

Stereotypes and Stereotype Threats Experienced by Latinx Engineering Undergraduates*

ELIZABETH TUROCHY

Department of Civil and Environmental Engineering, Auburn University, Samuel Ginn College of Engineering 1301 Shelby Center, Auburn, Alabama 36849, USA. E-mail: emt0016@auburn.edu

LINNEL MARIE S. BALLESTEROS

Civil, Construction, and Environmental Engineering Department, Iowa State University, Town Engineering Building, 394 Town Engineering, Ames, IA 50011, USA. E-mail: linnelsb@iastate.edu

TOBY NII TAIRO NELSON

Civil, Construction, and Environmental Engineering Department, Iowa State University, Town Engineering Building, 414 Town Engineering, Ames, IA 50011, USA. E-mail: tntelson@iastate.edu

MICHAEL PEREZ

Department of Civil and Environmental Engineering, Auburn University, Samuel Ginn College of Engineering 1301 Shelby Center, Auburn, Alabama 36849, USA. E-mail: mike.perez@auburn.edu

KYLE ESTES

Department of Political Science and International Studies, Bradley University, 1501 W. Bradley Ave, Peoria, IL 61625, USA.
E-mail: kwestes@bradley.edu

CRISTINA POLEACOVSKI

Civil, Construction, and Environmental Engineering Department, Iowa State University, Town Engineering Building, 394 Town Engineering, Ames, IA 50011, USA. E-mail: poleacov@iastate.edu

ERIN DORAN

School of Education, Iowa State University, 1620 Lagomarcino Hall, 901 Stange Road, Ames, IA 5001, USA.
E-mail: edoran@iastate.edu

TIMOTHY YUEN

Department of Computer Science, The University of Texas at San Antonio, One UTSA Circle, San Antonio, TX 78249, USA.
E-mail: Timothy.Yuen@utsa.edu

Latinx engineering students often experience stereotype threats in their programs. Stereotype threats not only affect student self-esteem but can influence academic performance and persistence in engineering programs. Our research aims to increase understanding of the specific types of stereotyping and stereotype threats experienced by Latinx engineering students. We also analyze how these stereotypes and stereotype threats are experienced across different demographic groups, class standing, engineering major, and institutional context. Our research analyzes various stereotypes and stereotype threats that Latinx undergraduate engineering students face using data collected from interviews and surveys across three universities, two Predominately White Institutions (hereafter, PWI) and one Hispanic Serving Institution (hereafter, HSI). A content analysis of the 28 interviews and Ordinary Least Squares (OLS) regression analysis were conducted on our 156 survey responses. Nine major stereotype and stereotype threat themes related to engineering identity were identified. Findings showed that Latinx undergraduate engineering students commonly experienced both ethnicity and gender stereotype threats, particularly in the form of “assumed behaviors” and “assumed academic abilities”. Regression analyses also suggest that female gender identity is a statistically reliable predictor of students experiencing both gender and ethnicity stereotype threats. Latinx undergraduate engineering students commonly experience stereotyping and stereotype threat along ethnic and gender lines, with female identifiers systematically more susceptible to both. The implications of this research are significant, as both identity categories of this intersectional group – female and Latinx – are already underrepresented in engineering educational programs and professions. This research expands the literature on the impact of stereotypes and stereotype threat on Latinx undergraduate engineering students’ persistence and success in this major and emphasizes the need to foster inclusion and diversity within engineering programs.

Keywords: stereotypes; stereotype threat; Latinx; double-minority status

1. Introduction

Compared to the national proportion of nearly one-fifth of the country’s residents [1], Latinx students

continue to be underrepresented across STEM fields in U.S. higher education institutions. The term “Latinx” is a gender-neutral term that has gained popularity since 2015, particularly in aca-

demographic contexts. It is meant to be more gender inclusive than Latina/o, which represents the gender binary; however, it is also controversial in that many Latinx-identified people either reject the term or do not identify with it [2]. In this study, most participants identified as male or female, but we did have two respondents who self-identified as non-binary. As such, we use the term Latinx to be intentionally inclusive. In cases where we know the respondent's gender identity, we used Latina or Latino. According to the National Science Foundation, in 2019 only 15% of the bachelor's degrees in engineering were awarded to Latinx students [3]. The underrepresentation of Latinx students extends to the engineering industry, where only 6% of the employed, bachelor's degree-holding population identify as Latinx. Further, underrepresentation continues to grow in graduate studies where only 4.5% of master's degrees and 2.6% of doctoral degrees were awarded to students who identify as Latinx [3]. This issue of Latinx underrepresentation across the classroom-to-career pathways calls attention to how higher education can better recruit Latinx students and help them persist in engineering programs.

When addressing issues of underrepresentation of a minority group (i.e., racial, ethnic, gender, etc.), it is critical to examine any affective and socio-cultural challenges they may face. This is especially important when we look at ways to ensure that members of that minority group feel a sense of belonging within their social and professional context. In this case, we look at the challenges that may prevent Latinx undergraduate students from feeling like they belong in the engineering field. This "sense of belonging" is critical for both recruitment into and persistence through educational programs.

Two important barriers to minority student success in higher education are stereotypes and stereotype threat [4]. Stereotypes are widely held, oversimplified images or ideas of a particular aspect of one's social identity, such as ethnicity, gender, and race, and are commonly faced by Latinx individuals [5]. Stereotypes can have a negative impact on students' experiences in part because they lead to stereotype threats – the fear of inadvertently confirming a negative stereotype about oneself or one's group while also not feeling a sense of belonging in relation to other groups.

Stereotypes and stereotype threats can affect a student's academic performance and persistence [4]. The effects of exposure to negative stereotypes can lead to underachievement in minority students through internalization and externalization of stereotypes. Students who internalize negative stereotypes tend to disconnect their effects on academic performance from self-esteem. This discon-

nect helps to reduce the psychological degradation of self-esteem caused by the experienced negative stereotype and often leads to reduced academic effort [6]. The reduced academic effort helps relieve the pressure of falling under a negative stereotype by allowing the student to attribute their failure to lack of effort [4]. Students who externalize the negative stereotype tend to become preoccupied with the thought of their actions confirming the negative stereotype, which takes away concentration from the task at hand and can lead to underachievement. Both the internalization and externalization pathways can impact a student's academic performance and persistence. For engineering students, stereotype threats can undermine minority students' identity development as an engineer.

While current research on stereotypes faced by Latinx undergraduate engineering students is limited, research regarding stereotypes and stereotype threat, in general, is growing. Eschenbach et al. [7], for instance, analyze 300 articles on themes of stereotype threat in order to prescribe "best practices" in engineering education. Similarly, on the basis of a literature review, Thomas and Erdei [8] propose specific institutional reforms and implementation of evidence-based practices to limit the presence and effect of stereotype threat in STEM programs.

