

# The Critical Role of Race-related Stress and Racial Activism on STEM Graduate Students' Career Aspirations: An Intersectional Perspective

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## Abstract

*This study explores the intersectionality of race, gender, and racialized experiences on the career aspirations of underrepresented STEM students. Racial activism predicts academic career interest, while gender disparities persist. Race-related stress impacts entrepreneurship and mental health. Tailored support mechanisms are needed to address challenges faced by female and Black students. Understanding these dynamics promotes equity in STEM.*

**Keywords:** careers, race, gender, racialization, mental health

## 1. Introduction

Addressing the underrepresentation of Black, Latinx, and Indigenous people and other racially minoritized individuals in Science, Technology, Engineering, and Mathematics (STEM) fields necessitates a comprehensive approach that recognizes and tackles the systemic barriers and biases they face. Intersectionality, which considers how multiple forms of oppression and privilege intersect, is crucial in understanding and addressing these challenges (Crenshaw, 1989). This intersectional perspective recognizes that the experiences of racially minoritized individuals in STEM fields are shaped not only by their race but also by other aspects of their identity, such as gender, ethnicity, and socioeconomic status (Hancock, 2007).

To effectively address the underrepresentation, it is essential to acknowledge and confront historical and contemporary forms of racism and exclusion in STEM fields (McGee, 2020). Moreover, it is crucial to increase opportunities for racially minoritized individuals to receive a robust STEM education, as access to quality education is a key determinant of success in STEM fields (Gutiérrez & Vossoughi, 2010).

Historically, racially minoritized individuals in STEM have faced harmful outcomes of structural racism, such as stereotypes and biases that impede their progress and limit their opportunities (Steele, 1997; Moss-Racusin et al., 2014). These negative stereotypes can lead to lower self-efficacy and reduced interest in pursuing STEM careers among racially minoritized individuals (Cheryan et al., 2017). Therefore, it is essential to challenge and overcome these stereotypes to create a more inclusive and equitable STEM landscape.

Increasing race and gender representation in STEM fields is a vital goal that requires targeted efforts to address the barriers that disproportionately affect racially minoritized individuals (Funk & Parker, 2018). Despite comprising 11% and 16% of the U.S. workforce for Black and Latinx individuals, respectively, only 9% of Black workers and 7% of Hispanic workers are employed in STEM fields (Funk & Parker, 2018). These disparities raise questions about the persisting single-digit percentages of underrepresented racially minoritized (URM) individuals in STEM fields. To understand the motivations and experiences of URM individuals in STEM, it is essential to explore the existing literature from an intersectional perspective.

Previous studies have investigated the factors that attract and sustain URM students in STEM fields (Garibay, 2018; Gibbs & Griffin, 2013). These studies have found that social justice and activism, particularly a desire for racial justice, serve as major motivators for URM students in STEM (Thoman et al., 2015). URM students often exhibit a greater tendency toward enacting meaningful social change and have a stronger orientation toward social justice compared to their non-URM colleagues (Thoman et al., 2015).

The present study aims to build upon and expand the IT social inclusion scholarship to gain a deeper understanding of what motivates URM students to pursue careers in STEM. By examining the role of race-related stress, experiences of marginalization, and racial justice-seeking, we aim to shed light on how these

factors shape the career goals and aspirations of URM STEM graduate students.

## 2. Literature Review

The field of information technology (IT) encompasses various aspects, including software, computer systems, and data processing. In understanding the barriers and biases affecting the representation of traditionally marginalized groups in IT, Trauth's Individual Differences Theory of Gender in IT provides a valuable framework (Trauth et al., 2016). However, examining social inclusion in the context of IT requires acknowledging the role of identity and its impact on career interest and retention (Windeler et al., 2018). This literature review adopts an intersectional perspective to explore the racialized experiences and motivations of underrepresented and minoritized (URM) individuals in IT and STEM fields, with a particular focus on gender and race.

Information technology encompasses the study, design, and operation of software, computers, and related systems for data, information, and knowledge processing (IF4IT, 2012). Social inclusion, on the other hand, is a multifaceted concept with various interpretations (Gidley et al., 2010). However, research on social inclusion and IT highlights the significance of identity in shaping career interest and retention in the field (Windeler et al., 2018). Trauth and Howcroft (2006) emphasize that social exclusion in IT arises from social inequalities, leading to underrepresentation of certain groups within the profession.

