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# Navigating the Intersectionality of Race/Ethnicity, Culture, and Gender Identity as an Aspiring Latina STEM Student

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**ABSTRACT**

Latina high school students aspiring to careers in the fields of Science, Technology, Engineering, and Mathematics (STEM) participated in the year-long Latina STEM Fellowship (LSF) program. A team of education professionals interviewed the students to better understand how these Latina students visualize a future STEM career, their perceived obstacles, and the ways they leveraged their positionality as high school Latina students to construct their identities. Semi-structured interviews revealed these students used the intersectionality of their race/ethnicity, culture, and gender to develop agency and express resilience in their future path toward a career in STEM. The students incorporated a positive and synergistic view of their Latina identities to envision success in their STEM career aspirations. Future research should focus on longitudinal studies that follow Latina students from high school through the university pipeline to better understand the factors that contribute to their success. This study highlights the need for structured STEM experiences for Latina students, who are typically underrepresented in most STEM fields.

**KEYWORDS**

Adolescent; post-secondary education; qualitative research; race/racialization; science education; math education

A diverse workforce is greatly needed in the fields of science, technology, engineering, mathematics (STEM), yet many students of color are excluded from these opportunities. One of the primary groups where we see this disparity is in Latina students. The U.S. Department of Commerce Economics and Statistics Administration (Beede et al., 2011) reports multiple factors for their underrepresentation, including a lack of female role models and gender stereotyping. Kauffmann et al. (2009) believes there is an underrepresentation of females and students of color in STEM fields largely due to their lower rates of academic success. Yet solutions to these disparities may not be found in the K-12 environment alone. Initiatives meant to address these students' challenges, such as STEM programs that target career pathway development and identity construction, have the potential to disrupt and combat inequitable opportunities in STEM fields. These external STEM programs "can provide the context and experiences for students to not only 'become on the radar of science' in ways that recognize them as central participants in a scientific community, but also to 'operate the radar'" (Adams & Gupta, 2013, p. 88).

## *Latina STEM Fellowship (LSF)*

This research applies a lens of intersectionality to the lived experiences of a group of Latina high school students who participated in a year-long Latina STEM Fellowship (LSF) to explicate how these experiences contributed to their identity construction. The LSF is used as a location and context for

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STEM identity construction to develop a clearer understanding how these students navigate the intersections of their identities, including their race/ethnicity (socialized experiences related to their Hispanic/Latina heritage), culture (home and school interactions that mold their racial/ethnic identity), and gender (in this study, female). The LSF was designed as a support system for Latinas, an underrepresented population in STEM, in a densely populated, urban city in the Southwest US. The LSF also serves as a potential pipeline for Latina students to guide them toward post-secondary education as they envision a future career in STEM.

### *STEM identity and role model development in external programs*

Racial/ethnic and cultural identity not only include knowledge of membership within a particular group, but also actions that group members are prepared to take based on that knowledge (B. A. Brown et al., 2017). Within their established social groups, students have beliefs, feelings, and knowledge about themselves and their roles, yet some of these roles become more salient (recognized as have meaning) for individuals in different scenarios. Thus, students may at times focus on their racial/ethnic identity, their identity as a female, or their identity as a student interested in a STEM field, as they envision their future career pathway. Latina students challenge stereotypes by describing counter-stories that challenge dominant discourses of Latina/o students as academically indifferent (Cooper, 2012) and uninterested in careers in STEM and demonstrate their resilience in the face of these socio-culturally produced negative stereotypical portrayals (DeCuir-Gunby & Walker-devose, 2013; Leyva, 2016). As well, interaction with exemplars in STEM who match the students' intersectional identities (in this case Latina and STEM-focused) has been found to be one of many factors influencing the success of Latina students (Sanchez-Peña et al., 2016). This study strengthens the research on mentoring and role models and adds to the literature on the importance of students interacting with exemplar role models, specifically ones who match their intersectional identities, as they construct their STEM identities.

This study attempts to fill gaps in the literature related to Latina students who aspire to careers in STEM fields by answering two research questions: (1) How do these urban Latina high school students navigate the intersectionality of their race/ethnicity, culture, and gender as they construct their STEM identity? (2) In what ways do these urban Latina students leverage the intersectionality of their race/ethnicity, culture, and gender identities to build agency and resilience in their STEM pathway?

## Literature review

### *Latinas in STEM*

Latinas have traditionally been underrepresented in STEM fields, with only 4–6% gravitating to the biological sciences and less than 3% choosing fields such as engineering, computer science, physics and mathematics (National Science Foundation [NSF], 2017). Blickenstaff (2005) believes gender disparities in STEM fields exist for Latina students because they are inadequately prepared academically for STEM courses, lack experiences related to STEM that they see as positive, rarely see role models who are female and in STEM fields, perceive their K-12 curriculum as irrelevant, and have experienced bias in classrooms that favor male students (Cooper, 2012). Research has also shown that Latina students self-assess their confidence and self-efficacy to be lower than Latino (male) students (Correll, 2004). Latina students can also be turned off by classroom learning that focuses on rote memorization and perpetuates deficit ideologies related to their language skills (Parker, 2014). Like African American females, Latina students have experienced a history of social, political, and cultural marginalization (Gallard Martínez et al., 2019). Because of these past and continuing injustices, Latina students have difficulty constructing and sustaining a STEM identity, even in the face of expressing interest in STEM careers (Sorge et al., 2000).

