White Male Allyship in STEM Higher Education: An Autoethnographic Study

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Abstract
Research on allyship has increased in recent years. Many higher education institutions seek to address issues that have resulted in a participation gap between white students and racially minoritized populations at predominantly white institutions (PWIs). White students have held a position of privilege in STEM higher education since the foundation of universities and colleges in the United States. In recent decades, marginalized populations have experienced increased access, but there still remains lower representation of minoritized individuals as compared to their white counterparts. One way to help increase representation is to create more white male allies who can help advocate for minoritized populations in science, technology, engineering, and mathematics (STEM) fields (e.g., recruiting underrepresented minority faculty).

An ally holds a position of power, and can help underrepresented populations persist in environments where they are marginalized. A white racial ally uses their position of power to help support racially minoritized individuals. White allies can leverage their positions of power to support racially minoritized populations' (e.g., persons who identify as Black or LatinX) advancement in STEM fields. Allyship in higher education has been extensively detailed in research literature. This includes, defining allyship, how allies engage, and how they are viewed by targeted groups (e.g., women). However, there is a paucity of research on white racial allyship. There is a significant amount of research literature on marginalized populations' various experiences in STEM fields. There are significantly less studies on structural inequity in STEM higher education spaces, and how white allies can disrupt these inequities. These studies are necessary as interventions implemented to address minoritized populations' negative experiences have not moved the needle significantly for minoritized students in STEM.

This paper presents an autoethnographic study on two researchers, a Black man and a white man, as they conduct a larger study on white male racial allyship in STEM higher education. Literature and theoretical framing used for the larger study include whiteness, critical consciousness, and allyship. That study involved a survey, and a focus group and one-on-one interviews involving white men in STEM higher education. This study involves self-reflections of the primary researchers on their experiences conducting that study. The results from the larger study will not be reported here. Results indicate that the researchers' experiences in conducting the study differ due to their different intersectional identities, especially given the fact that the participants of the larger study are from a privileged group (white men). The results also suggest that white men's allyship can increase due to interrogation of other white men, as well as mentoring by a PI of color. Thus, in this autoethnographic study, we will provide insights on the impact of equity research within the context of collaborative efforts between researchers from racially marginalized and privileged groups.

Introduction
Racialized minoritized populations have been historically barred from participation in higher education [1]. In recent decades there has been increased access due to interventions like affirmative action and other policies. Nevertheless, science, technology, engineering, and mathematics (STEM) higher education is still dominated by white people [2], [3]. Many studies address minoritized populations' preparation, access, persistence and completion. These studies

have uncovered phenomena such as: 1)The significance of historically Black colleges and universities (HBCUs) in producing minoritized STEM talent [3]; 2) The colorblind lens where all students are treated equally with no regard to unequal advantage for white students [4]; 3) The need to conform to whiteness within STEM spaces [5]; 4) Meritocratic hegemony, which perpetuates the notion that minoritized students do not perform well due to a lack of effort or ability [6]; 5) The lack of minoritized role models and stereotype threat [7]; 6) The limited access to social networks enjoyed by white students [8]; and 7) Under-resourced K-12 schools [9]. In addition, there has been significant research that has reported on phenomena such as imposter syndrome and anti-Blackness [10], [11], [12], [13]. Racially minoritized populations are defined as Black, LatinX, Indigenous and Asian Pacific peoples. There has also been an abundance of research on interventions targeting these populations (e.g., enrichment programs, bridge programs etc., [14], [15], [16].

There are fewer studies that center interrogation of whiteness in STEM higher education, but rather minoritized students' navigation of these oppressive spaces ([5]. Haynes and Patton report that 78% of faculty in STEM are white [6]. In addition, according to McGee, half of STEM positions are occupied by white men [5]. Given that white males have maintained a position of dominance in STEM, they can use this privilege and power in addressing the concerns stated above. In particular, white men can recognize, and act against inequity both in their classes, as well as overall systemic inequity in STEM departments [4]. However, disruption of privilege cannot occur without continuous reflection on their whiteness, and significant engagement with peers and students of color [17], [18]. There is a paucity of research reporting on the structural inequity in STEM fields [5]. The goal of this paper is to explore how collaboration between a Black and white scholar on an equity-focused research project can inform racial allyship in white men within the context of STEM higher education.

