

The Counter-storytelling of Latinx Men's Co-Constructions of Masculinities and Undergraduate Mathematical Success

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While Latinxs complete undergraduate engineering degrees at lower rates than Whites and Asians, Latinx men trail behind Latinx women who recently earned over half of engineering and science degrees conferred to Latinxs. With multiple semesters of mathematics required in engineering majors, qualitative analyses of undergraduate Latinx men's strategies of persistence and success in engineering can illuminate ways to inform more socially-affirming postsecondary educational opportunities and thus increase retention in STEM (science, technology, engineering, and mathematics). This report presents findings from a phenomenological study that characterized variation in two undergraduate Latinx men's negotiations of their masculinities with pursuits of mathematical success as engineering majors at a large, predominantly White four-year university. Findings illuminate the Latinx men's strategies of managing risks of mathematics classroom participation, building academically and socially supportive relationships with faculty members, and negotiating pursuits of STEM higher education with their gendered sense of commitment to family.

Keywords: equity, gender, identity, intersectionality, Latinx

Analyses of academic success among Latinxs¹ in undergraduate STEM education have shed light on disparities between Latinx women and Latinx men (Chapa & De La Rosa, 2006; Cole & Espinoza, 2008; Simpson, 2001). Cole and Espinoza (2008), for example, highlighted how undergraduate Latinx women in STEM have higher grade point averages and degree completion rates than Latinx men. At the same time, Latinx women demonstrated lower levels of confidence and weaker academic self-concept often shaped by the masculinized nature of undergraduate engineering and mathematics spaces perpetuated through issues of representation and valued norms of engagement (Camacho & Lord, 2014; Cole & Espinoza, 2008). Despite the masculinization of engineering spaces, Latinx women outnumber Latinx men as recipients of undergraduate engineering degrees in the United States (U.S.; NSF, 2017).

Engineering is a mathematics-intensive field of study. The socially exclusionary nature of mathematics, therefore, raises considerations about how different constructions of masculinity are privileged or marginalized in undergraduate mathematics, including those among Latinx men pursuing engineering majors. In mathematics education, Latinx students have “seldom been asked for their perspectives on their classroom mathematics experiences” (Varley Gutiérrez, Willey, & Khisty, 2011, p. 27), especially in relation to how they negotiate mathematical success with multiple intersections of their race, gender, and other identities. This points to the promise of intersectional analyses of mathematical success among undergraduate Latinx men pursuing engineering degrees that focus on their negotiations of academic pursuits with constructions of their masculinities.

This report presents findings from a study that detailed the variation of mathematical success

¹ The term *Latinx* decenters the patriarchal nature of the Spanish language that groups Latin American women and men into a single descriptor *Latino* denoting only men. The “x” in *Latinx* allows for gender inclusivity among Latin Americans (including those identifying as gender-nonconforming) compared to *Latina/o* implying a gender binary.

among two Latinx men pursuing engineering majors at a large, predominantly White four-year university. A three-tiered analytical framework was adopted to address the following question: What institutional structures, interpersonal relationships, and ideological discourses shaped the two undergraduate Latinx men's co-constructions of masculinities with mathematical success?

Relevant Literature

Two bodies of literature are reviewed in this section. The first body of literature details insights from intersectional studies on Latinx students' co-constructions of mathematics and social identities in undergraduate mathematics as a socially exclusionary space. The second explores undergraduate Latinx men's constructions of masculinities in their pursuits of higher education. Insights across these bodies of literature provide conceptual points of consideration for the study's exploration of how undergraduate Latinx men co-construct mathematical success as engineering students with their sense of masculinity.

Undergraduate Mathematics as a Socially Exclusionary Space for Latinx Students

Mathematics has been well documented as a gendered and racialized space for marginalized populations, including women as well as Black and Latinx students (Boaler, 2002; Leyva, 2016; McGee & Martin, 2011; Mendick, 2006; Oppland-Cordell, 2014; Stinson, 2008; Varley Gutiérrez et al., 2011). Issues of gender and race, however, have largely been studied separately in extant mathematics education research and with conceptualizations of gender as a female-male binary rather than socially constructed (Leyva, 2017). This leaves the field with minimal insight on varying forms of mathematics experience among underrepresented student populations at different intersections of gender and other social identities.