### Intersectionality

Traditionally, when analyzing underrepresented students in STEM fields, the focus has been on applying theories to African American, Latina/o, and Asian American populations to better understand their identity construction and career trajectories. Using quantitative and qualitative methodologies, researchers sometimes mistakenly label these students as a monolithic group (Aleman, 2018). One example of this anomaly is using the phrase *Black students* when referring to a diverse array of students who define their identity in many ways, including but not limited to African American, African immigrant, African international, Afro Caribbean, or mixed race. In similar fashion, Latino/a students may represent the countries of Mexico, Spain, El Salvador, Cuba or be first- or second-generation Hispanic immigrant students with parents having cultural history in several different countries. Other researchers neglect to incorporate the importance of the students' gender identities (Cooper, 2012). This narrow focus may cause some individuals, whose experiences and identities fall outside the norms of the monolith, to feel invisible. To better understand these students' unique experiences, a focused and convergent lens must be used. As such, this study focuses on intersectionality (e.g., Collins, 1999; Crenshaw, 1991; Malcom & Malcom, 2011; Ong et al., 2011; Sparks, 2018) as a research framework.

Intersectionality involves considering all aspects of a student's identity, including race/ethnicity, culture, and gender, and related issues of power and privilege, when seeking to understand their life experiences (Crenshaw, 1991). While it does not discount the importance of group processes and interactions, it primarily focuses on the lived experiences of individuals who encompass multiple marginalized identities and examines how power and privilege affect their daily lives (Brunn-Bevel et al., 2015). Intersectionality was first coined by Crenshaw (1991) to illuminate the oppressions of African American women and to demonstrate how they have been historically marginalized and excluded from conversations about feminism and gender equity. Subsequent research continued to focus on Black women and the barriers that have perpetuated their marginalization (Brewer, 1993; Collins, 1999; James & Busia, 1993; Seiler, 2003; Settles, 2006). As a clearer understanding of the applications of this construct evolved, some researchers (I. Browne & Misra, 2003; Carbado et al., 2013; Nash, 2008) have proposed that characterizations of intersectionality be expanded to consider additional configurations of students' identities.

In this case study research, we applied a lens of intersectionality to the lived experiences of a group of Latina high school students attending a summer camp after being involved in a year-long Latina STEM Fellowship (LSF) experience. As women of color in STEM fields, Latinas have had gendered as well as racialized interactions which have resulted in confusion and isolation during their career identity development. Like African American females, they have experienced a *double-bind* (Malcom & Malcom, 2011) in which they have experienced oppression and marginalization based on their gender as well as their race/ethnicity and culture. These experiences for Latina students are acknowledged in the literature (Rodriguez et al., 2017a) and have a powerful affect on their choice of career pathway.

### Identity in STEM fields

It is important to consider the meaning and scope of identity, and specifically STEM identity, when discussing how Latina students come to feel a part of the STEM community. According to Hall (1992) identity is "something formed through unconscious processes over time, [and is] ... an on-going process (p. 288)." External programs like the LSF may play a role in a students' process of identity development. For underrepresented students, Eccles' expectancy-value theory (Eccles, 2009) describes how students analyze the importance of interest, utility, attainment value, and cost when considering a career pathway. Students use these considerations when deciding if they have the skills necessary to be successful in a chosen career and whether or not they fit into that community. Wenger (1998) refers to these variables as identities-in-practice. Tan and Calabrese Barton (2008) believe that students adjust

to these identities-in-practice depending on their participation in a particular community and the awareness of their place in it. When describing identity, Oyserman and Oliver (2009) believe "people have as many versions of themselves as they have interactive partners because different partners facilitate, encourage, and provide role models for different ways of being self (p. 130)." For students, these identities are developed by way of their core identity and role identity.

A student expresses a core, or personal, identity which include qualities about the student that are separate from their social group interactions such as gender, sexual orientation, ethnicity, and physical characteristics (Stets & Burke, 2000). In contrast, a student's role, or social identity, means "acting to fulfill the expectations of the role and negotiating interactions with role partners" (Stets & Burke, 2000, p. 226). Role identity is exhibited in a number of social interactions with peers, mentors, faculty, and role models, including students' interactions with those who identify as a part of the STEM community. This role identity helps a student understand how they fit into a community of peers and, for marginalized and underrepresented students, if they feel like they fit into that community at all (Cobb, 2004). Using these two identities, students are able to better navigate the complexities of a STEM community. Gottlieb (2018) reminds us that these STEM identities are "multiple, fluid, and emerge from engagement with communities" (p. 8).