Allies in general occupy a position of power, and use their privilege to promote, protect or provide resources for a disadvantaged group [19]. This paper focuses on the perspectives of two researchers as they conducted research on racial allyship. There is more research reported in overall racial allyship in higher education compared to STEM. Therefore, this work can be used to inform allyship in STEM higher education. This can inform how to help broaden participation of racially minoritized students in different STEM fields. Specifically, the themes may be transferable to other vulnerable populations (e.g., first generation students, differently-abled students, etc.) including those with intersecting identities (e.g., Black women, minoritized immigrants, etc). This work will be framed through the lens of allyship, whiteness and critical consciousness and adds to the existing research on racial allyship. This study's research questions are:

1. How does a minoritized PI perceive and navigate racialized experiences while conducting research with privileged groups?

2. How does a privileged researcher perceive and interpret racialized experiences while conducting research with privileged groups?

These research questions require examination of elements related to allyship. These are critical consciousness, and whiteness. We posit that as white men become critically conscious (aware of

how some groups are systemically oppressed) and critically reflect on the oppressive nature of whiteness and the unearned privilege they have, then they can become racial allies.

Literature Review

Allyship

According to Patton and Bondi, an ally can engage in Diversity, Equity, and Inclusion (DEI) work, but still retain white privilege [20]. Welp defines an advocate (ally) in his study as: "willing to take a stand to support inclusion and equity in the face of resistance, being one of a small group who brings attention to these issues, recognized by women, people-of-color, gay, lesbian, bisexual, disabled, and other marginalized groups as an advocate, as well as by other white males, and having demonstrated commitment of significant time and resources." p. 40 [20]. Allies must immerse themselves in non-white spaces regardless of comfort level [3]. Therefore, in allyship, white people need to reflect on their whiteness and how white supremacy perpetuates harm in everyday lived experiences of minoritized individuals [21]. Thus, an ally is someone who can speak to power without being silenced [20]. The terms ally, accomplice, advocate are sometimes used interchangeably. For this paper, the term ally will be used. Further, the type of allyship referenced is specifically racial allyship.

Racial Allyship

In developing an allyship scale, Miller & Sharif discovered that racial allyship is more likely when the allies have another marginalized identity such as gender or sexuality [21]. From a study with 15 white undergraduate students, Reason et al. developed a racial ally model which includes: 1) support for structural diversity and seeking out diverse living situations, 2) advocating for courses on race relations, 3) acting on injustice, and 4) encouraging critical reflection on whiteness [22]. Tevis & Foste recommend four steps for white administrators to disrupt whiteness in higher education: 1) naming and acknowledging racist histories, 2) locating racism as institutional and structural, 3) starting from a place of racial critique, and 4) releasing attachments to individual goodness [17]. In other words, recognizing that racism has always existed, it is systemic in every institution, white supremacy is everywhere, and there is a need to check your own whiteness continually, as you are not exempt. Butte & Jackson suggest that allies also have to give up some privilege and be prepared to lose friends [23]. In summary, the overarching themes of racial allyship are: 1) a need for critical reflection on whiteness, 2) engaging with diverse others, 3) acting against oppression no matter what the cost, and 4) indoctrinating others. White males are therefore frequently centered where ally work is concerned because of their hyper privilege, and power to interrogate and disrupt existing racial structures [24]. Allyship work can be born out of intercultural and intergroup work. This was mirrored in King and Magolda's work on intercultural maturity, specifically the intrapersonal component. There are stages to ally development, which can correlate to intercultural maturity development [25]. Allies must engage with diverse others in terms of personal relationships, cultural, professional and service activities [25]. Continuous self-awareness/reflexivity is needed as racial realities are revealed to them [25], [26].

There are different levels of allyship activity: personal, institutional and societal [20], [27]. An example of an individual can be a teacher incorporating more examples of contributions from inventors of color in a course. Institutional allyship, for example, can be spearheading the

implementation of school-wide policies to increase minoritized participation in the college of engineering in a historically white institution. Societal allyship, for example, can be leading a campaign for reparations for African Americans nationally. During racial discourse white defensiveness can reinforce white supremacy. Allies must thus engage in racial discourse with an open mind to understand, and not to defend whiteness [28].

Theoretical Framing

In this study, Whiteness and critical consciousness are theoretical constructs used to frame this study. We used these constructs to help us examine the historic nature of whiteness on the oppression of people of color, and how it is still centered in society and STEM departments. Critical consciousness is used to help us examine how one reflects on and acts towards dismantling oppression.