Despite the growing interest in this area, significant gaps in our understanding of the stereotypes faced by Latinx undergraduate engineering students and their effects still exist. Thus, we ask the questions:

- (1) What are the prevailing ethnicity- and gender-based stereotypes and stereotype threats faced by Latinx undergraduate engineering students?
- (2) What demographic and institutional (Primarily White Institution, or PWI vs. Hispanic Serving Institution, or HSI) characteristics of Latinx undergraduate engineering students influence the extent of gender and ethnic stereotype threats they experience?

Our research aims to provide analyses of various stereotype threats that Latinx undergraduate engineering students face. This research examined these questions through interviews and surveys collected from Latinx undergraduate engineering students across two PWIs and one HSI to answer the proposed research questions.

2. Impacts of Stereotype Threats

The term stereotype threat, or the fear of inadvertently confirming a negative stereotype about aspects of one's social identity – for instance, their

race, gender, ethnicity, social class, sexual orientation, etc. – was first introduced by Steele and Aronson [6]. This study investigated how Black freshman and sophomore students performed more poorly on standardized tests than White peers when exposed to race-specific stereotypes. After this initial study, the body of research on stereotype threat continued to grow [7–9], with much of the research focusing on race and gender-based stereotypes and stereotype threats. Race-based stereotypes are stereotypes formed from the oversimplification of ideas about a particular racial group, and gender-based stereotypes stem from the oversimplification of an idea about a particular gender group. This body of research determined that stereotype threat can lead to negative outcomes such as hyperawareness, thought wandering, thought suppression, and cognitive appraisal, all of which take up valuable thought processing space when experienced and can negatively impact academic performance and persistence [10].

When an individual from a stigmatized group is presented with a negative stereotype of that group, it can cause the individual to become hyperaware of their actions. This heightened awareness often reduces self-efficacy or the belief in one's ability to complete a task. Self-efficacy perceptions can influence the goals an individual sets and their level of persistence when difficulties arise [10, 11]. On average, individuals with higher perceptions of self-efficacy tend to perform better and have greater persistence in STEM disciplines relative to those with lower self-efficacy [12].

In addition, research suggests that if an individual of a stigmatized group is presented with stereotypes before a task and anticipates a stereotype-based task, they are likely to experience thought wandering and increased worries regarding the task [13]. Stereotype-based task is the situation where an individual's performance is influenced by the stereotypes associated with their social group. The effects of thought wandering include a decrease in task attention, negatively affecting performance [14]. For example, if engineering is considered a male-dominated field, female engineering undergraduates may face stereotype threat, where they feel anxious and underperform due to the negative stereotype associated with their gender.

Similar to thought wandering, when an individual of a stigmatized group is presented with a stereotype before a task, it can cause increased thought suppression. Thought suppression occurs when an individual is faced with negative stereotypes or stereotype threats and puts forth the mental effort to attempt to suppress them and avoid distraction. When an individual experiences stereotype threat, they become highly aware that

their task performance is being judged through the lens of a negative stereotype [15]. The mental distractions caused by increased awareness and efforts to suppress any associated negative thoughts can impact task performance. An example of such a situation is how students from underrepresented minority groups in engineering, such as African American or Hispanic students, may be mentally burdened by stereotypes that assume poor performance, and this can distract attention from the task at hand and reduce productivity. Though such minoritized students are as capable of high performance as their peers, the pressure put on them by negative stereotypes may lower their capacity to succeed.

Lastly, a cognitive appraisal can play a significant role in task performance. Cognitive appraisal occurs when an individual evaluates a task based on the performance implications of a negative stereotype [16–18]. When individuals evaluate the task based on their ability to defy the negative stereotype, two possible outcomes include seeing it as a challenge or a threat. If it is seen as a challenge, an individual is more likely to perform better at the task in an attempt to disprove the stereotype [18]. On the other hand, if the task is seen as a threat, an individual is more likely to perform poorly and disengage from the task.

These impacts of stereotype threat on cognitive function can negatively affect task performance and impact poorly on academic performance and persistence. For example, male and female engineering undergraduates who receive a poor grade on a project may appraise the situation differently. As a result of stereotype threat, male students may be more likely to see it as a challenge and work harder to improve their performance, while female students may feel overwhelmed and demotivated, leading to a decrease in their academic performance. Similarly, engineering undergraduates who receive feedback from a professor or mentor may appraise it differently. While representatives of non-minoritized groups may see it as constructive criticism and work to improve their performance, minoritized students may feel personally attacked and lose confidence in their abilities.

One of the spaces where the effect of stereotypes and stereotype threat can be most disruptive is in an academic setting. Specifically, students pursuing higher education are disadvantaged by stigmas [19, 20]. In the study that coined the term stereotype threat [6], the hypothesis that student exposure to negative stereotypes would reduce the academic performance of stigmatized group members was tested. White and Black college students were assigned a test, and half of the participants were informed that the test administrator would be

evaluating their academic abilities based on the test, thus initiating stereotype threat. The other half of the participants were not told that their academic abilities would be judged based on this test. The resulting data from this test indicated that Black students who were not informed that their academic abilities were being evaluated based on this test performed equally compared to their White counterparts. However, for the group of participants who were told their academic abilities would be evaluated, the Black students performed worse than their White counterparts. Subsequent research produced similar results [21], and other studies have found that these patterns persist when evaluating the influence of stereotype threats on Latinx academic performance [22]. Although this general research is beneficial, studying the individual stereotypes and stereotype threats experienced by specific minority groups is an important expansion of this research area.

2.1 Stereotypes Experienced by Latinx Students in STEM

Previous literature discussing stereotypes that Latinx students experience in higher education has focused on ethnicity-based stereotypes and gender-based stereotypes. Latinx-identifying individuals often experience stereotypes based on race and ethnicity pertaining to an assumption of criminal status, denial of individual racism (i.e. belief or attitude that an individual cannot be racist because they do not harbor personal feelings of hatred or animosity towards people of different races), and assumption of second-class status [22]. Assumption of criminality typically includes stereotypes such as “all Hispanic individuals are drug dealers or are affiliated with one.” While more common specific stereotypes are encompassed by categories such as these, Latinx students in higher education may experience an additional set of stereotypes that do not align with one of the previously mentioned stereotypes. Some of these negative stereotypes are related to the assumption of academic abilities and are more strongly experienced by first-generation students, i.e., “Hispanics fail out of engineering due to lack of education” [22].

In addition to ethnicity-based stereotypes, Latinx-identifying individuals may face gender-based stereotypes. Gender-based stereotypes are stereotypes that Latinx individuals in higher education face, with common gendered stereotype themes focusing on academic abilities and expectations to meet traditional roles [19, 23]. While these stereotypes can affect all women in higher education, women who identify with multiple minority groups can experience a distinct set of multiple stereotypes simultaneously, a phenomenon called

“double-minority status” [22]. These double-minority stereotypes often include race- and ethnicity-based stereotypes along with gender-based stereotypes. For example, Latinas may experience assumptions regarding their intelligence and ability to persist in an engineering major or be faced with stereotypes regarding expectations of staying at home to take care of children. Research regarding stereotypes does not often consider how being a member of multiple minority groups may affect an individual’s experience. This study aims to close that gap by analyzing how both ethnicity and gender separately and jointly affect an individual’s experience with stereotypes.