As well, Carlone and Johnson (2007) developed a model of science identity that included a student's race/ethnicity and gender, and concluded that women of color, primarily African American females and Latinas, seek to be recognized as a legitimate and contributory member of a STEM community. The authors stressed the importance of STEM students self-recognizing that they belong in STEM and also receiving outside recognition from their peers, faculty, and other mentors. However, for underrepresented students of color, other factors may hinder this recognition. Included in Latina students' STEM identity development is how they respond to instances of both racism and sexism (Elmesky & Seiler, 2007). Additional research has found racialized and gendered microagressions can hinder educational outcomes and career options (Chaves et al., 2004; Flores et al., 2008; Garriott et al., 2014; Rollins & Valdez, 2006), as well as make the intersectionality of race/ethnicity, culture, and gender more salient and influential to their career pathway choices (Armstrong & Jovanovic, 2017; B. A. Brown et al., 2017; Gross, 2004; Grossman & Porche, 2014; Hall, 1992; Malone & Barbino, 2009; Settles, 2006; Zirkel, 2002). Students overcome the hindrances of racism and sexism inherent in STEM communities by focusing on the strength of their ethnic/racial identity as well as their gender identity. The students saw these hindrances as opportunities to shine and prove their place in the community (Rodriguez et al., 2017b). The more students are able to express this resilience and be recognized in the STEM community, the more confident they become in their choice of a STEM career pathway.

### *Importance of community and mentorship*

Part of a student's identity development includes interacting with STEM mentors and role models, including peers, advisors, faculty and role models that represent STEM fields. These interactions contribute to a student's feeling of belonging in that community.

Mentors are extremely important to STEM identity development for students of color, and in particular Latinas. Having mentors who match students' intersectional identity (in this case, intersectional mentors refers to those who are Latina and in the fields of STEM), has been studied in the field of vocational psychology and behavior (Darling et al., 2006; Easton-Brooks, 2019; Markus & Nurius, 1986; Ortiz-Walters & Gilson, 2005; Zirkel, 2002), as well as in STEM-related fields (Blake-Beard et al., 2011; Syed et al., 2012). These interactions may guard against the effects of racialized microaggressions by allowing students to see successful exemplars who match their intersectional identities, thus providing them with living examples of successful individuals in their fields of interest (Sparks, 2018).

In a sense, these interactions may *inoculate* the students from harmful societal influences. Dasgupta (2011) proposed a model that demonstrates how students of color having mentors that match their intersectional identity can protect these students from the effects of stereotyping and stereotype threat. The stereotype inoculation model (SIM) proposes that

> analogous to a vaccine, contact with successful ingroup experts and peers . . . functions as a social vaccine that inoculates individuals against self-doubt, especially in the early years of academic and professional development and other transitional periods when individuals' self-efficacy is in flux. (p. 233)

Dasgupta (2011) make it clear that this inoculation is not a cure, but students that have these relationships are more likely to be successful than those who lack these unique partnerships.

Additional research has studied the benefits of same-race mentoring for Hispanic and Latina/o students (R. Brown & Campbell, 2008; Lord et al., 2009; Rodriguez et al., 2017b; Sanchez et al., 2008; Syed et al., 2007). For Latina STEM students in particular, studies (R. Brown & Campbell, 2008; Chapman et al., 2019) point to the necessity of Latinas interacting with role models that match their gender and ethnicity as they construct their STEM identity. This is sometimes referred to as *race/ethnicity matching* (Chapman & Feldman, 2017) or *ethnic matching* (Easton-Brooks, 2019). Sparks (2018) and Sparks, Pole, and DenHartog (2020) used the term *intersectional adaptation theory* to describe the influence of a student's intersectionality and the importance of these unique, vicarious role models, on the identity development of African American females in STEM fields. What is still unknown are the points in the students' lives, and under what circumstances, these same-race mentors have the most influence on a student's STEM career trajectory. Because of the overall underrepresentation of Latinas in STEM fields, finding role models and mentors that match Latina students' unique identities may be difficult. Therefore, it is important for students to seek out mentors that can relate to them in different ways.

While it is important that students have a thorough knowledge of their own racial and ethnic identity, Oyserman et al. (2007) found that students must also understand that they are connected to the larger society, and in the case of the Latina students in this study, to the larger STEM community. The authors found it is imperative that marginalized students connect with members of their ingroup (Latina females) who value intellectual stimulation and ascribe high value to success and learning in school. Latina STEM students feel the need to be recognized as legitimate members of the STEM community through self-recognition, but also by outside recognition from their family, peers, mentors, instructors, and role models (Rodriguez et al., 2017b). Latina students who participated in the LSF were given the opportunity to interact with Latina camp counselors, speakers, and mentors and learn why those role models chose their STEM-related pathways. This study sought to capture their impressions of these interactions and offer them the chance to reflect on the contributions of these unique individuals to their perceptions of being a future member of the STEM community.

