APPROVAL SHEET

Title of Dissertation: Campus Inclusion and Sense of Community Among URM Women in STEM Amid Gendered Racism and Violence

Name of Candidate: Nicole A. Telfer
Doctor of Philosophy, 2022

Dissertation and Abstract Approved: 

Shuyan Sun, Ph.D.
Associate Professor
Department of Psychology

Date Approved: 07/13/2022

NICOLE A. TELFER

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EDUCATION

B.S. 2014 - 2018
The Pennsylvania State University, Cum laude
Human Development and Family Studies; Psychology
Thesis: *Household tasks and Academic Functioning among African American Adolescents*
Research Advisors: Susan M. McHale, Ph.D. and Olivenne Skinner, Ph.D.

M.A. 2018 - 2020
University of Maryland, Baltimore County, Magna cum laude
Applied Developmental Psychology
Thesis: *Ethnic-Racial Socialization Practices, Gender, and Academic Achievement Among High School Adolescents*
Research Advisors: Kenneth I. Maton, Ph.D. and Nicole M. Else-Quest, Ph.D.

Ph.D. 2018 - 2022
University of Maryland, Baltimore County
Applied Developmental Psychology, Magna cum laude
Dissertation: *Campus Inclusion and Sense of Community Among Racially Minoritized Women in STEM Amid Gendered Racism and Violence*
Research Advisors: Shuyan Sun, Ph.D. and Mariano R. Sto. Domingo, Ph.D.

RESEARCH AREAS OF FOCUS

- Black/African American youths' development and mental health outcomes
- ADHD and learning differences among children of color
- Mental health outcomes among children and adolescents of color
- Family influences on youth's outcomes
- Research-to-policy – education reform and academic success of racially minoritized youth

- Gender differences among racially minoritized youth and their academic outcomes
- Socio-cultural factors in racially minoritized youth development, including resources (e.g., ethnic/racial socialization) and stressors (e.g., discrimination, financial hardship)
- Gendered racism and violence against URM college women
- Intersectionality in quantitative and qualitative research

SCHOLARSHIPS AND AWARDS

- UMBC Dissertation Fellowship — June 2022
- UMBC 2022 GSA Senator Award — May 2022
- Meyerhoff Fellows Program Travel Grant — January 2022
- Oluwatoyin Salau Freedom Fighters Grant — December 2021
- UMBC Dissertation House Award — October 2021
- UMBC Graduate Organization of the Year Award — May 2021 – May 2022
- Victor E. and Dorothy M. McIntosh Award — February 2020
- UMBC Graduate School Professional Development Grant — May 2019
- Multicultural Leadership Way Paver's Award — April 2018
- Penn State Academic Scholarship — August 2015 – May 2018
- Penn State Bunton Waller Scholarship — August 2014 – May 2018
- Dean's List Certificate of Recognition — August 2014 – May 2018
- UMBC Ronald E. McNair Scholars Award — September 2017
- The Paul Robeson Cultural Center Academic Award — April 2017
- Ragosta Summer Research Scholarship — July 2017
- Penn State Child Development Scholarship — August 2017 – December 2017

FELLOWSHIPS

University of Maryland, Baltimore County – Teaching Fellow
August 2021 – May 2022
This fellowship was awarded by the University of Maryland, Baltimore County's psychology department. Fellows teach a course based on their knowledge, expertise, and interest for one academic year.

- Course taught for the academic year 2021-2022: Child Development

Association for Public Policy Analysis and Management – Student Fellow
August 2021 – May 2022
APPAM is dedicated to improving public policy and management by fostering excellence in research, analysis, and education.

Researchers Investigating Sociocultural Equity and Race (RISER) – Pre-Doctoral Fellow
January 2021 – May 2022
RISER is an interdisciplinary, cross-university team of researchers and practitioners working on issues for and about Black children.

Meyerhoff Fellows Graduate Program – Meyerhoff Fellow
August 2018 – May 2022
The goal of the fellowship program is to increase diversity among students pursuing Ph.D. degrees in the biomedical and behavioral sciences at the University of Maryland, Baltimore County.

National Association of Student Personnel Administrators – NUFP Fellow
October 2017- May 2018
NASPA Undergraduate Fellows Program creates possibilities and changes the landscape of student affairs and higher education.

PRACTICUM AND CLINICAL EXPERIENCE

Graduate Student Intern – University of Maryland Medical Center
June 2022 – Present
Department of Psychiatry and Pediatrics

- Observing standardized assessments to evaluate children (5 to 13) under the supervision of Dr. Kathleen Kane
- Observing at the NICU follow-up clinic and attending developmental and behavioral pediatrics didactics
- Working on clinical projects focused on children with developmental disabilities, as well as on maternal health

Mentor– Baltimore Leadership School for Young Women
January 2021 – May 2021

- Met with Black and Brown high school seniors weekly to assist with their research project
- Provided professional development skills and college readiness resources

Research and Policy Intern – Research-to-Policy Collaboration
January 2022 – May 2022

- Joined meetings with legislative staff and the RPC coordinator; organized and responded to requests for research-based information
- Produced written products (e.g., research summaries, policy briefs, op-eds)

TEACHING EXPERIENCE

Guest Lecturer – Morgan State University Fall 2021

- Child Developmental Psychology

Guest Lecturer – University of Maryland, Baltimore County Spring 2020
- Professions in Psychology

Guest Lecturer – University of Maryland, Baltimore County Spring 2020
- Gender and Women's Studies

Teaching Assistant – University of Maryland, Baltimore County
- Poverty and Child Health Outcomes Spring 2019
- Advanced Child Psychology Summer 2019
- Professions in Psychology Fall 2018- Spring 2020
- Psychology of Women and Gender Fall 2018
- Lifespan and Development Fall 2018

Teaching Assistant – The Pennsylvania State University
- Intervention and Prevention Spring 2017
- Introduction to Psychology Spring 2016

GRADUATE AND RESEARCH EXPERIENCE

Research Consultant – University of North Carolina at Chapel Hill
January 2022 – May 2022
Funded by the University of North Carolina at Chapel Hill (P.I., Nicole Else-Quest, PhD), this position consisted of journal article reviewing and manuscript writing (Award: $5,000).
- Served as reviewer for Stigma and Health Journal special issue on intersectional research
- Worked on a co-authored manuscript titled, The Intersectional Imperative: Calling in Stigma and Health Research
- Manuscript (in preparation) using the Philadelphia Adolescent Life Study (PALS) data.

Graduate Research Assistant, Maton STEM Lab
August 2019 – August 2021
Funded by the National Science Foundation (Dr. Kenneth Maton, PI), Maton STEM lab focuses on the minority student achievement (ongoing evaluation and implementation assessment of the Meyerhoff Scholars Program).
- Assisted undergraduate students in data cleaning and data entry
- Ran analyses using SPSS for ongoing research projects
- Assisted in evaluation of the Meyerhoff graduate program

Graduate Research Assistant, Promoting Understanding in Life Science Education
August 2018 – August 2020
Funded by a grant from the National Institute of General Medical Sciences at the National Institutes of Health (Dr. Nicole Else-Quest, PI), PULSE examines and

seeks to improve the performance of students enrolled in Chemistry 101 at the University of Maryland, Baltimore County.

- Assisted in participant recruitment and consent process
- Assisted in data entry of demographics using excel

Graduate Assistant, Women Involved in Learning and Leadership
August 2020 – May 2021
The WILL+ program offers students confronting these realities a valuable knowledge base about gender and its relation to other differences such as race, class, and sexuality as well as practical leadership skills that will improve their academic and professional accomplishments.

- Facilitated monthly meetings with WILL+ students
- Guest lecturer in Gender and Women's Studies courses

Research Assistant, Youth Experience in School Study (YESS)
August 2016 – May 2018
Funded by the National Science Foundation (Dr. Olivenne Skinner, PI) YESS examines school experiences of African American youth using a daily diary approach.

- Assisted in data collection process and IRB; developed Qualtrics surveys
- Assisted in participant recruitment and consent/assent process

Research Assistant, Penn State Family Relationships Project
September 2016 – May 2018
Funded by the National Institute for Child Health and Human Development (Drs. Susan McHale and Ann Crouter, co-PIs), this set of longitudinal studies examines the family contexts of youth development from middle childhood through young adulthood.

- Research paper: Families' roles in African American youth academic achievement
- Literature reviews; data analysis in SAS

Research Assistant, Wellness Empowerment for Brooklyn Project
June 2016 – August 2016
Eight-week summer internship created by MIT graduate students and funded by the Summer Youth Employment Program in the Tri-state area.

- Conducted surveys among community residents in Brooklyn, NY
- Developed strategies to improve living conditions for people within Brownsville and East New York

PROFESSIONAL DEVELOPMENT

Society for Research on Child Development – Graduate Student Member
December 2021 – Present

Society for Research in Child Development (SRCD) advances the developmental sciences and promotes the use of developmental research to improve human lives.

Association for the Study of African American Life & History – Member
May 2021 – Present
The mission of the Association for the Study of African American Life and History (ASALH®) is to promote, research, preserve, interpret and disseminate information about Black life, history and culture to the global community.

Midwestern Psychological Association – Graduate Student Member
September 2020 – May 2022
Seeks to advance the science, teaching, and application of psychology with a special focus on the Midwestern region of the United States.

Eastern Psychological Association – Graduate Student Member
October 2020 – May 2022
Seeks to advance the science and profession through the dissemination of professional information about the field of Psychology.

American Psychological Association– Graduate Student Member
April 2020 – April 2021
Psychology of Women. Providing an organizational base for feminists, women, and men of all national origins, who are interested in teaching, research, or practice in the psychology of women.

Society for Research on Adolescence – Graduate Student Member
February 2019 – May 2022
The Society for Research on Adolescence (SRA) is a rapidly growing, dynamic society focused on the theoretical, empirical, and policy research issues of adolescence.

Ronald E. McNair Scholars Summer Research Program
June 2017-August 2017
Research conducted in the Penn State Family Relationships Project lab explored ways in which f family experiences are related to the academic functioning of African American youth.

National Society of Leadership and Success – Sigma Alpha Pi - Member
January 2017- Present
Promotes goal, discovery, and achievement.

Ronald E. McNair Post-Baccalaureate Achievement Program
December 2016- May 2018
Promote excellence in the academic endeavors of low income, first generation, and underrepresented groups in graduate education.

PUBLICATIONS

Telfer, N.A., Skinner, O.D., & McHale, S.M. (2017). Household tasks and academic functioning among African American adolescents. *The Pennsylvania State University McNair Scholars Journal, 22*, 145-156. Retrieved from https://gradschool.psu.edu/McNairJournals/mcnair_jrnl2017/files/PSU-McNair-Vol22.pdf

Telfer, N. A. & Else-Quest, N. M. (in press). An intersectional approach to parental ethnic-racial socialization practices and adolescent academic outcomes. *Merrill Palmer Quarterly*.

Telfer, N. A. *A Black Woman's Guide to Earning a Ph.D.: Surviving the First Two Years.* Bloomington, IN: Xlibris Publishing, 2020. Print.

Skinner, O.D., Wood, D., McHale, S.M., & **Telfer, N.A.** (2018). Gendered personality qualities and African American adolescents' academic functioning. *Journal of Youth and Adolescence*, 1- 12. https://doi:10.1007/s10964-018-0919-1

Iruka I. U., Durden T. R., Gardner-Neblett N., Ibekwe-Okafor N., Sansbury A., & **Telfer N. A.** (2021). Attending to the Adversity of Racism Against Young Black Children. *Policy Insights from the Behavioral and Brain Sciences, 8*,175-182. https://doi10.1177/23727322211029313

Else-Quest, N. M., French, A. M., & **Telfer, N. A.** (2022). The intersectionality imperative: Calling in stigma and health research. *Stigma and Health*. http://dx.doi.org/10.1037/sah0000397

Telfer, N. A., Kassimu, R., Abraham, M. S., Adeyinka, S., Aldridge, K., Anderson, C., Bent, T., Boulware, A., Crider, J., Gardner-Scott, D., Grimes, L. N., Irvin-Choy, N., Jeffrey, E., Julien, T., Lee, L. M., Miles, K., Pierre, G., Rentz, I., Robair, K., Robinson, S., Spivey, B., Stanislaus, E. P., Trammell, D., Watkins, C.S., & Williams, J. *Our doctoral journey: A collection of Black women's experiences*. Bloomington, IN: Xlibris Publishing, 2022. Print.

Lewis, K. A., Domingo, M. R., Singh, R., **Telfer, N. A.**, Moraga, R. W., Harrington, E. G., & Maton, K. I. (in press). Women Meyerhoff scholars: Relationships among racial climate, sense of community, science self-efficacy, science identity and academic performance. *Journal of Women and Minorities in Science and Engineering.*

Manuscripts Under Review

Iruka, I. U., Sansbury, A., **Telfer, N. A.**, Ibekwe-Okafor, N., Gardner-Neblett, N., & Durden, T. R. (under review). Factors associated with the early learning and readiness of Black children.
In S. Cabell, S. Neuman, & N. Patton Terry (Eds.), *Handbook on the Science of Early Literacy.* Guilford Press.

Abraham, M. S., Atal, D., Aquino, A., Arora, I., Bailey, K., Flynn, M., French, A., Gay, B., Gondermann, N., Harrison, G., Jumarali, S. N., MacIver, P., Rowan, M., Sadollah, H., **Telfer, N. A.,** Weiss, D., Wells, J., Thomas, D. & Hunter, B. A. (under review). *White supremacy in community psychology: How a class activity to dismantle white supremacy in community psychology became an exercise in maintaining the status quo.* Accepted for submission to the special issue, Imperial Algorithms: Contemporary Manifestations of Racism and Colonialism in the American Journal of Community Psychology.

Domingo, M. R., Beason, T. S., Singh, R., Holloway, B. M., **Telfer, N. A.**, Sun, S., Moraga- Wideman, R., & Maton, K. I. (under review). The influence of USM LSAMP on academic performance: Examining the roles of STEM participation and racial climate (Eds.), *Frontiers*.

Manuscripts in Preparation

Iruka, I. U., **Telfer, N. A.**, Sansbury, A. B., Durden, T. R., Gardner-Neblett, N., Ibekwe-Okafor, N., Curenton, S., & Simms, J. (in preparation). Effects of racism on child development: Advancing the science through an anti-racist lens.

Telfer, N. A., & Else-Quest, N. M. (in preparation). Parental expectations and adolescent academic motivation and achievement.

Submitted Policy Briefs

Iruka I. U., Durden T. R., Gardner-Neblett N., Ibekwe-Okafor N., Sansbury A., & **Telfer N. A.** (2021). *Attending to the Adversity of Racism Against Young Black Children.* Submitted to the Congressional Social Determinants of Health Caucus.

Reviewer Experience

- National Research Conference on Early Childhood 2022 (NRCEC, 2022)
- Society for the Psychological Study of Social Issues (APA Convention, 2022)
- Stigma and Health Journal: Intersectionality in stigma and health research

PRESENTATIONS

Telfer, N.A. (2017, July) Household tasks and academic functioning among African American adolescents. Symposium presented at Office of Graduate

Educational Equity Programs Summer Scholars Symposium. State College, Pennsylvania

Telfer, N.A. (2017, September) Household tasks and academic functioning among African American adolescents. Symposium presented at the annual Ronald E. McNair conference. Baltimore County, Maryland

Telfer, N. A. & Else-Quest, N. M. (2020, March) Ethnic-racial socialization practices, gender, and academic achievement among high school adolescents. Symposium presented at the Graduate Experiences, Achievements, and Research in Baltimore County, Maryland

Telfer, N. A. & Else-Quest, N. M. (2020, March) Ethnic-racial socialization practices, gender, and academic achievement among high school adolescents. Symposium presented at the Maryland Psychological Association for Graduate Students virtual conference

Telfer, N. A., Singh, R., Domingo, M. R., Wideman, R., Watkins-Lewis, K., & Maton, K. I. (2020, December) The relationship of racial climate, sense of community, and science selfefficacy among African American female undergraduate students in STEM. Symposium presented at the Understanding Interventions virtual conference

Telfer, N.A., Domingo, M. R., & Maton, K. I. (2021, March). The retention of women of color in STEM undergraduate programs: Examining the roles of classroom diversity and social challenges on campus. Symposium presented at the Eastern Psychological Association virtual conference

Sansbury, A.B & **Telfer, N.A.** (2021, September). Black Parent Voices: Resilience in the Face of the Two Pandemics—COVID-19 and Racism. Symposium presented at the Association for the Study of African American Life and History (ASALH) virtual conference.

Telfer, N.A., Domingo, M. R., Sun, S., & Maton, K.I. (2022, March). Campus Inclusion, Social Harms, and Academic Performance Among Undergraduate URM Women in STEM. Poster presented at the Association for Women in Psychology Conference in Chicago, Illinois.

Telfer, N.A., Iruka, I.U., Curenton, S.M., Sims, J., Ibekwe-Okofar, N., & Escayg, K.A. (2022, March). Black Parent Voices: Resilience in the Face of the Two Pandemics—COVID-19 and Racism. Poster presented at the Association for Public Policy Analysis and Management Conference in Austin, Texas.

Telfer, N.A., Kassimu, R., and Watkins, C. (2022, April). Self-Love is the Best Love: Ourselves First, The Academy After. Workshop conducted at the Women of Color in the Academy virtual conference.

Telfer, N.A., Sansbury, A. B., Iruka, I.U., Curenton, S.M., Sims, J., Ibekwe-Okofar, N., & Escayg, K.A. (2022, June). Black Parent Voices: Resilience in the Face of the Two Pandemics—COVID19 and Racism. Poster was presented virtually at the National Research Conference on Early Childhood (NRCEC).

LEADERSHIP AND VOLUNTEER EXPERIENCE

Graduate Student Senator - UMBC Graduate Student Association
August 2021 – May 2022

- Co-facilitated non-academic townhall meetings for UMBC graduate students
- Engaged in monthly discussions and providing feedback/consulting on improving the experiences of graduate students

Student Representative – UMBC Equity and Inclusion Council
August 2020 – May 2022

- Co-chairing a group on policing and the presence of police on campuses
- Joined meetings every month to discuss inclusive and equitable practices on UMBC campus

Diversity, Inclusion and Social Justice Committee – UMBC
August 2019 – August 2021

- Engaged in monthly meetings to discuss the climate of the department to examine our areas of strength and relative concerns
- Co-facilitated workgroups that centered equitable practices and faculty development

Mentor – Assist Our Kids (A-OK) Foundation
December 2019 – May 2021

- Worked with a first-grade Black/African American student at Swansfield elementary
- Engaged in educational after-school activities focused on mental health and behavior outcomes for about one hour each week.

Founder and President – Black Graduate Student Organization
May 2019 – May 2022

- Organized professional and social events for Black graduate students at UMBC
- Facilitated monthly meetings with general body and executive board

Orientation Advisor – UMBC
January 2019 – January 2022

- Assisted transfer students in registering for classes for the upcoming semester
- Assisted first year college students in developing a one-year academic plan

Volunteer – Penn State Alternative Spring Break Program
March 2018

- Assisted in handing out food at a local homeless shelter in Detroit, Michigan
- Assisted in planting seeds and flowers on a local farm in Detroit, Michigan

Co-Founder/ Co-Captain – Dark Storm Step Team at Penn State
April 2017 – May 2018

- Recruited Penn State students to join new organization at Penn State
- Created and taught new steps to members to perform at various events

Mentor – Youth Empowerment Program at Penn State
September 2017 – May 2018

- Worked with African American high school students on school assignments and career goals
- Focused on networking, professional development, and resume building

Membership Chair – The Black Student Union at Penn State
August 2017 – May 2018

- Oversaw Black Student Union members' activities and recruited new members
- Developed activities and outreach to engage members

Student Manager – Paul Robeson Cultural Center at Penn State
August 2016 – May 2018

- Oversaw daily operations of the information desk
- Organized cultural events focused on diversity and inclusion

ABSTRACT

Title of Document: CAMPUS INCLUSION AND SENSE OF COMMUNITY AMONG URM WOMEN IN STEM AMID GENDERED RACISM AND VIOLENCE.