In the IT field, racially minoritized people encounter racism and systemic marginalization, while women are underrepresented among technical professionals (Joseph et al., 2012). Notably, Mossberger et al. (2006) discovered that systemic racism contributes to the paradoxical situation where Black and Brown individuals exhibit positive attitudes toward technology but have limited access and skills. Their research highlights the role of "place" rather than solely race in creating these inequalities, as African Americans and Latinx are more likely to reside in areas characterized by segregation and concentrated poverty (Mossberger et al., 2006, p. 584).

The field of IT is expanding rapidly, with computer and information research scientists projected to comprise 22% of the workforce by 2023 (United States Bureau of Labor Statistics, 2022). Joseph et al. (2012) conducted a study on IT professionals' career paths and identified three trajectories: those who remain in technical IT careers, those who transition to non-IT professional or managerial positions, and those who move to lower-status occupations. Gender differences were observed among these groups, with males

dominating the technical IT professionals, while the other two paths had more balanced gender distributions (Joseph et al., 2012).

Similar findings by Turk-Bicakci et al. (2014) reveal that a significant proportion of STEM Ph.D. graduates, particularly Black women, end up in occupations unrelated to STEM. This indicates a disparity in career outcomes based on race and gender. Moreover, URM students, such as women of color, exhibit lower interest in and persistence within the IT field (Ashcraft et al., 2016). The U.S. Equal Employment Opportunity Commission's (2018) further supports these observations, highlighting the significant underrepresentation of Black and Latinx professionals in the information and data processing sector.

When considering the career intentions of IT students, Jaeger et al. (2013) found that race, rather than gender, was the most significant predictor of career trajectory. This research suggests that race influences students' interest in academic, industry, or public sector careers. Similarly, Ugwu and Adamuti-Trache (2019) discovered race as a strong factor influencing career trajectories among STEM students. For instance, Asian science and engineering doctoral graduates show a higher inclination toward working in industry compared to Hispanic/Latino and Black doctoral recipients (Ugwu and Adamuti-Trache, 2019). These findings indicate the complexity of intersecting factors that shape career choices in IT and STEM.

Pursuing non-academic careers may also come with its own costs. Doctoral students pursuing careers outside of academia were found to have lower career development capability, their job searches were less effective, and support from their advisors flagged in comparison to other students who made clear their intentions to stay in academia (St. Clair et al., 2017). Surprisingly, given the great personal and financial commitment involved in earning a doctorate, about one half (47.8%) of Black PhDs in science and engineering fields work in non-STEM related fields (such as the arts and humanities, non-S&E teaching, management, sales and marketing, social services; NSF, 2019). *What could account for this poor rate of retention of Black PhDs in STEM fields?*

Joshi et al. (2017) conducted a study examining the experiences of Black college students pursuing IT degrees. They identified several obstacles, including labor market discrimination, situational fit issues in predominantly white environments, academic questioning, and the lack of Black faculty mentors. These factors contribute to a sense of marginalization and hinder the success of URM students in IT. To address these challenges, it is crucial to implement strategies that promote a sense of belonging, provide

mentorship opportunities, and foster inclusive environments in academia and industry.

An important motivation for racially minoritized individuals in STEM fields is the equity ethic, which encompasses a social justice-oriented commitment to using STEM education for positive change in marginalized communities (McGee & Bentley, 2017). The equity ethic represents a principled concern for addressing racial injustices through professional endeavors (ibid). For instance, within academia, a faculty member guided by an equity ethic may adopt an inclusive approach to teaching, focus their research on environmental or racial justice issues, mentor younger URM students, or demonstrate leadership within a program or department. They may also express their equity ethic through the development of curricula with a social justice focus or through their entrepreneurial endeavors. Additional studies by Gibbs and Griffin (2013), and Naphan-Kingery et al. (2019) found that URMs in academic settings felt a responsibility to serve as mentors for younger generations, aligning with their other-directed concerns and orientation as URM STEM students. Pellissier et al. (2022) emphasize the significance of integrating equity and diversity concerns into engineering education to foster the professional development of URM STEM students. By nurturing this ethic, institutions and organizations can empower URM individuals to contribute meaningfully to their fields and drive broader societal change.