### *Identity-safety*

To be successful, Latina students must feel safety as they evolve into a member of the larger STEM community. Identity-safe cues (Johnson et al., 2019), or behaviors that signal to the student in some way that the role model values the student's identity within a given field, help students alleviate fears and concerns as they forge their STEM identity (Dasgupta & Asgari, 2004; Morgenroth et al., 2015; Pietri et al., 2019). For Latina students, certain individuals may serve as identify-safe mentors and role models (Walton et al., 2015). Although the role model's physical appearance, include race/ethnicity, culture, and gender may match the student's, that is not necessarily their primary concern when seeking out a supportive mentor. For example, students of color have been shown to value role models who have actively worked to alleviate injustices and discrimination (Ashburn-Nardo, 2018; K. T. Brown & Ostrove, 2013). Pietri et al. (2019) demonstrated that students are drawn to individuals who have faced adversity, even if they do not share the same race/ethnicity, culture, and/or gender.

While gender is an important consideration, research has also shown that, in many instances, female students tend to be more sensitive to discrimination related to their race and culture than their gender (Remedios & Snyder, 2015). Cultural influences are unique and powerful for Latina students (Koch et al., 2015), but their experience as a female also play a major role in their identity construction. It is clear that female underrepresented students are attracted to persons with identities they feel are

the most marginalized or devalued, and tend to relate to these individuals when they experience marginalization and stereotyping themselves (Pietri et al., 2019). But does the mentor have to always be female? Although white males can also be role models for students of color (Marx, 2008), it is unclear the mechanism by which these students come to identify white males as identity-safe allies (Chaney et al., 2016).

Below we describe how six aspiring Latina STEM students in the LSF navigated the intersectionality of their race/ethnicity, culture, and gender identities and leveraged these identities for agency and resilience. Their struggles, microaggressions, and marginalization will not be ignored, but the focus of the analysis of their reflections will be on how they leverage these struggles to seek future success and attainment of their career goals. Detailed information regarding the study participants can be found in Table 1.

## Methods

### *Interviews*

The pool of applicants consisted of 20 female Latina high school students attending a summer camp that provided STEM experiences and mentoring as part of a year-long Latina STEM Fellowship (LSF). The intensive two-week camp included guest speakers, engaging curriculum, field trips, and career development exercises (see Appendix A). The majority of the camp counselors identified as Latina and included college instructors, doctoral students, and local STEM and education professionals. Using convenience sampling, student attendees (N = 20) were approached about participation in the IRB-approved research study. The final set of study participants (n = 6) included students who volunteered to take time out of their last day of camp to share their experiences. The six students represented a unique cross-section of the camp participants, including students with a variety of Latina ethnic and cultural representations, and a mixture of students who were attending the LSF for the first or second time. The research team included a Cuban American doctoral student, an Asian American doctoral student, and a White male education professor. The questions were prepared by the research team as part of a larger study on effectiveness of the year-long fellowship program, which culminated in the two-week summer camp. A list of the semi-structured interview questions can be found in Appendix B.

The interviews were held in a semi-private room with the members of the research team. The positionality of the research team reflected an importance of having female members present, both to allow the students to feel at ease in the presence of a White male researcher, assist with follow-up questions, and to stimulate additional dialogue during the interviews. The interviews were conducted at the same facilities of the two-week camp to allow the female students to share their experiences in a naturalistic setting (Patton, 2014). It was important to the research team that the students felt comfortable in sharing discourses from a Hispanic/Latina/o perspective, a group with a history of marginalization. This included counter-stories (DeCuir-Gunby & Walker-devose, 2013; Delgado,

**Table 1.** Research participants and characteristics.

| Students | Race | Ethnicity (Self-Described) | Career Aspiration |
|---|---|---|---|
| Maria | Other | Mexican-American, Latina, and/or Hispanic | Nurse Practitioner |
| Katalina | White-having origin of Europe, Middle East, or North America | Hispanic | Pediatrician |
| Alejandra | Mixed-Race | Hispanic/Latina | Biologist |
| Bonita | Mixed Race | Hispanic | Engineer |
| Adelina | White-having origin of Europe, Middle East, or North America | Hispanic | Forensic Scientist |
| Gracia | American Indian or Alaska Native | Latina | Physical Therapist |

1995; Solorzano & Villalpando, 1998; Yosso, 2006) that allowed them to freely share discourses that sometimes challenged the perspectives of privileged groups (Delgado & Stefanic, 2001). After each interview, the research team discussed relevant points and refined the questions to be asked. While the basic structure of the questions was retained, additional follow-up questions were added to explore nuances within the students' experiences. At the end of the six interviews, the team met to discuss key points and conversations that evolved within the interviews. These discussions, which included analytical notes of the researchers' initial perceptions, were conducted to ensure that proper member checking occurred for respondent validation.