Nicole A. Telfer, Doctor of Philosophy, 2022

Directed By: Shuyan Sun, Ph.D., Associate Professor, Department of Psychology

Efforts to advance and improve science, technology, engineering, and math (STEM) education in the U. S. continue to expand alongside steadily increasing demands for STEM skills in the workforce. Women from underrepresented racially minoritized (i.e., Black, Latinx, and Indigenous; URM) groups show declining interest and motivation toward STEM learning (English, 2016). The disadvantages of being both a woman and a member of a URM group may contribute to URM women's declining motivation and retention in STEM. An inclusive climate helps them to have a strong sense of community (Johnson, 2012), but they still experience feelings of isolation, invisibility, discrimination, and disconnectedness from external social and cultural networks (Ong, 2005). They also experience social harms such as gendered racism, sexual harassment, and physical violence in STEM environments. Using data from the Meyerhoff Scholars Program at UMBC, the current study examined the relations between perceptions of campus inclusion and undergraduate URM women's motivation and achievement outcomes in STEM. It also explored the moderating roles of social harms—i.e., gendered racism, sexual harassment, and physical and

verbal violence—and psychological sense of community on URM women's science identity and GPA. Regression analyses indicated that perceptions of campus inclusion did not significantly predict students' motivation and achievement outcomes, nor did gendered racism and sexual harassment or violence against person and property moderate these relations. However, psychological sense of community significantly predicted science identity. Findings from the current study highlight the need for more research on the impact of social harms on STEM outcomes among URM college women.

CAMPUS INCLUSION AND SENSE OF COMMUNITY AMONG URM WOMEN IN STEM AMID GENDERED RACISM AND VIOLENCE

By

Nicole A. Telfer

Dissertation submitted to the Faculty of the Graduate School of the
University of Maryland, Baltimore County, in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
2022

Foreword

Written by Aziza Frank and Ayanna Williams

Aziza Frank is currently a 3rd year PhD student in the Pharmaceutical Sciences program at the University of Maryland, Baltimore School of Pharmacy. She received her Bachelor of Science degree in chemistry at Howard University in 2019. Aziza's research interests include drug design, discovery, and synthesis. A fun fact about Aziza is that she shares the same birthday as her 4th great-grandfather, Josiah Henson, the infamous slave who inspired the book, "Uncle Tom's Cabin".

Growing up, I've always been intrigued by science. I would spend hours watching the tv show "Zoom" showcasing children conducting science experiments like baking soda and vinegar volcanoes, egg drop containers, and lemon juice-powered rockets. At a very young age, all I dreamed of was becoming a scientist and spending my days in the lab. Unfortunately, as time went on, my dream of being a scientist diminished. The lack of representation in my desired career made me believe that being a scientist as a Black woman was impossible. I began to dive more into my artistic abilities and became interested in fashion design, painting, and puppet making. My high school career consisted of me floating between five different careers all centered around art. Although I earned outstanding grades in every class, I struggled to connect with my courses until my junior year when I took chemistry. It was this moment where I was reminded of how much I loved science as a kid. At the end of my junior year, after seeing how well I did in chemistry, my teacher connected me with an old friend that synthesizes therapeutics at a pharmaceutical company as a chemist. To my surprise, after 17 years, I finally met a chemist that was a Black woman! After hearing about

that love for her occupation that was fun, challenging, and brought her to new levels, I decided on my career path. In August of 2015, I enrolled as a chemistry major at Howard University with aspirations of being a pharmaceutical scientist, just like her.

My journey to rediscovering my love for science was not easy. I attended a predominantly white, all-girls catholic high school where I experienced racial discrimination and isolation. I was denied AP courses, STEM electives, and was even told that I'm "meant to be a basketball player, not a scientist." from my principal. It started to feel like I didn't belong and began to heavily struggle with imposter syndrome. Oddly, this treatment carried over into my career at Howard University when my chemistry professor told me I had "half a brain" and not cut out to be a chemist. The lack of support from those who should encourage me almost caused me to switch majors. Fortunately, I have a strong family foundation that helped me push through these barriers and reminded me of my capabilities. Since childhood, I was showered with affirmations from my father and mother to believe in my abilities. Without them, I would've succumbed to the societal fears of successful Black women and abandoned my love of science.

Your research is extremely important. Often, society forgets to factor in how experiences as an URM, especially in STEM fields, impact our success, retention rate, and overall comfort in our career. I am honored to be able to witness this type of conversation being brought to the forefront. I hope that this study expands and ignite some real changes in the STEM field to allow URM to flourish without barriers and challenges that their counterparts do not experience. My overall goal is to start a research and formulation-based lab where all employees are People of Color (POC),

and managerial positions are held by women. The focused research initiatives would encompass diseases affecting POC at higher rates including HIV/AIDS, sickle-cell anemia, Hepatitis C, heart disease, and cancer. The manufacturing side would formulate medications widely used by POC including blood pressure and HIV medication, insulin, and estrogen and testosterone injections for the transgender community at a discounted rate. I hope the work that I do in my community and career will persuade other interested URM to join the STEM field. In the future, I hope to see more women— that look like me— taking up these spaces unapologetically and exhibiting their capabilities.

Ayanna Williams is a rising 3rd year graduate student at the University of Maryland Baltimore pursing a doctorate degree in pharmaceutical science. She received a bachelor's degree in chemistry with a minor in biology from Xavier University of Louisiana. Currently, Ayanna's research interests are based in metallo-biochemistry where she studies the properties of proteins that require metals to function. Specifically, her work involves investigating the structure and function of both classical and non-classical zinc binding proteins called zinc-fingers (ZFs). Ayanna's long-term professional goal is to be involved in a career related to scientific/medical testing. As the realm of medicine is constantly evolving, she hopes to contribute to the efforts that help solve various health issues. One fun fact about Ayanna is that she loves music and DJs as a hobby in her spare time.

As a junior undergraduate student, I felt discouraged because I was unsure of my next steps after graduation. I knew that science was my niche, but I didn't know what career path I wanted to pursue. I discovered my interest in pharmacy after

participating in a study abroad medical fellowship with The Atlantis Project in Villarrobledo, Spain. The Atlantis project is an organization that provides students with a more global perspective of medicine through intense clinical experiences. I was able to gain first-hand experience shadowing physicians through a variety of specialties including pharmacy. From this experience, I initially wanted to pursue a career as a clinical pharmacist. My first introduction to scientific research happened through the encouragement of my undergraduate biochemistry professor Dr. Kelly Johanson at Xavier university of LA. She expressed that I would do exceptionally well in a research environment based on my performance in class. After considering her advice, I began my research career in biochemistry as an undergraduate student. In addition to her encouragement, Xavier held a powerhouse of female scientists and faculty members that served as great models of inspiration. Altogether, my experiences as well as the encouragement and inspiration from women in the faculty motivated me to pursue a doctorate in pharmaceutical science.

As many others before me, I have always felt a sense of apprehension during my studies as a graduate student. Doctorate programs are rigorous, and it is important to learn the skills necessary to be an expert in your field. Yet, as a Black woman in STEM, I feel there is an additional burden that contributes the declining interest in this field. There are many times that I have felt like I am not equipped enough or that I do not possess the abilities to obtain a doctorate degree. This is often termed as imposter syndrome. Although this is an internal struggle, I believe that it is rooted in the lack of inclusiveness and presence of social harms in professional environments. Historically, STEM fields were dominated by white men where women, especially

women of color, were deemed incapable. Even though society has advanced, women are continuously experiencing social harms and prejudice. Altogether, I believe my underlying feelings of doubt and fear lingers from the immeasurable number of women and POC that were excluded, discriminated against, or experienced social harms while pursuing a degree in STEM. Although I have not directly encountered this at my school, I am impacted by their experiences because it, too, could happen to me. One aspect that has helped me combat these challenges is having a cohort of friends who are also pursuing doctorate degrees. My cohort has provided me with a community of people who look like me and are going through similar experiences. They are my support system that motivate me during times when I feel discouraged and can provide advice when needed.

With this, I believe Nicole's work is important because it prompts us to continue to tackle the issues faced by women in professional environments. Not only does her work bring awareness to how college communities can support students better, but she also prompts us to consider the underlying effects of the issues addressed. I hope that women in URM groups continue to fight external and internal struggles when pursuing a degree in STEM. I believe it is necessary to have diversity in STEM as it serves as a representation of the world's population and the communities that will be impacted. If there is a gap in providing equal opportunities for all, then there should be efforts to mend it for the advancement of future generations to come.

Dedication

To my momma, Doraine A. Chambers: May the words of my mouth and meditation of my heart be acceptable to you, always.

To my ancestors: Thank you for paving the way. You're always on my mind, and I hope that I have made you proud.

Acknowledgements

First, I'd like to acknowledge and thank God for creating this path for me and guiding me along the way.

I'd like to acknowledge my dissertation chair, Dr. Shuyan Sun, co-chair, Dr. Mariano Sto. Domingo, and committee members, Dr. Nicole Else-Quest, Dr. Charissa Cheah, and Dr. Kiesha Allen, for their support and mentorship throughout the dissertation writing process.

To my doctor friends, church friends, and childhood friends— I am always grateful for your love, good vibes, and support. To my parents, siblings, nieces and nephews, and extended family in New York, Maryland, New Jersey, North Carolina, and on the beautiful island of Jamaica— thank you for always rooting for me and being in my corner.

Lastly, I am grateful for my spiritual mom, Shirley Richards, and my spiritual family at both the Voice of Hope SDA church and Miracle City SDA church. Your prayers and good thoughts have certainly carried me through.

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Chapter 1: Introduction and Theoretical Frameworks

Disparities in STEM Education and Fields

Efforts to advance and improve science, technology, engineering, and math (STEM) learning and education in the United States continue to expand as demands for STEM skills to meet economic challenges have steadily increased. Underrepresented racially minoritized (i.e., Black/African American, Latinx, and Indigenous; URM) groups are also entering into these fields at a steady rate. To go more in depth, the National Center for Science and Engineering Statistics (NCSES; 2018) stated that URM women earned a higher share of science and engineering (S & E) associates and bachelor's degrees than did URM men. Still, URM women's interest and motivation toward STEM learning have declined, especially in Western countries (English, 2016; Thomas & Walters, 2015). A reason for this decline may be that, although URM women are earning S&E degrees, two-thirds of S & E graduates employed full-time are White men (NCES, 2018).

Indeed, disparities in STEM do not begin in the workforce but also exist on college campuses. Women are less likely to choose a STEM field as a college major and are more likely to switch out of STEM majors (Mann & DiPrete, 2013). Moreover, while URM women are more likely than White women to declare a major in STEM initially (Ireland et al., 2018), they are ultimately still underrepresented (Ma & Liu, 2017). The double jeopardy must also be considered as URM women face two primary societal disadvantages: being a woman and being a member of a racially minoritized group. These societal disadvantages may work against URM women in

college and take a toll on their motivation and retention in STEM. For example, Ma and Xiao (2021) found that when URM women (specifically, Black/African American and Latina) experienced a decrease in their science identities, they were more likely to leave their STEM majors. The authors also found that URM women topped the chart in their tendency to leave STEM, with more than 34 percent of URM women leaving their initial STEM fields for non-STEM fields. What factors influence URM women's science identities, decisions to stay in their STEM majors, and academic outcomes? What kinds of support and resources do URM women need from faculty and peers in their STEM majors and from the broader campus community in order to persist and succeed in STEM?

To identify the resources and supports needed, it is critical to first acknowledge and name the disparities that exist and the social harms that students from underrepresented backgrounds experience in their STEM majors, which drive to the need for more support. URM women face unique challenges in STEM because of their gender and racial/ethnic background, such as feelings of isolation, invisibility, discrimination, not belonging, and disconnectedness from external social and cultural networks (Ong, 2005). URM women are often unable to find culturally-appropriate and gender-specific resources that could promote retention and academic success in their STEM programs (Sólorzano et al., 2005). Alongside these exclusionary practices, URM women are also subjected to several forms of violence, such as gendered racism, sexual harassment, and physical violence in STEM environments.

Harassment remains a persistent issue in STEM. More than one-third of women in STEM report that sexual harassment is a problem in their workplace (Pew

Research Center, 2017). In addition, 60 percent of African Americans in STEM report encountering discrimination because of their race (Pew Research Center, 2017). Gendered racism may also be a common issue that prevents undergraduate URM women from being retained in college and completing their STEM programs. Thus, it is important to examine how these social harms may influence students' perceptions of campus inclusion and their motivation and achievement outcomes. It may be the case that when URM women have a positive perception of the broader campus climate, it combats the negative climate in STEM that they describe (Ong, 2005; Tate & Lin, 2005). For example, Johnson (2012) found that when the campus climate was inclusive, such that the environment accommodated the demands of STEM majors, reinforced women's career choices in nontraditional fields, provided a readily accessible social support network, and countered the isolation some students experience in their STEM major, URM women were more likely to have a strong sense of community and belonging to their STEM programs. Therefore, exploring the role of sense of community on students' motivation and achievement outcomes may also present meaningful findings and conclusions.

Despite significant findings from extant literature, very little research addresses violence, such as gendered racism, sexual harassment, and physical and verbal violence, that URM women in STEM may encounter and how these social harms can influence the relation between their perceptions of campus inclusion on their motivation and achievement outcomes. Given these limitations, the current study takes an intersectional approach by examining the relations between perceptions of campus inclusion and motivation and achievement outcomes among undergraduate

URM women in STEM. While prior studies have stated that Asian women are well represented in STEM (Lee & Zhou, 2015; Xie & Goyette, 2003), it is important to note the diversity among Asian women. In particular, STEM achievement and experiences vary significantly across students from diverse Asian subgroups (e.g., Chinese, Korean, Cambodian, Vietnamese, etc.) and refute the model minority myth (Pang et al., 2011). Moreover, Asian women are just as likely to encounter experiences related to discrimination, harassment, and violence as Black/African American and Latina women (Castro & Collins, 2021; Wu & Jing, 2011). Thus, for the current study, the umbrella term *URM women* represents Black/African American, Latina, and Asian American/Pacific Islander women. The current study examines whether the relations between perceptions of campus inclusion and motivation and achievement outcomes are shaped by experiences of social harms and one's sense of community. That is, this study explores the moderating roles of social harms—as measured by gendered racism, sexual harassment, and physical violence—and psychological sense of community on URM women's science identity and GPA outcomes.

Theoretical Frameworks

The two theoretical frameworks that guide the current study are the critical theory of intersectionality and the theory of psychological sense of community. The theory of intersectionality centers the experiences of marginalized groups within the context of oppression based on social categories (e.g., gender, race/ethnicity). The theory of psychological sense of community highlights the importance of connectedness and belonging among, specifically, URM women in STEM.

Theory of Intersectionality

Intersectionality was coined by critical race theorist and legal scholar Kimberlé Crenshaw in 1989. Broadly, this theory refers to the idea that all individuals belong to multiple social categories, such as race, gender, and class, which are connected to systems of oppression (Crenshaw, 1991). For this reason, intersectionality also focuses on power and inequality tied to one's simultaneous membership in multiple social categories and on giving voice to those who are at multiply-marginalized intersectional locations (Else-Quest & Hyde, 2016b).

Although a relatively recent term, the concept of intersectionality is historically rooted in the activism of Black/African American women. For example, in the mid-1800s Sojourner Truth highlighted the differential experiences of oppression and racism between White and Black/African American women during the suffragist movement in her famous "Ain't I a Woman" speech. Other women of color have also greatly contributed to the intersectional framework, like bell hooks, Patricia Hill Collins, Gloria Anzaldúa, Cherríe Moraga, and many others. Intersectionality is important because it guides us in interpreting experiences within various social, political, economic, environmental, and historical contexts (Metcalf, Russell, & Hill, 2018). When individuals hold multiple social categories that are not acknowledged simultaneously, structural inequities within an environment may only focus on singular identities (e.g., race *or* gender), rather than an individual as a whole and the quality of the context that they occupy.

STEM research has made significant progress and efforts to incorporate the theory of intersectionality; still, more research is needed in this area. Metcalf and

colleagues (2018) used a qualitative data visualization, Quid, to retrieve a representative subsample of 2,876 papers published in Elsevier's Scopus database since 1993 discussing intersectionality in their titles, abstracts, and/or keywords. Of these papers, only 2.7 percent were about STEM and of that 2.7 percent, 1.8 percent focused on STEM workplaces. To add, Gayles and Smith (2019) conducted a systematic review on recent studies that focused on women in undergraduate STEM programs to determine what studies are and are not addressing intersectionality. They found that a majority of the studies relied on historical trends, which reinforces traditional, westernized ways of measuring variables and can be harmful to URM women, in particular. They also found that the few studies that used a theoretical framework chose theories that do not highlight the multiple dimensions of identity and social categories.

Metcalf and colleagues (2018) suggested that one reason why STEM research has not fully adopted an intersectional approach when studying STEM participation is because there may be methodological issues. Specifically, it would require that researchers select "modes of analysis best suited to address how multiple social categories shape the lived experience . . . to examine the as-yet unanswered questions intersectionality generates" (Griffin & Museus, 2011). Additionally, Gayles and Smith (2019) state that researchers' methods of data collection often lack contextual and sociopolitical information, which are both crucial in examining one's multiple minoritized social categories. Nevertheless, these authors urge researchers to make an effort to consider the intersectional experiences of students in STEM. Intersectionality within a research design is critical in understanding the multiple

minoritized social categories that URM women occupy, and how these social categories shape their experiences in STEM fields.

Ireland and colleagues (2018) suggest that the *psychology* of intersectionality may explain why some students in STEM may have different experiences based on their social categories, particularly with educational outcomes such as STEM achievement, self-efficacy, belonging, and stereotype threat. The authors also suggest that one way to highlight the experiences of students across and within social groups and understand the personal and social impact or meaning of intersectionality in STEM education is by incorporating Cole's (2009) framework. This framework is posed as three questions: (1) *Who is included in this category?* (2) *What role does inequality play?* And (3) *Where are the similarities?* Cole's (2009) framework challenges us to advance our understanding of intersectionality and the benefits of having a broad perspective pertaining to various social identities.

Studying STEM outcomes with an intersectional approach may help us to better understand the experiences of URM women in STEM undergraduate programs. Metcalf and colleagues (2018) provide recommendations to adopt intersectionality frameworks and critical methodological approaches to the study of STEM participation. These are to: 1) be inclusive in response options and language, 2) remember systemic and contextual factors, 3) incorporate qualitative elements, and 4) pay attention to power dynamics. Additionally, Else-Quest & Hyde (2016b) proposed two agendas for quantitative psychology research that seeks to use an intersectional approach. These are: 1) Intersectional criticism of traditional quantitative psychological research, and 2) Producing excellent intersectional quantitative

research that demonstrates a better way of conducting quantitative research. To add, Else-Quest and Hyde (2016a) concluded that in order for research to be considered intersectional, it must 1) attend to the experience and meaning of belonging to multiple social categories at once, 2) take into consideration power and inequality, and 3) attend to social categories as characteristics of both the social context and the individual and consider the importance of social categories as potentially fluid and dynamic.