## 2.1 Intersectionality and Power

Intersectionality is a powerful analytical framework that helps us understand the complex ways in which various aspects of URM identities and social positions in STEM intersect to shape their experiences and access to power. When applied to the analysis of power dynamics, intersectionality allows us to delve deeper into the nuances of how different forms of privilege and oppression intersect and interact with our participants. Multiple axes of intersectionality identity recognize that individuals have multiple social identities, such as race, gender, class, sexuality, disability, and more. These identities intersect, creating unique experiences. Analyzing power through an intersectional lens involves understanding how each identity axis contributes to one's social positioning. For example, a Black woman in STEM faces a different set of power dynamics compared to a white woman or a Black man.

Intersectionality acknowledges complex power structures as it operates through multiple, interconnected structures (Joshi, 2022). Intersectionality operates through interconnected structures, dissecting how economic, political, and cultural powers overlap

and interact, presenting distinct opportunities and challenges. It helps us comprehend how Black and Brown individuals encounter disproportionate structural barriers in STEM. Structural inequalities are deeply rooted in society, and an intersectional analysis exposes their impact on diverse identities. This perspective is vital for fostering racial and social justice and crafting effective strategies to combat inequality.

Moreover, intersectionality uncovers the innovative strategies marginalized individuals develop to navigate power structures, offering unique strategies on resistance and empowerment. Applying intersectionality as an analytical tool within the context of power, we gain profound insights into the intricate web of privilege, oppression, and avenues for change. This perspective is indispensable for dismantling persisting structural inequalities and fostering a more equitable STEM ecosystem.

## 2.2 Research Questions

The fostering of even a small group of successful URM STEM faculty has the potential to generate influential role models for future generations of STEM students. These role models can inspire and empower others to pursue careers in science, engineering, and computer science while addressing racial equity concerns (McGee, 2020; Naphan-Kingery et al., 2019). Building on the notion that an equity ethic strengthens racially marginalized STEM identities and motivates STEMers to utilize their skills for addressing racial justice issues, we hypothesize that URM STEM students who have experienced racial suffering and possess strong racial activist orientations are more inclined towards careers that align with their equity ethic, social change objectives, and racial justice goals. Therefore, a comprehensive exploration of racial justice orientation within the mainstream STEM literature is crucial to better comprehend the motivations of racially minoritized STEMers. Neglecting to investigate the racial activism of URM STEMers risks overlooking a critical aspect of the graduate school experience, limiting our understanding to hegemonic perspectives on the role of STEM in addressing social change and impact. To advance these objectives, we sought to answer the following research questions:

- How do race-related stress and racial activism influence career interests among underrepresented and minoritized (URM) graduate students in STEM?
- To what extent does gender impact the experiences of race-related stress, racial activism, and career interests across various sectors among URM students in STEM?

- Are there significant differences in race-related stress and racial activism between Black/African American students and Hispanic/Latinx students within the URM population in STEM?
- Which factors serve as predictors of racial activism among URM students, considering its influential role in shaping their career interests?

How do the interconnections between racial activism, race-related stress, and interest in entrepreneurship manifest among URM students?

### 3. Methods

To examine the relationship outlined above, the authors developed and administered two national survey instruments to understand the academic plans and career trajectories of minoritized STEM students.

#### 3.1 Survey Design

The *Exploring the Experiences and Career Trajectories of STEM Doctoral Students of Color* (EECT-STEM) and *Supporting Innovative and Diverse Entrepreneurs* (SIDE I) survey builds on qualitative findings that demonstrate that mental health, racial identity, and racial activism play significant roles in URM STEM students' career trajectories (Alfred, Ray, & Johnson, 2019; Charleston et al., 2014; Hale, 2016; Ortiz, et al., 2019; Rosa & Mensah, 2016). Both instruments were administered online to a national population of graduate students in STEM from all races and genders.

The goal of the EECT-STEM survey is to investigate the experiences of URM doctoral STEM students, focusing on connections between their PhD experiences and post PhD outcomes. In doing so, the project involves examining these students' racialized experiences (e.g., race-related stress caused by discrimination and bias) and career aspirations. The SIDE I contained similar constructs as the EECT-STEM; however, the aim of the SIDE I was primarily to identify nascent URM entrepreneurs and founders of STEM businesses.

