

“Really, you’re a math major?!”: Students’ Descriptions of Racial and Gendered
Microaggressions and Sense of Belonging in Mathematics

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Microaggressions (MAs) are intentional or unintentional messages that communicate hostile, derogatory, or negative messages towards a recipient (Sue et al., 2007). MAs that students receive in a math class can impact a students’ learning experience and can often lead to feelings of exclusion (Cawley et al., 2023). This paper expands on previous work, discussing two types of MAs—racial and gendered—while also discussing students’ overall sense of belonging in a math classroom. This study analyzes the reflections of 133 undergraduate math students who were asked to reflect on an article about mathematical MAs (Su, 2015). Findings show that a majority of students have felt like they do not belong in the math classroom, and that racial and gendered MAs contribute to this. This research supports the need to develop initiatives at departmental and institutional levels to encourage more inclusive spaces in math classrooms.

Keywords: Microaggressions in the Mathematics Classroom, Sense of Belonging

There is much research related to microaggressions, and their impact within society. *Microaggressions (MAs)* have been characterized as the intentional or unintentional forms of insulting, disrespectful communications that occur during everyday exchanges (Yang & Carrol, 2018). These indignities can communicate “hostile, derogatory, or negative” messages that target a person and/or their marginalized group (Sue et al., 2007). The concept of *MAs* was introduced by Pierce and colleagues in the 1970’s to describe “subtle, stunning, often automatic, and non-verbal exchanges which are ‘put downs’ of Blacks by offenders” (Pierce et al., 1977, p.65). While these offenses themselves can be innocuous, they have a cumulative effect on the victim. Pierce felt that these *MAs* were essential to understanding how African Americans experience racism (Pierce, n.d.). While *MAs* were founded to describe experiences that Black people faced within society, these have expanded to other racial and ethnic groups such as Latine¹, Asian Americans, and indigenous people. In recent years other types of *MAs* that people have experienced have been identified by researchers to include women, persons with disabilities, ethnic and religious minority groups, and LGBTQ people (Nadal, 2011).

MAs have been studied within education to understand their effect on a students’ sense of belonging. Sense of belonging pertains to a person’s belief that they are an accepted member of an academic community, whose presence and contributions are valued (Good et al., 2012). The experience of mattering or feeling cared about, accepted, respected, valued by, and important to the classroom and campus community define ways that students feel a sense of belonging (Strayhorn, 2018). When thinking of students within a university context, sense of belonging can also include the perceived social support a student has while pursuing their degree. Steele (1997) implied that it is important for students to feel a sense of belonging to a domain, in other words, an area of study like math or STEM. Yet, Steele also highlighted how societal barriers, such as stereotypes around race or gender, actively reduce feelings of being accepted or valued. *MAs* have been well reported as widespread in academic spaces and detrimental to student outcomes

¹*Latine* is a gender-neutral replacement of the term Latino. It has been used as a more linguistically natural alternative to Latinx or Latin@ for Spanish-speakers (Celis Carbajal, 2020).

(Sue et al., 2009). This paper focuses on three types of MAs that STEM students face—racial, gendered, and mathematical—which we discuss in more detail below.

Sue and colleagues (2007) defined *racial microaggressions* as “brief and commonplace daily verbal, behavioral, and environmental indignities, whether intentional or unintentional, that communicate hostile, derogatory, or negative racial slights and insults to the target person or group” (p. 271). Solórzano and colleagues (2000) revealed that MAs were prevalent in classrooms and inhibit students’ sense of belonging, especially for students coming from marginalized groups. Nadal and colleagues (2014) reported that racial MAs negatively impact student self-esteem and self-worth which in turn can impact mental health and student achievement. Students’ reports of racial MAs within STEM departments are distinctive, which is problematic as many STEM departments already face issues in representation from marginalized communities (Burke, 2007; McGee, 2016). Students of color, especially Black students, report racial MAs from STEM instructors, advisors, and peers (Lee et al., 2020). Specifically focusing on STEM contexts, Marshall et al. (2021) noted that MAs especially impact students who have been historically excluded on the basis of race/ethnicity.