### *Analysis*

A professional transcription service (Rev.com) was commissioned to transcribe the interviews verbatim. Student names were then removed from the transcripts to ensure proper de-identification occurred prior to coding. Next, the lead researcher quality-checked the transcripts by listening to the interviews, correcting the words used by the students, and adding notes regarding the contexts of each part of the discussion. First-level coding (Strauss & Corbin, 1998) was conducted separately by the research team, who then met face-to-face to discuss their preliminary findings. Cross-case analysis was conducted to discover common themes and experiences among the participants (Stake, 2006). Codes and broad themes were discussed with an agreed upon consensus that intersectionality be used as a focus for second-level coding. Some of the broader codes included stereotypes, career identity, science/STEM identity, ethnic/cultural identity, inspirations/role models, STEM underrepresentation, and specific instances of an intersectionality focus by the students. The researchers used discourse analysis (Leech & Onwuegbuzie, 2008) to better understand the students' experiences, motivations, and aspirations. After secondary analysis, three themes emerged and will be discussed in the sections below. These include (a) the intersectional diversity of role models for Latina STEM students, (b) the importance of race/ethnicity, culture, and gender salience for the future success of Latina STEM students, and (c) the importance of intersectionality in the identity construction of Latina STEM students. These three themes were continually cross-referenced with the two research questions and to inform a deeper understanding of how the participants leveraged their intersectionality to build agency and express resilience as they envisioned and constructed their STEM educational pathways. A simplified illustration of how their intersecting identities converge can be found in Figure 1.

## Results

Qualitative analysis revealed how students' experiences and aspirations converged in the intersectionality of their race/ethnicity, culture, gender, and career identities, and revealed understandings of our two research questions: (1) How do these urban Latina high school students navigate the intersectionality of their race/ethnicity, culture, and gender as they construct their STEM identity? (2) In what ways do these urban Latina students leverage the intersectionality of their race/ethnicity, culture, and gender identities to build agency and resilience in their STEM pathway?

### *Role models come in many shapes and sizes*

The Latina students is this study expressed their desire to have Latina STEM role models and mentors, but in reality had interacted with few science or math teachers who were also Latina (although some of the role models were elementary teachers, Spanish teachers, and school counselors) and have been exposed to a limited number of Latina role models from STEM fields. Their role models were primarily White (male and female) math and science teachers and family members and relatives. Katalina discussed what she missed by not having Latina teachers: "I would have been able to relate more, because I feel like we all have different experiences and then they might have understood like how things work." Alejandra added the importance of some of those Latina teachers also being STEM teachers: "It

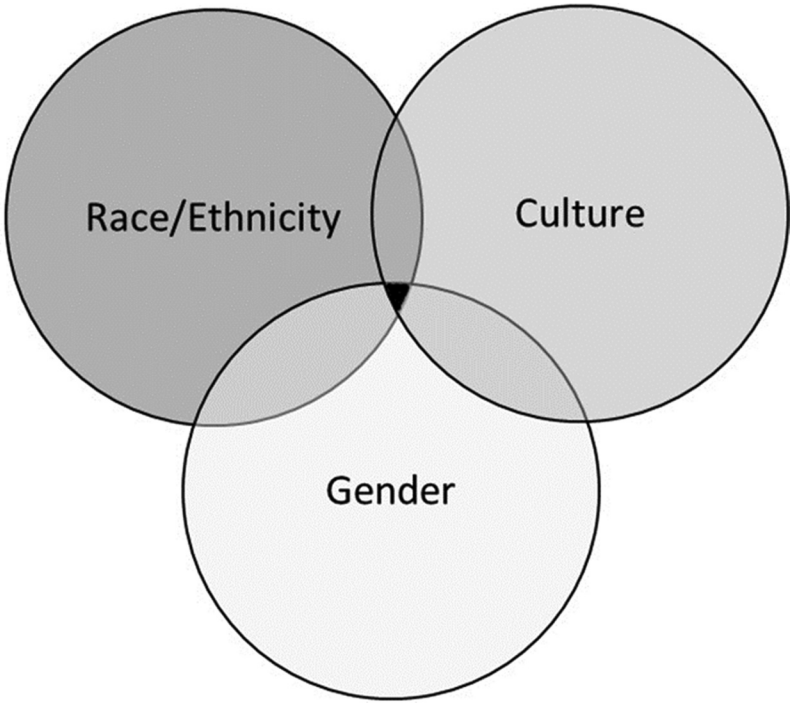


**Figure 1.** Intersectionality of Race/Ethnicity, Culture, and Gender.

would have been helpful to see that I am not the only one out there who likes STEM and is also a woman and Latina." Referring to one of her summer camp counselors, Adelina said, "I really like her story because she worked through all the hard times and she is working hard right now . . . Yeah it inspired me." However, the students also believed that not all of their role models had to be female or Latina; they felt they can learn from people with inspiring stories that match neither their culture nor their gender.

Specifically, Adelina believed that, no matter the race or gender of the teacher, it is important that teachers understand struggle and the importance of hard work. Sensing the importance of shared struggle was a common theme of the discussions, revealing that the students placed shared struggle above the intersectionality of these role models. Gracia added that she had an extremely supportive White male science teacher in high school.

> He was the same with every student. I never noticed a difference with any gender or anything like that . . . We're all human. So no, I've never felt that with any of my teachers [that they need to be Hispanic or Latino]. I don't want to feel like eyes are on me and stuff like that. That's a terrible feeling.

Even though the students were concerned about having more Latino/a STEM teachers and role models, Bonita reflected that it is ultimately up to her to succeed, which demonstrated her belief in personal agency.

> I'm trying to figure out for myself how to get through this path because I personally don't have someone to look off of in my personal life . . . It's hard to encourage yourself to see the end result for being a Latina, to see oh if they can do it I can do it too. It's basically me coming from myself saying, 'I know I can do this because I just believe in myself.'