Both the EECT-STEM and SIDE I were designed to examine several key factors, including (a) career trajectories; (b) the role of mentoring in advising, teaching, and research experiences; (c) the mental health and well-being of STEM graduate students and (d) their sentiments about various career paths. Their purpose is two-fold: (1) to highlight the importance of accounting for racial disparities and their impact on racially underrepresented people in these academic disciplines

and (2) to examine the factors in the career decision-making of STEM graduate students.

Survey constructs include those derived from the Multigroup Ethnic Identity Measure (Phinney, 1992), Minority Status Stress Scale (Smedley et al., 1993), the PROMIS General Health (Hays et al., 2009), Racial Activism (Szymanski, 2012) and Mental Health (Berwick et al., 1991) scales. Szymanski's (2012) Racial Activism scale (which measures African American activism) was modified for the SIDE survey to be inclusive of other non-white racial groups. For example, the term "African American" was modified to "People of Color" as in "I attend conferences/lectures/classes/trainings on issues pertaining to People of Color." In addition to assessing the psychosocial scales described above, surveys also captured demographic information about caregiver status (0, no; 1, yes), student loan struggle ("Would you say that you, or someone in your household, are currently struggling with student loan debt?"). To assess students' entrepreneurial plans, participants were asked to indicate the degree to which they are likely to start their own business ("How likely are you to found a startup or become a business owner/entrepreneur?" (1, not at all likely to 4, very likely). Cronbach's alphas were calculated across all psychosocial constructs and were found to be highly reliable: Perceived Social Support (12 items,  $\alpha=0.90$ ); Racial Activism (17 items,  $\alpha=0.93$ ); Minority Status Stress (14 items,  $\alpha=0.91$ ); Ethnic Identity (6 items,  $\alpha=0.88$ ), General Health (5 items,  $\alpha=0.86$ ), and Mental Health (5 items,  $\alpha=0.86$ ). All constructs achieved good to excellent reliability (Taber, 2018; Cortina, 1993).

#### 3.2 Data Collection

Responses were collected between 2018 and 2022: the SIDE I survey was administered to graduate students between 2020 and 2022, and the EECT-STEM survey, was administered to a combined group of graduate students and former graduate students from 2018 and 2021. Recruitment efforts included: 1) introductions to key organizations that have members that fit the sample (e.g., National Society of Black Engineers); 2) invitations to colleagues that fit our sample; 3) posting with social media (e.g., LinkedIn and Facebook); and 4) messages to organizations/corporations identified as key sources for potential participants. Statistical power calculations were used to inform our recruitment plan, and recruitment numbers were monitored on an ongoing, twice-monthly basis. The SIDE I survey was completed by 367 graduate students, while the EECT-STEM survey was completed by 820 graduate students. After searching both surveys for common items based on the variables of interest for this study, response data

were combined based on those common items. Combining SIDE I and EECT-STEM survey data yielded a dataset of 1187 graduate student respondents. Because this study focuses on students in STEM fields, we first filtered the dataset to include all students in the natural sciences, engineering, computer sciences, and social sciences, which yielded a total of 809 students. Next, because our study focuses on URM students, we filtered the dataset on our binary URM indicator (1 for students who self-identified as belonging to a racial group in one of the following categories: Black/African, Latinx/Hispanic, Native Hawaiian/Pacific Islander, and/or American Indian/Alaska Native; and 0 for other groups: White and/or Asian only). This process yielded a dataset of 552 student respondents. Given that missing data were common and varied among survey respondents, and to retain statistical power, regression analyses were conducted using pairwise deletion, which resulted in sample sizes for each regression analysis that varied by dependent variable.

## 4. Analysis

To answer our research questions, we utilize a combination of exploratory and predictive analytical approaches. To assess differences between Black and Latinx/Indigenous STEM graduate students, we conduct independent sample t-tests. Multiple linear regression was employed to examine the associations and relationships between variables concerning the intent to pursue a given career path.

### 4.1 Descriptive Statistics

Of the 552 URM STEM graduate student respondents, 330 (60%) identified as Black and 222 (40%) as Latinx. More than half, 327 students (59%) identified as female and 223 (40%) identified as male, while 2 students (<1%) did not disclose. There were 501 (91%) full-time students, 41 (7%) part-time, and 10 students (2%) who did not provide a response; 437 students (79%) were US natives, while 115 (21%) were not born in the US. Well over half of the respondents 347 (63%) attended a minority-serving institution (MSI), while 205 (37%) did not attend. In the absence of direct measures of socioeconomic status, students were asked whether they believed their household's current income was enough to live comfortably, for which 247 students (45%) indicated that it was, while 112 indicated that it was not enough (20%), and 193 students (35%) did not respond. Finally, 138 students (25%) indicated that they were pursuing a degree in an information technology (IT) discipline, either by indicating that their chosen graduate field was computer science or by listing a

specific discipline that contained IT-related keywords (e.g., "AI", "information systems," "machine learning", "data science"), while 414 (75%) were pursuing an alternative STEM degree.

