that of mestizo Latinos [27]. As a result, they could experience difficulties identifying themselves with other Latinos or experience rejection from those that do not perceive them as such [28], which can influence the experiences of Latinos in their educational environments. For example, Yosso, Smith, Ceja & Solózano [29] explored how Latina/o undergraduate students experienced racial jokes as microaggressions. Some Latina/o students who did not have a mestizo phenotype experienced jokes as microaggressions coming from their White counterparts in a more open and frequent fashion. These episodes posed a challenge for them concerning how to address these aggressions without being labeled as “too sensitive” while challenging the status quo of racism in their campuses [29].

At the faculty level, Murakami-Ramalho, Nuñez & Cuero [30] have explored their own experiences as mixed-heritage Latina faculty at an HSI and how these experiences impacted their own scholarship. Their auto-ethnographic study reported on how being mixed-heritage Latinas allowed them to inhabit multiple communities as partial insiders or “outsiders-within” (p. 702). The particular intersections between their race, class and gender allowed them to develop a research agenda with the priority to advocate for the Latino community in the areas of Leadership, Policy, and Education from a particular standpoint in which they were an oppressed minority in some ways (e.g. Latina, Asian) and an oppressing majority in others (e.g. White, economically advantaged upbringing) [30]. Although this work reported only on the case of three mixed-heritage faculty, it starts exploring the nuances on the experiences and challenges within a group that has usually been considered monolithic [30].

Identity through language also affects academic success. For example, while a percentage of Latinos speak Spanish and may be first generation college students, generalizations about their languages skills and upbringing can pose a threat to the understanding of the experiences of Latino/a students that do not possess these characteristics [31]. In fact, studies have shown that Latinos lacking Spanish speaking abilities perceived themselves as less Latino and therefore less entitled to minority based support from programs related to Affirmative Action [31].

2) Familismo influences professional goals and achievements of Latinas

An important characteristic of the Latino culture is familismo, which is described as the strong attachment of the members of the nuclear and extended family [32]. The phenomenon of Familismo at the faculty level has been analyzed in terms of the sense of belonging to the fraternal family and the academic family.

Fraternal familismo focuses on the prioritization of family above other aspects of life and have special connotations to Latinas because their roles as mothers, spouses, and daughters tend to be more demanding than roles expected by Latino men. This is an obvious area where overlapping identities and expectations through gender and race compound barriers to academic and faculty success. In spite of these issues, the same familismo that can hinder success can also facilitate the attributes that simultaneously promote success.

As one example of this paradox, family support has been identified as one of the main factors influencing Latino/a students' decision to attend and persist in higher education [33] and in particular in the areas of science and engineering [34-35]. At the undergraduate level, the support of parents [11, 33, 36] has been documented to be influential to the persistence of Latinos in engineering. This element is also crucial for Latina engineering professors, who often describe family role models as a source of motivation to pursue engineering [35]. However, some research suggests that these strong ties also dissuade Latino/a students from moving away from home to 4-year universities with large noteworthy academic reputations, preferring to enroll in community colleges [37]. This choice has the potential to affect the "pipeline" into professor or academic careers. The tension between academic preparation and closeness to the family are also faced at the graduate level [16], where Latino/a graduate students can develop a sense of betrayal to their roots [18,38] and may struggle to find a balance between family and studies.

The balance of family and work remain among the biggest challenges of Latina faculty. Saldana, Castro-Villarreal & Sosa [39] presented their *testimonios* (testimonies) as Latina faculty navigating the intersections of their academic roles and family. From their experiences, while familismo was a strong influence to become role models and mentors for their students, they also experienced an internal conflict in balancing the demands of academia and family, especially when considering their roles as mothers and spouses [39]. So the same sense of family functioned as a motivating force to be in academia while simultaneously representing a barrier for their success.