### *Salience of race, culture, and gender is vital for success*

The Latina STEM students expressed their identity salience in different ways and were asked to rank the importance of their culture and gender identities. The students were asked: "Which is more

important to you, your gender or your Hispanic/Latina heritage and culture?" The three bilingual students considered their culture most important, while the three monolingual students considered their gender most important. Of the three students who chose culture as most important, those same students also expressed gender equality and feminist viewpoints in their responses, which suggests that their identity salience is fluid and can change depending on the necessity of the situation. This speaks to the intersectionality of their racial/ethnic, culture, and gender identities, and demonstrates that language, culture, and familial connections all have a strong influence on their identity (Koch et al., 2015).

These cultural connections may often times overshadow their identity as a female student within the Latina community. Gracia expressed that her race and culture are much more important considerations to her than her gender, although she recognized that conflicts can occur: "There's some things I have to leave at home, you know? Because some things won't make sense. Whatever I learned at home, sometimes I have to leave that behind and . . . take what I learn now and use it." Gracia's comment gives insight into how these youth leverage, albeit unconsciously at times, their cultural heritage for resilience.

In contrast, Katalina felt that her gender was a more important factor in her identity development: "I feel like women in general aren't represented enough and once you get more women out there I feel you might inspire other cultures and more women from those cultures to go out." Alejandra added that overcoming adversity is central to females becoming successful in STEM fields:

> It's hard to encourage yourself to see the end result for being a Latina, to see oh if they can do it I can do it too. So basically, it's all willpower in [your] own self because I haven't had someone to look up to and say, 'oh I can do it like them.' It's basically me coming from myself saying, oh I know I can do this because I just believe in myself.

Alejandra added that seeing successful female role models at the camp inspired her to persist in her pursuit of a STEM field because "if they went through all of this, even with being discouraged and even with the odds against them, then maybe I can." Alejandra lends an authentic voice to how she, and many other Latina high school students, build agency and confidence through leveraging their intersectional identities of gender and culture/ethnicity as they envision future careers in STEM fields. Maria described her Latina identity as an opportunity and her cultural heritage instrumental in sculpting her identity: "I feel lucky to be part of this culture, because there's so many things that I've learned, and so many advantages that I have." Yet struggles and concerns are evidence throughout their conversations. Although they were excited to enter into their STEM pathway, all the students expressed that their Latina identity creates opportunities, but also challenges.

### *Identity for Latina STEM students is not either/or*

The Latina STEM students expressed confidence that emerged from their race/ethnicity, culture, and gender identities. They recognized that the intersectionality of their gender and culture can be advantageous to them because of increased job opportunities, programs that focus on females in STEM, and the support they receive from their Latino/a communities. They also expressed that their future success depends on the synergistic power of their intersectional identities. Alejandra described the importance of focusing on a combination of her race/ethnicity, culture, and gender to achieve success:

> There's still some Latinas who are holding back . . . sometimes because of their culture, even though they really should embrace their heritage and their gender; and be able to use both of those to an advantage somehow. I would tell them don't give up just because you think that you won't be able to do it, or you think that these people will never respect [you] because [you're] both a Latina . . . *both a minority and a woman* [emphasis added].

Alejandra leans into the intersectionality of her gender, culture, and ethnicity to offer words of encouragement to future LSF participants. Her words give insight into how the participants navigate and leverage their intersectional identities as they follow a STEM pathway. It is important to note that

they see this combined identity as a source of strength, resilience, and power and not as a detriment to their career pathway.

Gracia described the importance of not being discouraged when Latina students find themselves a numerical minority in their classes or future careers: "That's just another opportunity for us Latina women to get out there and I feel like if more of us get out there, then that's just a way for our community to stand out." Katalina also reflected that Latina underrepresentation in STEM does not discourage her. She spoke of her excitement at realizing the camp counselors had their PhD. Regarding one of the Latina camp counselors, she said: "I didn't know [she] had her PhD . . . but when I figured that out it was encouraging to know that there are women out there [in STEM] who are Latinas . . . Let's me know I am not alone." The year-long experience revealed options for the Latina students that they never knew existed and opened their eyes to additional (and lesser known) possibilities in STEM, including computer science, engineering, mathematics, and careers in academia.

The interviews also revealed complex interactions that some mixed-race Latina students experience in their STEM career identity development (Lord et al., 2009; Peralta et al., 2013; Rockquemore, 2002). The students spoke of their desire, as Latina students, to prove that they belong within the STEM community. This sense of *proving yourself* is also evident in African American female STEM students (Sparks, 2018). The difference, which was expressed vehemently by students like Bonita, is that some light-skinned Latina students are able to express a form of privilege when they are considered White by society (Golash-Boza & Darity, 2008); a privilege rarely afforded to mixed-race African American female students. This agrees with research conducted by Rodriguez (2001), Quiros (2009), and Quiros and Dawson (2013) which shows that, many times, *race trumps ethnicity*. However, this sense of privilege is fraught with contradictions. As Bonita, a mixed-race Latina student explains, "People tend to not believe me whenever I say I'm Latina or Hispanic . . . I look white, so [I am] not technically part of the Latina group." Although she personally identifies as Latina, society may not see her that way because of the color of her skin. This could lead her to believe that she is not *Latina enough* to be accepted by her peers, which could distance mixed-race students like her from their racial, ethnic, and cultural identities (Moraga, 1983).