3. Methods

This study employs a mixed-methods approach to study ethnicity- and gender-based stereotype threats. The qualitative approach evaluates the first research question presented above regarding the types of ethnicities- and gender-based stereotypes and stereotype threats that Latinx undergraduate engineering students face. The quantitative approach evaluates the second research question regarding the differences in stereotype threats across demographic and institutional attributes. This study was approved by the Institutional Review Board (IRB) at the lead university in this study in collaboration with the partner universities.

3.1 Participants and Research Sites

Two PWIs and one HSI from three different regions in the United States were the sites of this study. Table 1 provides a descriptive summary of each university’s demographics. All three universities are public institutions. Student counts are estimations based on institutional research data published in 2021.

3.2 Qualitative Data Collection for Stereotypes and Stereotype Threat Experiences

Individual semi-structured interviews and surveys with open-ended questions were conducted to capture Latinx undergraduates’ experiences, if any, with stereotypes and stereotype threats. The individual interviews allowed for the discovery of the various stereotypes and stereotype threats participants may have been confronted with while gaining a rich understanding of their overall experiences in their engineering programs. The surveys contributed to generalizing and validating the stereotype and stereotype threat themes identified from the interviews. In total, researchers conducted 28 individual interviews and collected 156 survey responses from participants.

Table 1. Institutional Characteristics

University Location	Institution Type	Number of Undergraduate Students	Number of Undergraduate Engineering Students	Percentage of White and Latinx Students
Southeast	PWI	24,500	5,100	78% White 4% Latinx
Midwest	PWI	25,800	7,600	73% White 7% Latinx
Southwest	HSI	34,700	2,800	22% White 57% Latinx

3.2.1 Interviews

Recruitment for the interview portion of this study was conducted entirely via email across seven months beginning in June 2020. Flyers were sent via email to the undergraduate engineering population at each university through academic advisors and other program personnel. After showing interest in participating in the study, individuals received a link to be filled out, and electronically signed an audio release form and a consent form via Qualtrics. The consent form provided study information, an initial eligibility screening, and ensured that the participants were undergraduate engineering students, at least 18 years of age, and identified as Latinx. The signed audio release forms verified that the interview audio collected via Zoom could be transcribed and analyzed for the study. The first author conducted interviews lasting 15–45 minutes each via Zoom. The interview protocol included 33 questions. A total of 28 undergraduate engineering students participated in the interviews. The participants who completed interviews were diverse in terms of their major (i.e., engineering subfield) and year in college to allow sufficient representation based on varied college experiences. Participants were given a \$25 Amazon gift card as an incentive for completing the interview.

The interview protocol included a set of questions related to demographics, stereotypes, and stereotype effects. At the beginning of each interview, the researcher described the study's goal, the rules of the session, and the confidentiality requirements per IRB guidelines. In order to obtain the demographic information about each participant while maintaining anonymous data, the following questions were asked:

- (1) What year are you, and what is your major?
- (2) Where are you from?
- (3) What race do you identify as?
- (4) What ethnicity do you identify as?
- (5) What gender do you identify as?

In order to obtain the information regarding the stereotypes each participant faced, a set of questions were asked regarding experiences of identity-based stereotyping in STEM courses, academic

programs, specific individual and group-based stereotypes, and the perception of being ignored or assigned specific tasks due to identity-based stereotypes. Additionally, to obtain the information regarding the stereotype threats each participant faced, questions were asked about their fears of behaving in a manner which confirms stereotypes discussed in the previous portion of the interviews. The relation of stereotypes to sense of belonging to the engineering community, and the perception of being assigned tasks based on stereotypes were also asked during the interviews (see Appendix A for all interview questions). When necessary, probing questions were asked to elicit more detail from the participant. The interview data provided additional insight and context for the quantitative results from the surveys.

3.2.2 Surveys

Recruitment for the survey portion of this study was conducted via email beginning March 2021. An email was sent to the Latinx undergraduate engineering population at each university. The email contained a preliminary eligibility screening stating that the respondent must be an undergraduate engineering student, at least 18 years of age, and identify as Latinx, as well as including a link to take the survey via Qualtrics. Students were also informed that they were eligible to enter their name for a drawing to win one of three \$100 Amazon gift cards. The beginning of the survey contained a consent form that, once signed, gave the participant access to the survey. A total of 156 Latinx undergraduate engineering students took the survey.

The survey consisted of 80 questions. In order to capture the demographic characteristics and institutional contexts of the survey participants, the following series of questions were asked:

- (1) What pronouns do you identify with?
- (2) What race do you identify as?
- (3) What ethnicity do you identify as?
- (4) What gender do you identify as?
- (5) What year are you in school?
- (6) What university do you attend?
- (7) What is your major?

We then asked a series of questions regarding ethnic and gender stereotypes and stereotype threat, each of which were measured utilizing a Likert scale (Appendix B). Lastly, to capture any stereotype threat-related experiences that were not collected during any of the previous questions, two open-ended questions were asked, each followed by a question regarding their response.

- (1) Please list a stereotype you have experienced based on your ethnicity. (If multiple, please separate with commas.)
 - (a) Do you worry that people will view you with these stereotypes in mind?
- (2) Please list a stereotype you have experienced based on your gender. (If multiple, please separate with commas.)
 - (a) Do you worry that people will view you with these stereotypes in mind?

3.2.3 Qualitative Data Analysis

The responses collected in the individual interviews were transcribed using the Trint transcription software and were reviewed by a research team member for accuracy. All members of the research team reviewed the raw data and provided feedback on the data and the analysis process. During biweekly meetings over three months, the research team identified and categorized the most commonly occurring stereotype and stereotype threat themes across all interviews. Data saturation was reached after 28 interviews as common stereotype and stereotype threat themes emerged, and no new stereotypes and stereotype threats were mentioned. These themes were refined into a set of analytical codes using a deductive method based on literature

relevant to this study (e.g., research on stereotype threat, racialized experiences of Latinx students in engineering). The coding frameworks developed were then evaluated by the research team in biweekly meetings until a final framework was created. This final coding framework was then used to analyze all interview transcriptions in NVivo 12.

Through analyzing the interview transcriptions, nine stereotype themes and nine stereotype threat themes were identified (Table 2). All interview transcriptions were evaluated for stereotype occurrences mentioned by the interviewee. Once all stereotypes were identified, they were sorted into the nine different categories to produce a percentage value of total interviews in which each stereotype and stereotype threat were mentioned. During the data analysis process, stereotypes based on ethnicity and gender were considered. The institution that the student attended and their year in school were also taken into consideration.

3.3 Quantitative Data Collection

Quantitative data was collected using the same survey described in the previous section. To capture gender and ethnic stereotype threat, eight Likert scale (seven-point scale) survey questions for each allowed participants to express how much they agreed or disagreed with statements that relate to gender/ethnic stereotype threats (see Appendix B for survey questions).

To capture demographic attributes the survey asked questions related to gender identity. To capture institutional attributes, the survey asked questions related to class standing, academic major, and university affiliation.