Familismo can also refer sense of belonging to an academic family, the facilitation of which could play a significant role into the recruitment, retention, and advancement of both Latinas and Latinos in academia. Luca & Escoto [40] refer to familismo as an essential cultural norm that may influence the successful recruitment and support of Latino faculty as they look for the creation of an extended family with colleagues. In fact, Lechuga [41] noted that Latino/a faculty members in STEM identified how the sense of connectedness to friends and family was a factor that helped the participants to keep intrinsically motivated in their scholarship.

3) The Latina value of community influences academic objectives and strategies

Due to the particular challenges faced by the Latino community due to social and economic positionality, Latinas

are often identified with the objective of advancing their communities [5]. The commitment of Latinas to the advancements of their community can be linked to the concentration of Latino/a faculty in some areas of higher education; for example, Latino/a faculty was reported to be more concentrated in the areas of education and the social sciences than in other areas [42]. The importance of a focus on societal and community betterment may be perceived as conflicting with engineering and science disciplines, which are usually viewed as less oriented to social betterment [43], which may affect the recruitment of Latinas into engineering disciplines. In Soto's [20] foundational study of Latina engineering professors, one subject noted her desire to advance the Latina community by working to increase the number of Latina faculty, a different view on traditional "societal betterment" motivation.

Although a motivating factor for joining the academic faculty, the desire to help the community may also prohibitively affect a Latina professor's promotion through implicit bias mechanisms. The value of service is often underestimated for women faculty of color [44], and are penalized in the often-ambiguous tenure process. Other documented challenges that prevented them to feel part of the academic community include tokenism, i.e., feeling valued exclusively by their ethnicity [45], stereotyping due to accent or look [46], and overt racism [47]. These challenges have been documented as part of the experiences of Latinas and other women of color faculty in engineering and STEM [48], at the departmental level as well as with their interactions with students [49]. Latina faculty in engineering also experienced a higher scrutiny of their academic knowledge by their students and colleagues [35]. A deeper understanding of these challenges, and how the academic space of engineering can be built as more equitable place to Latina faculty is necessary.

4) Latinas may experience the challenges associated with tenure differently than other groups

Although the tenure-track experience may be challenging for all faculty despite of their ethnicity, Latinas and other minority female faculty seem to face considerable extra-challenges that may deter them from pursuing and persisting in the academic path. Gonzales, Murakami & Núñez [17] describe academia as a *labyrinth* "that can be dark, lonely, and without much direction" [17]. Soto's [20] analysis of the challenges of Latina and Black women faculty in STEM, revealed that most of the subjects indicated difficulties understanding the ambiguous expectations for promotion and tenure, perceiving they were progressing "blindly" in the tenure process especially regarding the number of publications or grants expected for tenure. In order to combat isolation and ambiguity during tenure, mentorship is critical for all faculty. Where sufficient mentorship structures are lacking, some minority faculty in sciences and engineering foster productive networks with colleagues outside of their institution [50], especially if guidance or mentorship is not easily obtained at their home institution. The underrepresentation of minority female faculty at advanced levels of the faculty means that there are fewer resources to which minority junior faculty can

ask for help or guidance. While tenure-track mentorship from persons of similar gender or race is not critical, often, minority faculty feel more understood or comfortable asking advice from someone with a similar cultural background. For Latina faculty in engineering, mentorship is required to navigating the gendered climate of engineering, the gendered expectations of the Latino culture, and the racial bias encountered in academia while meeting ambiguous tenure demands. As a result of overlapping identities as ethnic minorities, women, and class, earning tenure may be a prohibitively grueling experience, and may affect persistence at the faculty level, even once tenure is earned.

C. Class

Few studies explicitly address issues of class (either social class or economic status) within the Latina professoriate, and those that do have not studied these issues for STEM disciplines. However, themes resulting from this literature may inform future endeavors to study of the influence of class in the experiences of Latina faculty in engineering, as well as address the “non-financial” attributes of class that may affect Latina faculty.