## Discussion

Identity, from a sociolinguistic perspective, manifests daily through interactions with others. Duff (2012) suggests that culturally and linguistically diverse youth " . . . may be socially and discursively positioned in various ways, sometimes to their disadvantage (e.g., as reticent, hostile, unforthcoming, evasive, or overly direct), on the basis of their group membership" (p. 412). Programs such as the Latina STEM Fellowship (LSF) create opportunities for these students to contest their *otherness* and at times negatively-positioned identities in certain contexts, such as STEM-related programs and pathways of study. As directly evidenced by the participants' voices, within these opportunities Latinas find interests, motivation, and investment that can inform and feed their agency and resilience. They begin to leverage these interests to tap into motivation, investment (Norton, 2013), and holistic identities as they become valuable participants in their future *imagined* STEM communities (Tucker-Raymond & Rosario, 2017). According to Kanno and Norton (2003) "imagined communities refer to groups of people, not immediately tangible and accessible, with whom we connect through the power of our imagination" (p. 241). Identity potentially lies beyond ascribed roles and positions, but without reconceptualization of the opportunities that Latinas are afforded at school to multimodally perform knowledge and identities and to be taught and influenced by other Latinas, they may never be able to experience their individualized potential. This view of agentic displays of identity negotiation on the part of Latina adolescents will continue only to reside those that combat their marginalized positioned status and search out interaction in communities of practice (Wenger, 1998). The LSF is an example of one such community of practice that provides a road map for Latinas to demonstrate agency and resilience as they seek future employment in STEM fields.

The Latina students in this study expressed their desire to follow STEM career pathways, although they are still investigating their specific areas of focus. Their discussions centered on positive aspects of their underrepresentation in the field of STEM as members of the Latina community. They expressed confidence that they could be successful in STEM. The students described the importance they placed on the support of their family and appreciation for the role models that were introduced to them during the year-long LSF. They recognized a diverse array of role models, both Latina/o and non-Latina/o, and how they have connected to these individuals while in elementary, middle, and high school. They shared that these role models were rarely Latino/a in their STEM-related courses and included mostly White male and female teachers and guidance counselors (Cook et al., 2018; Marx, 2008). What really stood out for these students, as they looked for mentors and role models, was that the individuals they observed had experienced challenging circumstances which they had successfully traversed. No matter the role models' race or gender, the students appreciated their honest struggles and were inspired by their perseverance.

The students did, however, express some concerns. Although four out of the six of the students were confident that it would be acceptable to be only one of a few Latina individuals in STEM college majors and future careers, for two of the students this appeared to be a daunting reality. They expressed that they were ready for the challenge, but discussed some trepidation. They described their financial concerns in paying for college and their fears of moving away from their families to complete their education. Four of the six students felt that their best career options were limited to those that involved healthcare and biology-related fields. However, the year-long program programming helped the Latina students to consider STEM options that are outside the life-science related track, including chemistry, physics, astronomy, computer science, and engineering. The year-long LSF and intensive two-week summer camp enlightened them to new career options that they had never had the luxury or opportunity to explore in their high school STEM classrooms. Many also expressed their openness to the possibility of working on a doctoral degree in a STEM field.

Although the participants' voices uncover the challenges facing young Latinas aspiring to careers in STEM fields, it also revealed that in those salient moments of trepidation that they leveraged the three components of their intersectional identity. The students draw from these feelings of agency and strength in complex and interactive ways. At times, they drew from their race/ethnicity and culture for resiliency, while other times they drew from their gender to confidently perform in STEM spaces. The students all recognized that they must harness *all* their strength and resilience to be successful in STEM. Many of the students' responses implied that they understood the oppressive structures, discrimination, and racism that they would encounter as their journey continued. However, they understood it only on an intellectual level, since they have not yet experienced these issues in the confines of a STEM college major or career pathway (Rodriguez et al., 2017b).

## Recommendations

For these Latina students, the construction of their race/ethnicity, culture, and gender identities began long before the LSF and will continue well into the future. Their evolution and development as confident and resilient members of the STEM community will continue as well. In the context of the LSF and the intensive summer camp, it is important that they were able to interact with peers, mentors, faculty, and role models who are Latina. It is also important that they experienced a sense of belonging as a member of the larger STEM community. This includes being inspired by those that who are not Latina, but importantly represent individuals who have overcome adversity and have experienced success in STEM fields. It is also important that they understand that, in a sense, STEM traverses and legitimizes race/ethnicity, culture, and gender when it seeks the greater good of society. Oyserman and Oliver (2009) believe that all students should come together under common goals and values, including "healthy lifestyle and civic engagement, education and career advancement, and [develop] effective strategies for obtaining these goals" (p. 131). Research must continue to critically analyze the experiences of Latina students, who struggle to navigate the intersectionality of their race/

ethnicity and gender in a male-dominated STEM culture (Banda & Flowers, 2018), while continuing to focus studies on the strength and resilience they cultivate by the interplay of those intersections.