Using an intersectional approach may also help us to understand and promote positive science identity and academic outcomes among URM women in STEM. Studies have suggested that students' identity as a scientist is one of many determining factors of whether they choose a career in science (Eccles, 2007). One study also found that the higher the students' school performance, as measured by their GPA, the greater their evaluation of being good scientists are, which will lead to higher likelihood of pursuing jobs in science-related fields (Stets, Brenner, Burke, & Serpe, 2017). This may suggest that students' GPA influences their science identity, and that these two constructs may be important outcome variables to examine among URM women in STEM. Conversely, the expectancy-value model suggests that one's science identity influences their achievement outcomes through value and expectations of success (Eccles & Wigfield, 2002). Given these findings, the current study seeks to further investigate and explore the roles of both science identity and GPA, and how campus inclusion may influence these motivation and achievement outcomes.

In sum, intersectionality in STEM is crucial for understanding the experiences and achievement of, specifically, URM women in undergraduate STEM programs. Landry (2007) argues that social categories such as race, class, and gender cannot be separated when studying individuals with an intersectional lens as the relationship between these social categories are interactive and plays a crucial role in an individual's daily life experiences. Important information about an individual or a group of people can be missed when and if researchers do not consider multiple social categories simultaneously, and this important information may be essential to advance marginalized populations. Thus, intersectionality must not only be seen as a theoretical framework to be used in STEM research, but also as a tool that informs research, policy, and practice and ultimately become the center of conversations focused on dismantling systems of oppression and creating resources of individuals or groups of people who occupy multiple minoritized social categories (Collins & Bilge, 2016).

Theory of Psychological Sense of Community

The theory of psychological sense of community has been studied for many years as researchers sought to explore group cohesiveness and how various elements work together to form a sense of community among individuals. In 1978, Doolittle and MacDonald created a 40-item sense of community scale to examine behaviors and attitudes at the community or neighborhood level of a social organization. Additionally, Ahlbrant and Cunningham (1979) explored the relationship between sense of community and an individual's commitment to a particular neighborhood and satisfaction with that neighborhood. These researchers found that those who were

most committed to their neighborhood were more likely to view their neighborhood as a small community and were most loyal to their neighborhood. These findings suggest that sense of community is an important contributing factor in one's integration into a specific setting, and whether one decides to stay within that setting.

McMillan and Chavis (1986) built upon these previous studies on psychological sense of community by adding that sense of community has four distinct elements: membership, influence, integration and fulfillment of needs, and shared emotional connection. *Membership* refers to the sense of belonging that an individual has once they've invested into a particular group. *Influence* is the idea that in order for a member to be attracted to a group, they must have some influence over what the group does. *Integration and fulfillment of needs* is the idea that the needs of the member will be met through resources and shared values within that group. Lastly, *shared emotional connection* is based on shared history, events, and experiences that members of a group are able to identify with. McMillan and Chavis (1986) further suggests that there are relationships between the elements of sense of community. For example, the authors state that emotional safety and connectedness can lead to self-investment in the community which, in turn, can influence a sense of earned membership in a particular group. The authors concluded that sense of community is affected by time through changing values and external forces, and that sense of community must be used to foster understanding and cooperation (p. 20).

Sense of community may be an important buffer for undergraduate URM women in STEM who experience social harms; however, few studies have explored this possibility. In one study that examined psychological sense of community,

perceived program benefit, science identity, and research self-efficacy among African American, Asian American/Pacific Islander, White, and Latinx students in the Meyerhoff Scholars Program (MSP), Maton and colleagues (2016) found that psychological sense of community was positively related to science identity and research self-efficacy. That is, when the MSP STEM students had a high sense of community, they were more likely to identify as scientists and were also able to function as scientists. Additionally, the authors concluded that all students may benefit to some extent from the sense of community within their programs, but those who experience higher levels of community appear to benefit more. Still, little is known about how psychological sense of community may influence science identity and GPA outcomes among URM women, specifically in the MSP.

Chapter 2: Review of the Literature

Experiences of Campus Inclusion Among URM Women in STEM

Although many students report having a difficult time adjusting to the college experience, URM women face additional stress and difficulty due to their minoritized status within a chilly and unwelcoming campus climate. By contrast, an inclusive and supportive campus climate may mitigate the negative effects of stress on URM students' academic outcomes. In one study that examined the mediating role of perception of University's environment in the relation between minority stress and persistence attitudes, Wei and colleagues (2011) found that a positive perception of the University environment was positively associated with college persistence attitudes for African American, Asian American, and Latinx students. The authors concluded that efforts should be made to create a diversity- and inclusion- friendly

university environment (e.g., increasing minoritized faculty, staff, and student bodies) to improve underrepresented students' retention.

Beyond Diversity: The Importance of Campus Inclusion

Now more than ever, college campuses across the U.S. are incorporating diversity and inclusion initiatives inside and outside of the classroom on behalf of underrepresented students. The initiatives found on college campuses tend to reflect different theoretical approaches to intergroup relationships (Gurin & Nagda, 2006). These differences center three issues: 1) salience of racial/ethnic group identity; 2) power, privilege, and inequality as a context for intergroup relationships; and 3) intergroup harmony, understanding, and collaboration. Moreover, when diversity and inclusion are acknowledged and reflected on college campuses, it can increase students' awareness of the experiences of other racial/ethnic groups, and how power, privilege, and inequality might shape these experiences. Campus diversity and inclusion are essential because students are provided with a wide array of varying worldviews to consider which, in turn, may influence their ideas and perspectives. Indeed, many colleges are beginning to realize the importance of including diversity and inclusion statements on their websites and in their syllabi to ensure all students that their campus welcomes the range of human representation, including gender, race/ethnicity, nationality, religion, and so on.

Nonetheless, these statements are only the bare minimum, and some faculty and students still struggle with creating an inclusive environment for all students. Students from underrepresented groups continue to face a host of challenges pertaining to support and inclusion. URM women in undergraduate programs,

specifically, tend to switch their STEM majors due to unwelcoming environments, exclusionary practices, and gendered racism in the classroom (Goodman Research Group, 2002).

The challenges that URM women face in their STEM majors mirror their overall experiences on college campuses. Specifically, Black/African American women have reported feeling disconnected from social life on campus and have reported being misunderstood because of stereotypes (Johnson, 2011). In addition to finding their space on campus, some Latinas also grapple with familial expectations (e.g., being keepers of their culture), English language proficiency, and cultural identity issues (Ginorio & Huston, 2000). Similarly, some first-generation Asian women also face barriers when it comes to their English language skills (Hune, 1998). They also experience gendered racist stereotypes of being exotic and passive and are often overlooked when they experience academic difficulties (Johnson, 2011).

The learning and social environments in STEM and the broader campus community shape the experiences of URM women, who may encounter a hostile climate related to stereotypes, discrimination, and isolation from faculty and peers (Armstrong & Jovanovic, 2017; Johnson, 2011). Specifically, *living-learning programs and communities* were established on college campuses to facilitate students' transition and adjustment to college, help students make meaningful connections across their courses, and create a sense of community and belonging to a campus environment (Johnson, 2011). Living-learning programs also provide students with similar academic interests to live together and create community amongst each other.

Although around for decades, living-learning programs have recently been adapted to center the experiences of URM women in STEM undergraduate and graduate programs (The Residential Learning Community International Registry, 2008). STEM living-learning programs tend to offer several resources to support URM women, such as special sections of introductory science and engineering courses, paid research experiences, academic and career workshops, tutoring, study groups, and activities that promote social interaction between students and faculty (Goodman Research Group, 2002; Kahveci et al., 2008; Pace et al., 2008). Living-learning communities are intended to be inclusive, collaborative, and integrative, where students' learning styles and preferences are highlighted and multiple perspectives are represented in the curriculum (e.g., articles and books written by women of color). Additionally, racial/ethnic diversity has also been found to be a core component of living-learning environments as it includes supporting groups that have been historically underrepresented in education and developing unique teaching strategies that would accommodate a diverse group of learners. Mertens and Hopson (2006) suggest that when diversity-related issues are included in living-learning communities, significant changes can be made on college campuses.

Johnson (2011) examined racial/ethnic diversity among undergraduate women in STEM who also participated in various types of living-learning programs. Findings from that study suggest that URM women have different experiences than White women in STEM. More specifically, the author found significant correlations between overall sense of belonging and perceptions of campus racial climate among Black/African American and multi-ethnic women. Johnson (2011) also found that

White women reported greater participation in women-only STEM programs, stronger overall sense of belonging, and fewer interactions with peers from different racial/ethnic groups. This finding may be due to the large number of White women in the sample and may suggest that more research is needed solely on URM women's experience in living-learning programs and the influence of campus inclusion among URM women who have declared a major in STEM. Johnson concluded that STEM living-learning community educators should work to explore and understand the contexts of power and privilege within the larger campus community.

When college campuses choose to practice and incorporate diversity, this may not only nurture inclusive practices, but also improve learning outcomes for all students. Gender and ethnic diversity on scientific teams also improves a variety of outcomes, such as individuals making novel contributions to their field that are not discounted (Hofstra et al., 2020). Diverse and inclusive campuses provide students with the opportunity to learn from one another about social issues impacting one's group. In a study that examined campus racial diversity on academic outcomes, Chang (2001) found that when a student socialized with another student of a different race, there was a direct effect on two educational outcomes: retention and college satisfaction. Additionally, the author found that talking about racial issues was positively related to all outcomes, which included retention (student persistence), college satisfaction, social self-concept (self-confidence), and academic self-concept.

Over the years, there has been a growing concern over diversifying STEM, and while URM students are enrolling in STEM degree programs (Anderson & Kim, 2006), they are less likely to graduate with a STEM degree as compared to White

students (Chubin, May, & Babco 2005), partly due to lack of campus diversity and inclusion. Winkle-Wagner and McCoy (2018) concluded that if students are feeling excluded across the institution, as if they are an 'alien' on campus or in their programs, they might be less likely to complete their programs and less likely to feel connected to their program and STEM disciplines. The authors also found that students who reported strong support and feelings of inclusion were more likely to remain in STEM disciplines and persist to graduation.

In sum, an extensive literature indicates that campus inclusion bolsters academic success and persistence among college students and, particularly, among STEM majors. Studies also suggest that students' sense of community to the broader campus and to their STEM program may be positively associated with their academic outcomes and persistence. However, to my knowledge, no studies have examined the direct links between perceptions of campus inclusion and science identity and academic achievement (e.g., GPA) among URM women in STEM. Thus, the current study seeks to explore these links. The current study also explores the role of sense of community among undergraduate URM women in STEM at the University of Maryland Baltimore County (UMBC) who are part of the Meyerhoff Scholars Program (MSP).

The goal of the MSP at UMBC is to increase the representation, persistence, and academic success of URM students in STEM programs. Initially, the MSP was developed and implemented in 1988 with the sole purpose of increasing representation and retention of African American men in STEM programs. Soon after, the program was opened to African American women and then, eventually, to

all URM students. Furthermore, the MSP includes a number of components, such as the Summer Bridge, which is a 6-week intensive STEM training program, study groups, mentorship, and research opportunities. Sense of community is present in all of these components, and is both highly encouraged and fostered. Along those same lines, the primary goal of the MSP is to produce high-achieving URM students in STEM programs and fields through building a strong sense of community and strengthening student's STEM identity and STEM research self-efficacy (Carter et al., 2009). Indeed, the MSP has produced many positive outcomes among URM students in STEM (Maton et al., 2000; Maton et al., 2012; Maton et al., 2016), and as have replications of it at other universities (Sto. Domingo et al., 2019).

Psychological Sense of Community and Academic Outcomes

In their model of sense of community, McMillan and Chavis (1986) explained what membership may mean within a community by stating that membership has boundaries, which indicates that some individuals belong, and some do not. While boundaries are created for emotional safety of members, it can also cause harm to those who are rejected and isolated based on social identities that may not align with the community's norms. Another attribute of membership includes sense of belonging and identification, which refers to the feelings, belief, and expectations that an individual fits in with their group and is highly dedicated to their group (McMillan & Chavis, 1986). Feelings of belonging and identification are important for members within the STEM community. For example, Cheryan and Plaut (2010) sought to examine potential gender differences in computer science and found that women were less likely to persist in computer science when they perceived social identity threat.

However, they also found that undergraduate women's sense of belonging to the university significantly predicted their interest in pursuing a degree in computer science.

Similarly, Hausmann and colleagues (2007) examined the influence that student's sense of belonging may have on their retention in college. Their sample included both White and Black/African American first-year college students from a predominantly White institution (PWI). The authors found that, over time, African American students who were well integrated into the academic community (e.g., such that students had positive interactions with their peers and faculty) had a higher sense of belonging, whereas African American students who were not well integrated into the community had a lower sense of belonging. Additionally, peer-group interactions, interactions with faculty, peer support, and parental support were all associated with a greater sense of belonging among African American students. These findings call for a deeper understanding of the role of community for URM students and the impact that it has on their STEM success.

Another key aspect of McMillan and Chavis's (1986) sense of community model that may explain the critical need for community among, specifically, undergraduate URM women is shared emotional connection. The authors state that there are features of shared emotional connection, such as quality of interaction (i.e., positive experiences lead to greater bond) and shared valent event hypothesis (i.e., collective crisis leads to great community bond). Although their experiences may be unique to their own racial/ethnic group, URM women share a collective experience of marginalization and exclusion because of their racial/ethnic background and gender.

When it comes to retaining URM women in STEM programs, studies have urged future research to pay attention to the safe social spaces, or counter-spaces, which offer support and enhance feelings of belonging in STEM (Ong et al., 2017). *Counter-spaces*, such as the Meyerhoff Scholars Program, are academic and social safe spaces that allow underrepresented students to promote their own learning, vent frustrations by sharing stories of isolation and social challenges and establish and maintain a positive collegiate racial climate for themselves (Solórzano & Villapando, 1998). Many interventions that were developed to increase participation and persistence in STEM sought to target students individually (e.g., one-on-one tutoring, socialization into science) instead of addressing larger structural issues within the STEM climate. When there is a significant focus on the individual rather than on systems, a context-minimization error occurs, placing blame on the individual, and there is a lesser chance at identifying what a collective group of students might need.

Ong and colleagues (2018) discussed the importance of counter spaces for URM women as they navigate the STEM environment. More specifically, the authors discussed the experiences of a Black/African American woman in STEM who often felt excluded and isolated because of her racial and gender background. She reported being a victim of racial and gender discrimination, negative stereotypes about her racial group, and negative gender stereotypes as well. Fortunately, the participant found a counter-space and built a community with other women within that space which, in turn, helped her to persist in her chosen STEM field. This story is just one account of URM women's negative racial and gender experiences and the importance of community, and more research is needed in this area.

Undergraduate URM women in STEM may have difficulty finding others who share similar identities as them and, as a result, keep their STEM peers separate from friends with whom they socialize. Thus, formal as well as informal counter-spaces are necessary for URM women as these spaces may enhance persistence and retention in their STEM programs. Furthermore, in one qualitative study, Ong and colleagues (2017) explored how social factors presented challenges to persistence and success in higher education among URM women and how counter-spaces influenced participants' persistence in higher education. Several findings emerged from this study. Firstly, the authors found that negative social experiences contributed to social discomfort and a low sense of belonging which, in turn, led to lower persistence rates in STEM education among URM women. Secondly, they found that nearly all of the participants in their study engaged in counter-spaces. These counter-spaces included peer-to-peer relationships, mentoring relationships, national STEM diversity conferences, and STEM and non-STEM campus student groups. Peer-to-peer and mentoring relationships in STEM with individuals of the same racial/ethnic and gender background may be important counter-spaces for URM women as similar social identities can inform and influence a shared emotional connection to STEM. In Ong and colleagues' study, URM women reported engaging in counter-spaces to seek support to counter personal attacks, get emotional support and strategies to counteract isolation, and build a cohesive identity in a hyper-masculine and White culture such as STEM. Lastly, the authors also found that counter-spaces both inside and outside of the department were important for the persistence of URM women in STEM graduate programs.

In sum, Ong and colleagues (2017) found that counter-spaces are important for persistence and success in STEM among URM women in higher education. Likewise, Hausmann and colleagues (2007) found that sense of belonging was significantly associated with students' institutional commitment and persistence at the beginning of their academic year. Hurtado and Carter (1997) strongly urged future research to consider examining the influence of sense of community on student's persistence and academic outcomes. In order to foster strong sense of community and persistence for diverse groups of people, more inclusionary practices are needed. Brodsky (2017, p. 271) stated, "a diversity that does not change underlying experiences and inequalities, is a diversity without inclusion and without inclusion, there may well be no sense of community." Thus, the relation between sense of community and inclusion is critical for students' outcomes. Still, little is known about the importance of sense of community and URM women's achievement and science identity outcomes in their STEM programs. Thus, the current study examines the moderating role of psychological sense of community on the academic outcomes, as measured by GPA, and science identity among URM women in STEM undergraduate programs at UMBC. Sense of community may be especially important for URM women who experience social harms stemming from sexism and racism on campus. Social harms can include, but are not limited to, gendered racism, sexual harassment, stalking, and physical violence.

Men's Violence Against Women in College

Men's violence against women includes sexual violence, intimate partner violence, and stalking, and these forms of violence may disproportionately affect

college women and their retention in their undergraduate programs (Rennison & Addington, 2014). One in three women experiences rape, sexual coercion, or sexual assault at some point in her life (Smith et al., 2017), and 28% of women experience sexual assault while in college (Mellins et al., 2017). Yet, between 75-87% of rapes and sexual assaults of college women are unreported (Cantor et al., 2015).

Sexual and physical violence against college women can negatively impact their mental health outcomes and academic performance. For example, Smith, White, and Holland (2003) conducted a longitudinal study on college women who experience physical assault or intimate partner violence. They found that women who reported more psychological distress as a result of physical and sexual violence were more likely to drop out of college. To add, women who reported being sexually harassed by individuals in positions of power at their universities also reported decreased school attendance, decreased quality and quantity of work, and dropping grades (van Roosmalen & McDaniel, 1998). While the influence of sexual and physical violence on the academic performance of victimized college women has received limited research attention, one study found that, among women who were sexually assaulted during their first semester, GPAs subsequently dropped (Jordan, Combs, & Smith, 2014).

Moreover, evidence indicates that men's violence against women is associated with their attitudes towards women, gender, and sexuality (Flood & Pease, 2009; McDermott et al., 2015; Trottier et al., 2021). Generally, men are more likely than women to believe and agree with rape myths that are supportive of violence against women, blame and show less empathy for the victim, minimize the harms associated

with physical and sexual assault, and see behaviors constituting violence against women as less serious, inappropriate, or damaging (Flood & Pease, 2009). Research also has linked attitudes towards violence against women and beliefs about gender roles. Specifically, traditional gender-role ideologies are associated with greater acceptance of violence against women (Davis & Liddell, 2002; De-Judicibus & McCabe, 2001). That is, when individuals endorse traditional ideologies about how a woman should act, they are more likely to justify any violent acts against women. With respect to women in STEM, when traditional beliefs are upheld in this field (e.g., masculine and White-dominated), women, particularly URM women, are mistreated and excluded because of their gender and racial identity.

Alongside traditional views of and attitudes towards women, studies examining the STEM discipline of physics have posited that the culture of physics is rooted in a masculine design. Women are viewed as contrary to science in part because of the clothing that they wear in, specifically, the physics community (e.g., high heels and skirts), and this often leads to gatekeepers of science depicting them as unfit (Barthelemy, McCormick, & Henderson, 2016). When women in STEM are policed because of the clothing that they wear, this is a form of sexism and gender discrimination. Klonoff and Landrine (1995) state that sexist events tend to happen to many women and can range from such things as hearing people make sexist or degrading jokes to being treated unfairly because of one's sex or gender identity in classroom or work situations.

In sum, these findings highlight the critical need for understanding how men's violence against college women impacts women's academic outcomes and success.