Table 2. Stereotype Themes and Definitions

#	Stereotype Theme	Stereotype Theme Definition	% of interviews that mentioned it	% of surveys that mentioned it
1	Assumption of Criminality	Stereotypes that assume individual's criminal background	11%	6%
2	Cultural and Religious Assumptions	Stereotypes that assume individual's religious background	7%	0%
3	Denial of Ethnic/Racial Identity	Stereotypes that invalidate one's ethnic/racial identity based on personal characteristics	32%	5%
4	Assumption of Socioeconomic Class	Stereotypes that assume an individual's class	7%	7%
5	Projection of Assumed Cultural Norms	Stereotypes that enforce over-generalized assumed cultural norms	18%	28%
6	Assumption of Academic Abilities (based on ethnicity)	Stereotypes that discredit an individual's academic status and abilities based on ethnicity	46%	24%
7	Assumption of Academic Abilities (based on gender)	Stereotypes that discredit an individual's academic status and abilities based on gender	39%	18%
8	Assumption of Behaviors	Stereotypes that assume individuals' behavioral patterns	54%	53%
9	Projection of Gender Roles	Stereotypes that assume an individual's skills based on assumed gender norms	14%	7%

3.3.1 Quantitative Data Analysis

Gender was coded as dichotomous (0 = male, 1 = female). Class standing was coded as a dichotomous variable (1 = lower class standing, which included freshman and sophomore, 2 = higher class standing, which included junior and senior). Institutional characteristics were coded as dichotomous (0 = PWI, 1 = HSI). Majors was coded as dichotomous (1 = civil engineering, 0 = other engineering majors).

To test the association between variables, correlation analysis were conducted among ethnicity stereotype threat, gender stereotype threat, and the four major characteristics of the student – gender, class standing, institutional context (PWI or HSI), and major (Table 4). To test the extent to which gender and ethnic stereotype threat levels are predicted by demographic and institutional characteristics, Ordinary Least Squares (OLS) linear regression analysis was performed (Tables 5 and 6).

3.4 Qualitative Results: Stereotype Categories and Stereotype Threats

Table 2 summarizes the qualitative results including the nine primary stereotype themes with their accompanying definitions. The code frequencies from the interviews and the surveys show similar results. The qualitative results show that the most frequently experienced stereotype reported by the participants was the assumption of behaviors based on their racial and/or ethnic identities. Assumption of behaviors includes stereotypes that assume an individual's behavioral patterns (i.e., being lazy, aggressive, sarcastic, outgoing, etc.). These stereotype encounters included a variety of stereotypes, ranging from physical appearance to verbal expression. One participant reported that peers made assumptions regarding their professionalism. These stereotypical assumptions included, "Hispanics are aggressive and loud" and "If you are Hispanic, you don't look professional." Other participants reported that peers made assumptions about their work ethic, with the most frequent assumption being that, "Hispanic immigrants are lazy." Though perhaps an extreme example of a racist microaggression, one male senior electrical engineering major from the southern land-grant institution stated that since he was Colombian, he received jokes about drug use and the cocaine kingpin Pablo Escobar frequently.

Assumption of academic abilities was the next most frequently experienced stereotype. Assumption of academic abilities includes the assumption that an individual has lower or higher academic abilities because of their identity. For self-identified Latinas, the most frequently experienced stereo-

types revolved around the assumption that men are more capable of engineering-related tasks than women. Exemplifying this finding, a junior female civil engineering major at the HSI described her experience in "an atmosphere where males kind of just disregard you and they kind of think of you as less of an engineer, less likely to make it. I guess because, you know, they see you as intellectually inferior." For male-identifying Latino respondents, the most frequently experienced stereotype typically revolved around a general questioning of individuals' ability to complete an academic-related task. Multiple participants reported experiencing peers assuming that, "Hispanics will fail out of engineering." A junior female biomedical engineering student remarked that she felt doubly judged by her identities: "I'm a girl in engineering, so maybe [others felt that] she's not going to be as smart, as quick as a male would. And the fact that I'm Hispanic – probably less smart up there."

On the other hand, several interview respondents explained that other students believed they had easier access to opportunities like internships and jobs, because of their gender (especially for females) or their minoritized identities. A Puerto Rican male student who majored in mechanical engineering at a Midwest university recalled preparing diligently for a career fair during his freshman year, and he felt really proud to land an internship. When he told his peers, he described, "Instead of congratulating me, [one friend] told me, 'Oh, you know why you got that, right? It's because they [the employer] have ethnicity requirements...so that's the only reason why you were able to get it and why we didn't get it.'" Put another way, Latinx students reported the perception from others that they benefitted not from their academic achievements but from affirmative action-like programs that give minoritized students or applicants an advantage over White students.

Table 3 summarizes the qualitative results including the nine primary stereotype threat themes associated with the previously identified stereotype themes and their definitions. A stereotype became a stereotype threat whenever the respondents acknowledged that a stereotype had caused them to change their behavior, way of approaching social or academic scenarios with peers, or caused an increase in thought wandering.

The code frequency from the interviews and the surveys shows similar results (Table 3). Based on the code frequency data, the top two most frequently experienced stereotype threat themes were assumption of behaviors and assumption of academic abilities. In other words, Latinx engineering students across these three institutions face obstacles to their academic performance and persistence

Table 3. Stereotype Threat Themes and Definitions

#	Stereotype Threat Theme	Stereotype Threat Definition	% of interviews that mentioned it	% of surveys that mentioned it
1	Assumption of Criminality	The fear of being associated with illegal actions	7%	5%
2	Cultural and Religious Assumptions	–	–	–
3	Denial of Ethnic/Racial Identity	The fear of behaving or appearing in a way that dissociates an individual from their ethnicity and/or race	18%	4%
4	Assumption of Socioeconomic Class	The fear of acting in a way that others associate with a certain class	4%	5%
5	Projection of Assumed Cultural Norms	The fear of behaving in a way that confirms the assumed norm	11%	19%
6	Assumption of Academic Abilities (based on ethnicity)	The fear of confirming the assumed academic status based on ethnicity	32%	18%
7	Assumption of Academic Abilities (based on gender)	The fear of confirming the assumed academic status based on gender	32%	15%
8	Assumption of Behaviors	The fear of acting in a way that confirms the assumed behavior	39%	40%
9	Projection of Gender Roles	The fear of behaving in a way that confirms the assumed gender norm	14%	4%

in part through the assumptions that others make about their likely behavioral patterns and propensity to perform well academically, with the latter founded in both gender and ethnic stereotypes.