Future research should also explore the conditions under which Latina students desire peers, mentors, instructors, and role models who match their unique intersectionality of race/ethnicity, culture, and gender. This includes investigating when (elementary/middle school, pre-college, college years, and/or initial employment) these unique interactions are most influential to their STEM career trajectories. Additionally, more research must be conducted on what Latina students should do when Latina role models are unavailable, including how to seek out identity-safe allies who are sympathetic to their struggles (see Hernandez et al., 2017). This future research should consider how White males, who are typically over-represented in STEM fields (NSF, 2017), can create identity-safe environments for their Latina students. This will require training White males in identity-safe practices to help them successfully mentor Latina students. Since African American females face many of the same struggles as Latina students, cross-cultural events with African American female STEM students would be beneficial in helping Latina students understand they do not face these struggles alone (Craig & Richeson, 2012; Rodriguez et al., 2017a). Additionally, longitudinal studies on the experiences of Latinas STEM students in college and after graduation would be a powerful way to determine if these students continued (or did not continue) to follow through with their career aspirations in STEM.

All too often, Latina students in K-12 classrooms, especially precocious students who are interested in professional STEM careers, are not exposed to exemplary Latina role models. It is important that these students see Latina STEM professionals in not only healthcare-related fields, but also in more technical fields such as chemistry, physics, engineering, and computer science. For Latina students to be made fully aware of the possibilities set before them, they must also be exposed to role models who have overcome adversity and exhibited confidence in accomplishing their future goals. Unfortunately, these vital connections are few and far between at the K-12 level. Successful external programs like the Latina STEM Fellowship expose Latina high school students to opportunities they never knew existed, including careers in industry and academia. Connecting students to these opportunities will go a long way in increasing the confidence, resilience, and success for Latina students who seek to pursue STEM as their future field of employment.

## Limitations

The life stories of these students may not reflect the experiences of other high school Latina students with dissimilar backgrounds and perspectives. Nor do these findings imply that the identity development seen in these students is indicative of the experiences of all Latina students interested in STEM career pathways. The small sample size does not lead to a saturation of data that could be used to form a theory applicable to all Latina students' career identity development. Additional quantitative and qualitative studies are needed to determine if the experiences of STEM identity development seen in these students are applicable to Latina students in other fields of study, as well as for Latina students who represent different intersections of race/ethnicity, culture, and gender. The results from these interviews are also limited to one point in time. Longitudinal studies are necessary to fully illuminate how career identity development proceeds for Latina students as they progress through college and into their career of choice. Lastly, the study did not interview students who identified as gender-fluid or gender non-conforming, which limited the discussions of gender to a male/female dichotomy.

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**Appendix A. Latina STEM Fellowship: Growing the Next Generation**

Mission: To support young women interested in STEM through skill building, education and career planning, and mentorship.

Week 1:

I. Pretest and Schedule Overview

II: Activities

(A) Lab Safety and Tour of Community College Lab Facilities
(B) Tour of Entire Community College Facilities
(C) STEM Career Presenter: Information Technology
(D) Hour of Code
(E) Lab Skills Practice
(F) My Career Test and Career Exploration
(G) STEM Career Speaker: Female STEM Professor
(H) Scientific Readings
(I) Field Trip to Major University and Tour
(J) Recruiting/Perspective Student Session
(K) Biochemistry Lab Tour and Activity

III: Journaling and Reflection Time (at the End of Each Day)

Week 2:

IV: Review of Previous Week and Overview of Upcoming Activities

V. Activities

(A) Lab Skills
(B) STEM Career Speak: STEM Faculty
(C) 3D Printing Lesson
(D) Tour of Major University Research Labs
(E) Tour of Botanical Research Institute
(F) Educational and Career Planning
(G) Presentation Skills and Group Work
(H) Practice Presentations
(I) Student Presentations and Awards Ceremony

VI. Camp Reflections and Posttest

**Appendix B. List of Semi-Structured Interview Questions**

(1) Tell me about yourself (school, interests, etc).
(2) What type of career are you considering? Why are you considering that specific career?
(3) Who inspired you to consider a career in STEM? Tell me about that person.
(4) Do you have any Hispanic or Latina STEM teachers? Are they male or female? Is it important for you to have teachers who are Hispanic or Latina in STEM? Why or why not?
(5) Which is more important to you, your gender or your Hispanic/Latina heritage and culture? Explain.
(6) Is the fact that there are few Latinas in STEM a challenge or an encouragement to you? Why?
(7) Give the name of the person you most identified with over these last two weeks in the STEM program. Explain why you identified with this person.
(8) What would you tell another Latina student, your age, who is considering a career in STEM but is not sure because there are not as many Latina females in STEM careers?

*Follow-Up Questions*: If you could tell future campers about this experience, what would you tell them? Would you recommend that they come back for a second year, and what would you tell them to convince them to come back?