### 4.2 Variable Operationalization

*Independent variables:* The *Racial Activism Scale* was adapted from a measure of African American activism, which Szymanski (2012; 2015) adopted from a modified version of the Involvement in Feminist Activism Scale (Szymanski, 2004). In Szymanski's research, she modified the scale by replacing the word "feminist" with "African American." We adapted the measure to apply to all People of Color by replacing African American with "People of Color." There are 17 items that participants rate on a scale from 1 (Very untrue of me) to 7 (Very true of me). A sample item is: "I actively participate in organizational, political, social, community, and/ or academic activities and events regarding People of Color."

*Patient-Reported Outcomes Measurement Information System (PROMIS):* PROMIS measures self-reported perceptions of health (Hays et al., 2009). There are ten items in total. Two constructs are measured – global mental health and global physical health. A global mental health item ( $\alpha = .86$ ) is "In general, how would you rate your mental health, including your mood and your ability to think?" on a scale from 1 (Poor) to 5 (Excellent). A global physical health item ( $\alpha = .81$ ) is "How would you rate your fatigue on average?" on a scale from 1 (None) to 5 (Very severe).

The *Minority Status Stress* (read: race-related stress) measure (includes 37 items (Smedley et al., 1993) and makes sense of the following five constructs – social climate stresses ( $\alpha = .93$ ), interracial stresses ( $\alpha = .85$ ), racism and discrimination stresses ( $\alpha = .87$ ), within-group stresses ( $\alpha = .78$ ) and achievement stresses ( $\alpha = .76$ ). An example item is "The university does not have enough professors of my race." Each item is to be rated on a 6-point Likert scale, from "Not Applicable"

(0) to "Extremely stressful" (5).

*Dependent variables:* To assess students' career interests, the survey asked respondents to indicate on a 4-point Likert scale (1, "Not at all likely" to 4, "Very likely") their likelihood of pursuing a position after obtaining their graduate degree. In particular, students were asked about their interest in pursuing a variety of careers including faculty positions: "How likely are you to pursue a position as a university faculty member with an emphasis on teaching?" and "How likely are you to pursue a position as a university faculty member with an

emphasis on research?" Other career trajectories were also assessed, including likelihood to pursue a position in industry, a start-up company, government, nonprofit organization, or a postdoctoral fellowship.

## 5. Results

*Finding 1:* Racial activism emerges as the strongest predictor of academic career interests among underrepresented minoritized (URMs) in STEM. This suggests that active engagement in racial activism significantly influences the likelihood of pursuing academic careers in faculty research and faculty teaching for URMs in STEM fields. These findings underscore the importance of fostering an inclusive and supportive environment that encourages and recognizes the contributions of URMs engaged in racial activism, highlighting the intersection of social justice advocacy and academic career aspirations (see Tables 1-3).

Table 1. Research Faculty Career

Faculty Research (DV)	B	Std. Error	$\beta$	t	p-value
(Constant)	1.87	0.56		3.31	.001
Female	-0.20	0.13	-0.09	-1.51	.131
SES	0.00	0.15	0.00	-0.03	.978
PROMIS Mental	-0.10	0.12	-0.05	-0.85	.399
PROMIS Physical	0.07	0.12	0.03	0.57	.569
Race-related Stress	-0.04	0.06	-0.04	-0.61	.543
Racial Activism	0.19	0.05	0.25	4.00	<b>.000</b>

$R^2=0.06$ ,  $F(6, 300)=3.17$ ,  $p=0.005^{**}$

Table 2. Teaching Faculty Career

Faculty Teaching (DV)	B	Std. Error	$\beta$	t	p-value
(Constant)	1.27	0.53		2.38	.018
Female	0.05	0.12	0.02	0.40	.692
SES	-0.04	0.14	-0.02	-0.29	.773
PROMIS Mental	-0.11	0.11	-0.06	-0.96	.340
PROMIS Physical	0.19	0.11	0.10	1.76	.079
Race-related Stress	-0.03	0.06	-0.03	-0.43	.669
Racial Activism	0.16	0.05	0.22	3.64	<b>.000</b>