3.5 Quantitative Results: Stereotype Threat across Demographic and Institutional Attributes

Table 4 shows descriptive statistics and correlations of all variables. Utilizing a seven-point Likert scale, the results show that the mean score of ethnicity stereotype threat was 4.12 (SD = 1.62), while the mean score of gender stereotype threat is 3.83 (SD = 1.76). The descriptive statistics indicate that Latinx undergraduate engineering students, on average, experience some level ethnicity stereotype threat and gender stereotype threat. Additionally, the positive and statistically significant correlation between gender stereotype threat and ethnicity stereotype threat suggest that those who experience stereotype threat along one element of their identity are also likely to experience it on another, further deteriorating Latinx undergraduate students' sense of belonging. The positive and statistically significant correlation between ethnicity stereotype threat and gender indicates that female students correspond with higher mean ethnicity stereotype threat

scores. Similarly, the positive and statistically significant correlation between gender stereotype threat and gender indicates that female students correspond with higher mean gender stereotype threat.

Multivariate linear regression models are used in statistics and data analysis to examine the relationship between multiple independent variables and a single dependent variable. Table 5 presents results from multivariate linear regression models. These models are particularly useful when there are multiple factors (demographic and institutional characteristics) that may influence the outcome of interest (levels of gender stereotype threat), and the goal is to determine the strength and direction of the relationship between these factors and the outcome.

Model 1 shows that class standing has no consistent relationship to levels of gender stereotype threat. Model 2 shows no significant differences in gender stereotype threat scores between students who are in PWI and in HSI. Model 3 shows no significant differences in gender stereotype threat scores between students who are in Civil Engineering and other majors. Model 4 shows that, overall, the characteristics of Latinx undergraduate engineering students except for gender do not predict

Table 4. Descriptive statistics and correlations

Variables	Mean	Std. Dev.	(1)	(2)	(3)	(4)	(5)	(6)
1 Ethnicity stereotype threat	4.12	1.62	–					
2 Gender stereotype threat	3.83	1.76	0.70*	–				
3 Gender	0.47	0.50	0.39*	0.58*	–			
4 Class standing	2.69	1.12	–0.09	–0.12	–0.07	–		
5 Institution type (PWI vs. HSI)	0.72	0.45	–0.05	–0.05	–0.04	–0.29*	–	
6 Major	4.12	2.00	–0.04	0.02	–0.02	0.11	–0.06	–

$n = 156$; * $p < 0.001$.

Table 5. Linear regression models: What determines gender stereotype threats?

Variable	1		2		3		4	
Gender	1.87***	(0.22)	1.89***	(0.22)	2.00***	(0.22)	1.97***	(0.22)
Class standing (lower vs. higher)	-0.31	(0.24)					-0.32	(0.25)
Institution type (PWI vs. HSI)			-0.19	(0.26)			-0.23	(0.26)
Major (Civil vs. Others)					0.20	(0.23)	0.24	(0.23)
Constant	1.39***	(0.37)	1.31***	(0.38)	0.76	(0.51)	1.11**	(0.56)
R-squared	0.33		0.33		0.36		0.37	
F-test	37.79		36.99		42.79		21.88	

$n = 156$; standard errors are in parenthesis; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 6. Linear regression models: What determines ethnic stereotype threats?

Variable	1		2		3		4	
Gender	1.12 ***	(0.23)	1.13 ***	(0.22)	1.19***	(0.23)	1.17***	(0.23)
Class standing (lower vs. higher)	-0.20	(0.25)					-0.22	(0.27)
Institution type (PWI vs. his)			-0.16	(0.27)			-0.20	(0.28)
Major (Civil vs. Others)					0.19	(0.24)	0.04	(0.25)
Constant	2.68***	(0.39)	2.66***	(0.40)	2.46***	(0.52)	2.73***	(0.59)
R-squared	0.14		0.14		0.15		0.37	
F-test	12.40		12.25		13.38		21.88	

$n = 156$; standard errors are in parenthesis; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

experience of gender stereotype threat. All models indicate that female identity is a positive and statistically significant predictor of gender stereotype threat experience. Strikingly, the independent effect of female gender identity is to increase average gender stereotype threat more than 25 percent.

Table 6 also presents results from multivariate linear regression models to understand which demographic and institutional context characteristics influence levels of ethnic stereotype threat. Similar to the gender stereotype threat models, female identity has a positive and statistically significant relationship to experience of ethnic stereotype threat, though the substantive effect is not as great. Model 1 shows that there is no statistically significant difference among those of lower and upper class standing. Model 2 shows no significant differences in ethnicity stereotype threat scores between students who are in PWI and in HSI. Model 3 shows no significant differences in ethnicity stereotype threat scores between students who are in Civil Engineering and other engineering majors. Model 4 shows that the effect of gender on ethnic stereotype threat remains robust when all other factors are accounted for.

4. Discussion

A diverse engineering workforce is essential, and Latinx individuals remain underrepresented. Improving the diversity of universities is the first step in raising these numbers. Many Latinx individuals experience stereotypes that often result in

negative experiences [5] and decreased academic persistence [4]. Exploring stereotype themes and stereotype threat themes encountered by students is important to understanding the experience of undergraduate Latinx engineering students and finding a way to improve it.

This study found that the assumption of behaviors was the most commonly experienced stereotype theme across both the interview and survey data. The frequency data from the interviews showed the assumption of academic abilities based on ethnicity and assumption of academic abilities based on gender as the second and third most frequently experienced stereotype themes, respectively. The frequency data from the surveys showed a projection of assumed cultural norms and assumption of academic abilities as the second and third most frequently experienced stereotype threat theme. Additionally, it was found that assumption of behaviors was the most likely stereotype theme to be internalized and become a stereotype threat.

When Latinx students are faced with the assumption of behaviors stereotype, they may internalize this stereotype and begin to believe that they are not capable of achieving success in their academic pursuits. This can lead to a lack of self-efficacy and a decrease in motivation and academic performance. Furthermore, if students are not aware of their own thoughts and how they are influenced by stereotypes, they may not recognize the harmful impact that these stereotypes are having on their self-efficacy and academic performance. This change in behavior or internal thought processes as a

response may then turn into a stereotype threat. Assumption of behaviors likely became more internalized due to the direct connection to the actions of the individual. These findings further our understanding of the particular categories of stereotypes that Latinx undergraduate engineering students face and, at times, internalize. It is important to address stereotype themes and stereotype threat themes among Latinx students and to provide resources that promote thought awareness and self-efficacy. By increasing students' awareness of the impact of stereotypes on their thoughts and behavior, and by promoting a belief in their ability to succeed, Latinx students can overcome stereotype threat and achieve their academic and career goals.

Furthermore, the quantitative data analysis shows that gender, and specifically identifying as female, substantially predicts higher levels of gender and ethnicity stereotype [24, 25]. We note that previous studies [25] conducted their research at PWIs. In this study, we considered the context of both PWIs and an HSI. Yet, regardless of institutional context, this study found that gender-based stereotype threat is common for female Latinx students in particular. This confirms the qualitative data analysis that one of the prevalent stereotype threat themes Latinx undergraduate engineering students frequently experience is the assumption of academic abilities based on gender. It is important to consider the gender variable when examining stereotype threats among Latinx individuals. Intersectionality theory emphasizes that the experiences of Latinx women and Latinx men can be distinct due to the interaction of various social identities [26, 27]. Latinx women are often subjected to stereotypes such as being hypersexualized and exoticized, which can lead to their experiences being objectified and marginalized [28]. On the other hand, Latinx men may not encounter the same level of discrimination, especially in fields like civil engineering where the workforce is more accepting of Latinx men. Acknowledging the concept of intersectionality is crucial in understanding the different experiences within the Latinx community.