Gendered microaggressions are defined as “nuanced and brief everyday exchanges that communicate sexist denigration and slights toward women, which can be conveyed verbally and/or nonverbally through expression, gaze, and other gestures (Yang & Carroll, 2018). Rainey et al. (2018) found that women more often lacked a sense of belonging in STEM and left the major at higher rates than men, citing reasons such as feeling socially different or feeling like they did not fit in. Sekaquaptewa (2019) shared that while receiving a gendered MA can greatly impact a person, witnessing other women receive MAs can also have a negative impact on a student. Intersections of gender and race create a nuanced space where women of color experience an even more elevated exposure to MAs during their college experience (Lewis et al., 2013; McGee & Bentley, 2017).

As an extension from discussions of racial MAs, Su (2015) used the term *mathematical microaggression*, which refers to the subtle ways that mathematical authorities (such as instructors, classmates, or textbook authors) communicate that one does not belong in math. Su offered examples such as “It is obvious/clear/trivial that...” and “The rest is just algebra,” and elaborated that such comments can convey negative messages towards students (e.g., their knowledge is lacking, their questions are unwelcome, their potential in math is limited). Cawley and colleagues (2023) documented three different types of mathematical MAs students experienced, which included microslights, microinsults, and environmental MAs. They found that most students did experience a mathematical MA, and that these were often received from both their instructors and peers.

Our study focuses on the types of racial or gendered MAs that students share they have experienced in their math learning experiences. Specifically, this paper focuses on the following research questions: 1) How do math students describe experiencing racial or gendered microaggressions? 2) How have math students been made to feel like they do not belong in a math class?

Methods

This study took place at a large public university on the West Coast of the U.S., designated as a Hispanic-Serving Institution. Data for this paper were collected between Fall 2019 and Spring 2022. The sample included 133 participants enrolled in calculus 1 (46 students) or abstract algebra (87 students), taught by the same instructor (Author 2). Course modalities included both

in-person and virtual instruction. These classes incorporated inquiry-based learning and active learning and provided a significant amount of time for student collaboration and discussion during instruction. Based on institutional data of the 133 students², 46% were female, 54% were male, and one student was non-binary. Table 1 shows the racial/ethnic demographics of the students in the study. Students in the study were mostly STEM majors.

Table 1. Student Demographics

	Female (N = 61)		Male (N = 72)		Non-Binary (N = 1)		Total (N=134)	
	Total	%	Total	%	Total	%		
Latine	33	55%	28	38.9%	1	100%	62	46.6%
Black	1	1.6%	5	6.9%			6	4.5%
Asian	10	16.6%	15	20.8%			25	18.7%
Native	0	0%	1	1.4%			1	0.7%
White	11	18.3%	10	13.9%			21	15.8%
Mixed Race	1	1.6%	3	4.2%			4	3.0%
Unknown	4	6.6%	10	13.9%			9	6.7%
Total	60		72		1		133	

Throughout the course, students were asked to submit reflection assignments. In one of these assignments, students were asked to read Su's (2015) article on mathematical MAs, to reflect on the paper, and to respond to the following prompt: Have you ever been made to feel like you don't belong in a math class? Students could reflect on any moments in their math experience. The 133 reflections form the data set for this study.

The data were analyzed using constant comparative methods (Corbin & Strauss, 2008). In the first round of coding, all de-identified reflections were coded to identify if the student had explicitly written if they had ever been made to feel like they do not belong in the math classroom. We categorized it as 1) yes, they have been made to feel they do not belong, 2) no, they have never been made to feel like they do not belong, and 3) does not say. After reviewing the data, we completed a second round of deductive coding to identify MAs that students experienced in STEM, specifically mathematical, racial, and gendered MAs. We marked a MA as present if a student wrote about an incident that related to any of the three types of MAs. The authors coded the journals in sets of 20, meeting to discuss coding to ensure agreement.