These studies have also shed light on the importance of understanding and considering the intersectionality of women in STEM. While only a few studies have addressed overall violence against college women in STEM programs, other studies have brought attention to specific social harms that women in STEM experience. These include, but are not limited to, sexual harassment, gender bias and discrimination, and racist discrimination. The current study expands the definition of experiences of social harms by including violence against women and their property, such as verbal and written harassment, anonymous phone calls, and stalking.

Experiences of Sexism & Racism on Campus

While it is important to consider early exposure to STEM, motivation, and other individual factors, it is also critical for researchers to examine how sexism and racism might contribute to gender disparities in STEM. For example, gender bias and sexual harassment are two forms of sexism that women experience in STEM fields (Moss-Racusin et al., 2012; NASEM, 2018). Gender bias (or sexist bias) refers to discrimination or bias against people based on their gender, whereas sexual harassment includes unwelcome sexual advances, requests for sexual favors, and other verbal or physical harassment of a sexual nature, which create a hostile environment and/or are leveraged as terms of employment or academic standing (Else-Quest & Hyde, 2021; U.S. Equal Employment Opportunity Commission). Men's violence against women—e.g., in the forms of rape/sexual assault, sexual harassment, and stalking—is also understood by Title IX as part of the spectrum of sexism that college women face (Educational Amendments Act of 1972, 2018).

Sexual Harassment in STEM

Sexual harassment is pervasive throughout STEM in the U.S. and results in talented researchers and academics leaving the field. Researchers who examine sexism and harassment in STEM found that 71 percent of women reported experiencing harassment in the field as compared to 41 percent of men (Clancy et al., 2014). Reports from the U.S. National Academies of Sciences, Engineering, and Medicine (NASEM) in Washington D.C. concluded that policies created to combat sexual harassment are ineffective because they tend to protect institutions, not victims. NASEM (2018) described three broad types of sexual harassment: 1) gender harassment (akin to gender bias and discrimination), 2) unwanted sexual attention, and 3) sexual coercion, with gender harassment being the most common form of sexual harassment. The NASEM report estimated the prevalence of sexual harassment in U.S. academia at 58 percent, with URM women being more likely to experience higher rates of harassment.

In one study that examined sexual harassment and gender bias among undergraduate women in STEM, 78.1 percent of women experienced STEM-related sexual harassment within the past year, with greater perpetration by instructors than by friends or classmates (Leaper & Starr, 2019). In turn, sexual harassment from instructors was negatively related to valuing STEM and feeling more competent in the humanities. When women experience sexual harassment from instructors and peers, they may also experience institutional betrayal (Smith & Freyd, 2014), which can further undermine their motivation in the field. Women's feelings of betrayal are heightened when their perpetrators are not held accountable (e.g., when they are

allowed to keep their jobs), which enables perpetrators to find new victims and perpetuates rape culture (Else-Quest & Hyde, 2021).

Similar patterns of sexual harassment exist in STEM workplaces. In a survey of 474 astronomers, 40 percent of women reported hearing sexist remarks "sometimes or often" from their peers, in comparison with 23 percent of the men (Burke, 2017). To add, 21 percent of women reported hearing such remarks "sometimes or often" from their supervisors, whereas only 5 percent of men reported observing such behavior. Another study of scholars in astronomy and planetary science found that URM women were the most likely to experience verbal harassment related to their race and gender, and most likely to feel unsafe in their place of work due to their race and gender (Clancy et al., 2017). As a result of URM women's experience with sexual harassment and racist and gender discrimination in STEM, they struggle to maintain a sense of belonging or STEM identity (Ong et al., 2011). Studies have reported that such experiences are especially common for URM women in computing, such that they encounter isolation and stress (Thomas et al., 2018) alongside higher rates of sexual harassment (National Academies of Sciences, Engineering, and Medicine, 2018) and unfair treatment (Scott et al., 2017). Consequently, when URM women experience such violence and assault, they end up leaving their STEM programs and fields.

URM women are disproportionately targeted for sexual harassment (Cantalupo, 2018). Racist and sexist discrimination are intertwined with sexual harassment, making it important to consider double jeopardy and intersectionality to create solutions that would address multiple forms of discrimination and harassment.

Initiatives to combat sexual harassment in STEM include legislation such as the Combating Sexual Harassment in STEM Act, which was passed by the House in a bipartisan manner in 2019 and strives to address and prevent sexual harassment. Additionally, this initiative directs the NSF to award grants to institutions researching sexual harassment in the sciences with the goal of prevention and reduction. Addressing sexual harassment and other forms of violence against women in STEM is important to ensure that women are not pushed out of their fields and are protected from perpetrators who may not be held accountable for their actions.

Barthelemy and colleagues (2016) sought to examine the negative gendered and sexist experiences of women in physics. In their qualitative study, participants reported experiences of restrictive gender roles, sexist jokes, the use of sexist language, and invisibility. More specifically, with respect to sexist jokes, one participant stated, "…there have been situations with a past group member that made some very inappropriate comments and jokes…a joke about date rape and a joke about domestic violence…it was a problem. I talked to my advisor about it…nothing was ever done about it" (p. 9). Along those same lines, Aycock and colleagues (2019) also found that 68 percent of women in the field of physics reported experiencing sexist gender harassment, 51 percent experiencing sexual gender harassment, and 24 percent experiencing unwanted sexual attention. Experiences of sexual harassment diminished participants' sense of belonging and exacerbated the imposter phenomenon, which were linked to persistence in their program. In sum, these findings, focusing on the discipline of physics, shed light on the pervasiveness of sexist gender harassment and the impact it has on women in STEM. These findings

also serve as a wake-up call for STEM programs and fields to create an inclusive environment for women, particularly URM women, so that they join, remain, and persist in STEM.

Gender Bias in STEM

Multiple factors contribute to gender disparities in STEM education, many of which are related to gender bias throughout STEM. For example, one study reported that boys learn about physics more from hobbies, media, books, classes, and employment than do girls, and they report more prior experiences with electric toys, fuses, and pulleys (Hazari et al., 2010). Additionally, boys tend to spend more time than girls on computer or physical science exhibits at science museums whereas girls spend more time than boys on human body or biology exhibits (Greenfield, 1995b; Cheryan et al., 2017). Another factor that may contribute to gender disparities found in STEM is that women tend to have a stronger preference than men for work environments that provide opportunities to work with people. Given traditional gender roles, such that girls are socialized to have higher values in interacting with and helping people, women are more likely to work in fields that would allow them to provide care or help to people, such as teaching, nursing, or medical science.

Consistent with this difference in gender roles, Woodcock and colleagues (2013) found that women were more people-oriented and that men were more things-oriented. Moreover, people- and things-orientations predicted the choice to pursue a STEM major in college, such that things-orientation was positively associated with STEM major choice, and people-orientation moderated this relationship. In other words, there was a significant relationship between things-orientation and STEM

major choice when people-orientation was low. In the expectancy-value theoretical model, Eccles and colleagues (2002) stated that the perceived task values of several occupations (e.g., "Can I directly relate to people and help people in this field?") is one of the most important mechanisms underlying educational and occupational choices, including one's decision to enter into a STEM field. Since women are expected to gravitate towards people-oriented fields because of traditional beliefs and societal expectations, they often encounter negative experiences when they stray away from the *norm* by pursuing things-oriented fields, such as STEM.

In an academic context, hearing negative comments about women in STEM, which sends the message that women do not belong in STEM, contributes to the experience of gender bias and sexual harassment among URM women (Moss-Racusin, et al., 2018). These social harms may create a negative climate that broadly undermines women's motivation and achievement. Studies have reported girls' and women's experiences with gender-biased messages about their fit in STEM fields. For example, Leaper and Brown (2008) found that 52 percent of adolescent girls heard negative comments related to girls being in math, science, or computer classes, and these sexist comments about girls in science, math, and computers were negatively related to the girls' motivation (i.e., competence beliefs and task value) in math and science.

Gender bias in STEM persists at the university level. Specifically, Robnett (2016) found that when undergraduate women majoring in STEM encountered gender-biased messages about women in STEM, they had lower STEM motivation. Along those same lines, Leaper and Starr (2019) found that the undergraduate

experiences of sexual harassment among women in STEM majors uniquely contributed to lower STEM motivation. To add, Steele and colleagues (2002) found that undergraduate women in male-dominated areas (mostly STEM) were more likely than women in female-dominated areas (arts, humanities, and social sciences) to experience sexist discrimination and to consider changing their major. URM women contend with gender bias as well as racist discrimination in STEM.

Racist Discrimination in STEM

Black/African American students and women in STEM may be impacted by stereotype threat, which has also been found to increase their likelihood to change majors in college or drop out (Cabrera et al., 2001; Casad et al., 2017). In one study by Park and colleagues (2020), Black/African American students had the lowest retention rate in STEM undergraduate programs and were more likely to experience discrimination from professors than any other racial/ethnic group, despite being more likely to ask questions in class, ask faculty questions after class, and meet with professors to discuss material that they did not understand. Previous studies have also reported that negative experiences in introductory science courses are one of the major factors that hinder student learning and academic commitment in STEM majors (Hurtado et al., 2011). Specifically, "coldness" of the classroom environment was frequently reported by students from URM groups.

For many URM students, their selection and persistence in STEM majors has been greatly associated with how academically prepared they were in high school (Bonous-Hammarth, 2000). For example, Latinx students who were interested in science, math, and engineering majors and maintained a high GPA of A or A+ in high

school were also more likely to be retained in science, math, and engineering majors in college. Still, Black/African American and Latinx students face several social challenges and systemic barriers that can impact their persistence and retention in STEM. According to the National Center for Education Statistics (2021), only 12 percent of Black/African American students and 15 percent of Latinx students received a STEM bachelor's degree in the academic year 2019-2020 compared to 18 percent White students and 33 percent Asian American students. Moreover, one study states that historical and contemporary practices that exist within STEM programs have been negatively associated with Black/African American and Latinx students' academic outcomes (McGee, 2016). These practices include lack of STEM faculty from URM groups, impostor syndrome, unwelcoming institutional climates, and ethnic and racial stereotyping (Robinson, McGee, Bentley, Houston, & Botchway, 2016).

The negative experiences, such as racial stereotypes, that Black/African American and Latinx students experience may also cause emotional injury and impact their overall college STEM experience. In one qualitative study, McGee (2016) describes the experiences of Black/African American and Latinx STEM students who came from economically disadvantaged neighborhoods. One Latinx student reported that his professor told him to "quickly forget where he came from (i.e., neighborhood and ethnic heritage) and embrace his more respectable lifestyle as an academic in STEM" (p. 1644). Additionally, a Black/African American woman also reported racial bias and stereotype experiences from faculty and peers. Specifically, she talked about being hypersexualized by a White roommate who stated that no one would

believe she is a smart STEM student if she continued to wear revealing clothes. These are two of many social challenges that Black/African American and Latinx students experience, and these challenges can disrupt students' education and undermine their academic learning. In sum, these findings highlight the need to explore and examine other forms of social harms that URM women experience in their STEM programs, such as verbal threats, assault, and stalking. The current study explores how these phenomena are related to STEM achievement.

Although a relatively large percentage of Asian Americans/Pacific Islanders persist and are retained in STEM majors, they still experience a host of social challenges in relation to their cultural background. The perceived success of Asian American/Pacific Islander students in STEM programs is pervasive in media, politics, and academia. Indeed, this perception of STEM success among Asian Americans/Pacific Islanders has its historical roots. After World War II, large numbers of Asian students migrated to the United States seeking technical expertise in STEM fields, studying civil or aerospace engineering (Chen & Buell, 2017; Hsu, 2015). Since this migration, the stereotype that Asian Americans/Pacific Islanders are especially talented in math and science has been maintained by systems and institutions.

Moreover, the depiction of Asian Americans/Pacific Islanders as being a model minority also influences the stereotypes that depicts Black/African American and Latinx students as being bad at math and science, which then creates a racial hierarchy in STEM education (Martin, 2009). Consequently, this racial hierarchy in STEM education contributes to disparities and negatively influences the self-

perceptions and STEM identities of Asian American students (McGee, Thakore, & Lablance, 2017). The model minority myth also invalidates the prejudice and discrimination experiences that Asian Americans/Pacific Islanders encounter in school and in society (Tran & Birman, 2010; Pang et al., 2011). When the model minority myth is upheld, it implies that racism can be transcended and other racial minoritized groups can achieve equality (Pang et al., 2011). The model minority myth also implies that homogeneity across social categories (e.g., gender, SES, ethnicity) among Asian subgroups' outcomes are shaped in the same way. For these reasons, it is critical for future studies to include, specifically, Asian American/Pacific Islander women when addressing STEM disparities and outcomes, as well as URM students' experiences of social harms.

While there is much evidence on the impact of gender and racist discrimination on the academic success and overall wellbeing of URM students and women in STEM programs and fields, very few studies have examined the intersection of gender and racist discrimination, or gendered racism, among Black/African American, Asian American/Pacific Islander, and Latina women.

Gendered Racism Among URM Women

The current study names and examines URM women's experiences of gendered racism in STEM undergraduate programs. Gender hierarchies are intertwined with racial hierarchies in STEM education, retention, and success (Gnall, 2020). For example, it is critical to highlight the differences in STEM-related experiences and outcomes among Asian American/Pacific Islander women, who are often depicted as an invisible population, compared to Asian American men and

White men and women. According to the National Science Foundation (NSF), Women, Minorities, and Persons with Disabilities in Science and Engineering (2018), only 7 percent of Asian American/Pacific Islander women worked in science and engineering occupations compared to 49 percent White men, 18 percent White women, and 14 percent Asian men. This finding speaks to the need to examine the intersections of gender- and race-related experiences in STEM education among URM women.

The term *gendered racism* was originally coined by scholars to capture the intersections of racism and sexism experienced by Black/African American women (Essed, 1991; Thomas, Witherspoon, & Speight, 2008). That is, Black/African American women are likely to experience racism similar to Black/African American men and sexism similar to White women, but also a unique form of racism that is gendered. Gendered racism is a form of oppression that intertwines the influences of sexism and racism that Black/African American women and other women of color experience simultaneously (Essed, 1991). In one study that examined the link between gendered racism and psychological distress among African American college women, researchers found that greater experiences of gendered racism were related to higher levels of coping by withdrawing from others and from the discriminatory event, and by blaming oneself, which in turn were related to greater psychological distress (Szymanski & Lewis, 2016).

Posited that Black/African American women experience gendered racism across their lifespan, a qualitative study by Spates and colleagues (2020) examined gendered racism in the lives of Black/African American women and found that

Black/African American women have difficulty navigating societal expectations of being Black and a woman due to both racism and sexism. For example, one Black/African American woman stated, "…I put extra thought into what I put on and how I comb my hair because people are going to think certain things…because of stereotypes that America has." Based on these findings, it is of critical importance that future studies highlight and discuss the impact of gendered racism and how racism and sexism contribute to the social challenges that Black/African American women and other women of color experience daily.

While scholars have noted how these intersectional experiences can differ for subgroups of women of color (Buchanan, 2005; Cole, 2009), many similarities exist. Because of their double minoritized status (e.g., based on race and gender), Black/African American, Asian American/Pacific Islander, Latina, and Indigenous women in STEM experience similar social challenges, such as discrimination, isolation from peers and lack of support from faculty (Johnson, 2011). Women of color have also been intentionally excluded from social and networking events where information about classroom and laboratory work, as well as scholarship and research opportunities, is typically shared (Malone & Barabino, 2009). Additionally, the lack of racial and ethnic diversity in STEM undergraduate programs made it more challenging for women of color to connect with members in their racial/ethnic group and establish a concrete academic and social network (Tate and Linn, 2005). When women of color are not able to establish safe and healthy spaces in STEM settings, this may heighten the impact of gender and racist discrimination experiences on their outcomes.

While prior studies have examined gendered racism specifically among Black/African American women, it may be equally important to examine this concept among other women of color who also encounter discrimination experiences because of the double bind. Thus, the current study will extend the literature on gendered racism by exploring this framework among Black/African American, Asian American/ Pacific Islander, and Latina women in STEM undergraduate programs.

The Importance of Intersectionality in the Experiences of URM Women in STEM

According to the U.S. Census Bureau (2019), the percentage of women in STEM fields increased from 8 percent to 27 percent between 1970 and 2019; however, of that percentage, URM women make up a small percent. Specifically, the National Center for Education Statistics (2019) reported that in 2017–2018, URM women earned a small percentage (14.1%) of bachelor's degrees across all STEM fields, and that 5 percent of Asian women, 2.9 percent of Black/African American women, and 3.8 percent of Latinas earned higher education STEM degrees. Undoubtedly, the literature on gender and racial equity in STEM education has been examined and explored for decades (Chipman, Brush, & Wilson, 1985; Rosser, 1997), such that studies have focused solely on gender equity in STEM (e.g., Blickenstaff, 2005) or on racial equity in STEM (e.g., Anderson & Kim, 2006). However, there is very little research that considers the simultaneous intersection of gender *and* race, alongside other social categories.

As one study states, "women of color are not just women of color. They have many identities that intersect and coexist" (Gayles & Smith, 2019; p. 30).

Undergraduate URM women, specifically, have experienced marginalization in their STEM programs which has led to a diminished sense of belonging (Johnson, 2012) and, consequently, the underrepresentation of URM women in STEM fields. Some challenges that URM women face in STEM environments are mistreatment from male faculty and peers, exclusion from faculty interactions, discouragement from faculty to pursue their STEM major, and blatant sexism (Johnson, 2012). Studies have reported that racial and gender stereotypes contribute greatly to students' academic self-confidence and performance (Steele, 1997). Thus, when URM women experience both racial and gender stereotypes, this may lead to poor STEM performance and influence the pushout of URM women in STEM programs. In one study that examined campus racial climate and sense of belonging among undergraduate URM women in STEM, the researcher found that being a URM woman in STEM was negatively related to overall sense of belonging, even when aspects of the college environment were taken into account (Johnson, 2012).

Despite undergraduate URM women having greater intention to pursue a STEM major at the start of college, relative to White women (National Science Foundation, 2018), they still have the lowest rate of STEM persistence among all students in STEM (Smyth & McArdle, 2004). Researchers have developed another term to describe the racial and gender discrimination experiences of URM women in STEM, known as the "double bind" (Malcom, Hall, & Brown, 1976). This term, similar to intersectionality, suggests that URM women as scientists experience oppression and discrimination based on their racial/ethnic background and gender, making URM women the most invisible and marginalized student group in STEM.

Irrefutably, there are unique experiences among Black/African American, Asian American/Pacific Islander, and Latina undergraduate women in STEM. Since 2014, the percentage of Black/African American women earning degrees in biological sciences (4.23%), physical sciences (2.83%), mathematics and statistics (2.35%), and engineering (0.99%) remain disproportionately and concerningly low (National Center for Science and Engineering Statistics, 2017). Much of the research that has focused on Black students' experience in STEM environments have largely focused on Black boys and men (Ortiz et al., 2019; Fries-Britt, 2017), making Black girls and women "hidden figures" in STEM and their intersectional experiences ignored (Ireland et al., 2018). Understanding the historical roots of education among Black/African American women, particularly in STEM, is important because Black/African American women did not always have the opportunity to earn degrees in the U.S. Thus, when Black/African American women enter predominantly White male spaces, such as STEM, they experience gendered racism and may question their belonging in these spaces.

Similarly, Latinas also have reported a diminished sense of belonging in their STEM programs, and prior studies have concluded that for Latinas, generational status is a significant contributing factor to their sense of belonging in STEM (Nuñez, 2009). More specifically, Nuñez (2009) found that first- and third-generation Latina students feel a greater sense of belonging than second-generation Latina immigrant students. Not only are Latinas marginalized in the contexts of race/ethnicity and gender, but they are also marginalized in the context of culture and language as many

Latinas reside in first-generation households (Gloria, Castellanos, & Orozco, 2005; Hurtado, Griffin, Arellano, & Cuellar, 2008).