The theories of thought awareness and self-efficacy can play a crucial role in helping female Latinx students overcome gender and ethnicity stereotypes that can negatively impact their academic performance and retention in the engineering field. When female Latinx students experience gender and ethnicity stereotypes, it can lead to a decrease in self-efficacy, motivation, and academic performance. However, if these students are aware of the impact of stereotypes on their thoughts and behavior, they can be better equipped to resist and overcome stereotype threat. In the context of

gender and ethnicity stereotypes, thought awareness can help female Latinx students recognize when they are being influenced by harmful stereotypes and challenge those thoughts. This can lead to a stronger sense of self-efficacy and a belief in their ability to succeed in their academic pursuits.

Additionally, the quantitative analysis finds a statistically significant relationship between female identification and high levels of ethnic stereotype threat. Combined with the previously mentioned finding, this is notable for providing an understanding of the intersectional obstacles faced by female Latinx undergraduate engineering students, who are likely to be challenged due to both gender and ethnicity stereotype threats in such a way as to potentially harm academic performance and retention. With the finding of no significant difference predicted by other characteristics of Latinx undergraduate engineering students, we can conclude that the experience of stereotype threat is relatively widespread, regardless of type of institution, major, and class standing.

Finally, our findings did not find differences in the way Latinx students experience stereotype threat at the two PWIs or the HSI. This may be counterintuitive that Latinx students at a Hispanic-Serving Institution (HSI) would experience stereotype threat. However, as the literature reminds us, most HSIs are still historically white institutions and the system and norms of higher education are still rooted in white normative standards [29]. What our findings may also suggest is that Latinx students can still experience stereotype threat and other racialized microaggressions from other Latinx students. This type of internal discrimination [30] has been understudied in the context of higher education

5. Limitations

This study has limitations that should motivate future research. First, this data has been collected through self-report measures. Despite the data coming directly from the respondent, the participant still risks not reporting all experiences explicitly. This is particularly the case when asking sensitive questions about respondents feeling stereotyped or discriminated and might be overcome partially by employing a "list experiment" technique [31]. Second, this data was collected at various points in students' academic careers, influencing their perspectives and experiences. Future research would benefit from longitudinal data collection following students through all years of their undergraduate career in order to get a clearer sense of, first, at what point students start to confront stereotypes and stereotype threats and, second, how

these are related causally to students' academic performance and persistence.

6. Conclusion

The engineering workforce is generally less diverse than other professions. Despite the growing rate of engineering bachelor's degrees being awarded, the numbers see no significant increase in Latinx participation in engineering as compared to their representation in higher education and the national population. Recently, there has been more focus on studying the barriers to broadening diversity in engineering and ways to tackle such challenges. While this body of research is expanding, there is a gap in knowledge regarding the types of stereotypes and stereotype threats experienced by Latinx students pursuing a bachelor's degree in engineering.

This study aimed to specify these stereotypes and stereotype threats. The results showed that stereotypes regarding assumptions of behaviors and assumptions of academic abilities made Latinx engineering students doubt their academic abilities and reduced their confidence to persist in and complete their engineering degree programs. Additionally, our quantitative analysis provides evidence that female Latinx students systematically experience higher levels of both gender and ethnic stereotype threat, regardless of their institutional context or academic characteristics. Therefore, this study reinforces the need to conduct more work on intersectional identities and how these impact students' experiences in engineering contexts.

These stereotype and stereotype threats present barriers to Latinx engineering students' success and sense of belonging in the engineering field. As long as stereotype threats continue, growth in the diversity of engineering programs may be impeded, affecting the diversity of the workforce as a whole.

This is particularly the case for female Latinx students, who are already underrepresented along two key identity categories and are simultaneously likely to experience both gender and ethnic stereotype threats. Follow-up research to this study needs to examine the effects of these stereotypes on student persistence and explore coping mechanisms and strategies that help to reduce these experiences. Stereotypes foster a negative learning environment and the goal is to eliminate these experiences among Latinx students in engineering.

To promote a more diverse field in engineering, issues surrounding these stereotypes and stereotype threats must be addressed and reduced. That is, engineering programs must strive towards creating an environment that fosters inclusion and diversity both within the university as well as the field at-large. Such initiatives will require engineering programs to provide training to faculty, staff, and students on how to break down stereotype threats to create an inclusive environment that builds positive engineering identities for all students. These can be achieved by raising awareness of the negative impact of stereotypes on academic performance, retention, and professional development, and highlight the benefits of creating a more inclusive environment. Faculty, staff, and students must also be encouraged to reflect on their own attitudes and stereotypes about race, gender, and other identities, and to recognize the ways in which these attitudes may impact their interactions with others.

6.1 Data Availability Statement

All data and codes generated or used during this study are proprietary or confidential and may only be provided with restrictions (e.g., anonymized data).

References

1. U.S. Census Bureau QuickFacts: United States, <https://www.census.gov/quickfacts/fact/table/US/PST045222> (accessed May 23, 2023).
2. C. Salinas, The Complexity of the 'x' in Latinx: How Latinx/a/o Students Relate to, Identify With, and Understand the Term Latinx, *Journal of Hispanic Higher Education*, **19**(2), pp. 149–168, 2020.
3. Women, Minorities, and Persons with Disabilities in Science and Engineering: 2019 | NSF – National Science Foundation, <https://www.ncses.nsf.gov/pubs/nsf19304/> (accessed May 23, 2023).
4. J. Owens and D. S. Massey, Stereotype threat and college academic performance: A latent variables approach, *Social Science Research*, **40**(1), pp. 150–166, 2011.
5. T. Reny and S. Manzano, The Negative Effects of Mass Media Stereotypes of Latinos and Immigrants, in *Media and Minorities*, G. Ruhrmann, Y. Shooman, and P. Widmann, Eds., 1st ed. Theaterstraße 13, D-37073 Göttingen, Deutschland: Vandenhoeck & Ruprecht, pp. 195–212, 2016.
6. C. M. Steele and J. Aronson, Stereotype threat and the intellectual test performance of African Americans, *Journal of Personality and Social Psychology*, **69**, pp. 797–811, 1995.
7. E. A. Eschenbach, M. Virnoche, E. M. Cashman, S. M. Lord and M. M. Camacho, Proven practices that can reduce stereotype threat in engineering education: A literature review, in *2014 IEEE Frontiers in Education Conference (FIE) Proceedings*, Madrid, Spain: IEEE, pp. 1–9, 2014.
8. N. Thomas and R. Erdei, "Stemming Stereotype Threat: Recruitment, Retention, and Degree Attainment in STEM Fields for Undergraduates from Underrepresented Backgrounds," presented at the 2018 CoNECD – The Collaborative Network for Engineering