Although generalizations about the socioeconomic status (SES) of Latinos in the U.S. cannot be made, low-SES communities that many Latino families live in affect access to high quality and affordable education. Gonzales, Murakami & Núñez [17] discuss these early beginnings of the academic “labyrinth,” in which Latina students are more likely to have disadvantaged backgrounds, and limited access to high quality pre-college and college preparation. The effects of this socioeconomic and class status propagates into higher education, in combination with the cultural influences of *familismo*. Community colleges are an affordable educational venue for higher education in response to financial [51] and familial constraints. However, it may be difficult to transfer to other universities, or gain undergraduate research experiences that will be considered for graduate education. Research experiences at the undergraduate level have been linked to interest in and success through graduate school, as well as important in being competitive for graduate funding, which has been documented to be a decisive factor for the graduate education of minorities [16, 52]. It is necessary to review the different economic challenges faced by Latinos and other minority students as they move through their educational pathway to prevent their interest in the professoriate from being discouraged by financial limitations.

Social class also affects how Latina faculty are perceived by students and colleagues. One of the main challenges they face in within the teaching space, where students may question their credentials due to a gender and ethnic bias [46]. To combat these biases, it has been shown that Latina faculty enact their legitimacy in a variety of ways, such as wearing formal attire [49], extensive preparation [46], and maintaining emotional distance [49]. Despite compensating for raced and gendered biases, Quijada Cerecer and colleagues [53] explored how a sample of Latina faculty at an HSI perceive their social class background influencing their identities in a positive way. Finding that social class consciousness influenced shifts in the

perceived definitions of academic success, that was more focused on community uplift than in individual advancement, shifting the paradigms in service, teaching and research [54]. Other studies report Latina faculty relying more heavily on equity-based pedagogies in their teaching roles [55].

Similarly, as race and class are often intertwined in the United States, it is important to note the attributes the Latino culture has adopted in general to overcome adversity. Themes of resilience (including resilience in social competence; in problem-solving; autonomy; and purpose) [53-57] and community cultural wealth (including cultural knowledge; linguistic capital; and aspirational capital) [33] have been noted as attributes of the Latino cultural that promote persistence of Latinos despite difficult circumstances.

V. CRITIQUES ON THE BODY OF KNOWLEDGE THROUGH INTERSECTIONALITY THEORY

Intersectionality theory, again, is the theory that suggests that overlapping identities that are traditionally underrepresented can cause experiences and disadvantages that are unique to any one of the discrete identities. The themes found in the literature above display some of these issues where identity as a woman (and a woman in engineering,) and a person of Latino origin come together to layer challenges for Latinas in (engineering) faculty roles.

Some efforts have been developed to identify and implement best mentoring practices to address the disparities faced by minority female faculty at PWIs in STEM areas [58], although established structures and exploring the best practices for this mentoring are still underexplored, and Latina faculty may not share the lived experiences with other minority women of color. One example of an effective mentoring model for junior Latina faculty is modeled in the Department of Education at the University of Texas-San Antonio entitled Research for the Educational Advancement of Latin@s (REAL); which has established peer *muxerista* (women to women) mentoring aiming to support the advancement of a community of Latina faculty towards promotion and tenure [59], and the success of this strategy has been documented over time [60]. The current difficulty in widespread implementation of applications like these is the overwhelming lack of Latina faculty, especially in engineering. Although Latina support groups across disciplines may be useful for community-development, it could be argued that Latina engineering faculty may not feel these groups to be useful for professional guidance, where the research and publication demands on tenure-track faculty take different forms than for faculty in the humanities or social sciences. However, given the scarcity of female faculty in engineering, approaches to improve mentoring multi-gender and multiethnic mentoring might also be explored. It should be noted though, that programs aimed specifically at women faculty or faculty of color may not sufficiently address the specific needs of Latinas in particular because of the nuanced experiences as women within the Latino culture.