Intersectional analyses, thus, allow for the detailing of within-group differences in how individuals make meaning of gendered, racialized, and other socially exclusionary experiences in their pursuits of mathematical success (Martin, 2009). Much of the foundational mathematics education research on Latinxs largely focuses on the importance of validating Latinx students' cultural backgrounds through use of the Spanish language and home experiences as resources for mathematical learning (Khisty & Willey, 2013; Moschkovich, 2013). Thus, there is room for exploring how other social identities including gender intersect with Latinx culture to shape variation in Latinx students' experiences of navigating mathematics as a socially exclusionary space. Below I present findings from studies in undergraduate mathematics education that adopted such intersectional analyses of Latinx students' co-constructions of mathematics and social identities at predominantly White universities.

In a study focusing on the experiences of two undergraduate Latinx women in their first year of pursuing mathematics-intensive majors (Leyva, 2016), I examined self-report data (including interviews, a focus group discussion, and mathematics autobiographies) to capture variation in strategies for negotiating their *familismo* (Marín & Marín, 1991; Suárez-Orozco & Suárez-Orozco, 1995), or a sense of loyalty or responsibility to the Latinx family unit, with pursuits of STEM higher education. Both Latinx women discussed managing gendered cultural discourses of Latinx women becoming young mothers and wives rather than being college-bound.

Oppland-Cordell (2014) coupled self-report and classroom observation data to detail how a Latinx woman's and Latinx man's emerging mathematical and racial identity constructions (EMRICs) contributed to shifts in their participation as learners in an undergraduate calculus workshop. While intersectional analysis revealed how gender was only relevant in the Latinx woman's participation shift related to perceptions of her and her peers' mathematical ability,

Oppland-Cordell (2014) detailed how socioeconomic status, particularly having access to more meaningful and socially-affirming mathematical learning opportunities in the workshop than K-12 education, played a role in the Latinx man's workshop experience. These different social influences on the Latinx woman's and Latinx man's identity constructions and workshop participation illustrate the "complex intersectional nature of Latina/o students' EMRICs in mathematics classrooms" (Oppland-Cordell, 2014, p. 51). Considering how such variation of experience exists even within intersectional subgroups as noted in my study involving Latinx women, the coupling of self-report and observation data like in Oppland-Cordell's (2014) analysis allows for more situated insights into variation of how Latinx students, at different intersections of social identities, make meaning of their classroom experiences to inform the future design of more socially-affirming undergraduate mathematics learning opportunities.

Social Constructions of Latinx Masculinities

Latinx men is an example of a marginalized subgroup in STEM whose mathematics experiences have been minimally explored, especially using intersectional analyses of gender. However, research insights from higher education and psychology on Latinx masculinity ideologies and constructions of manhood can be leveraged to understand how Latinx men negotiate their masculinities with pursuits of mathematics-intensive STEM degrees like engineering. Compared to Black and White men, Latinx men more readily internalize and endorse traditional, culturally-specific norms of masculinity (Abreu, Goodyear, Campos, & Newcomb, 2000; Vogel, Heimerdinger-Edwards, Hammer, & Hubbard, 2011). Latinx masculinities are largely shaped by notions of *machismo* from Mexican culture that has a negative side (or *traditional machismo*) and a positive side (or *caballerismo*) (Arciniega, Anderson, Tovar-Blank, & Tracey, 2008; Torres, Solberg, & Carlstrom, 2002). Traditional machismo is associated with aggression, emotional restrictedness, hypermasculinity, avoidance of the feminine, and sexism including gender-role dominance (Arciniega et al., 2008). Caballerismo is characterized by ethnic acceptance, chivalry, family-centeredness, nurturing qualities, and problem-solving coping strategies (Arciniega et al., 2008).

It has been documented that Latinx men with high levels of caballerismo and high levels of perceived academic racism produce motivation for success to achieve their aims of protecting and providing for their families (Liang, Salcedo, & Miller, 2011). Latinx men with high levels of caballerismo and low levels of perceived academic racism placed less restrictions on emotional behaviors with other men, thus reflecting a reduction in feeling the need to validate their sense of Latinx masculinity in academic contexts (Levant & Fisher, 1998; Liang et al., 2011). In addition, self-confidence and traditional gender norms were commonly observed among Latinx men (particularly Mexican-American) of more recent generational status and lower socioeconomic status respectively (Ojeda, Rosales, & Good, 2008). Family plays a major role in Latinx men's college persistence as a source of motivation (e.g., parental encouragement) or distraction (Ojeda et al., 2011, Sáenz, Bukoski, Lu, & Rodriguez, 2013; Sáenz, Mayo, Miller, & Rodriguez, 2015). In alignment with the notion of caballerismo, Latinx men's pursuits of higher education can be interpreted as being framed by notions of *familismo* (Marin & Marin, 1991; Suarez-Orozco & Suarez-Orozco, 1995) with aims of ultimately supporting their families.