- and Computing Diversity Conference, Apr. 2018. Accessed: May 23, 2023. [Online]. Available: <https://peer.asee.org/stemming-stereotype-threat-recruitment-retention-and-degree-attainment-in-stem-fields-for-undergraduates-from-underrepresented-backgrounds>
9. J. R. Shapiro, Different Groups, Different Threats: A Multi-Threat Approach to the Experience of Stereotype Threats, *Pers Soc Psychol Bull*, **37**(4), pp. 464–480, 2011.
 10. F. Pajares, Gender Differences in Mathematics Self-Efficacy Beliefs, in *Gender differences in mathematics: An integrative psychological approach*, New York, NY, US: Cambridge University Press, pp. 294–315, 2005.
 11. A. Bandura, W. H. Freeman and R. Lightsey, Self-Efficacy: The Exercise of Control, *Journal of Cognitive Psychotherapy*, **13**(2), pp. 158–166, 1999.
 12. A. Bandura and E. A. Locke, Negative self-efficacy and goal effects revisited, *Journal of Applied Psychology*, **88**(1), pp. 87–99, 2003.
 13. R. J. Rydell, K. J. Van Loo and K. L. Boucher, Stereotype Threat and Executive Functions: Which Functions Mediate Different Threat-Related Outcomes?, *Pers Soc Psychol Bull*, **40**(3), pp. 377–390, 2013.
 14. M. D. Mrazek, J. M. Chin, T. Schmader, K. A. Hartson, J. Smallwood and J. W. Schooler, Threatened to distraction: Mind-wandering as a consequence of stereotype threat, *Journal of Experimental Social Psychology*, **47**(6), pp. 1243–1248, 2011.
 15. J.-C. Croizet, G. Després, M.-E. Gauzins, P. Huguet, J.-P. Leyens and A. Méot, Stereotype Threat Undermines Intellectual Performance by Triggering a Disruptive Mental Load, *Pers. Soc. Psychol. Bull.*, **30**(6), pp. 721–731, 2004.
 16. C. R. Pennington, D. Heim, A. R. Levy and D. T. Larkin, Twenty Years of Stereotype Threat Research: A Review of Psychological Mediators, *PLOS ONE*, **11**(1), p. e0146487, 2018.
 17. Jr. Sawyer Thomas P. and L. A. Hollis-Sawyer, Predicting Stereotype Threat, Test Anxiety, and Cognitive Ability Test Performance: An Examination of Three Models, *International Journal of Testing*, **5**(3), pp. 225–246, 2005.
 18. D. H. Schunk, Self-efficacy and achievement behaviors, *Educ. Psychol. Rev.*, **1**(3), pp. 173–208, 1989.
 19. P. C. Flore and J. M. Wicherts, Does stereotype threat influence performance of girls in stereotyped domains? A meta-analysis, *Journal of School Psychology*, **53**(1), pp. 25–44, 2015.
 20. L. Raphael, Stereotype threat and lift effects on perceived ability and motor task performance of high school physical education students: the moderating role of stereotype endorsement and domain identification, *Mov. Sport Sci./Sci. Mot.*, **95**, pp. 21–30, 2016.
 21. J. Aronson, C. B. Fried and C. Good, Reducing the Effects of Stereotype Threat on African American College Students by Shaping Theories of Intelligence, *Journal of Experimental Social Psychology*, **38**(2), pp. 113–125, 2002.
 22. P. M. Gonzales, H. Blanton and K. J. Williams, The Effects of Stereotype Threat and Double-Minority Status on the Test Performance of Latino Women, *Pers. Soc. Psychol. Bull.*, **28**(5), pp. 659–670, 2002.
 23. A. True-Funk, C. Poleacovschi, G. Jones-Johnson, S. Feinstein, K. Smith and S. Luster-Teasley, Intersectional Engineers: Diversity of Gender and Race Microaggressions and Their Effects in Engineering Education, *J. Manage. Eng.*, **37**(3), p. 04021002, 2021.
 24. M. M. Camacho and S. M. Lord, Latinos and the exclusionary space of engineering education, *Lat. Stud.*, **11**(1), pp. 103–112, 2013.
 25. R. A. Revelo and L. D. Baber, Engineering Resisters: Engineering Latina/o Students and Emerging Resistant Capital, *Journal of Hispanic Higher Education*, **17**(3), pp. 249–269, 2018.
 26. V. Purdie-Vaughns and R. P. Eibach, Intersectional Invisibility: The Distinctive Advantages and Disadvantages of Multiple Subordinate-Group Identities, *Sex Roles*, **59**(5), pp. 377–391, 2008.
 27. A. Hurtado and M. Sinha, More than Men: Latino Feminist Masculinities and Intersectionality, *Sex Roles*, **59**(5), pp. 337–349, 2008.
 28. S. Brooks, Hypersexualization and the Dark Body: Race and Inequality among Black and Latina Women in the Exotic Dance Industry, *Sex Res. Soc. Policy*, **7**(2), pp. 70–80, 2010.
 29. G. A. Garcia, *Becoming Hispanic-Serving Institutions: Opportunities for Colleges and Universities*, JHU Press, 2019.
 30. J. Lavariega Monforti and G. R. Sanchez, The Politics of Perception: An Investigation of the Presence and Sources of Perceptions of Internal Discrimination Among Latinos, *Social Science Quarterly*, **91**(1), pp. 245–265, 2010.
 31. G. Blair and K. Imai, Statistical Analysis of List Experiments, *Polit. anal.*, **20**(1), pp. 47–77, 2012.

Appendix A: Interview Protocol

TAPE RECORDER INSTRUCTIONS

If it is okay with you, I will be recording our conversation. This is to ensure I document all of the details of this interview. I assure you all of your comments will remain confidential. I will be compiling a report that will contain all participants' comments, but have no reference to individuals. Do you have any questions before we begin?

SECTION I.

Introduction: I am going to ask you a few questions about yourself.

1. Why did you decide to attend [University Name]?
2. Are you a first-generation college student?
3. What do you identify as?
4. What is your degree in?

SECTION II. YOUR UNIVERSITY

Next I am going to ask you a few questions regarding how you feel about your university.

1. Do you feel that the student population in your program is diverse?
2. Do you feel that the faculty and staff population in your program is diverse?

3. Do you feel as though your university provides ample opportunity for other students to become more educated on other ethnicities?
4. Do you feel as though your opinion is heard and valued at your university?

SECTION III. YOUR EXPERIENCES

Now I'm going to ask you some questions about your experiences as an engineering student and as a college student in general.