The impact of class on Latina faculty was nearly completely ignored, or only briefly mentioned in the literature

as impacting academic trajectories without addressing class as a societal construct (e.g. choosing affordable community college instead of leaving home to an expensive four-year university, as studied by Camacho and Lord [51]). However, we promote that a more thorough understanding of both economic class and social class (especially related to cultural and educational capital) may uncover some nuanced phenomena related to recruitment and retention of women into higher education, and specifically into engineering as a discipline (a profession which carries class status.)

Further critiques of the body of literature as a whole come from the fact that most of the studies documenting faculty experiences were conducted either across all disciplines, or studying Latina faculty in social sciences and humanities (such as the studies by Medina and Luna [45], Aguirre [42], Gonzalez [54]). While the documentation of these experiences can generally probe experiences and strategies for success, such as the works by Gonzalez [54] and Quijada Cerecer, Alanis & Murakami-Ramalho [53], it can be presumed that the constraints and requirements of success as an engineering faculty in a male-dominated area may be quite different, or marginalization may be represented differently within an engineering context. There was a lack of comparative studies investigating the experiences with challenge, marginalization, and strategies for success between underrepresented groups (e.g., investigating tenure-track navigation challenges and strategies in both White faculty and Latina faculty.) Comparative studies like these, investigating multiple facets of academic experiences for Latina faculty, and especially Latina engineering faculty, may make findings more profound in how the intersection of identities can lead to increased marginalization in the academy.

Finally, many of the studies were qualitative with an extremely small sample size, such as those conducted by Machado-Casas [60], Cavazos [22], and Soto [20]. Methodologically, it is understood that qualitative research is an effective way to develop a rich and deep understanding of participants' lived experiences with a phenomenon of interest. Small number studies are required in the Latina population that is prohibitively small, and large scale quantitative studies are difficult to achieve. However, in order to best understand the experiences of Latina faculty through the lenses of race, class, and gender, we feel that a quantitative investigation of these phenomena for Latinas would be a valuable addition to the body of knowledge. Although their low numbers present a challenge for conducting quantitative studies, efforts should be made to collect more thorough data on Latina faculty in engineering.

VI. CONCLUSIONS AND OPPORTUNITIES FOR FUTURE WORK

Without claiming to be exhaustive, this literature review covered a wide range of elements that are relevant to the experiences of Latina faculty across disciplines. While very little explicitly studies Latina faculty in academia, the experiences studied in other works indicate that there is a great need to investigate Latina faculty within engineering, where representation is much lower than in other areas of academia. Intersectionality as a theoretical framework notes

both the overlapping themes that sometimes simultaneously promote and prohibit academic success for Latina faculty, while also revealing obvious gaps within the literature that might be covered by studying the overlapping themes of gender, race, and class. As a result of this research synthesis, we call for three research priorities in this area:

- (1) A more detailed study of the Latinos in engineering, specifically Latinas, would enrich the conversation regarding challenges faced at different stages of their preparation. In light of the changing demographics of the U.S. population, this exploration may begin to promote a deeper understanding of required changes to promote the recruitment and retention of Latino/as in engineering.
- (2) Exploration into how Latino cultural elements, such as *familismo*, value of community, and resilience can be integrated to the academic spaces of Latinas, welcoming new structures that may challenge the paradigm of academia as a cold and isolating space for minorities would support not only the persistence of Latinas but also other women of color
- (3) A more comprehensive study of the tenure-track experience, in particular of cross-ethnic and cross-gender comparisons would help improving policies that would support the advancement of women and minorities.

The overall impact to the field of engineering as a whole and engineering education as a subdiscipline that stem from understanding past literature on Latina faculty (in engineering) include development of effective policies and interventions to recruit and retain Latina engineering professors to become the mentors and role models for other Latina engineering students and future faculty. Harnessing the particular strategies for persistence of current Latina faculty will promote further development of research, support structures, recruitment policies, funding structures, and available resources for Latina faculty to succeed in their careers.

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