Whiteness

Whiteness manifests through white supremacy, dominance and privilege. Whiteness is not an ethnicity, but a social construct that insulates white supremacy [21]. To understand how whiteness functions, we have to look at both the historical and contemporary contexts of whiteness. Whiteness is at the top of a hierarchy that was put in place to justify the subordination of non-whites [29]. Throughout history, there is ample evidence of white superiority as illustrated in the apartheid regime of South Africa and colonization of the Americas [30]. Likewise, there was a time in U.S. history where only white males were granted the rights of a citizen [29]. In contemporary society, whiteness no longer only asserts itself through violent means (e.g., police brutality, lynchings), but also through subtle means like campus police demanding students or faculty of color to show identification on campuses [1].

Whiteness is, then, the perpetuation of dominance that gives white people an unfair advantage, while rendering these advantages as "invisible" (p. 7) [30]. The first tenet of critical race theory discusses the "invisibility" of whiteness. In American society, whiteness has traditionally been synonymous with "innocence and goodness," as well as "normative." (p. 107) [31]. Delgado describes a two-headed hydra of racism. One consists of outright racial acts (e.g., lynchings) and the other represents white privilege [31]. White privilege is the systemic advantage received by whites relative to other groups [32]. Lipsitz describes how whiteness functions: "…methodological individualism that portrays social relations as simply the sum total of acts by individuals, not the product of interactions within complex practices, processes, systems, and structures…" (p. 261) [29]. Whiteness is seen as the natural order, which often leads racism to be unrecognized or unchallenged [33], [34]. In a study with white college students, Whitehead noted that white students often remain silent witnesses to racism [34]. Whitehead also positions whiteness as being structured by anti-Blackness, meaning Black people are seen as non-human (2021). Thus, violence against Black people is sadly tolerated [35]. Even those who are not white can participate and perpetuate whiteness. For example, when people of color debase each other for having non-white features like "kinky" hair [36]. Though whiteness can be invisible to white people, it is very visible to people of color, and can manifest in artifacts, for example pictures of prominent historical white figures in campus buildings [37].

Within higher education spaces, underrepresented groups are compelled to adapt to whiteness' hegemony, sacrificing their own identities, and feeling the need to prove themselves repeatedly

[5], [38]. Many higher education institutions have long thrived on merit-based systems which, though claiming to be fair, have disadvantaged underrepresented students [39]. In the United States, higher education institutions were either built by enslaved Africans, or faculty at these colleges owned enslaved people [40], [1]. Students of color were largely excluded until the civil rights era [1]. STEM higher education for example has been described as historically designed to attract white, cis-gender, able bodied, white, Christian males [5]. Consequently, "White people, men, straight people, cis-gendered people, able-bodied people, with settler mindsets, are systematically powerful people in engineering" (p. 450) [41]. White men, for example, often experience an insulated segregated world where white privilege or supremacy is never challenged, racism is unacknowledged, or ignored, and white solidarity works against social justice [42], [43]. Thus, interventions (e.g., bridge programs) aimed to increase minoritized participation are then seen as unnecessary or even unfair to white students [6]. Another element of whiteness is the exclusion of those that are othered. This is referred to as "white immunity", which calls into action exclusion of those who don't "belong" [44]. In other words, white people can show up in most spaces and be accepted even in largely minoritized spaces.

In order to counter racism, it is not only necessary for white people to acknowledge its existence, but to acknowledge how they have benefitted from it. Tatum describes white students' general reluctance to learn about racism because it places them in the role of oppressor[45]. White people generally are uncomfortable with terms like white supremacy, racism or oppression and performing ally work requires them to own it [21]. Helms indicates three major models of whiteness: a) active white supremacists, for example, Klan members; b) the group that fails to acknowledge whiteness, i.e., proponents of color blind ideology, and c) white guilt. In addition, a development of a positive white identity necessitates the awareness and interrogation of whiteness [46]. This however is a process which involves stages like contact or denial of the racialized context of whiteness. Disintegration involves acknowledgement of white supremacy and systemic nature of racism. In addition to these elements, there is reintegration, where victims of racism are blamed for their oppression. There are also other stages, the last being autonomy, where white people become active antiracists engaging with other white antiracists and marginalized communities (people of color and other oppressed identities). Encouched in this positive white identity is racial allyship [45]. Subsequently, as white people reflect on whiteness and oppression, they can develop critical consciousness.