Studies documenting the cultural experiences of Latinas in STEM programs found that demographic characteristics, such as socioeconomic status, self-sacrifice, and generational status significantly predicted Latina's precollege math and science performance (Rodriguez, Pilcher, & Garcia-Tellez, 2017). Specifically, Rodriguez and colleagues (2017) found that higher socioeconomic status and generational status were associated with better math and science performance. Conversely, traditional Latina values rooted in the *marianista* principle of self-sacrifice were associated with lower math and science performance. While sense of belonging in STEM among Latinas is shaped by hostile environments, it is also shaped by supportive communities via identity-based student organizations (Rodriguez & Blaney, 2020). Specifically, Rodriguez and Blaney (2020) found that Latina women who described STEM environments as sexist and racist, and reported receiving general skepticism from their peers, were more inclined to seek community from other sources, such as groups of women and Latinx groups.

The generational status of Asian women must also be considered when examining STEM outcomes among this group. According to Education Data (2019), about 1.1 million international students are pursuing a degree in the U.S., with 369,548 students coming from China and 52,250 students coming from South Korea. Additionally, 51.6 percent of international students in the United States pursued STEM degrees in the academic year 2018-19 and the number of international students in math and computer science programs grew by 9.4 percent. First-generation Asian

women in STEM might be socialized to conform to European American standards through academia, their profession, and overall American culture (Le & Gardner, 2010). Furthermore, Le and Gardner (2010) found that the international status of Asian women in STEM doctoral programs was important in their overall experience as well as their persistence to degree completion.

The experiences of Asian American/Pacific Islander women in STEM are important to explore because while they are overrepresented in STEM as Asian Americans/Pacific Islanders, they are underrepresented as women (Castro & Collins, 2021). Asian American/Pacific women are often challenged with the stereotype of being submissive, passive, and obedient (Hune, 2006; Patel, 2008), which may influence the way they are treated by White academics in STEM environments. In one qualitative study, researchers examined the hostile environments experienced by Asian American women in STEM (Castro & Collins, 2021). Participants reported incidents of sexual harassment and inappropriate comments made by male lab mates. The authors also reported that one student felt the effects of the double bind and the perception of Asian American women as submissive and obedient when she received comments like, “You’re not what I expect of an Asian girl” (p. 47). Understanding the experiences of Asian American/Pacific Islander women in STEM is critical because they often face several challenges pertaining to identity, validation, and assimilation.

In sum, intersectionality is, indeed, captured in the current study as it considers the multiply marginalized social categories (i.e., race, gender) of URM women in STEM undergraduate programs. As such, the current study examines how

race *and* gender are intertwined in the STEM experiences, which includes community, science identity, and GPA, of women from underrepresented backgrounds. Because of the interconnection of race and gender, URM women in STEM also experience social harms, such as racism and sexism, simultaneously, which may create a significant challenge in their ability to develop a strong identity as scientists. Thus, the current study explores the relation between social harms and URM women's science identity and GPA outcomes.

The Relation Between Sense of Community and Campus Diversity

Neal and Neal (2014) suggest that to simultaneously promote diversity and sense of community in a particular context, it is necessary to understand and address the mixed findings on the relationship between these two constructs. In one review, Townley and colleagues (2011) proposed the community-diversity dialectic which suggests that contexts that foster diversity may differ from those that foster a sense of community. Furthermore, one study found that, in a university setting, White first year students showed less racial prejudice but also less relationship satisfaction when they were paired with a Black/African American roommate rather than a White roommate (Shook & Fazio, 2008).

On the other hand, studies have reported a positive relation between sense of community and diversity and have suggested that a useful approach to fostering a sense of community may include honoring differences and promoting shared values. For example, Chang (2002) found that when universities required courses that emphasized the benefits of diversity, White students had more favorable attitudes toward their Black/African American peers. Other studies have suggested that

campus climate is important when examining the relation between sense of community and campus diversity. Specifically, Hussain and Jones (2021) found that, for Black college students, a negative racial climate was related to a lower sense of belonging and less positive feelings that their institution is committed to diversity. They also found that diverse peer interactions are necessary to mitigate the effects of discrimination experiences and bias on sense of belonging for all students of color. These findings suggest that when students of color perceive an institutional commitment to diversity, it can serve as a protective factor against discrimination experiences and bias on their overall sense of belonging.

In sum, both sense of community and campus diversity are critical elements to examine when finding ways to improve the educational experiences of URM students. Mixed findings on the relation between sense of community and campus diversity also highlight the need for more research in this area. Thus, the current study explores this relation.

Science Identity and Academic Performance Among URM Women in STEM

Science identity is defined as the adoption of a professional identity within the scientific culture (Byars-Watson & Rogers, 2019). It includes both an individual's self-recognition and others' recognition of that person as a scientist within the science community. Studies have reported that a strong science identity has been a significant predictor of an individual's persistence in science majors and likelihood of choosing a science-related career (Caroline & Johnson, 2007; Hunter, Laursen, & Seymour, 2007). Furthermore, Carlone and Johnson (2007) suggest that the key components that drive science identity are a sense of community and affiliation. Oftentimes,

individuals of various cultural backgrounds may question how different they are from the norm and what they must do to fit in. Thus, understanding the role of science identity also involves understanding how people negotiate their cultural norms to fit in and become affiliated with the larger community of scientists.

Several studies have found gender and racial/ethnic group differences in science identity. For example, Williams and George-Jackson (2014) found that male students reported slightly higher comfort with identifying themselves as a scientist than their female counterparts across several STEM disciplines. Additionally, Byars-Watson and colleagues (2016) found that Latinas were more likely to view themselves as scientists and reported significantly higher science identity whereas Black/African American men reported significantly higher negative affective/emotional arousal for doing research. The authors concluded that a reason for this may be that the same research training environment is either experienced differently by Black/African American men and Latinas or that the research training environment itself provides different experiences to various groups (p. 9). Furthermore, these studies highlight the importance of examining the roles of race, ethnicity, gender, and culture in an individual's identity as a scientist. These factors are important to consider because, historically, STEM fields have been viewed as a White, male dominated spaces, thus, individuals who do not meet the requirements of being White and a man may question their belonging and science identities.

Seymour and Hewitt (1997) examined the experiences of science majors from 7 colleges and universities and highlighted features in the science departments that represent White, masculine norms and values. The authors found that URM students

and White women had more difficulty thriving and excelling in undergraduate science majors than did White men. In their study, all participants were prepared to major in science as determined by the Scholastic Aptitude Test (SAT); however, the environment of the science department placed URM students and White women at a disadvantage. The experiences of, specifically, URM women in science are crucial to understand because they often face several systemic barriers in their respective science majors. Despite these barriers, URM women persist and, at times, thrive in the sciences. According to the National Science Foundation (2014), Asian American women, although no specific breakdown of sub-groups, were the most well-represented science graduates, specifically representing 5.2 percent of science graduates. Additionally, Black/African American, Latina, and Indigenous women were only moderately underrepresented in science majors.

A reason for URM women's persistence in science may be a result of their science identity development. For example, in their qualitative study, Carlone and Johnson (2007) explored the science experiences among Black/African American, Latina, and Asian American women, and how these experiences shape their science identities. The researchers found that nearly every woman in their study recognized herself as a "science person." These women expressed enthusiasm toward science's practices, subject matter, and career choices, and also viewed science as an exciting way of knowing. What factors support the development of science identity?

In their qualitative study examining science identity among Latina students, Jackson and Suizzo (2015) found that several factors play a role. One prominent factor is community obligation. One Latina stated, "I feel like I want to represent the

Hispanic community and do it for people who can't have an education and do it for the culture. It's what helped me go into a science field, because I know a lot of Hispanics don't go into the field and I like it, so that's been a big factor" (p. 112). Latinas were aware of how their science identities were developed and factors that shape their identity as scientists. Both science learning experiences and familial support appear to be key in developing a science identity among Latinas. Indeed, these qualitative studies shed light on the importance of science identity development among URM women, and how science identity helps URM persist in STEM, despite the unwelcoming culture that exists.

When examining the retention of URM students in STEM, we must examine the roles of social factors (e.g., race, gender, SES) and institutional structures (e.g., peer environment and interaction, the culture of science; Chan, Eagan, Lin, & Hurtado, 2011). A large body of research suggests that students' marginalized social identities influence the prejudice or negative racial experiences that they encounter which, in turn, negatively influence the quality of their academic and social experiences in college and their commitment to degree completion (Hurtado, Carter, & Spuler, 1996; Museus, Nichols, & Lambert, 2008). In one study by Smedley and colleagues (1993), researchers found that racism and discrimination on campus increased the levels of psychological and sociocultural stressors that URM students experienced, which also negatively affected their adjustment at their institution.

Negative racial experiences may also include stereotypes which can undermine the academic performance of members of racial minoritized groups. The stereotype threat has been found to be negatively related to Black/African American

(Aronson, Fried, & Good, 2002; McKay, Doverspike, Bowen-Hilton, & Martin, 2002) and Latinx (Gonzales, Blanton, & Williams, 2002; Schmader & Johns, 2003) students' academic performance. Furthermore, Aronson (2004) stated that when URM students are repeatedly exposed to the stereotype threat on their campus environment, it can lead to disidentification from a particular major in which the student previously identified with. For instance, a URM student who faces challenges of being one of the few minoritized scientists within a competitive academic environment may disidentify with the science or STEM major as a way to preserve self-esteem and to alleviate anxiety associated with confirming a stereotype (Chang et al., 2011). This, in turn, can diminish student motivation and interest in pursuing a STEM-related career.

In one study that examined racial stigma and science identity among biomedical and behavioral science (BBS) students, Chang and colleagues (2011) found that URM students who reported low levels of negative racial experiences were more likely to identify as a BBS student than their peers who frequently experienced negative racial interactions. The authors also found that being highly identified with these BBS-related goals significantly improved the chances of persisting in a BBS major. Nonetheless, the authors concluded that challenges arrive when URM students who identify as scientists encounter racial stigma. In sum, their overall findings suggest that understanding the role of the stereotype threat and negative racial experiences will help researchers to understand why high-achieving URM students do not persist in science-related majors, like BBS, during their first year of college.

Studies have also reported an association between science identity and GPA among students in STEM. In one study, Hernandez and colleagues (2013) found that science identity trajectories positively correlated with stability in mastery goals, which, in turn, was a significant positive predictor of undergraduate GPA. In another study, researchers found that students with high levels of science identity salience were more likely to translate high college GPAs into graduate school matriculation compared to students with lower levels of science identity salience (Merolla & Serpe, 2013). Sense of community and science self-efficacy are also important predictors of increased science identity and academic achievement, especially for URM students. For example, in a study that examined the relationship between the science self-efficacy beliefs science identity, racial identity, and the science achievement of African American students attending HBCUs, the authors found that there was a significant relationship between college science GPA and the predictors (science identity and centrality, nationalist, and public regard) via the mediation of science self-efficacy belief (White, DeCuir-Gunby, & Kim, 2019).

Although many studies have examined the relations between racial stigma, sexism, gender discrimination, science identity, and academic outcomes among URM students, little is known about the relations between these social harms, science identity, and GPA among, specifically, URM women in STEM undergraduate programs, which is what the current study seeks to explore. Studies have found that adopting a science identity for URM women remains a daunting task as they combat social challenges, such as gendered racism and sexual harassment. More specifically, Black/African American women often find it difficult to adopt a science identity due

to negative stereotypes about both Black people and women regarding intelligence and science ability, the lack of representations of Black scientists, and not being accepted as scientists by their White and male peers (Carlone & Johnson, 2007; Finson, 2002; Hazari et al., 2013).

Having a community of individuals who share the same identities and experiences may serve as a protective factor for URM women amid negative social challenges in STEM. In one study that examined the relationship between racial and gender identity on the development of STEM identity and academic achievement among Black female undergraduate STEM students, Smith and colleagues (2019) found that participants had a high private racial regard and STEM identity. That is, they were proud to be Black female scientists within a predominantly White and male-dominated field. One Black woman stated, "if you've been successful in your STEM major and you're just continuing, and you don't fall short that . . . shows you're a strong independent Black woman" (p. 413). This finding highlights the critical need for more research on the roles of sense of community and science identity amid experiences of social harms among URM women in STEM undergraduate programs.

In sum, science identity and academic achievement are important to explore when examining the overall outcomes of students in STEM undergraduate programs because a strong science identity and high GPA may lead to persistence in STEM even after four years of college. For example, one study found that science identity salience had significant impact on graduate school matriculation (Merolla & Serpe, 2013). The authors also found that science identity salience was related to higher

college GPA, and that science identity salience, along with college GPA and research experience, act as mediators of STEM enrichment program effects on graduate school matriculation. Thus, these findings suggest that a supportive environment that amplifies science identity salience is critical for both students' GPA outcomes and retention in STEM fields. The current study explores these relations.

College as a Context of Development

The age range of most college students is typically between 18 and 25, and Arnett (2000) describes individuals within this range as *emerging adults*. Emerging adulthood is a developmental period during which individuals have postponed adult roles and responsibilities for further exploration of uncommon work and educational possibilities. Arnett (2000) also describes emerging adults as distinctive—demographically, subjectively, and in terms of their approach to identity exploration. The period of emerging adulthood may be challenging for many college students and students transitioning to college as it is a period of newfound independence (Johnson et al., 2010), which may lead to significant stress, risky behaviors, and the utilization of mental health services (Arnett, 2000). Furthermore, it is critical to examine and explore the development of emerging adults in college because they are exposed to a wide array of varying ideas that will, ultimately, influence their worldview, which is also important for their identity development (Arnett, 2016).

Several studies have examined how race or gender shape the psychological experiences of emerging adults. For example, one study found that emerging adult women scored higher than men in in psychological distress, chronic stress, minor daily hassles, emotional coping style and social support (Matud et al., 2020). Another

study proposed five pillars of emerging adulthood as it relates to race/ethnicity: age of instability, age of possibilities, age of self-focus, age of feeling in-between, and age of identity exploration (Syed & Mitchell, 2013). The authors describe the *age of possibilities* as a challenging period for URM students as they face barriers to succeeding in school, such as negative teacher interactions and experiences of institutional racism (Syed et al., 2011). They also reported that Black/African American (81 percent) and Latinx (84 percent) emerging adults are more likely than White emerging adults (74 percent) to view college education as one of the important keys to success (Arnett & Schwab, 2012). These findings highlight the influence of race or gender in the developmental outcomes and wellbeing of college students.

In sum, it is evident that college is an important period of adult development, and while little research has explored the intersectionality of race and gender among emerging adults in college, previous studies have presented meaningful findings on why these social categories are necessary to consider in this developmental context. Thus, the current study explores the experiences of URM women in STEM undergraduate programs who are within this period of development.

Chapter 3: The Current Study and Methodology

The Current Study

In the current dissertation I explore the relations between campus inclusion, motivation, and achievement among URM women in STEM undergraduate programs. I also examine the moderating roles of URM women's experience of social harms, such as gendered racism, sexual harassment, and physical and verbal violence, and psychological sense of community. These aims were explored using data from the Meyerhoff Scholars Program (MSP) at the University of Maryland-Baltimore County (UMBC) in an effort to understand the relations among these variables and identify ways to improve STEM outcomes among undergraduate URM women in the MSP and similar programs at other universities. The research questions and hypotheses that guide the current study are:

Research question 1: What is the relation between URM women's perceptions of campus inclusion and their STEM motivation and achievement outcomes, as measured by science identity and GPA?

Hypothesis 1: I predicted that perceptions of campus inclusion would positively predict undergraduate URM women's science identity and GPA outcomes.

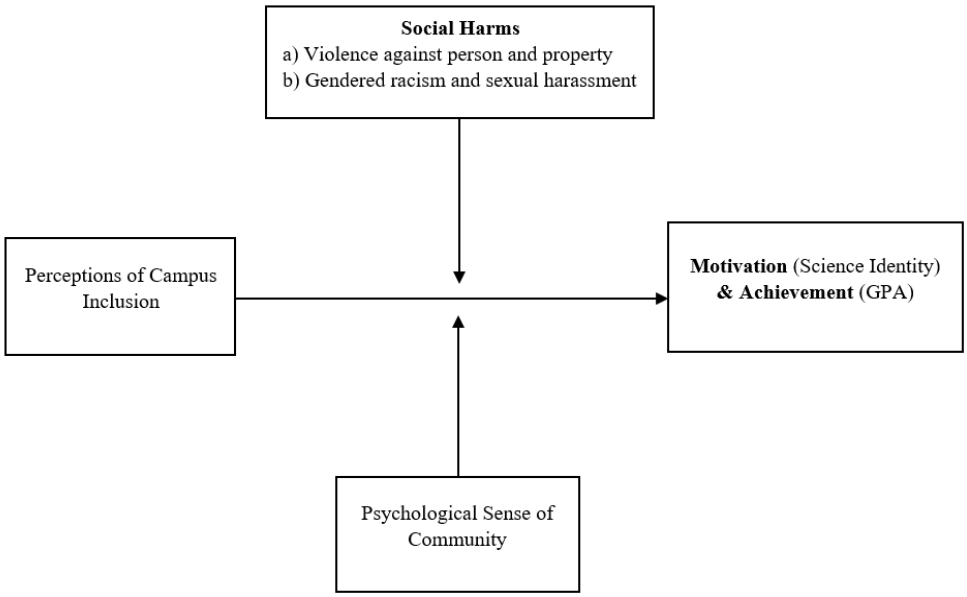
Research question 2: Does experience of social harms—such as gendered racism, sexual harassment, and violence against person and property—moderate the relation between URM women's perceptions of campus inclusion and STEM motivation and achievement outcomes?

Hypothesis 2: I predicted that experiences of social harms would moderate the relation between campus inclusion and motivation and achievement outcomes, such that experience of social harms would weaken or undermine the relation between perceptions of campus inclusion and motivation and achievement outcomes.

Research question 3: Does psychological sense of community moderate the relation between URM women's perceptions of campus inclusion and STEM motivation and achievement outcomes?

Hypothesis 3: I predicted that psychological sense of community would moderate the relation between perceptions of campus inclusion and outcomes among URM women, such that sense of community would strengthen the relation between campus inclusion and motivation and achievement outcomes among undergraduate URM women in STEM.

Figure 1. Psychological Sense of Community and Experiences of Social Harms as Moderators in the Relations Between Campus Inclusion and Motivation and Achievement Outcomes.



Method

Participants

Data for the current study were collected from undergraduate URM women who are part of the Meyerhoff Scholars Program (MSP) at the University of Maryland-Baltimore County (UMBC). The MSP was founded in 1988 with support from Jane and Robert Meyerhoff to provide financial assistance, mentoring, advising, and research experience to Black/African American male undergraduate students committed to obtaining doctoral degrees in math, science, and engineering. The first cohort (M1) of 19 incoming first-year students were enrolled in 1989, and by 1990, women were admitted into the program. Participants of the current study were scholars who entered the program between Summer of 2012 (M24) and Summer of 2019 (M31).

Participants who self-identified as a woman and as Black/African American, Asian American/Pacific Islander, and/or Latina were included in the analyses for the

current study. Among the 246 scholars of cohorts M24-M31, *n* = 68 participants identified as male, and *n* = 29 participants identified as White and female, and these participants were excluded from the study because they did not meet the inclusion criteria. Lastly, *n* = 3 participants who identified their gender as nonbinary and *n* = 9 participants who identified as mixed-race or reported their race/ethnicity as "unsure" were excluded due to low sample size and insufficient statistical power. The final study sample consisted of *N* = 137 women from URM groups. Specifically, *n* = 105 (76.1 percent) identified as Black/African American women, *n* = 19 (14.3 percent) identified as Asian American/Pacific Islander women, and *n* = 13 (9.4 percent) identified as Latina women. Further descriptive analyses were conducted on the final sample. The age range of Meyerhoff scholars upon acceptance into the program and university was between 17 and 21 with a mean age of 18 (*M* = 18.19, *SD* = .63). Additionally, more than half of the sample attended high school and resided in the state of Maryland. Other states and countries in which participants resided and attended high school includes Arizona, Indiana, Michigan, North Carolina, New York, Pennsylvania, South Carolina, Virginia, and U.S. Virgin Islands, as well as Canada. Other demographic variables, like socioeconomic status (SES) and parental education, were not collected in the Meyerhoff Scholars project and, thus, could not be reported in the current study.