1. What stereotypes have you faced in your engineering program?
 - a. Do you believe that any of these are false stereotypes? (False Stereotype: a stereotype about a particular type of person, group, or thing that is not true for all members.)
2. Do you feel as though stereotype threat negatively affects your academic performance? (Stereotype Threat: a psychological threat that occurs when one is in a situation or behaving in a way that confirms or conforms to negative stereotypes that are common among their group.)
3. Have you ever felt the need to defend your qualifications to be in your major?
 - a. If so, will you tell me what happened?
4. Have you ever felt ignored for simply being a minority in engineering?
 - a. If so, will you tell me what happened?
 - b. Did this involve peers, faculty and staff, or both?
5. What is the general reaction you receive when you tell someone that you are pursuing an engineering degree?
6. In an engineering or school related setting, do people ever refer to you based on your ethnicity before they refer to you as an engineer?
 - a. Do they ever refer to you based on your gender first?
7. Do you ever feel singled out in your classes based on your skin color? (verbally or non-verbally)
 - a. Are there any specific events where this occurred? If so, will you tell me what happened?
8. Do you ever feel singled out in your classes based on your gender? (verbally or non-verbally)
 - a. Are there any specific events where this occurred? If so, will you tell me what happened?
9. Do you ever feel singled out in your classes based on your ethnicity? (verbally or non-verbally)
 - a. Are there any specific events where this occurred? If so, will you tell me what happened?
10. Do you ever feel singled out in your classes based on your accent? (verbally or non-verbally)
 - a. Are there any specific events where this occurred? If so, will you tell me what happened?
11. Have you ever felt the need to compete for an equal position as your peers in group work?
12. Have you ever been told that you were given special consideration in your major (admission, scholarships and/or other opportunities) simply because you are a minority?
13. Do you feel proud of your personal identity in engineering?

SECTION IV. PRESSURE BASED ON STEREOTYPES/COPING MECHANISMS

My last questions are about how the previous experiences made you feel. Don't worry, we're almost done!

1. Do you ever feel pressure to conform to stereotypes surrounding your skin color, gender, or ethnicity?
2. Do you feel as though stereotype threats hold you back socially? (Stereotype Threat: a psychological threat that occurs when one is in a situation or behaving in a way that confirms or conforms to negative stereotypes that are common among their group.)
3. Do you feel as though you sometimes have to change your personality in order to fit in or meet the expectations of others?
4. Have you ever felt forced to separate your personal identity from your engineering identity in order to gain respect?
5. Have you ever felt restricted academically by stereotype threats? (Stereotype Threat: a psychological threat that occurs when one is in a situation or behaving in a way that confirms or conforms to negative stereotypes that are common among their group.)
6. Have you witnessed other conforming to stereotypes surrounding their personal identity? (i.e. skin color, gender, or ethnicity)
 - a. If so, will you tell me what happened?
7. Does your university provide opportunities for you and other Latinx students to meet each other outside of class?
 - a. If so, could you tell me what they are?
8. Do you ever discuss stereotype or stereotype threat related experiences with your peers?

9. Do you have any role models of the same skin color, gender, or ethnicity that you can talk to at your university?
10. Does your university provide opportunities for you to see, speak to, or listen to (guest speaker or speaker series) people of your same skin color, gender, or ethnicity in your chosen field?
11. Do you ever separate your personal identity from your engineering identity and focus on your engineering identity in order to counteract negative stereotypes?
12. Do you believe it will be difficult to discuss and/or address stereotype issues when you are an engineer? If so, why? If not, why not?

This concludes the interview. Thank you for participating, we have greatly appreciated your input.

Appendix B: Gender and Ethnic Stereotype Threat Survey Questions

Gender Stereotype Threat

1. In testing situations, I worry that people will draw conclusions about my gender group based on my performance.
2. I often think about issues concerning gender.
3. I often feel that people's evaluations of my behavior are based on the gender group to which I belong.
4. I worry that people will draw conclusions about me based on what they think about my gender group.
5. In an academic setting, I often worry others will assume I am aggressive and/or loud based on my gender group.
6. I often worry that people will assume my academic abilities based on my gender.
7. I often feel that people make assumptions about my gender group based on how I present myself.
8. I often worry that people will make assumptions about my gender based on my physical appearance.

Ethnic Stereotype Threat

1. In testing situations, I worry that people will draw conclusions about my ethnic group based on my performance.
2. I often think about issues concerning ethnicity.
3. I often feel that people's evaluations of my behavior are based on the ethnic group to which I belong.
4. I worry that people will draw conclusions about me based on what they think about my ethnic group. In an academic setting,
5. I often worry others will assume I am aggressive and/or loud based on my ethnic group.
6. I often worry that people will assume my academic abilities based on my ethnicity.
7. I often feel that people make assumptions about my ethnic group based on how I present myself.
8. I often worry that people will make assumptions about my ethnicity based on my physical appearance.

Linnel Marie S. Ballesteros is a PhD Candidate at Iowa State University. They focus on using scientific methods to investigate housing and infrastructure systems in disaster-prone areas and identify equitable solutions to challenges met by vulnerable and minoritized communities. They hold a BS in Civil Engineering from the University of Cebu in the Philippines. They have experience as a civil engineer in a social enterprise providing disaster-resistant homes in typhoon- and earthquake-prone areas in the Philippines. Linnel's poster titled, "Engineering Analogies Used by (In)formal Builders in Puerto Rico" earned them the first place in the 10th Annual CCEE Student Research Showcase and Poster Competition.

Toby Nii Tairo Nelson is a PhD student in the Department of Civil and Environmental Engineering at Iowa State University. He researches social and humanitarian contexts in construction engineering, emphasizing the impacts of natural hazards on physical infrastructure and emotional and mental health. He earned his BSc from Kwame Nkrumah University of Science and Technology in Kumasi, Ghana (2016).

Michael A. Perez is an Assistant Professor in the Department of Civil and Environmental Engineering at Auburn University where he specializes in the evaluation of construction, post-construction, and agricultural stormwater practices, methods, and technologies. He earned his PhD (2016) and MS (2014) from Auburn University and BS from Florida State University (2012). He oversees the research, testing, and training programs at the Auburn University – Stormwater Research Facility, where he has been involved in investigating and improving stormwater management practices using full-scale testing techniques.

Timothy Yuen is the Associate Dean for Undergraduate Studies in the College of Sciences at the University of Texas at San Antonio. His research interests and projects investigate how to improve student success and broaden diversity in computer science, engineering, and other STEM subjects through culturally responsive and transformative teaching practices. At UTSA, he holds joint faculty appointments in Computer Science, Interdisciplinary Learning and Teaching, and Electrical and Computer Engineering.

Kyle Estes is Assistant Professor-in-Residence in the Department of Political Science and International Studies at Bradley University. His research focuses on the intersection of ethnic identity and distributive politics, with a regional specialization in the post-Soviet region. He approaches these questions through a mixed-methods lens and considers culturally sensitive fieldwork to be an integral element of his research process.

Cristina Poleacovschi is an Assistant Professor in the Department of Construction and Civil Engineering at Iowa State University. Her expertise focuses on addressing issues of microaggressions in engineering education. She uses mixed-methods approaches to identify how microaggressions affect marginalized students and proposes curriculum interventions to address them

Erin Doran is an Associate Professor of Higher Education and Community College Leadership at Iowa State University. Her research focuses on Latina/o/x students in higher education, the faculty who teach them, and the institutions they attend, particularly community colleges and Hispanic-Serving Institutions (HSIs). She uses predominantly qualitative and historical methods to understand the contexts that Latina/o/x students move through in their postsecondary education trajectories.