$R^2=0.06$ ,  $F(6, 302)=3.28$ ,  $p=0.004^{**}$

Table 3. Postdoc Career

Postdoc (DV)	B	Std. Error	$\beta$	t	p-value
(Constant)	1.92	0.56		3.40	.001
Female	0.00	0.13	0.00	-0.01	.991
SES	0.20	0.15	0.08	1.36	.176
PROMIS Mental	-0.22	0.12	-0.12	-1.85	.065
PROMIS Physical	0.22	0.12	0.11	1.88	.061
Race-related Stress	0.03	0.06	0.04	0.54	.589
Racial Activism	0.11	0.05	0.14	2.25	<b>.025</b>

$R^2=0.05$ ,  $F(6, 289)=2.72$ ,  $p=0.014^*$

*Finding 2:* When accounting for all other variables in the model, gender stands out as the sole factor influencing career interest in an industry position, with females displaying a significantly lower likelihood of being interested in such a career compared to males. This finding suggests that gender disparities persist in industry career aspirations, highlighting the need for targeted interventions to address the factors contributing to this gender-based discrepancy (see Table 4).

Table 4. Industry Career

DV= Industry	B	Std. Error	$\beta$	t	p-value
(Constant)	3.02	0.47		6.50	.000
Female	-0.25	0.11	-0.14	-2.36	<b>.019</b>
SES	0.04	0.12	0.02	0.31	.755
PROMIS Mental	0.15	0.10	0.10	1.55	.122
PROMIS Physical	-0.07	0.10	-0.04	-0.72	.470
Race-related Stress	0.08	0.05	0.11	1.54	.125
Racial Activism	-0.05	0.04	-0.08	-1.25	.213

$R^2=0.04$ ,  $F(6, 276)=1.99$ ,  $p=0.068^{\dagger}$

*Finding 3:* Racial activism ( $\beta=.18$ ,  $p<.05$ ) and race-related status stress ( $\beta=.16$ ,  $p<.05$ ) emerge as the most influential predictors of entrepreneurship. These findings indicate that URM STEM student who actively engage in racial activism and experience higher levels of race-related stress are more likely to demonstrate an interest in entrepreneurial pursuits (i.e., starting a business). This underscores the complex interplay between social advocacy, stress factors related to race-related status, and entrepreneurial aspirations (see Table 5).

*Finding 4:* The regression models fail to establish significant relationships between the predictor variables and career interests in non-profit and government sectors, indicating that additional factors, not included

Table 5. Entrepreneurship

DV= Start own Business	B	Std. Error	$\beta$	t	p-value
(Constant)	1.46	0.61		2.41	.017
Female	-0.03	0.14	-0.02	-0.22	.824
SES	-0.24	0.16	-0.11	-1.52	.131
PROMIS Mental	0.28	0.13	0.15	2.15	<b>.033</b>
PROMIS Physical	-0.19	0.13	-0.10	-1.48	.141
Race-related Stress	0.14	0.07	0.16	2.00	<b>.047</b>
Racial Activism	0.13	0.05	0.19	2.47	<b>.014</b>

R<sup>2</sup>=0.11, F(6, 200)=4.14, p=0.001\*\*

in our survey, may play a significant role in driving interests towards these career paths. This suggests the presence of unexplored variables or contextual factors that influence career preferences in these specific sectors. Further research should be conducted to identify and examine the specific factors that shape career interests in non-profit and government careers.

- Nonprofit: F (6,290) = 1.44, p=.199, not significant (ns)
- Government: F (6,298) = .734, p=.623, ns

*Finding 5:* Among URM graduate students in STEM fields, females experience significantly higher levels of race-related stress (Female:  $\mu$  = 2.31; Male:  $\mu$  = 2.12, p=.049) report poorer mental health (Female:  $\mu$  = 3.18; Male:  $\mu$  = 3.30, p=.015) outcomes and better physical health (Female:  $\mu$  = 3.53; Male:  $\mu$  = 3.40, p=.006) outcomes compared to males. However, levels of racial activism are similar across genders (p=.220). These findings underscore the presence of gender disparities in terms of race-related stress and health, highlighting the need for targeted support and interventions specifically tailored to address these challenges. Furthermore, the similar levels of racial activism suggest that both male and female URM graduate students in STEM are equally engaged in racial advocacy efforts.