Procedure

The current study utilizes data from the MSP between the years 2012 and 2021. Prior to completion of surveys, all students (or their parents or guardians) completed consent forms when they applied to the MSP. Survey data on

psychological sense of community, science identity, and other demographic items were collected from cohorts' M24-M31. These items were collected during students' respective summer bridge programs. Specifically, the psychological sense of community scale was administered along with a set of other scales at the end of the 6-week Summer Bridge and at the end of every academic year. Each incoming cohort of Meyerhoff Scholars is required to attend the summer bridge program prior to the start of their Fall semester. During the summer bridge program, students receive orientation and take two summer classes: "Calculus" and "Race and Science." Meyerhoff Scholars are administered four online surveys that were spaced out during the six-week summer bridge program. Scholars were made aware that their self-reported answers to the measures are used to assess the effectiveness of the program, and these surveys were administered by UMBC Psychology graduate students. Data on psychological sense of community were collected during the summer bridge program, and at the end of every academic year. For the current study, psychological sense of community measured at the end of students' sophomore year was used for the analysis.

Every school year, at the end of the Spring semester, Meyerhoff scholars complete an online end-of-year survey that is sent via email. The science identity scale and items on diversity were administered along with other scales. For the current study, Year 2 responses on the psychological sense of community scale, experiences of social harms (items on diversity), and perception of campus inclusion (items on diversity) scales are used. However, responses on science identify scale at the end of the scholars' junior year and their GPA on the same period are utilized (see

Table 1). The current study examines outcome variables one year later to determine whether there are changes over time in, specifically, students' GPA outcomes. Also, past studies using Meyerhoff scholars have taken a longitudinal approach to examine change over time (e.g., Maton et al., 2016; Sto. Domingo et al., 2019). More specifically, in their second study, Maton and colleagues (2016) found that sense of community, which was measured at the end of the summer bridge program, significantly predicted both perceived program benefit (measured at the end of their first year) and science identity (measured at the end of their sophomore year) among Meyerhoff scholars.

Measures

Predictor Variables

***Campus Inclusion*.** Items for the Perceptions of Campus Inclusion scale were drawn from the University of California, Los Angeles (UCLA) Diverse Learning Environments survey which captures student perceptions regarding the institutional climate, campus practices as experienced with faculty, staff, and peers, and student learning outcomes (HERI; Diverse Learning Environments Classroom Climate Module, 2015). Students responded to these 9 items at the end of their sophomore year on a scale from *1 = Very Few to 4 = All the Time*. Given the lack of research on these specific items, an exploratory factor analysis (EFA) was conducted to determine factor structure and internal reliability. A total of 9 items were strongly associated and loaded highly onto the same factor, which created the *Perceptions of Campus Inclusion* scale. Item statements and factor loadings appear in Table 2 and Cronbach's alpha for this and all other measures in the current study appear in Table 3.

***Experiences of Social Harms*.** Items for the Experiences of Social Harms scale were drawn from the Higher Education Research Institute (HERI) survey which examines campus climate among faculty, students, and staff (HERI; Diverse Learning Environments Classroom Climate Module, 2015). Twelve items regarding violence and discrimination were administered to students at the end of their sophomore year on a scale from *1 = Very Often* to *5 = Never*. Given the lack of research on these items, an exploratory factor analysis (EFA) with principal axis factoring and varimax rotation was conducted to determine factor structure and internal reliability. A total of 7 items were strongly associated with and loaded highly onto the same factor, which was named *Violence Against Person and Property*. A total of 5 items were strongly associated with and loaded highly onto the same factor, which was named *Gendered Racism and Sexual Harassment*. Table 2 shows the factor loadings of each item for the three scales. Table 3 shows the descriptive statistics for each scale, along with Cronbach's alpha.

***Psychological Sense of Community*.** The psychological sense of community scale includes 12 items adapted from the original Sense of Community Index (Chavis et al., 2008). The Sense of Community Index (SOCI) was informed by McMillan and Chavis' (1986) theory of psychological sense of community, which suggests that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together. Furthermore, Meyerhoff Scholars were prompted to report how well each of the 24 statements represented how they felt about the program (*1 = not at all* to *4 = completely*). Sample items include statements like, "I expect to be part of the

program for a long time." Reliability of this measure has been found to be high, with Cronbach's alpha = 0.82 (Chavis et al., 2008; Maton et al., 2016); see Table 3 for Cronbach's alpha in the current sample. While there are four critical elements of sense of community, the current study examines sense of community wholly as prior studies that focused on the Meyerhoff Scholars program did not analyze these four elements separately. Thus, there is no conceptual justification in doing so. Also, given the relatively small sample, the current study does not have sufficient statistical power to analyze the four elements of sense of community separately.

Outcome Variables

Motivation: Science Identity. The science identity scale was measured during the fourth week of the summer bridge program and again at the end of students' junior year using the five-item Scientific Identity Scale (Chemers et al., 2010) that asks students to assess how much being a scientist is viewed as part of who they are on a scale from *1 = Strongly Disagree to 5 = Strongly Agree*. Sample items included statements like, "I feel like I belong in the field of science," and "I have come to think of myself as a scientist." Scale scores were calculated by taking the mean of all items completed. High reliability was reported in previous studies, with Cronbach's alpha = 0.89 (Chemers et al., 2010; Estrada et al., 2011); see Table 3 for Cronbach's alpha in the current sample.

Achievement: Grade Point Average. Students' cumulative GPA from their junior year (Year 3) was used to assess their academic outcomes. GPAs are collected from students' transcripts which are obtained from the registrar's office of the

University of Maryland, Baltimore County. Descriptive statistics for Year 3 GPA appear in Table 3.

Covariates

High School GPA. Students' high school GPA was collected from their college application information, which is used to screen prospective Meyerhoff scholars. High school GPA is submitted by students as part of the college application process and Meyerhoff Scholars program process. Descriptive statistics for High School GPA appear in Table 3.

SAT Math. Students' Scholastic Assessment Test (SAT) in Math was collected from their college application information, which is used to screen prospective Meyerhoff scholars. Descriptive statistics for SAT Math appear in Table 3.

Both high school GPA and SAT math scores were used as covariates in the current study to be consistent with previous studies that examined the Meyerhoff Scholars program (see Maton et al., 2012; Maton et al., 2016). These two measures are often used as covariates in order to ensure that the outcome of Meyerhoff students is not determined by pre-college credentials, which is also one of the determining factors of scholars' entry into the program, but by their overall experience in the Meyerhoff Scholars program.

Data Analytic Strategy

Experiences of Social Harms and Psychological Sense of Community as Moderators

To address the three research questions, which examine the relation between perceptions of campus inclusion and subsequent achievement (GPA) and motivation (science identity) outcomes, as moderated by social harms (gendered racism and sexual harassment and violence against person and property) and sense of community, I conducted two hierarchical linear regressions. For preliminary analyses, I tested assumptions for hierarchical linear regression by 1) checking for normality of the dependent variable, 2) checking for outliers, 3) confirming that a linear relationship between the dependent variable and the predictor variables exists, 4) confirming that multicollinearity between the predictors is not present, and 5) examining the homoscedasticity of residuals.

In the first linear regression model, science identity was the criterion variable, and in the second linear regression model, GPA was the criterion variable. In step 1 of the models, SAT math and high school GPA were entered as covariates. In step 2, I entered the perceptions of campus inclusion, psychological sense of community, gendered racism and sexual harassment, and violence against person and property variables. Finally, in step 3 of the models, I entered the cross-products of campus inclusion and psychological sense of community, campus inclusion and gendered racism and sexual harassment, and campus inclusion and violence against person and property. Significant interactions were further probed to understand how the relation between campus inclusion and each outcome vary by the moderators.

All analyses were conducted using IBM SPSS Statistics Version 28 (IBM Corp., 2021). Effect size partial eta squared and post hoc power were reported for

regression analyses. According to Cohen (1988), η_p^2 values of .01, .06, and .14 are considered small, medium, and large effects, respectively.

Chapter 4: Presentation of Results

Preliminary Analyses

Table 4 shows the means, standard deviations, and group comparisons for each key variable for Black/African American, Asian/Pacific Islander, and Latina women in the Meyerhoff Scholars program (N = 137). There were no statistically significant differences between the three group means as determined by the one-way ANOVA for the predictor variable, perceptions of campus inclusion, F (2, 113) = 1.82, p = .168. There were also no statistically significant differences between group means for the moderators, gendered racism and sexual harassment, F (2, 113) = 0.14, p = .868, violence against person and property, F (2, 113) = 0.34, p = .712, psychological sense of community, F (2, 114) = 1.46, p = .237, and the outcome variable, science identity, F (2, 114) = 0.86, p = .425. These preliminary findings support my data analytic strategy to analyze experiences of social harms among these three groups of women together and not separately. Additionally, experiences of social harms (i.e., gendered racism and sexual harassment, and violence against person and property) appears to be low as scores were largely in the "rarely/never" range. For year 3 GPA, high school GPA, and SAT math, however, there were statistically significant differences between group means. Post-hoc analysis via Bonferroni's for multiple comparisons revealed that Black/African American women had lower GPA outcomes in their junior year compared to Asian/Pacific Islander women. Bonferroni's post hoc test also revealed that Asian/Pacific Islander women had higher high school GPAs than Black/African American and Latina women.

Lastly, Asian/Pacific Islander women earned higher SAT math scores than Black/African American women.

Missing Data

The data were assessed for missing and out-of-range values. While there were no out-of-range values, missing data were found for the predictor variable, perceptions of campus inclusion, the moderators, gendered racism and sexual harassment and violence against person and property, and psychological sense of community, the outcome variables, GPA and science identity, and the two covariates, high school GPA and SAT math scores. Specifically, data for perceptions of campus inclusion, gendered racism and sexual harassment and violence against person and property were missing for 17.4% (n = 24) of the full sample. Data for psychological sense of community were missing for 16.7% (n = 23) of the full sample. Data for science identity were missing for 16.7% (n = 23) of the full sample, and data for GPA were missing for 4.3% (n = 6) of the full sample. Lastly, data for high school GPA were missing for 6.5% (missing n = 9) of the full sample, and data for SAT math scores were missing for 18.8% (n = 26) of the full sample. The SPSS Multiple Imputation procedure was used to generate 5 imputed datasets. Results for correlational and regression analyses were pooled across 5 imputed datasets.

Correlations Among Key Variables

Pearson correlations for the study variables post-imputation for the final sample (N = 137) appear in Table 5. Correlations among the variables ranged from -.06 to .56. Perceptions of campus inclusion at year 2 were positively correlated with psychological sense of community at year 2 with a small to moderate effect, such that

greater perceptions of an inclusive campus environment were related to a greater sense of community among these students. There was no significant correlation between perceptions of campus inclusion and violence against person and property (p = .472) or gendered racism and sexual harassment (p = .150). However, perception of campus inclusion at the end of students' sophomore year (year 2) was positively correlated with science identity at the end of students' junior year (year 3) with a small to moderate effect, revealing that greater perceptions of an inclusive campus environment were associated with greater subsequent science identity. Perception of campus inclusion was not significantly correlated with students' GPA at the end of their junior year (p = .281).

Students' psychological sense of community was not significantly correlated to their year 3 GPA (p = .165), or experiences of social harms, as measured by violence against person and property (p = .197) and gendered racism and sexual harassment (p = .091). However, their psychological sense of community was positively correlated with their science identity outcomes with moderate to large effects, such that a greater sense of community among MSP students was related to a higher identity salience one year later. Gendered racism and sexual harassment was positively correlated with violence against person and property, such that greater experiences of gendered racism and sexual harassment was related to greater exposure to violence. Gendered racism and sexual harassment, however, was not significantly related to students' science identity (p = .645) and GPA outcomes (p = .561). On the contrary, violence against person and property at year 2 was negatively correlated with GPA outcomes at year 3 with small to moderate effects, such that

greater exposure to violence was related to a lower GPA. Violence against person and property were not associated with science identity (p = .543).

Primary Analyses

Experiences of Social Harms and Psychological Sense of Community as Moderators in Science Identity

The current study sought to explore whether experiences of social harms, as measured by gendered racism and sexual harassment and violence against person and property, moderated the relation between students' perceptions of campus inclusion and their motivation (science identity) and achievement (GPA) outcomes. In step one of the model predicting perceptions of campus inclusion on science identity, high school GPA and SAT math scores did not account for any proportion of variance in science identity. In step 2 of the model, perceptions of campus inclusion, gendered racism and sexual harassment, and violence against person and property did not account for any significant proportion of variance in science identity. In both the pre- and post-imputed model, psychological sense of community was statistically significant in step 2. Finally, in step 3 of the model, the two-way interactions of campus inclusion and gendered racism and sexual harassment, campus inclusion and violence against person and property, and campus inclusion and psychological sense of community did not account for any significant proportion of variance in science identity. Table 6 shows the full regression statistics pre- and post-imputation for the key variables predicting science identity.

Experiences of Social Harms and Psychological Sense of Community as Moderators in Year 3 GPA

Table 7 shows the full regression statistics pre- and post-imputation for the key variables predicting GPA. In step 1 of the model predicting perceptions of campus inclusion on year 3 GPA outcomes, high school GPA accounted for 1.5 percent of the variance in year 3 GPA. In step 2 of the model, none of the key variables accounted for a significant proportion of the variance in year 3 GPA. Lastly, in step 3 of the model, the two-way interaction of campus inclusion and psychological sense of community accounted for 4.8 percent of the variance in year 3 GPA. Further probing via PROCESS Macro (Hayes, 2013) revealed that the interaction between psychological sense of community and perceptions of campus inclusion was statistically significant for Asian/Pacific Islander women ($p = .041$), but not for Black/African American or Latina women. However, these results should be interpretated with great caution, as post-imputation analyses from the pooled results revealed that the two-way interaction between psychological sense of community and perceptions of campus inclusion were not statistically significant.

Chapter 5: Discussion, Implications, and Future Directions

Discussion

The current study sought to explore motivation and achievement outcomes among undergraduate URM women in STEM majors who are part of the Meyerhoff Scholars program at UMBC. Specifically, I examined how perceptions of campus inclusion predicted students' identity as scientists and their GPA at the end of junior year. Gendered racism and sexual harassment, violence against person and property, and psychological sense of community were also explored as moderators of the relation between perceptions of campus inclusion and motivation (science identity) and achievement (GPA) outcomes. It was hypothesized that gendered racism and sexual harassment and violence against person and property would weaken or undermine the relation between perceptions of campus inclusion and motivation and achievement outcomes. It was also hypothesized that psychological sense of community would strengthen the relation between perceptions of campus inclusion and motivation and achievement outcomes.

RQ 1: Perceptions of Campus Inclusion and Subsequent Motivation and Achievement

The current study found that perceptions of campus inclusion at Year 2 did not predict science identity or GPA at Year 3. This finding stands in contrast to Hypothesis 1 and the literature finding that campus inclusion bolsters academic success and persistence among college students and, particularly, among STEM majors. For example, Victorino and colleagues (2022) explored the relation between

perceptions of campus climate and classroom engagement among STEM majors, and how this relation differs by race/ethnicity. They found that classroom engagement was a significant predictor of students' overall performance as measured by GPA. The authors also found that students' perceptions of campus climate had a positive association with classroom engagement which, subsequently, had a positive impact on their GPA. In another study that examined Black students'—in STEM or social, behavioral, and economic (SBE) sciences programs—perceptions of campus climate and their academic resilience (Mills, 2021) found that more positive perceptions of the general campus climate predicted higher levels of academic resilience, as measured by the Academic Resilience scale ("I can handle difficult situations at school"). Past studies that examined the relation between students' perceptions of campus climate and GPA outcomes have considered other factors, like class engagement or academic resilience. In the current study, the only achievement measure that was examined was students' subsequent GPA; thus, it could be that other aspects of academic achievement would need to be considered in order to fully understand the academic experiences of URM women in STEM undergraduate programs.

Victorino and colleagues (2022) also found that the positive relationship between classroom engagement and GPA was significant for Latinx students, but not for White students. This is an important finding to highlight because URM students may feel excluded and marginalized on their college and university campus, which may impact both how they perceive their campus environment and their performance in classrooms. Indeed, studies have reported how a hostile campus or department

environment can negatively influence the academic performance of, specifically, URM women and can result in them leaving their STEM programs before graduating (e.g., Rincón et al., 2016; Cross et al., 2017). For URM women, a hostile campus or department environment can include exclusion on the basis of race *and* gender, stereotype threat, experiences of gender, racial, and/or sexual harassment, and so on. Thus, it is critical that future studies continue to explore these relations among this group.

Furthermore, other studies have found a significant relation between inclusion practices and STEM identity outcomes. For example, Jensen and Cross (2021) sought to examine the relationship between engineering undergraduate students' level of identification with engineering and their self-reported mental health and perceptions of inclusion. The authors found a significant relationship between perceptions of inclusion and Engineering Identity. They also found moderate correlations between engineering identity and engineering career, department caring, and department pride. In their study, perceptions of inclusion were measured using the Engineering Department Inclusion Level Survey (EDIL). Subscales include Department Caring, Department Diversity, and Department Pride. In the current study, however, perceptions of campus inclusion statement items were general to the broader campus community and not specifically with STEM departments at UMBC. Thus, students in the current study may have answered the items based on their perceptions of inclusion to the UMBC community, which can include engagement in sports, clubs, and other classes, instead of their perceptions of inclusion to their major department.

In sum, while findings from Jensen and Cross's (2021) study suggest that inclusive practices may be critical for the development of students' STEM identity, the current study did not find a similar pattern of results. Another possible explanation for the nonsignificant finding in the relation between perceptions of campus inclusion and motivation and achievement outcomes could be that URM women in the current study may have already established a sense of community and inclusive environment prior to their official start of classes at UMBC. Specifically, all Meyerhoff scholars engage in a summer bridge program, which is a 6-week program that is intended to provide them with the tools they need to succeed in the first semester of college. These scholars take a few courses together and are collectively taught about time management and study skills. For students who are not part of such a rigorous program as the MSP, their opportunities to build community among each other and establish a sense of belonging may develop once they begin their first day of classes rather than during the summer. Thus, it is important to note that campus inclusion may be more important for non-Meyerhoff scholars who do not have the opportunity to engage in such activities before the start of their semester.

RQ 2: Experience of Social Harms as a Moderator

Results from bivariate correlations indicated that violence against person and property was negatively correlated with GPA at Year 3, such that greater experience of violence was associated with poorer subsequent achievement. However, regression analyses revealed that neither gendered racism and sexual harassment nor violence against person and property significantly moderated the effects of perceptions of campus inclusion on subsequent GPA or science identity, in contrast to Hypothesis 2.

Results also indicated that participants reported experiencing these social harms rarely, if ever (see Table 4 for means). Selection effects may partially explain these findings. That is, the current study consists of highly talented students who are part of the Meyerhoff Scholars program and, thus, the sample is not representative of the entire female student population at UMBC.