Findings

This section is separated into two parts. First, we will share about how students wrote about racial and gendered MAs. 21 students discussed racial MAs while 13 students wrote about experiencing a gendered MA. Seven students discussed how both racial and gendered MAs impacted them. Then, we discuss the ways that students have shared whether they have/have not been made to feel like they do not belong in a math classroom.

Racial Microaggressions

21 students discussed racial MAs in their writing. The racial identities of the students included Latine, Asian American, Black, and unknown race/ethnicity. Seven students explicitly

² Because racial- and gender-identity data were not collected during the course each semester, the authors used institutional data provided for each student to identify race/ethnicity and sex. This may not properly reflect the students' gender-identity or racial/ethnic identity.

mentioned how they related to Su's experience as an Asian American in Texas explaining scenarios that were similar to those that Su shared about himself. Each student shared some sort of experience that affected their sense of belonging. Most of these racial MAs represented experiences in the math classroom, while others reflected general experiences that they had.

A majority of the responses were written by Latine and Asian American identifying students. Three of these students expressed comments that reflected the Model Minority Stereotype (Chou & Feagin, 2008), indicating that they have experienced the notion that because they are Asian American, they should be good at math. Some students' writing reflected experiences they faced with MAs both inside and outside of the classroom. For example, Alan, an Asian American math major described many ways his intelligence was assumed based on his race.

Math aside, microaggressions suck. One thing I've heard until I was a senior in high school was, "oh you're Asian, you should [just] be good at math." And lately (as of 2020) as a mathematician among engineers, my new boss has said "you're a math major, you should be able to do [algebra] in your head." Albeit that these examples aren't exactly like Su's examples, hearing these statements made me feel anything but a positive emotion. Alan acknowledged how these comments negatively affected him, appearing to follow him in many aspects of his schooling and career. Another student, Lucia, a Latine female math major shared an experience where being a math major was questioned.

I remember speaking to a man about where I go to school and what major I was studying. I don't know if it was because I was in my Domino's Pizza uniform, my ethnicity, being a woman, or a combination of all three, but the man's response was "really?! You go to [university name]? You're a Math major?! Isn't that major super hard and for smart people?" I remember feeling really annoyed and almost anger at the response. Lucia faced incredulous remarks from strangers regarding her major, and described how her complex intersectionality made it appear that she could not possibly be a math major.

Gendered Microaggressions

Thirteen female students wrote about experiencing a gendered MAs. Two main themes occurred in this group: 1) female students noticed how male-dominated the STEM space is and 2) how male peers do not take them seriously and often do not believe that they are capable of doing math. Almost half of the women coded with a gendered MA described the memory of being one of only a few in their math classes. Monica, a Latine female math major explained her feeling of being the only female student,

As a female in a male-dominated field, there have been times that I have felt I do not belong in the classroom. One of the first times was my first quarter...in my Calc 3 class. My Calc 3 had 30 students and only 3 were female. I did not feel unwanted but I will say that it felt uncomfortable at times.

This sensation of being one of the only women in the math classroom amplified other MAs. Six students described ways in which their male peers made them feel as though they were not capable of contributing to the math space, often not taking them seriously. Flor, a Latine female engineering major expressed ways that she coped with this type of treatment.

[My pre-calculus] class was predominantly male students, with just a handful of us female. From what I remember, after lecture, it seemed as if all the guys just "got it". Myself and the other five girls usually sat together because it took us longer to get the material. We felt more comfortable sitting next to each other because we all knew we wouldn't judge each other for it. It was as if we created a safe place for ourselves within our pre-calculus class; we could ask each other questions rather than asking our teacher

or the guys, who'd just make us feel stupid. That was the class that made me hate math again. I struggled the entire semester, but with the help and support of the other girls, I'd managed to pass with a C.

Other women shared similar experiences as Flor, describing how in group work their contributions would often be overlooked, or their male peers would get exasperated when they would ask clarifying questions.