*Finding 6:* Within our URM population, Black or African American STEM students demonstrate higher engagement in racial activism (Black:  $\mu$  = 4.59; Latinx/Indigenous:  $\mu$  = 4.09, p<.001), experience greater levels of race-related stress (Black:  $\mu$  = 2.40; Latinx/Indigenous:  $\mu$  = 1.97, p<.001) compared to their Latinx/Hispanic and Native/Indigenous American counterparts. These findings imply that the unique challenges faced by Black students within the STEM field may heighten their awareness of systemic

inequities and motivate their active involvement in advocating for racial justice.

*Finding 7:* Race-related Stress ( $\beta$ =.39, p<.01) is the strongest predictor of Racial Activism. This finding suggests that higher levels of race-related stress are associated with increased engagement in racial activism. These results emphasize the significance of considering the impact of race-related stress on the motivation for social advocacy among underrepresented students in STEM fields.

Table 6. Racial Activism

DV= Racial Activism	B	Std. Error	$\beta$	t	p-value
(Constant)	1.43	0.66		2.18	.030
SES	0.05	0.17	0.02	0.31	.759
PROMIS Mental	0.45	0.14	0.18	3.28	<b>.001</b>
PROMIS Physical	0.01	0.14	0.00	0.05	.957
Race-Related Stress	0.50	0.07	0.39	7.10	<b>.000</b>
Female	0.16	0.15	0.06	1.06	.292
Black	0.33	0.16	0.11	2.11	<b>.035</b>

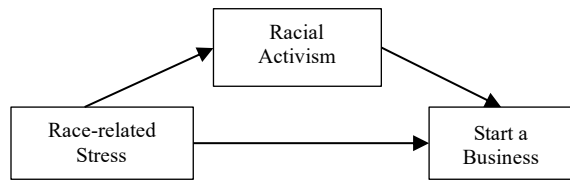
R<sup>2</sup>=0.19, F(6, 314)=12.01, p=0.000\*\*

*Finding 8:* Racial activism acts as a partial mediator in the relationship between race-related stress and career interests in entrepreneurship among URM graduate students in STEM. This finding suggests that the engagement in racial activism helps explain the association between experiencing race-related stress and expressing interest in entrepreneurial pursuits. These results shed light on the potential influence of social activism in shaping the career aspirations of underrepresented individuals and highlight the intricate interplay between race-related stress, racial activism, and entrepreneurial interests.

The Sobel test (Sobel, 1982) was utilized to examine if racial activism mediated the relationship between race-related stress and entrepreneurship (Start own business). First, results of simple linear regression show that race-related stress was a statistically significant predictor of entrepreneurship (b= .20,  $\beta$ =.23, t=3.48, p=.001). Next, when the mediator, racial activism, was added to the analysis, the predictive power of race-related stress decreased (b= .13,  $\beta$ =.14, t=2.03, p=.043). The Sobel test<sup>1</sup> was utilized to examine if racial activism significantly mediated the relationship between race-related stress and entrepreneurship. The results confirmed that racial activism significantly

<sup>1</sup> Sobel Test was run using the online calculator found here: <https://quantpsy.org/sobel/sobel.htm>

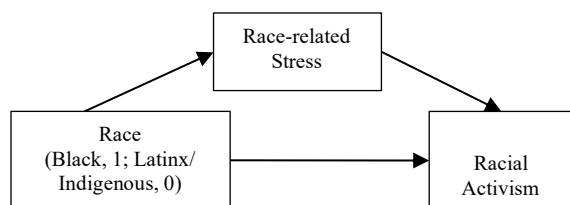
mediates this relationship ( $z= 2.73, p=.006$ ). Findings suggest the presence of partial mediation.



**Figure 1. Mediation Model: Starting a Business**

*Finding 9:* Race-related stress partially mediates the relationship between race (coded as 1 for Black and 0 for Hispanic/Latinx and Native American) and engagement in racial activism. This finding challenges the notion that racial activism is solely determined by one's racial identity. Instead, it suggests that the experience of being a target of racism and enduring the burden of race-related stress may leave Black students with a profound urgency to actively engage in advocating for racial justice. Together, this emphasizes the critical role of contextual factors in shaping the commitment and involvement of underrepresented students in addressing systemic inequities through activism.