Undergraduate Latinx men minimally engage in help-seeking behaviors in times of struggle to avoid being perceived as vulnerable, less self-reliant, and thus feminine (Cabrera, Rashwan-Soto, & Valencia, 2016; Gloria, Castellanos, Scull, & Villegas, 2009; Sáenz et al., 2013; Sáenz et al., 2015). Cabrera and colleagues (2016), for example, detailed constructions of self-defeating masculinities among Latinx men at a predominantly White university that brought them to

downplay the significance of academic and racial stressors, internalize responsibility for managing these struggles, and refuse seeking help because it was an affront to their masculine pride as well as a manifestation of fear and vulnerability. Such avoidance of help-seeking was a performative strategy that protected the undergraduate Latinx men's masculinity while also jeopardizing their academic success. Focusing on persistence and success in community college, Sáenz and colleagues (2013, 2015) documented how Latinx men managed gender role conflicts with their pursuits of higher education. Machismo operated as both a barrier to academic success and a "quasi-positive" source of motivation for success, mainly by way of competition with Latinx women (Sáenz et al., 2013). Caballerismo guided Latinx men's management of fears about academic failure by positioning full-time employment after high school and higher education at odds with one another, the former representing a "cultural marker of manhood" (p. 91) for the advancement of supporting their families (Sáenz et al., 2013). The positioning of employment as a form of successful Latinx masculinity shaped the discouragement that Latinx men received about going to college from hometown peers as well as discourses of Latinx women as smarter and more destined for higher education than Latinx men (Sáenz et al., 2015).

Theoretical Framework

This study synthesized various perspectives into a theoretical framework that guided data analysis. Critical race theory (CRT) in education is a perspective that "foreground[s] and account[s] for the role of race and racism" (Solórzano & Yosso, 2002, p. 25) to disrupt racism and other intersecting systems of societal oppression (e.g., sexism, classism) in schools and classrooms. Intersectionality (Crenshaw, 1991), a tenet of CRT, refers to the constitution of unique systemic forms of oppression experienced at intersections of race, class, gender, and other identities. As a "close cousin" to CRT, Latinx critical race theory (LatCrit) was adopted to examine the intersectionality of experience among Latinxs in relation to culture, immigration, and language that often go unaddressed in CRT (Bernal, 2002). The intersectionality tenet of CRT and LatCrit focused this analysis by exploring variation in participants' strategies for negotiating mathematical success with different intersections of their social identities.

Methods

This yearlong study took place at a large state university in the northeastern U.S. Less than 15% of the 2011-2012 graduating class was Latinx. These Latinx graduates earned only 10% of the university's conferred STEM degrees. Latinx study participants were purposefully recruited based on criteria informed by extant scholarship on successful underrepresented students in STEM (Cole & Espinoza, 2008; McGee & Martin, 2011; Stinson, 2008). Five Latinx participants (2 women and 3 men) were recruited from the university's chapter of the Society of Hispanic Professional Engineers (SHPE), a national organization aimed at empowering the Hispanic community in realizing its potential in engineering through STEM outreach and professional networking. The analysis presented in this report focused on two Latinx men: Brian (a third-year, Peruvian electrical engineering student who had transferred from a community college and immigrated to the U.S. when he was twelve years old) and Daniel (a fourth-year, Dominican- and Ecuadorean-American mechanical engineering student).

Phenomenology informed the study's methodology of collecting and critically examining multiple "texts of life" (Creswell, 2013) to detail the phenomenon of mathematical success among the two Latinx men as engineering majors at the university. Under the CRT perspective, these "texts of life" informed the analytical construction of the two Latinx men's *counter-stories* (Solórzano & Yosso, 2002). Counter-storytelling is a methodology used to tell the stories of

marginalized individuals in society that “aims to cast doubt on the validity of accepted premises or myths, especially ones held by the majority” (Delgado & Stefancic, 2001, p. 144). The coupling of CRT with LatCrit framed the study’s cross-case, phenomenological analysis of mathematical success as an intersectional endeavor across the two Latinx men’s counter-stories.

Four types of data were collected: (i) mathematics autobiographies, (ii) field notes from classroom observations, (iii) semi-structured interviews, and (iv) a focus group. Observations in the participants’ mathematics classrooms and engineering department offered situated insights to complement participants’ reflections of experience captured in other data sources for the study.