To my knowledge, this is one of only a handful of studies to examine violence against person and property and gendered racism among URM women in STEM undergraduate programs. Past research discussed violence against women on college campuses more generally as opposed to within their STEM departments. For example, Rennison and Addington (2014) talked about the importance of operationalizing violence against women beyond sexual violence. That is, previous studies have defined violence against women in college as synonymous with sexual violence. However, Rennison and Addington (2014) argue that other forms of violence must be considered and studied, such as robbery, nonsexual assaults, posting of inappropriate photographs online, stalking, and other forms of online reputational harm. In the current study, none of the items on 'Violence Against Person and Property' included experiences of sexual violence and have highlighted other forms of violent crimes as suggested by Rennison and Addington. Nonetheless, most participants in the current study reported that they did not experience any form of violence within their STEM programs (see Table 4), which is critical to highlight. It could be that participants in this study simply did not encounter any form of violence (as listed in Table 2) on the UMBC campus, which is an optimistic finding. It could also be that any form of violence participants may have encountered may not have

been captured in the subscale used in the current study. Still, previous studies have documented the pervasiveness of violence against women at colleges and universities (e.g., Hames, 2009; Jessup-Anger et al., 2018), which is worth further exploring among, specifically, URM women.

Although very few studies on STEM outcomes among URM women have used the term 'gendered racism,' URM women's experiences of racism and sexism in STEM has been documented in the literature. In a qualitative study by Charleston and colleagues (2014) that explored the role that race and gender play in the academic pursuits of African American women in the STEM field of computing sciences, two main themes emerged: racial and gender challenges, and a shared sense of isolation. Specifically, African American women participants reported grappling with their identities as women of color in race- and gender- exclusive academic spaces. Participants also discussed how their intersecting social categories of being Black and female left them feeling unwelcome in their computer science department. One participant described her encounter with a White male peer who questioned her academic capabilities and stated, "Maybe there was the perception that I was female, I was Black, and I was incompetent. His perception was I was going to pull him down" (p. 282).

Charleston and colleagues (2014) also found that their participants had a shared sense of isolation, which included mistreatment from both faculty and peers in computer science. One participant shared a story about when an Asian graduate student bystander intervened and confronted a professor who said, regarding an African American woman student, "I don't think she has talent. I think White

professors gave her grades because of her race and they felt bad about slavery. I don't think there are any real computer scientists who are Black, and maybe she can be the first" (p. 283).

Another critical component of science identity is being validated by important others as being a "science person" (Carlone & Johnson, 2007). Thus, when URM women's capabilities of being scientists are questioned by faculty and peers, it may interrupt the development of their identity as scientists. Moreover, Wilkins and colleagues (2019) explored the racialized and gendered experiences of women of color in STEM graduate programs, and participants shared their experiences with racial or gendered stereotypes and microaggressions in their departments. None of the participants, however, described the intersection of both race- and gender-based experiences. In sum, findings from these past studies suggest that further exploration of these variables is important to fully understand how these experiences of social harms might influence URM women's STEM outcomes, such as their science identity.

Furthermore, sexual harassment and STEM outcomes (e.g., STEM value, STEM career aspirations) have been well documented in the literature (e.g., Cabay et al., 2018; Leaper & Starr, 2019; Robnett, 2016). However, very few studies examined the relation between sexual harassment and science identity outcomes in undergraduate students. In their study, Aycock and colleagues (2019) suggested that sexual harassment may impact the physics identity of women in physics but were unable to explore this phenomenon because it was beyond the scope of their study. The authors did find that sexual gender harassment was a significant predictor of

negative sense of belonging, which is a key component of science identity as suggested by Carlone and Johnson (2007; e.g., I have a strong sense of belonging to the community of scientists). This finding highlights the critical need for more research on the potential impact of sexual harassment on, specifically, URM women's science identity development.

It is also important to note that the culture and climate of a college or university may influence how students perceive campus inclusivity and may also hinder or prevent them from reporting their experiences with sexual harassment. All participants for the current study were students at UMBC, an institution where there have been demands for new policies around campus sexual assault in recent years. For example, in 2018, two former students reported to UMBC's campus police that they had been sexually assaulted while enrolled but that their reports were ignored (Bauer-Wolf, 2018). According to one news report, one student stated the UMBC police discouraged her from filing a complaint and that the institution would be swift with conducting an investigation (Bauer-Wolf, 2018). These were just two of many sexual assault reports that sparked protests and sit-ins on the UMBC campus for weeks. This led to five women who were former students coming together to file a Title IX lawsuit against UMBC. These women stated that they were sexually harassed and assaulted between 2014 and 2017 and described unfair treatment of sexual assault victims at UMBC. All claims were dismissed by the presiding judge, and little is known about the extent to which this case has impacted female students' willingness to report of sexual harassment or assault at UMBC. In short, events like these may contribute to a campus culture that might make students reluctant to report, even on

confidential surveys, in part because of rape culture and gender-based violence that often goes unaddressed on college or university campus.

Despite Title IX, which prohibits discrimination (including harassment and assault) on the basis of sex or gender in educational institutions receiving federal funding, experiences of sexual harassment remain grossly underreported on college campuses (Cantor et al., 2015). Pinchevsky and colleagues (2019) found that victims of sexual harassment may refrain from reporting due to fear of retaliation, perceived inaction from complaint handlers, and shame. In another qualitative study that sought to examine why female college student victims do not report sexual harassment, the data yielded three major themes: institutional barriers, social barriers, and financial inadequacy (Ssali et al., 2021). Specifically, institutional barriers included insensitive investigative practices, power dynamics, biases in handling sexual harassment or assault complaints, and the need for more clear evidence. One student stated, "Students know that even when they report, nothing will happen to the harasser. They tell you to start with the Head of Department and he asks you for evidence and sometimes this is not easy because maybe the lecturer touched you and you have no evidence. The Head of Department tells you to go back and ensure that you get evidence. That bureaucracy, students get fed up" (p. 69). This finding suggests that when female students try to speak up about their sexual harassment experiences and seek justice, various institutional barriers arise, leaving students feeling hopeless about making reports.

For URM women in college, seeking justice for experiences with sexual harassment or assault might seem nearly impossible as URM women face the double

jeopardy of being a woman and a person of color and are often silenced. In a qualitative study that examined women of color undergraduate student survivors' experiences with campus sexual assault, Harris (2020) found that many survivors of campus sexual assault refrained from reporting because of the pervasiveness of white feminism and society's description of what a sexual assault victim would look like, which often excludes women of color. One Latina student stated, "people, or even nonprofits spread awareness, they always focus on who is acceptable to be a survivor, who is allowed to be a victim. I think it's always going to be a white woman, and if you're anything else, you can't be a survivor…You don't fit into that category" (p. 18). Undeniably, URM women have been hidden figures when dialogue on sexual harassment and assault occurs. For this reason, the current study sought to examine undergraduate URM women's experiences with gendered racism and sexual harassment on their science identity outcomes, and future studies should continue to explore this relation. In sum, intersectionality is important to center in the literature on harassment and STEM outcomes because the co-occurrence of racism and sexism creates unique experiences for URM women as racial stereotypes are often infused in sexual harassment experiences for these groups (Buchanan & Fitzgerald, 2008).

The finding that gendered racism and sexual harassment and violence against person and property did not significantly predict students' year 3 GPA has not been thoroughly explored in previous studies, to my knowledge. However, findings from studies that have explored a similar relation stand in contrast to what was found in the current study. For example, Mengo and Black (2016) examined whether sexual or physical and verbal violence impact students' GPA and decision to leave their

university. Their study's demographics included 87.8 percent women and 59.5 percent URM students. The authors found that students' GPA significantly declined after students reported experiencing sexual or physical and verbal violence, with sexual violence being more strongly associated that physical and verbal violence. They also found that students who experienced sexual violence were more likely to leave school compared with students who experienced physical/verbal violence. Similarly, in another study that explored the association of rape and sexual assault with academic performance among college women, the authors found that the experience of sexual assault in the first semester predicted lower GPA at the end of the first semester (Jordan et al., 2014). Findings from these previous studies emphasize that future research that seeks to examine sexual harassment and violence among URM women in college should also attend to their academic performance and retention outcomes.

RQ 3: Psychological Sense of Community as a Moderator

Findings revealed that, while psychological sense of community accounted for a significant proportion of variance in the model predicting science identity, it did not significantly moderate the effect of campus inclusion. The finding that psychological sense of community significantly and positively predicts science identity outcomes is consistent with extant literature. For example, Chen and colleagues (2020) hypothesized that science identity would foster a sense of belonging in science classes and within the University more generally. Their participants included 368 students who were taking to different biology courses at a large university; 70 percent identified as women and 67 percent identified as White. The authors concluded that,

for URM students, sense of belonging was an active mediator that made science identity significant for this group. Additionally, Maton and colleagues (2016) examined psychological sense of community among Meyerhoff scholars and found that sense of community at summer bridge (their initial entry into the program) significantly predicted their science identity outcomes one year later.

It is important to note that gender and racial differences may arise in sense of community in STEM. For example, Rainey and colleagues (2018) conducted a mixed methods study where they explored whether students felt like they belonged in their STEM majors. The authors found that women were more likely to report a low sense of belonging, resulting in them leaving their STEM majors, and were also more likely to report a lack of science identity than men. Additionally, students of color were more likely to report a lack of science identity than White students. Many of the URM students in their study reported feeling out of place in their classes and not understanding the material, which was crucial for successfully passing their classes. These studies highlight that science identity may be a significant indicator of students' decision to stay or leave a STEM major, and their sense of belonging and community within a STEM major influence whether they develop an identity as a scientist.

Furthermore, for the model predicting perceptions of campus inclusion on GPA, neither psychological sense of community nor the two-way interaction between perceptions of campus inclusion and psychological sense of community was statistically significant in the pooled results. This finding is in contrast to Hypothesis 3 and prior studies that found a significant relation between sense of belonging and

GPA outcomes. For example, Cwik and Singh (2022) examined the role of students' sense of belonging in predicting performance outcomes at the end of a mandatory first semester of an algebra-based introductory physics course sequence for bioscience majors. They found that students' sense of belonging played an important role in predicting students' grades at the end of the physics course. In their study, however, the authors examined sense of belonging at students' grades in the same year, whereas in the current study, GPA was examined one year later. A possible interpretation of findings from the current study could be that substantive changes in students' psychological sense of community between the end of their sophomore and junior year may have occurred as they learned to navigate the UMBC campus and the MSP program.

Furthermore, in another study that examined sense of community on GPA outcomes among transfer students in STEM, Townley and colleagues (2013) found that students who reported higher participation in the STEPs to STEM activities—which includes two courses called STEM 101 and HIST 108, research internships, socials workshops, and a STEM Club—also reported a stronger sense of community which, in turn, significantly predicted their overall GPA. This finding suggests that other factors, like STEM participation, may need to be considered when examining students' sense of community. The MSP also collects data on students' perceived program benefit, which asks scholars how useful the 17 program elements (e.g., tutoring, academic advising, social activities) are to them. Thus, a measure like this may be meaningful to explore when also exploring the role of students' psychological sense of community on their GPA outcomes.

In sum, psychological sense of community and belonging has been consistently examined in the literature on STEM (e.g., Johnson, 2012; Maton et al., 2016) and has been described as a critical component in STEM outcomes among URM students. Findings from the current study add to the literature on psychological sense of community by exploring how other factors, like social harms and campus inclusion, might impact students' sense of community to their STEM programs. In the current study, experiences of social harms did not significantly predict motivation or achievement outcomes, but psychological sense of community did. This may suggest that, amid gendered racism and sexual harassment and violence, sense of community might serve as a protective buffer for URM women in STEM undergraduate programs.

Strengths and Limitations

The current study has many strengths. One is its longitudinal design, which assessed the outcome variables of science identity and year 3 GPA one year after students responded to measures regarding social harms, perceptions of campus inclusion, and sense of community. Another strength is the intersectional approach and design of the study. Intersectionality was operationalized by exploring similarities and differences among three intersectional groups—i.e., Black/African American, Asian American/Pacific Islander, and Latina women—who are part of the Meyerhoff Scholars program, and by examining the intersectional phenomenon of gendered racism. Although other demographic information, like SES or first-generation status, were not collected, we know that many of the participants resided in the state of Maryland and were 18 years of age at their time of entry into the MSP.

Intersectionality scholars (e.g., Cole, 2009; Else-Quest & Hyde, 2016b) have posited that similarities across intersectional groups must be considered in intersectional research to identify commonalities and common ground. When similarities are considered and emphasized, Cole (2009) argues that the focus shifts to reflecting on what individuals and cultures do and not just on the social categories (e.g., race, gender) of individuals. Preliminary analyses conducted in the current study highlights the importance of exploring similarities among URM women in STEM undergraduate programs. For example, I found that URM women's mean scores on perceptions of campus inclusion, experiences of social harms, sense of community, and science identity were not significantly different from each other, which may suggest that they were experiencing similar levels on each of the measures.

Another strength of the current study is the three relatively new scales that were created and explored using exploratory factor analyses: campus inclusion, gendered racism and sexual harassment, and violence against person and property. There are just a handful of studies that have examined the intersectional phenomenon of gendered racism using a scale (e.g., Perry et al., 2012; Liu et al., 2019). However, most of these studies only focused on one racial/ethnic group and their gendered racism scale was general in nature (e.g., experiences in society) whereas in the current study, items on the scale were applicable to URM students in college or university settings. Similarly, prior studies have examined the campus racial climate of colleges and universities (e.g., Jensen & Deemer, 2019; Griffin 2019) but there has been little to no exploration on students' perceptions of campus inclusion.

While the current study has many strengths, some limitations also are present. First, the small sample size of $N = 137$, as well as the smaller subsamples of Asian/Pacific Islander ($n = 19$) and Latina ($n = 13$) women may have contributed to the insufficient statistical power and nonsignificant findings. Specifically, there was sufficient statistical power to detect medium and large effect sizes, but not small ones. Along these same lines, the current study does not include Indigenous women—an important group to consider—due to a significantly small subsample size that was excluded from the final sample. The current sample is also not generalizable to other undergraduate populations, given that participants were only recruited from the UMBC Meyerhoff Scholars Program. Future research must include larger and less selective samples to increase statistical power.

While the scales used in the current study are a good first step in exploring experiences of social harms among URM women in STEM undergraduate programs, the gendered racism and sexual harassment scale, specifically, asks questions about sexual harassment or racist discrimination experiences, but not the combination of these (although the items loaded highly onto the same factor). The development of scales that reliably measure intersectional phenomena such as gendered racism across diverse groups is an important direction for intersectionality research in psychology (Else-Quest & Hyde, 2016b).

Implications and Future Directions

The current investigation is important because it is one of the first studies to explore the impact of social harms, as measured by gendered racism and sexual harassment and violence against person and property, in the relation between

perceptions of campus inclusion and motivation and achievement outcomes among URM women in STEM undergraduate programs. Prior studies have investigated sexual harassment or racial discrimination among URM women in STEM programs, but very few studies deployed an intersectional approach or explored the similarities and differences among these groups. The current study makes a meaningful contribution to the literature because it sheds light on the unique experiences that URM women in STEM may encounter as it relates to gendered racism and violence, two factors that have not been well explored in the STEM literature.

The current study also implies that a strong sense of community is important for URM women in STEM. Scholarship programs, like the MSP, should consider facilitating events and opportunities for networking among these groups as they may serve as an important protective buffer in their STEM programs. The Women of Color in STEM program at Syracuse university is an excellent model for other programs that may wish to help women of color in STEM build community, foster a sense of belonging, and succeed academically. The Meyerhoff Scholars program is a well-known program that seeks to recruit outstanding students and increase diversity among future leaders in science, technology, engineering, and related fields. Thus, it is important that this program and other programs similar to the MSP foster an inclusive and safe environment that will also strive to acknowledge the intersectional identities and characteristics of their students, particularly URM women.

The current study also contributes to the applied developmental psychology literature because it focuses on an important period of development—emerging adulthood—among URM women. Understanding the developmental outcomes of

URM women in emerging adulthood and college is vital because although emerging adulthood is often characterized as the age of possibilities, URM women experience a greater number of societal disadvantages and social harms when it comes to achieving their goals (Syed & Mitchell, 2013). Yet, despite these negative experiences, studies have also documented URM emerging adults' perseverance in the face of these challenges. That is, URM emerging adults and their families hold high aspirations for their futures through optimism and continuity (Chang et al., 2006). The Meyerhoff Scholars program is, indeed, evident of high achieving URM emerging adults who may have endured many institutional and societal barriers but turned those experiences into opportunities for growth and success. While this does not mean that colleges and universities should refrain from doing the necessary work to dismantle barriers that prevent URM students from succeeding, this suggests that many URM students display great resiliency and have found ways to succeed and achieve their goals amid social harms.

Furthermore, future studies should continue using longitudinal techniques when examining the relation between students' perceptions of campus inclusion and their STEM outcomes. Specifically, statistical techniques like growth curve modeling may help us to better understand trends and individual difference in within-person change overtime in science identity development among students. Future studies should also consider a qualitative or mixed-methods approach. Past qualitative studies provided a meaningful and deeper understanding of the experiences of URM women in STEM programs (e.g., Harris, 2020). A qualitative or mixed-methods study using the same measures of social harms may shed light on the different experiences of

gendered racism and sexual harassment, and violence against person and property among Black/African American, Asian American/Pacific Islander, and Latina women. What is known is that these three groups may be experiencing similar levels of the aforementioned social harms; however, little is known about their within-group experiences which can be captured by qualitative responses.

Future studies should also explore other outcome variables, like retention or entry in STEM doctoral programs. The current study could not use retention as a possible outcome variable because the MSP does not formally collect retention data, although this information is occasionally recorded for specific MSP-related projects. Additionally, the retention of URM students in the MSP program from cohorts 25-28 was 97.6 percent, and total retention was 98. 2 percent. Given that retention—when recorded for Meyerhoff studies—is coded 0 (*not retained*) and 1 (*retained*), there isn't much variability, and the data may not tell us much as it relates to STEM outcomes among Meyerhoff scholars. Nonetheless, past studies have examined the retention of women of color in STEM programs (Soto & Yao, 2010), as well as URM students' entry into STEM doctoral programs (Sellami et al., 2021), and meaningful findings emerged. Specifically, Soto and Yao found that STEM students are likely to be retained in their programs if they have financial support, good relationships with their peers, connections with others from their own racial/ethnic background, and external (e.g., familial) support. Thus, it may be important to examine how experiences of social harms might influence the retention of URM women in STEM undergraduate programs and their decision to matriculate into STEM doctoral programs. Lastly, future studies should consider exploring other intersecting social

categories of URM women in STEM, such as their immigration status, SES, disability, and so on. These dimensions could not be explored in the current study because these demographic data are not collected from Meyerhoff scholars; however, they may provide a more thorough and nuanced understanding of these groups and aid future researchers who wish to continue to explore the impact of gendered racism and sexual harassment and violence on the STEM outcomes of URM women.

Conclusions

URM women have contributed tremendously to the past and present-day STEM industry despite their achievements being ignored and suppressed. Although many URM women have excelled in STEM fields, it is critical to shed light on the gendered racism and violent experiences they encounter. Specifically, studies have documented how the pervasiveness of harassment and racial discrimination have predicted poor outcomes among URM students and women in STEM undergraduate programs (McGee, 2016; Robinson, McGee, Bentley, Houston, & Botchway, 2016). An inclusive campus environment may mitigate the effects of these social harms on students' outcomes (Johnson, 2011). However, the current study found no significant associations between perceptions of campus inclusion and motivation and achievement outcomes, or evidence that gendered racism and sexual harassment and violence moderated those relations. Further research with larger samples is needed to thoroughly examine these potential links.