Racial, Gendered, and Mathematical Microaggressions

Seven students listed having experienced all three of types of MAs, all of which were female students of color. These women identified different moments within their educational experiences that relate to these MAs. Leticia and Claudia, both Latine female math majors, wrote about how the choice of name that the instructor uses for an example can demonstrate a lack of diversity and inclusion. Leticia wrote,

Choosing male white/European names was a weird thing in my opinion because when names are used in class the teacher tends to just say the first name that comes to mind, and I assume it is the same when making homework/test problems. Many of my non-white and/or female teachers just use the basic names (i.e., Ann, John, Max, Julie, etc.) because that isn't the important part of the problem.

Leticia implies that the names selected for word problems or examples usually relate to European names. What is more, she indicated that even her marginalized instructors, who she may assume would diversify this component, also use these types of names. Claudia shared that "as a person of color and a female in STEM, I have constantly felt like I didn't belong in my field or in college." She explained that utilizing more diverse examples in class would help to alleviate this feeling, and that it "is important to the students of color who are constantly told that they do not belong in higher education because the statistics said so or because society keeps showing the negative stereotypes of the community."

Shenise and Nina, both women of color, expressed the challenges of being a math major. Shenise shared her concerns of being both black and a woman in math.

I know as a black woman in the Math field, white men or men in general don't think you're capable of understanding the material the way that they do. There are countless times where I had ideas or different approaches to a problem and was ignored or overlooked and would eventually have to do it the way that I had suggested. They treat women as if we did not take the same classes to get where we are now.

Shenise's experiences reflected how men in math radiate the sense that she, and others like her, do not belong in math. Being ignored is a MA against the person contributing ideas and approaches, especially in a math class; this is amplified when Shenise explained that it was because she is a black woman. Nina shared,

It is especially hard to feel like I belong as a Latinx woman. Walking into a class and seeing that you are one of maybe 2 or 3 girls in the class is both interesting and scary. Interesting because now I realize that I am seeing the "leaky pipeline" happen in real-time, and scary because I remember when my previous math classes would have at least 8-9 girls in them. Women and minorities are still underrepresented in STEM fields and the numbers have not been exponentially growing even as the years have changed and people have gotten far more progressive.

Nina explained how she felt seeing few women, which is known as an environmental MA (Marshall et al., 2021), relating to MAs that occur in the environment in which a person exists, not directly received by another individual.

Sense of Belonging

72 students indicated that they have been made to feel like they do not belong in a math classroom while 19 students indicated that they have never been made to feel like they do not belong. We will refer to the first group as Low Sense of Belonging (LSB) and the second group as High Sense of Belonging (HSB). 43 students did not indicate an explicit answer. We discuss each of these groups in this order.

86% of students that indicated LSB also discussed a mathematical MA. Only ten students who stated they had LSB did not include any examples of receiving or witnessing a mathematical MA. Ezekial, a male student (whose race/ethnicity was unknown), shared an experience where a math teacher actively tried to push him out of the STEM field. He shared,

In the summer before my senior year of high school, after my retake of algebra 2, the teacher called me aside and asked me what my plans were for the future. He told me that he would only give me a passing grade if I didn't plan to major in anything involving math. While I remember my grade was a 66, and of course I should consider it an act of benevolence that he moved me up to a 70, I know I didn't deserve it. I felt like a fraud.

At the time of writing this, Ezekial was in his final semester as an economics major, a field that required a lot of mathematical skill and reasoning. His reflection indicates that his teacher provided a kind act, to provide him with a passing grade. However, he reflects that this act made him feel a LSB because he did not feel like he belonged in math.

Twelve students who indicated LSB also described instances of racial MAs while five students described gendered MAs. Carson, a Black male student majoring in physics and minoring in math explained how being one of a small minority of Black students creates LSB.

Being an underrepresented minority is difficult enough, as there are so few that we feel we do not belong. The lack of inclusive language in these subjects creates a subconscious feeling that we do not belong. It is interesting with microaggressions, those who inflict them often don't know that their statement or attitude was harmful. I have been told by others that I speak so well after doing presentations, and while they meant it as a compliment, it creates the feeling that they weren't expecting me to speak well.