The mathematics autobiography, completed prior to the first interview, allowed participants to adopt a storytelling role by writing a story of 3-4 paragraphs chronicling major experiences in mathematics. Field observations were completed in participants’ college mathematics classes, including three 80-minute lectures and three 80-minute recitations or problem-solving workshops per semester. These observations detailed the instructional and relational spaces of the mathematics classrooms as well as participants’ engagement noted in terms of interactions and participation (e.g., answering and asking questions) or lack thereof.

Throughout the academic year, participants completed three 60-minute, semi-structured individual interviews. All interviews were audiotaped and transcribed verbatim. The interviews were opportunities for participants to share and explore what being Latinx and mathematically successful meant to them across different contexts (e.g., classroom, home, SHPE meetings). Interview questions were structured in an open-ended manner, allowing participants to describe varying levels of consciousness of their different social identities across these contexts such as the mathematics classroom (Bowleg, 2008).

In addition, participants completed a focus group centered on three stimulus narratives of events from their mathematics lectures and recitation/workshop sessions. These narratives related to dynamics explored in extant literature of students taking up classroom space (Hand, 2012), stereotypes of mathematical ability (Shah, 2017), and faculty-student relationships (Battey, Neal, Leyva, & Adams-Wiggins, 2016). Participants were probed on the extent to which they observed such dynamics in mathematics classrooms and whether or not they saw themselves in similar situations. The focus group was audiotaped and transcribed verbatim.

Phenomenology guided data analysis by focusing on patterns across participants’ mathematics experiences to detail the phenomenon of mathematical success and how it was negotiated with their social identities (Creswell, 2013). Open codes were used to identify the institutional, interpersonal, and ideological influences on mathematical success while axial codes examined the intersectionality across participants’ mathematics experiences (Bowleg, 2008; Creswell, 2013). While some axial codes were specific to individual social identities (e.g., race, gender), other axial codes corresponded to different intersections of these identities such as race-gender (Bowleg, 2008). Implicit instances of intersectionality were made explicit through analytical consideration of subtexts in participants’ narratives of experience (Banning, 1999).

Validity was reinforced through triangulation of collected data, memoing, and member checking. I brought awareness of my positionality to pursue data analysis with strong subjectivity to develop nuanced understandings of the undergraduate Latinx engineering students’ mathematical success. In addition, I developed positive rapport and mutual trust with participants supported by our mutual identification as Latinx STEM majors.

Findings

Three themes emerged in the cross-case analysis of Brian’s and Daniel’s counter-stories: (i) managing risks of mathematics classroom participation, (ii) building academically and socially

supportive relationships with faculty members, and (iii) negotiating pursuits of STEM higher education with their gendered sense of commitment to family. This section presents the variation in the two Latinx men's co-constructions of their masculinities and mathematical success as engineering students with respect to these three analytical themes.

First, the Latinx men's experiences capture how the university's mathematics classrooms constructed racialized hierarchies of ability (Martin, 2009) along which Latinxs were positioned lower than their White and Asian classmates who were more regularly invited to participate. The Latinx men discussed how such racialized positioning resulted in managing risks associated with classroom participation to protect their status of mathematical ability from negative judgment. Brian described the classrooms' "tense and competitive" atmosphere where he "didn't have the guts" to respond to professors' questions like his White classmates did and avoided possibilities of "feel[ing] embarrassed" if professors thought he did not know the content well. Daniel reflected on "closed off" opportunities from connecting with higher-status peers "who go above and beyond" in participation, unlike him who remained silent because "no one want[ed] to be wrong." Unlike Daniel, Brian felt ease connecting with classmates of any race because they were in the "same position" as him in being successfully admitted to the university. Brian "got used to" being underrepresented in mathematics classrooms and viewed all classmates as "experiencing the same stuff [he was] experiencing" as university STEM students. Limited classroom participation and perceptions of sameness among peers capture the Latinx men's strategies for managing the racialized dynamics of undergraduate mathematics classrooms. However, such nonparticipation and erasure of social differences are problematic as they perpetuate ideologies of whiteness in mathematics that position Latinx students as less mathematically able and mathematics as a neutral, cultureless domain (Battey & Leyva, 2016).

