

# **Intersection of Race and Gender on Experiences of Undergraduate Engineering Students of Color in Positional Leadership Roles**

## **Abstract**

This work in progress discusses an NSF sponsored project that explores the leadership beliefs, experiences, and knowledge/skills of undergraduate engineering students who have self-identified as having leadership experience at a Research I minority serving institution (MSI) for Asian Americans and Native Americans, as well as a Hispanic Serving Institution. Thirty-two undergraduate engineering students with self-identified leadership experience were recruited from the College of Engineering at the MSI across the various majors. In this paper, the perspective of how students described their self-identities and the emerging categories of negative leadership experiences is presented and discussed. The research illustrates how nuances need to be explored to understand how intersectionality increases the complexity of creating an inclusive logic model that can be incorporated into a theory of change that increases academic and professional success of engineers as future leaders within an organization.

## **Introduction**

This work in progress focuses on the professional development of leadership skills by undergraduate engineering students. The development of leadership skills is key to a successful long-term career and has been highlighted by both the profession, academia and government funding agencies as a critical need. Increasing diversity and inclusion in leadership is also critical for technology companies as they become global enterprises. Yet, there is a gap in knowledge of leadership views, experiences, and skills for a diverse population of engineering students that are considered to be millennial students to frame how to construct a logic model that identifies the factors that influence a student's perseverance in pursuing leadership experience [1]. Traditional definition of leadership development based on predominantly White males are based on the framework of input-environment-output models, e.g. the work by Knight and Novoselich that are meritocracy based [1], or that base their leadership attribute models on predominantly White Males such as Powell and Butterfield [2]. Here, it is proposed that there are alternative conceptualizations of the leadership experiences for underrepresented minority students that include the hypothesis that organizations in the United States are racialized systems [3] and within engineering, they are also gendered [4]. This begs the question of what are effective strategies to address factors that reduce an engineering student's perseverance in professional development for leadership roles when a diverse student population is studied? Thus, the aim of this research is to address the existing knowledge gap on the influence of social identities on the preparation of engineering students for leadership roles. The ultimate goal is to construct a logic model to frame future research that implements the theory of change in designing interventions that increase perseverance in leadership development and also addresses the nuances of how the intersectionality of race and gender can affect this perseverance. Thus, the research questions are:

RQ1: How does the intersection of gender and race/ethnicity influence the leadership development model of a diverse undergraduate engineering student population?

RQ2: How do racialized, gendered, or combined stressors affect the leadership development of students of color in engineering?

Within this paper, the author will present the results on identity, leadership skills and attributes and propose where negative stressors act against the perseverance to advance in positional leadership roles within engineering while undergraduate students.

## Methods

The theoretical framework for the analysis is to use intersectionality of critical race theory and specifically focusing on the intersection of race/ethnicity and gender [5-8]. Thus, questions for the interview guide were developed in consultation with two social scientists with expertise on race and gender; as well as consulting two underrepresented minority undergraduate engineering students, one male and one female, who were leaders in their engineering societies and who did not take part in the study. The research included students who self-identified, meaning they were asked if they had prior or current experience in leadership roles as a student and if they answered in the affirmative, they were included in the recruitment pool and the research was approved by the institution review board for human subject research.

The coding of the interviews was done by the principal investigator. The first transcript was coded by the principal investigator and the social scientists were in consensus with the initial codes. Using Grounded Theory by Charmaz, the interviews were coded line-by-line using gerunds and the constant comparative method was used to develop a code book during the focused coding phase [9]. From the focused coding, constructs, i.e. categories, of the social identities of the students as well as their factors that influenced their personal experiences are defined. Analytical memos were also being concurrently maintained during the coding processes. Axial coding, again using intersectionality and more specifically an intercategory approach [7], was done after the initial focused coding was completed for all of the themes discussed in the interviews.

## Results and Discussion

Focusing on social identities, two themes that emerged were gender identity and race/ethnicity identity as the strongest social identities of the students that emerged from the study. Women “felt” being a women in engineering and alluded to negative experiences with sexism, of which there were stereotypes based on the “double bind” of being a woman of color in engineering and leadership [10]. For example, a multiracial Woman (Latina and White) when asked if her social identities influenced her experiences in leadership said:

...my mom, when I was growing up, she always told me that no matter where I go in life as a woman, I would have to prove myself twice... This is what she said, ‘As a brown woman, you have to prove yourself twice, once because you're brown and once because you're a woman.’, and so I've carried that with me everywhere. And I think that definitely follows being in a leadership position as well. Because there are times when people don't take me seriously, when people don't want to follow what I'm doing and so I have to prove myself. I have to become more knowledgeable, I have to become more patient, I have become stronger mentally

so that I can prepare for being in a leadership position where nobody will take me seriously.