Carson highlights that inclusive language is valuable to feeling a sense of belonging. He continues to say, "Mathematics, and Physics, tends to be full of language that is discouraging." While he persisted with the degree, he acknowledged that he did not feel as though he belonged.

Interestingly, of the 19 students who indicated HSB, 15 documented having received mathematical MAs while four did not express any examples of having received or witnessed a mathematical MA. This implies that while students experience mathematical MAs, they can still have HSB in the classroom. This number is very small, only representing 11% of students. Aron, a Latine male, described why he feels HSB,

I may have felt discouraged but not as if I didn't belong. I have always had a passion for math, and no one can ever take that away from me. At times it has proven to be challenging. However, that is part of the beauty. I don't think there is any other place I do belong in.

Aron finds a sense of belonging within the subject itself – he finds that a strong part of his identity is tied to the beauty of math itself.

While three people with HSB were coded as discussing racial MAs, they still felt like they belonged in the math class. Dane, an Asian American male student described,

I have not ever felt that I didn't belong in a math class. Being an Asian American there are a lot of stereotypes revolving around my ability to do math solely because of my race.

Growing up I was somewhat decent in math whether or not it was my genetics giving me an advantage or the cultural upbringing that came with being Asian.

Dane expressed that an awareness of the Model Minority Stereotype, yet persisted in his math endeavors maintaining a sense of belonging in the classroom. None of the students who described a gendered MA indicated HSB.

43 students did not state explicitly whether they had been made to feel like they don't belong. However, a majority of these students described mathematical MAs that they directly experienced; only five of these students did not write about a mathematical MA. Leticia, who did not explicitly say if she had LSB wrote,

The calculus three teacher I had should be required to read this five times. He is an aerospace engineer teacher that likes to make math majors feel awful about themselves if they aren't doing well or have questions. One other math student asked if he wrote an r or an n and he gave the most sarcastic answer. I was never the target because when he asked who was a math major he didn't see my hand... There is nothing worse than feeling belittled when you are learning something difficult.

Leticia described here a moment that felt like a macroaggression, where she and her peers experienced very direct interactions from a faculty member, creating an experience where many may not have felt a sense of belonging in the classroom. She points out that the Su (2015) paper would be a useful tool for some faculty to read to understand the possible experiences a student may have when trying to learn such a difficult subject. Paired with her acknowledgement earlier of the use of white, European names in math word problems, Leticia made clear how she may not have experienced a sense of belonging in math.

Discussion

Our study showed that students experience traumatizing MAs in their math learning experiences. While the frequency was low regarding racial (16%) and gendered (10%) MAs discussed in the journals, the fact that these experiences still exist implies a dire need to reflect and consider our classroom spaces and the math field in general. When considering all students who enroll in math courses, this affects many students. These are also the accounts of students who "made it"; what would we see if we collected data from students who left STEM or never made it Calculus 1? What is more, over half of the students in this study indicated that they have been made to feel like they do not belong in math. Many more wrote accounts that would indicate the same but did not state explicitly whether or not they have been made to feel that way. If we consider those who did not explicitly say it yet implied it in their writing, it *could* be possible that at some point in time about 85% of students have been made to feel like they do not belong in a math classroom. While this is an important finding, future work will explore the frequency and longevity with which students feel LSB in their math classrooms.

Understanding the racial, gendered, and mathematical MAs that students face in classrooms may help us to understand ways to make students feel a strong sense of belonging in their math classes. Leyva and colleagues (2021) have documented instructional mechanisms that may impact a students' experience in college math, which include limiting within-group peer support as well as activating exclusionary ideas of who belongs in STEM (p. 27). As we continue to develop best practices for supporting students, we need to keep in mind the ways to develop a stronger sense of belonging for math students. We note here that the intersectionality of students' identities as both women and students of color is an important aspect to consider, as negative experiences at the intersection of these identities can amplify the lack of sense of belonging (Crenshaw, 1991), specifically in math.

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