Secondly, the Latinx men reflected on the importance of building academically and socially supportive relationships with professors in and out of the classroom. Brian and Daniel valued professors who established relational spaces in classrooms that welcomed student participation, prioritized mathematical understanding, and were characterized by supportive teacher-student interactions. These influential faculty members' support went beyond coursework assistance, including office hour conversations that were emotionally-reaffirming "turning points" in the Latinx men's academic trajectories as engineers. Brian recalled a meaningful "big talk" with an Argentinian engineering professor at the community college who acknowledged his ability as a mathematics minor and encouraged him to pursue an engineering major. As a fellow Latinx man, the professor's advice was informed by his awareness of Latinxs' marginalized position in society, thus describing an engineering pathway as an opportunity for Brian to apply his ability in challenging deficit views by "be[ing] one of those persons who tries to make yourself look good and also your community." Daniel's relationship with a Honduran calculus professor, Benjamin, played a role in his "metamorphosis" as a calculus student when he began sitting toward the front of lecture halls, voluntarily attending office hours, and feeling like he "could become an engineer." He described Benjamin as a "uncle-grandfather hybrid" who, in speaking Spanish with him during office hours and sharing childhood stories during class, brought him to feel "more comfortable" than with other university professors who "felt like robots." These professors' blending of academic and social support can be likened to notions of *apoyo* (moral support, Auerbach, 2006) and *consejos* (culturally-specific forms of advice; Delgado-Gaitan, 1994) that Latinx children receive from family members for educational advancement. I argue that, while both professors in these examples were Latinx men, such family-like forms of support can be adopted by faculty members from other backgrounds with a

critical awareness of Latinx men's marginalized positions in higher education and society to inform more equitable educational practices.

Lastly, Brian's and Daniel's counter-stories captured how the Latinx men's familismo shaped how they made meaning of their pursuits of mathematical success and engineering careers as masculine endeavors. Brian's low-income, immigrant family background shaped his perceptions of STEM higher education as an opportunity to pursue a "good career" as an engineer, allowing for social mobility in the U.S. and to "help [his] parents out with economic problems." He viewed his STEM pursuits at a four-year university as being tied to a sense of responsibility of becoming "someone to look up to" in his hometown community. Daniel approached his engineering degree pursuits by associating academic failure with a sense of guilt about letting down his family. Graduating and becoming an engineer were ways that Daniel saw himself "represent[ing]" for his family and meeting his brother's gendered expectations that "you're not a man until you live alone [and] pay your bills." Brian and Daniel, therefore, similarly engaged in forms of caballerismo -- a construction of Latinx masculinity characterized by family-centeredness -- through their views of undergraduate mathematical success and engineering career pursuits as ways to contribute to the advancement of their respective family situations. The Latinx men also reflected on having encountered implicit forms of racism in relation to their mathematical ability as engineering students. While Brian reflected on his encounter with a hometown police officer who appeared "a little bit shocked" after learning about his engineering degree pursuits, Daniel interpreted Asian American peers asking for his grade on a mathematics exam as them adopting a "subtle change of words" to essentially ask if he failed. Being mathematically successful, as a result, served as a way for the Latinx men to show that "we're [Latinxs] not stupid" (Brian) as well as "not fall victim to the stereotypes" (Daniel) of racialized mathematical ability. They saw their STEM higher education pursuits as ways of them not becoming a "delinquent or deviant person" (Brian) as well as "not be[ing] a statistic" (Daniel), thus challenging discourses about Latinx men as criminals and underrepresented in higher education respectively. Brian's and Daniel's counter-stories, therefore, illustrate how their family-centered sense of caballerismo shaped their persistence as engineering students and coping strategies for managing interpersonal slights about their academic ability as Latinx men.

Implications for Educational Practice

Findings from this study raise implications for educational practice. The Latinx men's strategic management of risky classroom participation and limited opportunities for establishing classmate connections highlight undergraduate mathematics educators' important role in designing instruction and participation structures that disrupt racialized and other socially exclusionary status of mathematical ability. With public forms of help-seeking perceived as an affront to successful constructions of Latinx masculinity, it is important for mathematics educators to consider the extent to which they extend opportunities for student support rather than solely expect students to initiate contact. Brian's and Daniel's appreciation of faculty support, likened to notions of apoyo and consejos in Latinx families, illustrates the value of culturally-affirming teaching in undergraduate mathematics toward increasing retention and inclusion among underrepresented groups in STEM. With Brian and Daniel left largely on their own in negotiating engineering pursuits with their commitment to family as well as oppressive discourses about Latinx men, it is important for higher education institutions to carve spaces that bring Latinx men together for collective forms of coping and support in managing the racialized-gendered burdens of such experiences.

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