Sobel test was utilized to examine if race-related stress mediated the relationship between Race (Black/African American, 1; Latinx/Hispanic and/or Native American, 0) and Racial Activism. First, results of simple linear regression show that race was a statistically significant predictor of racial activism ( $b=.50, \beta=.17, t=3.72, p=.000$ ). Next, when the mediator, race-related stress, was entered in the regression analysis, the predictive power of race decreased ( $b=.29, \beta=.10, t=2.21, p=.027$ ). To further investigate the mediator, the Sobel test was utilized to examine if race-related stress significantly mediated the relationship between race and racial activism. The results confirmed that race-related stress significantly mediates the relationship between race and racial activism ( $z= 3.88, p=.000$ ). Together this may indicate partial mediation.



**Figure 2. Mediation Model: Racial Activism**

These findings reveal the complex interplay between racial activism, race-related stress, and career aspirations among underrepresented and minoritized

students in STEM. Racial activism has a significant impact on both academic and entrepreneurial career interests. Furthermore, the presence of gender disparities and the unique challenges faced by Black students underscore the importance of addressing intersectionality in STEM. Likewise, it is crucial to acknowledge the significant impact of race-based stress in fueling racial activism and, consequently, shaping the career preferences of URM students. By recognizing that URM students are frequently targets of targets of race-based bias, institutions can better understand why they feel compelled to take proactive measures to advocate for racial equity across a wide range of professional domains.

## 6. Discussion & Conclusion

This study explores how race, gender, and racialized experiences, specifically racial activism and race-based stress, impact the career aspirations of underrepresented minoritized (URM) STEM and IT graduate students. Examining these factors provides insights into the complexities and challenges faced by URM students and informs interventions for more equitable STEM environments.

Racial activism emerges as a significant predictor of URM STEM students' interest in academic careers, emphasizing the role of social justice advocacy in shaping their academic aspirations. This underscores the need to empower URM students in racial activism, fostering both social change and faculty-related career pursuits.

Gender disparities persist among URM STEM students, with females showing lower interest in industry careers compared to males. Addressing this imbalance is essential for promoting gender equity in STEM. Inclusive environments and opportunities should be created to attract and retain female URM students in industry-related careers.

The study reveals a connection between racial activism, race-related stress, and entrepreneurial aspirations among URM STEM students. Racial activism and race-related stress significantly influence their interest in entrepreneurship, highlighting the link between social advocacy and entrepreneurial ambitions. Supporting this connection is crucial to fostering entrepreneurial endeavors among URM students.

In contrast, the non-profit and government sectors show limited association with the tested variables, requiring further research to uncover the motivations and barriers affecting URM STEM students' career preferences in these domains.

Additionally, the study uncovers disparities in mental health outcomes and race-related stress between female and male URM students. Tailored support

mechanisms are needed to address the unique challenges faced by female URM students, promoting their well-being in academic and professional journeys.

The study highlights specific challenges faced by Black or African American STEM students, such as increased engagement in racial activism, higher race-related stress levels, and poorer mental health outcomes compared to Latinx/Hispanic and Native American counterparts. Targeted support, mentorship, and initiatives are essential for addressing these unique challenges and promoting the well-being of Black students in STEM.

Race-related stress is a strong motivator for racial activism among underrepresented STEM students, emphasizing the need to address systemic factors contributing to stress and empower URM students in social justice efforts.

Moreover, building on prior work by the authors, this study demonstrates that racial activism acts as a partial mediator in the relationship between race-related stress and entrepreneurship (Monroe-White & McGee, 2023). This finding highlights the transformative role of racialized experiences in shaping the career aspirations and entrepreneurial endeavors of underrepresented STEM students.

Additional research is needed to better understand and address these unique experiences and challenges. Only by doing so can foster the success of URM graduates and promote equity in STEM fields. The findings serve as a powerful reminder of the urgent need to develop targeted interventions, allocate necessary resources, and initiate proactive initiatives that empower URM students, address gender disparities, alleviate the burden of race-based stress, and prioritize student mental health and well-being. Adopting an unyielding intersectional lens and embracing equity ethic principles can help foster a more just and prosperous STEM ecosystem.

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