

Racial Microaggressions, Institutional Racism, Self-efficacy, and Mental Health of Undergraduate Black Women in STEM

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Introduction

Abstract

This online survey study explored the associations among racial microaggressions, institutional racism, self-efficacy, and mental health in Black female STEM students. Using an intersectionality framework and the biopsychosocial model, it fills a gap in understanding the biological, psychological, and social factors influencing Black female STEM students. Findings were that higher racial microaggressions correlated with greater race-related stress and a strong connection between Black identity assimilation and overall identity score among Black female undergraduates. Findings aim to guide policies and interventions to support Black women’s well-being and success in STEM.

Background & Aim of the Research

Black women remain significantly underrepresented in STEM, largely due to systemic racism, sexism, and intersecting biases that create unique challenges in these fields. Despite efforts to improve diversity, existing research has yet to fully address how these barriers affect the mental health of Black women, particularly at the undergraduate level. Previous studies emphasize the structural inequities contributing to this underrepresentation but overlook the specific impacts of gendered racial microaggressions, institutional racism, and self-efficacy on well-being. This study seeks to fill this gap by

Examining the association among racial microaggressions, institutional racism, self-efficacy, and mental health in Black female STEM students.

Research Question

What are the associations among racial microaggressions, institutional racism, and self-efficacy, and mental health of Black female undergraduate students pursuing STEM degrees?



Method

Research Design

This study examined associations among racial microaggressions, institutional racism, self-efficacy, and mental health in Black female STEM students at Florida State University and FAMU-FSU College of Engineering. Participants (ages 18-24) completed surveys on racial identity, self-efficacy, depressive symptoms, and gendered racial microaggressions. See *Participants* and *Measures Tables*. Correlation analyses explored variable relationships. Participation was voluntary.

Participants

Variable	N	%
First-Generation College	7	70
Current Undergraduate Major		
Athletic Training	1	10
Biological Science	1	10
BME(Biomedical Engineering	1	10
Computer Programming and Applications	1	10
Computer Science	1	10
Criminology	1	10
Interdisciplinary Medical Sciences-Clinical Professions	1	10
Management Information Systems	1	10
Psychology	1	10
Classification in College		
2 nd Year Undergraduate	2	20
3 rd year Undergraduate	3	30
4 th year Undergraduate	5	50
Relationship Status		
Single	10	100
Sexual Orientation		
Heterosexual	8	80
Bisexual	2	20

Note. *N* = 10 Participants were on average 21 years old (*SD* = 2.3), with all participants aged between 18 and 24. The sample consisted of 70% first-generation college students, 100% domestic students, and varied majors, with the majority being 4th-year undergraduates (50%). All participants identified as single, and the most common sexual orientation was heterosexual (80%). The household income of participants was diverse, with 30% earning between \$75,001 and \$100,000. ^aReflects the number and percentage of participants answering “yes” to this question

Measures

Author(s)	Scale	Sample items
Lewis & Neville (2015)	Racial Microaggressions (GRMS)	I have felt unheard... My comments have been ignored.
Sellers et al. (1997)	Multidimensional Inventory of Black Identity (Centrality sub-Scale) (MIBI)	Overall, being Black has very little to do with how I feel about myself....
Schwarzer & Matthias (1995)	Self-Efficacy Scale (GSE)	I can always manage to solve difficult problems if I try hard enough
Sellers et al. (1997)	Multidimensional Inventory of Black Identity (MIBI) (Ideology Assimilation sub-scale)	Blacks who espouse separatism are as racist as White people who also espouse
Utsey (1999)	Index of Race-Related Stress (IRRS)	You notice that crimes committed by White people tend to be romanticized, whereas the same crime committed by a Black person is portrayed as savagery, and the Black person who committed it, as an animal
Center for Epidemiologic studies (1999)	Self-Report Depression Scale (CES-D)	I was bothered by things that usually don’t bother me. I did not feel like eating; my appetite was poor.

Results

Conclusion

Variable	n	M	SD	1	2	3	4	5
1.Racial Microaggressions	10	26.50	9.36	-				
2.Multidimensional Inventory of Black Identity (MIBI)	9	45.89	4.78	-.188	-			
3.Self-Efficacy	9	30.00	5.61	.50	.068	-		
4.Average MIBI Ideology Assimilation	9	4.97	1.13	-.381	.704	-.106	-	
5.Index of Race-Related Stress (IRRS)	7	53.71	14.85	.828*	-.112	.213	.072	-

Note: Correlation is significant at the 0.05 level (2-tailed).

Discussion

The findings indicate that racial microaggressions are significantly linked to increased race-related stress among Black female STEM students, while a positive non-significant association between ideology assimilation and racial identity may underscore the complex role of identity in managing racial stressors.

Limitations and Future Directions
Although the small sample size (*N*=10) and reliance on self-report data limit the study’s generalizability, these results align with broader research on racial stress and identity. Expanding the sample, conducting longitudinal studies, and exploring resilience-building interventions could enhance support for Black women navigating STEM fields.

Key References

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