Nonetheless, the current study contributes to the literature on STEM outcomes by adopting an intersectional approach and centering the experiences of URM women who may encounter social harms like gendered racism—a concept that has not been

thoroughly explored in the literature—and examining ways in which their experiences are similar or different. Future studies should continue to explore these phenomena in URM women's STEM success which can increase their overall representation in STEM programs and fields today.

Appendices

Appendix A: Consent Form

Whom to Contact about this study:
Principal Investigator: Kenneth Maton, Ph.D.
Department: Psychology
Telephone number: 410-455-2209

The Success of Talented Students in Science, Technology, Engineering and Mathematics Informed Consent

This is a consent form for participation in a research project. Your participation in this research study is voluntary. It contains important information about this study and what to expect if you decide to participate. Please consider the information carefully. Feel free to ask questions before making your decision whether or not to participate.

I. INTRODUCTION/PURPOSE:

I am being asked to participate in a research study of programs that adapt the components of the Meyerhoff Scholars Program at UMBC, a program that support talented STEM students toward academic and career success . The purpose of this study is to assess the implementation of the Chancellor's Science Scholar Program at University of North Carolina at Chapel Hill (UNC-CH) and the Millennium Scholars Program at Pennsylvania State University (Penn State). It will gather data on 1) implementation barriers, 2) implementation facilitating factors, and 3) department-level and university-wide leadership climate, culture, and structural/contextual factors. I am being asked to volunteer because I am either 1) an administrator, faculty, or staff at UNC-CH or Penn State involved in approval, development, and ongoing operation of the program; or 2) a UMBC Meyerhoff Program consultant. My involvement in this study will begin when I agree to participate and will continue until August 31, 2019.

II. PROCEDURES:

As a participant in this study, I will be asked to answer interview or online survey questionnaires. A total of 60 participants will be part of this study. Interviews will either take place at UNC-CH, Penn State, or UMBC (for UMBC Meyerhoff consultants), or will be conducted over the phone. I will be interviewed multiple times between now and August 31, 2019. All interviews will be audiotaped. The identification code of the interviewee will be written on the audiotape. The interviews will be transcribed but only the identification codes (not the actual name) of the interviewees will be used. The data will be downloaded and all participants will be assigned unique codes that will contain no personal identifying information.

III. VOLUNTARY PARTICIPATION

I have been informed that my participation in this research study is voluntary and that I am free to withdraw or discontinue participation at any time. If I withdraw from this research study, I will not be penalized in any way for deciding to stop participating. I have been informed that data collected for this study will be retained by the investigator and analyzed even if I choose to withdraw from the research. If I do choose to withdraw, the investigator and I have discussed my withdrawal and the investigator may use my information up to the time I decide to withdraw.

IV. RISKS AND BENEFITS OF BEING IN THE STUDY:

My participation in this study does not involve any significant risks and I have been informed that my participation in this research will not benefit me personally, but hopefully will be of significant help to universities in developing science scholarship programs, and to the students pursuing science majors.

V. COMPENSATION/COSTS:

My participation in this study will involve no cost to me.

VI. CONFIDENTIALITY:

Any information learned and collected from this study in which I might be identified will remain confidential and will be disclosed ONLY if I give permission. The investigator (s) will attempt to keep my personal information confidential. A code will be placed on the interview transcript, survey and other collected data. Through the use of an identification key, the researcher will be able to link my survey to my identity. Only the researchers will have access to the identification key.

To help protect my confidentiality, all data will be kept in password protected files at the lab of Dr. Kenneth Maton, the Research Director, at UMBC. All printed data or reports will be kept in in Dr. Maton's alarm-secured and locked research lab.

Only the investigator and members of the research team will have access to these records. If information learned from this study is published or included in a report, I will not be identified by name or position. By signing this form, however, I allow the research study investigator to make my records available to the University of Maryland Baltimore County (UMBC) Institutional Review Board (IRB) and regulatory agencies as required to do so by law.

Consenting to participate in this research also indicates my agreement that all information collected from me individually may be used by current and future researchers in such a fashion that my personal identity will be protected. Such

use will include sharing anonymous information with other researchers for checking the accuracy of study findings and for future approved research that has the potential for improving human knowledge.

I give permission to record my voice or image and use in scientific publications or presentations. I do not give permission to record use my voice or image and use in scientific publications or presentations.

VII. SPONSOR OF THE RESEARCH:

HHMI (Howard Hughes Medical Institute) is the sponsor of this research study.

VI. CONTACTS AND QUESTIONS

The principal investigator, Dr. Kenneth Maton, who is responsible for this research study, has offered to and has answered any and all questions regarding my participation in this research study. If I have any further questions, I can contact Dr. Maton at (410) 455-2209.

If I have any questions about my rights as a participant in this study, I can contact the UMBC Office of Research Protection and Compliance at (410) 455-2737 or compliance@umbc.edu.

I will be given a copy of this consent form to keep.

VIII. SIGNATURE FOR CONSENT

By typing my name, email address and date, I agree to be a research participant in this study. I will return the signed form by email to maton@umbc.edu.

Participant's Signature: _____
Email Address: _____
Date: _____

Investigator's Signature: _____
Date: _____

Appendix B. Science Identity Scale

The following questions ask how you think about yourself and your personal identity. We want to understand how much you think that being a scientist is part of who you are. For the purposes of this study when you see the word scientist it is intended to mean a professional undertaking research activities in your area of study (e.g., a biologist or a research engineer).

Please select the best answer on the scale from strongly disagree to strongly agree.

Strongly Disagree	**Disagree**	**Neither Disagree nor Agree**	**Agree**	**Strongly Agree**

1. I have a strong sense of belonging to the community of scientists.
2. I derive great personal satisfaction from working on a team that is doing important research.
3. I have come to think of myself as a 'scientist.'
4. I feel like I belong in the field of science.
5. The daily work of a scientist is appealing to me.

Appendix C. Psychological Sense of Community Scale

How well does each statement represent how you feel about the Meyerhoff Scholars Program?

Not at all	Somewhat	Mostly	Completely

1. I get important needs of mine met because I am part of the Meyerhoff Scholars Program.
2. Program members and I value the same things.
3. When I have a problem, I can talk about it with members of the program.
4. I can trust people in the program.
5. I can recognize most of the members of the program.
6. Most program members know me.
7. Being a member of the Meyerhoff Scholars program is a part of my identity.
8. I have influence over what the program is like.
9. If there is a problem in the program, members can get it solved.
10. I am with the other Meyerhoff Scholars a lot and enjoy being with them.
11. I expect to be a part of the program for a long time.
12. Members of the program care about each other.
13. This community has been successful in getting the needs of its members met.
14. Being a member of this community makes me feel good.
15. People in this community have similar needs, priorities, and goals.
16. This community has symbols and expressions of membership such as clothes, signs, art, architecture, logos, landmarks, and flags that people can recognize.
17. I put a lot of time and effort into being part of this community.
18. Fitting into this community is important to me.

19. This community can influence other communities.
20. I care about what other community members think of me.
21. This community has good leaders.
22. It is very important to me to be a part of this community.
23. Members of this community have shared important events together, such as holidays, celebrations, or disasters.
24. I feel hopeful about the future of this community.

Appendix D: 2013-14 HERI Faculty Survey: Campus Climate (Original Items)

1. Please indicate the extent to which you agree or disagree with the following statements. This institution:
   (*Agree Strongly, Agree Somewhat, Disagree Somewhat, Disagree Strongly*)

   Has campus administrators who regularly speak about the value of diversity
   Lacks strategic diversity goals and plans
   Encourages students to have a public voice and share their ideas openly
   Has a long-standing commitment to diversity
   Respects differences in sexual orientation
   Promotes the appreciation of cultural differences
   Rewards staff and faculty for their participation in diversity efforts
   Promotes the understanding of gender differences
   Has standard reporting procedures for incidents of harassment or discrimination
   Racial and ethnic diversity should be more strongly reflected in the curriculum
   Treats faculty of color fairly
   Treats women faculty fairly
   Treats LGBTQ faculty fairly

2. Please indicate how often at this institution you have:
   (*Very Often, Often, Sometimes, Seldom, Never*)

   Had students from underrepresented groups on campus approach me for advice
   Assisted a student with a problem about discrimination
   Witnessed discrimination
   Reported an incident of discrimination to a campus authority
   Reported an incident of sexual harassment to a campus authority
   Been discriminated or excluded from activities because of my:
      Race/ethnicity
      Gender
      Sexual orientation
      Other identity
   Heard insensitive or disparaging racial remarks from:
      Faculty
      Staff
      Students
   Heard insensitive or disparaging remarks about women from:
      Faculty
      Staff
      Students
   Heard insensitive or disparaging comments about LGBTQ individuals by:
      Faculty
      Staff
      Students

3. Please indicate how often anyone you personally know has experienced the following forms of bias/harassment/discrimination at this institution:
(*Very Often, Often, Sometimes, Seldom, Never*)

Verbal comments
Written comments (e.g., emails, texts, writing on walls)
Exclusion (e.g., from gatherings, events)
Offensive visual images or items
Threats of physical violence
Sexual assault or violence
Other physical assaults or injuries
Anonymous phone calls
Damage to personal property

4. How satisfied are you with the following aspects of your institution?
(*Very Satisfied, Satisfied, Neutral, Dissatisfied, Very Dissatisfied*)

Overall sense of community among students
Racial/ethnic diversity of the faculty
Racial/ethnic diversity of the student body
Racial/ethnic diversity of the staff
Interactions among different racial/ethnic groups
Atmosphere for political differences
Atmosphere for religious differences
Atmosphere for differences in sexual orientation
Administrative response to incidents of discrimination
Administrative response to student concerns about exclusion or marginality

5. Please rate your satisfaction with your department in each area:
(*Very Satisfied, Satisfied, Neutral, Dissatisfied, Very Dissatisfied*)

Collegiality among faculty
Tolerance of different faculty opinions and beliefs
Representation of women and racial/ethnic minorities
Acceptance of differences in sexual orientation
Degree to which the curriculum addresses diversity in content or pedagogy
Student respect for my role in the classroom
Commitment to hiring women and minorities

Appendix E: Diverse Learning Environments: Classroom Climate Module

(Original Items)

1. Please indicate the extent to which you agree or disagree with each of the following statements:
   Response Categories: Strongly Agree, Agree, Disagree, Strongly Disagree

   I feel comfortable sharing my own perspectives and experiences in class
   I have been singled out in class because of my identity (such as race/ethnicity, gender, sexual orientation, disability status, religious affiliation, etc.)
   I feel I have to work harder than other students to be perceived as a good student
   In class, I have heard faculty express stereotypes based on social identity (such as race/ethnicity, gender, sexual orientation, disability status, religious affiliation, etc.)
   I don't feel comfortable contributing to class discussions

2. Please indicate how many of your instructors at this institution:
   Response Categories: Very Few, Less than Half, Most, but not All, All

   Value individual differences in the classroom
   Are sensitive to the ability levels of all students
   Ensure students are accommodated for disabilities or medical conditions
   Help students learn how to bring about positive change in society
   Encourage students from diverse backgrounds to work together
   Turn controversial topics into meaningful discussions
   Encourage students to contribute different perspectives in class
   Share their own experiences and background in class
   Have open discussions about privilege, power, and oppression
   Motivate students to work harder than they thought they could
   Encourage respect for different beliefs

3. How many of your courses this year involve:
   Response Categories: Very Few, Less than Half, Most, but not All, All

   Lectures (exclusively or almost exclusively)
   Class discussions
   Student presentations Multiple short papers
   One or more research papers of 10+ pages
   Multiple drafts of written work
   Group projects
   Lab work
   Reflective writing/journaling
   Electronic quizzes with immediate feedback in class (e.g., clickers)
   Posted on a course-related online discussion board

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Table 1
Measures Collected at Year 2 (End of Sophomore Year) and Year 3 (End of Junior Year)

Measures Collected at Year 2	**Measures Collected at Year 3**
Perceptions of Campus Inclusion	Science Identity
Gendered Racism and Sexual Harassment	Grade-Point Average
Violence Against Person and Property	
Psychological Sense of Community	

Table 2
Factor loadings for 21 items from the HERI and Diverse Learning Environments surveys

	Violence against person & property	Perceptions of campus inclusion	Gendered racism & sexual harassment
Threats of physical violence	**.98**	-.03	.08
Damage to personal property	**.97**	-.02	.05
Anonymous phone calls	**.96**	-.06	.05
Physical assaults or injuries	**.96**	-.10	-.00
Offensive visual images or items	**.90**	.04	.20
Written comments (e.g., emails, texts, writing on walls)	**.85**	-.05	.23
Exclusion (e.g., from gatherings, events)	**.78**	-.01	.25
Encourage students to contribute different perspectives in class	-.03	**.87**	.08
Turn controversial topics into good discussions	-.06	**.80**	.05
Help students learn how to bring about positive change in society	.04	**.79**	.01
Encourage students from diverse backgrounds to work together	-.01	**.68**	.06
Share their own experiences and background in class	-.06	**.63**	.04
Value individual differences in the classroom	-.01	**.63**	.05
Communicate high expectations for students' performance	-.03	**.56**	.07
Motivated me to work harder than I thought I could	-.05	**.54**	-.01
Are passionate about what they teach	-.06	**.47**	.18
Reported an incident of sexual harassment to a campus authority	.14	-.00	**.86**
Reported an incident of discrimination to a campus authority	.10	-.06	**.84**
Experienced sexual harassment	.08	.08	**.78**
Heard insensitive or disparaging racial remarks from staff	.20	.18	**.75**
Heard insensitive or disparaging racial remarks from faculty	.12	.13	**.67**

Note. Rotation converged in 5 iterations. Factor loadings <.2 are suppressed.

Table 3.
Descriptive Statistics for Key Variables and Covariates in full sample

	Number of items	Cronbach's Alpha	*N*	*M (SD)*	Min	Max
Predictor Variable						
Perceptions of Campus Inclusion	9	.88	114	2.78 (.63)	1.00	4.00
Moderators						
Psychological Sense of Community	24	0.96	115	2.94 (.56)	1.67	4.00
Violence against Person & Property	7	.97	114	4.58 (.90)	1.00	5.00
Gendered Racism & Sexual Harassment	5	.89	114	4.73 (.53)	2.00	5.00
Outcome Variables						
Science Identity	5	0.86	115	4.04 (.62)	2.60	5.00
Year 3 GPA	1	-	132	3.53 (.48)	1.84	4.00
Covariates						
High School GPA	1	-	129	4.11 (.37)	2.84	4.50
SAT Math	1	-	112	682.86 (50.36)	570.00	800.00

Table 4

Means (Standard Deviations) of Each Measure by Racial/Ethnic Background

	Black/AA (n = 105)	AA/PI (n = 19)	L (n = 13)	Group Comparison
Perceptions of Campus Inclusion	2.70 (.64)	2.71 (.54)	3.06 (.77)	No Difference
Gendered Racism & Sexual Harassment	4.74 (.52)	4.73 (.54)	4.66 (.69)	No Difference
Violence Against Person and Property	4.57 (.90)	4.72 (.39)	4.71 (.94)	No Difference
Psychological Sense of Community	2.89 (.55)	3.13 (.49)	2.86 (.81)	No Difference
Science Identity	3.97 (.60)	4.17 (.59)	3.95 (.77)	No Difference
Year 3 GPA	3.49 (.47)	3.80 (.17)	3.54 (.45)	B/AA = L < AA/PI
HS GPA	4.03 (.38)	4.39 (.19)	3.96 (.32)	AA/PI > B/AA = L
SAT Math	669.53 (49.92)	721.25 (30.08)	664.00 (48.12)	AA/PI > B/AA = L

Note. B/AA = Black/African American, AA/PI = Asian American/Pacific Islander; L = Latina. Higher scores indicate greater perceptions of campus inclusion, lower incidence of gendered

Table 5

Correlations Among Key Variables Post-Imputation for Full Sample (N = 137)

	1.	2.	3.	4.	5.	6.	7.
1. Perceptions of Campus Inclusion	-						
2. Psychological Sense of Community	.21*	-					
3. Violence Against Person and Property	.06	.13	-				
4. Gendered Racism & Sexual Harassment	.12	.12	.37**	-			
5. Science Identity	.23*	.56*	.06	.04	-		
6. Year 3 GPA	.14	.17	-.21*	-.06	.25	-	
7. High School GPA	-.10	.11	-.16	-.01	.06	.33**	-
8. SAT Math	.12	.08	.16	.13	.10	.28*	.29**

Note. *$p < .05$, **$p < .01$, ***$p < .001$.

Table 6

Regression analyses for perceptions of campus inclusion predicting science identity

	Results from Original Data					Pooled Results from 5 Imputations	
Variable	*B*	*SE(B)*	β	η_p^2	Observed Power	*B*	*SE(B)*
Step 1 F (2, 87) = 0.94, p =.393, adjusted R^2 = -.02							
SAT Math	0.00	0.00	0.11	0.00	0.06	0.00	0.00
HS GPA	0.10	0.18	0.06	0.01	0.12	0.11	0.18
Step 2 F (6, 83) =.672, p < .001, adjusted R^2 = .28							
SAT Math	0.00	0.00	0.08	0.00	0.06	0.00	0.00
HS GPA	0.01	0.16	0.22	0.01	0.12	0.06	0.16
PCI	0.09	0.09	0.09	0.00	0.05	0.10	0.08
GRSH	-0.03	0.11	-0.03	0.01	0.15	-0.03	0.10
VAPP	0.01	0.07	0.02	0.00	0.05	0.02	0.06
PSOC	0.57**	0.10	0.53	0.08	0.75	0.57**	0.09
Step 3 F (9, 80) = 4.79, p = <.001, adjusted R^2 = .28							
PCI x GRSH	0.21	0.16	1.19	0.01	0.14	0.23	0.14
PCI x VAPP	0.01	0.11	0.06	0.00	0.06	0.04	0.10
PCI x PSOC	-0.09	0.15	-0.42	0.02	0.28	-0.16	0.14

Note. p < .01*; p < .001**

PCI = Perceptions of Campus Inclusion; GRSH = Gendered Racism and Sexual Harassment; VAPP = Violence Against Person and Property; PSOC = Psychological Sense of Community.

Table 7

Regression analyses for perceptions of campus inclusion predicting year 3 GPA

Results from Original Data						Pooled Results from 5 Imputations	
Variable	*B*	*SE(B)*	*β*	η_p^2	Observed Power	*B*	*SE(B)*
Step 1 F (2, 67) = 6.29, p =.003, adjusted R^2 = .13							
SAT Math	0.00	0.00	0.20	0.06	0.40	0.00	0.00
HS GPA	0.34**	0.13	0.29	0.10	0.63	0.32**	0.11
Step 2 F (6, 63) = 3.85, p < .061, adjusted R^2 = .20							
SAT Math	0.00	0.00	0.21	0.05	0.40	0.00*	0.00
HS GPA	0.30*	0.13	0.25	0.10	0.63	0.28**	0.10
PCI	0.09	0.07	0.13	0.00	0.06	0.11	0.06
GRSH	-0.08	0.09	-0.09	0.00	0.05	-0.03	0.07
VAPP	-0.07	0.06	-0.13	0.00	0.06	-0.09	0.06
PSOC	0.10	0.08	0.13	0.02	0.31	0.06	0.06
Step 3 F (9, 60) = 6.20, p = <.001, adjusted R^2 = .40							
PCI x GRSH	-0.15	0.12	-1.20	0.00	0.06	-0.05	0.10
PCI x VAPP	-0.05	0.08	0.43	0.00	0.10	-0.01	0.07
PCI x PSOC	0.31**	0.11	1.93	0.03	0.43	0.18	0.10

Note. p < .01*; p < .001**

PCI = Perceptions of Campus Inclusion; GRSH = Gendered Racism and Sexual Harassment; VAPP = Violence Against Person and Property; PSOC = Psychological Sense of Community.