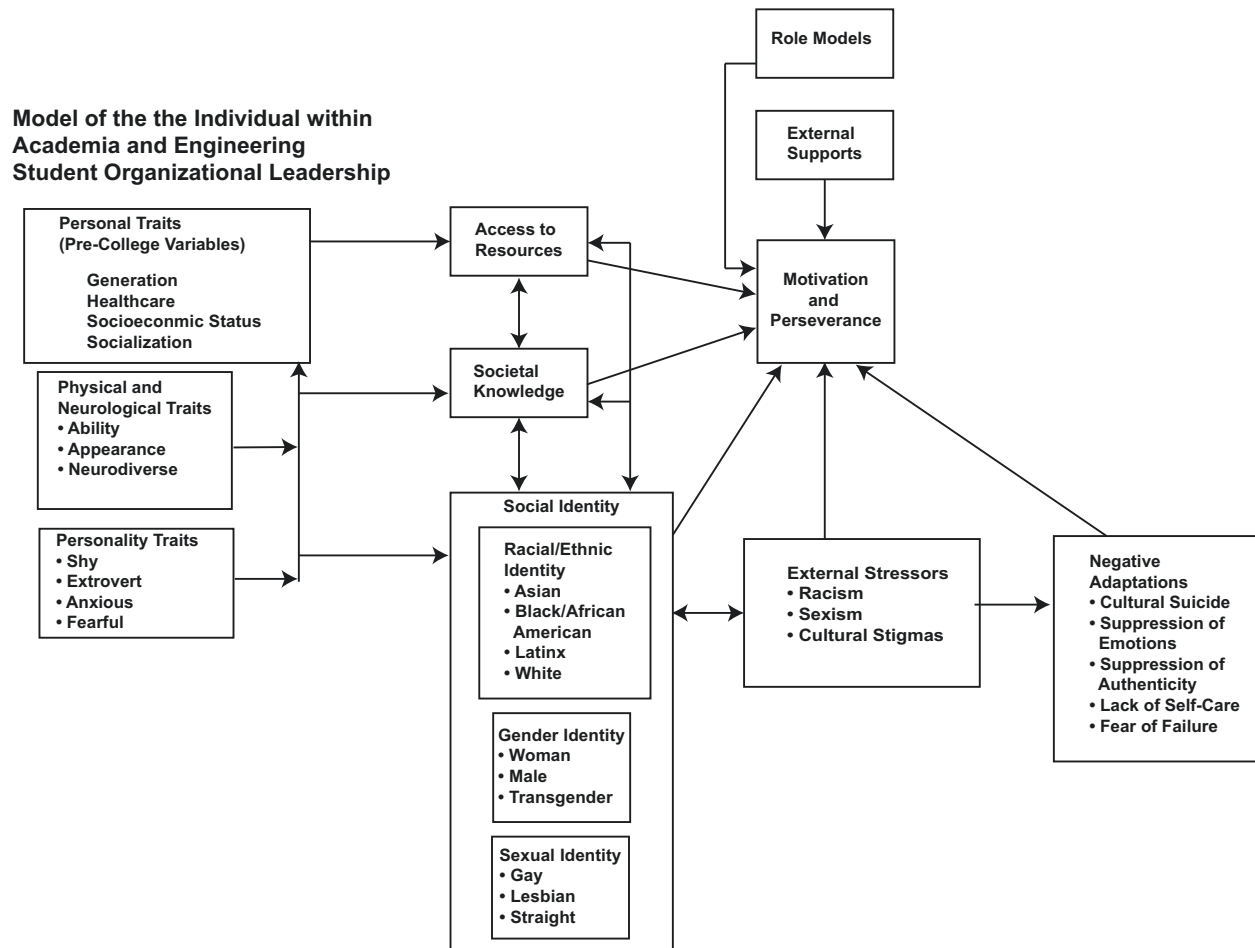


Figure 1. Leadership Development Model and Existing Stressors in Leadership Experiences

Another example of racism was an encounter by an Asian woman who was asked whether she felt her social identities influenced how others perceived her or reacted to her in her leadership position within an engineering student society. She organized a corporate tour for her engineering society as the outreach chair and when upon meeting their corporate contact in person for the first time experienced the following: “He said that my English was so great, that I didn't have an accent at all, and I don't think he would have said that if I was a man, or if I was white, by any means.” An example of racism by an African American male, when asked if he felt his social identity affected how others interacted with him in his leadership role stated that he had a supervisor and when he had met with her: “She would talk like...I don't know how to even explain it because talking black isn't a thing but talking in a way that she would think that I will appreciate, and I didn't.”

In addition, there were persistent negative adaptations that students focused their efforts on in order to disprove a negative stereotype. One example, when asked about whether he felt he had to tailor or adapt his behavior when in a leadership role, the African American male stated that he was cognizant of the following:

Perception that society usually has of black men is really aggressive. I don't try to change myself, but I have that in my mind, so I try to be...not aggressive at all. Just kind and gentle. I feel that should be a problem because you shouldn't think of stuff like that when you're doing things, because you should just be yourself always. I'm trying to struggle with it at the same time I'm trying to be myself, and still understand what society sees me as."

Similarly, a Latina woman discussed when they were taking actions in their leadership role how "The way I converse definitely a male thing because I definitely talk a little bit differently when I'm with family and people I know very well."

Another example is an African American Woman who similarly discussed if she thought that her social identities influenced how others perceived her when in a leadership role:

As an African American woman, I definitely feel like there's assumptions but there's always this surprise. Like wow, you carry yourself so well, you speak so well, you dress nicely. There's always assumptions but there's always a surprise as well. I don't really take it personally. It would be better if the social climate could adapt a little bit and not be so surprised..."

These examples illustrate how social identities indeed influence the experiences of students of color in positional leadership roles. In addition, how they experience race and gender effects is different. Thus, failing to include racialized and gendered experiences or the nuances of intersecting identities may overlook factors that can act as stressors (either immediate or through long term effects) on the leadership development of engineering students. As this research illustrates, there are still several nuances that need to be explored to understand how intersectionality influence the professional development experiences in organizational leadership for engineering students.

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