Critical Consciousness

Critical consciousness (CC) involves how oppressed people think critically about their oppression. This term comes from the English version of the original Portuguese word 'consciensation' [47]. The term critical consciousness originated with Paolo Freire and is defined as how oppressed people perceive their oppression [47]. Critical consciousness involves both critical reflection as well as critical action [48]. Oppressors cannot free oppressed people. Oppressed people actually liberate themselves and their oppressors [47]. It is therefore the task of the oppressed to lead the charge with dismantling oppression. The causes of oppression must be critically investigated and action must be taken. Even though oppressors can feel guilty about the situation of the oppressed, it isn't until they enter into the situation with the oppressed can they ever be in 'true solidarity' (p.47) [47]. Literature exists involving critical consciousness of mostly minoritized youth [48], [49], [50]. But there is not much work on critical consciousness in privileged groups (i.e., the oppressors).

Diemer et al. developed a critical consciousness scale based on Freire's work, which sought to measure an individual's level of critical consciousness [48]. This 22-item survey which included questions like: "Confronted someone who said something that you thought was racist or prejudiced." (p. 467) [48]. Constructs that were measured were *critical reflection: perceived inequality*, which explores how youths assessed socioeconomic, gendered and racial inequity relative to educational and occupational outcomes. Another construct is termed, *critical reflection: egalitarianism*. This construct assesses how youths endorsed social equality for all groups [48]. The third construct, Critical Action: Sociopolitical Participation assessed the actions youths took to address the perceived inequities. According to Freire, white people must be aware of their role as oppressor to become critically conscious [47]. This infers they must recognize the role of whiteness in the oppression of others. They must move beyond centering individual acts of racism, to the systemic effects on marginalized communities [31]. They must align themselves (become apprentices) with communities of color to uncover and learn about their oppression from the perspective of the oppressed. And they must act along with these communities to interrogate and disrupt white supremacy, while at the same time continuously reflecting on their identity as oppressor, or former oppressor [47].

Researchers' Positionalities

The first author is a Jamaican-born Black man, who has worked in STEM higher education for almost 20 years. He is a first-generation student who holds degrees in chemistry (BS), chemical engineering (MS), and engineering education research (MS). He is currently pursuing a PhD in engineering education research. He worked as a research and development engineer for a few years before returning to academia as a teacher. He has also taught chemistry at both 4-year and 2-year institutions. He has participated in several interventions geared towards increasing minoritized student participation in STEM higher education. Over the years he has experienced isolation, microaggressions, and unwelcoming spaces in STEM higher education, as well as corporate. As a teacher he had the privilege to form mentoring relationships with white male students. Through these relationships he is able to dialogue with them about race and oppression. This led to his current doctoral research in racial allyship work.

The second author is a current Master of Arts student at the University of Michigan within the School of Education. He aspires to be a researcher using critical approaches to make improvements within the field of education. He was introduced to Diversity, Inclusion, Justice, and Equity while completing his first Master of Arts in Urban Education. He continued developing his awareness about injustice, post MA, through self-exploration, guidance from peers, and mentors. Though he did not realize the challenge of systemic racism until higher level learning, he is an advocate for Black, Indigenous, People of Color and is eager to support equity and make change. His interest and passion for diversity, equity, and inclusion came while completing the Master of Arts in teacher education in Detroit. He is from a rural community and doing graduate work in an urban center was completely foreign and eye opening. This experience introduced him to another culture, and other people that he had only read about and casually interacted with while completing his bachelor's degree. He vaguely remembers Black, Brown, and Indigenous (BBI) people as a very young person. Though his interest in DEI increased in his first graduate experience, he was guided by the associate dean in the school of education at the University of Michigan to have a better understanding of the challenges BBI

people face daily. The intrinsic need to support and better understand BBI people has persisted into his second graduate experience and has driven him toward some of the projects, like the white male racial allyship in STEM higher education project. The third author is an African American woman who served as a point of triangulation for the study. She reviewed the authors' data and interpretation of their findings and provided constructive feedback.

Methods

Critical Autoethnography and Collaborative Inquiry

In this study, we use critical ethnographic and collaborative inquiry approaches to examine the experiences of the lead author, a Black man, and the second author, a white man, as they conduct a larger study on white male racial allyship in STEM higher education. Autoethnographic research is used to detail the experiences of researchers relative to their positionalities, and can reveal information about the cultural phenomena being investigated [51], [52], [53]. It can be defined as:

> "as a critical pedagogical tool offers a means to integrate deep analysis with reflection. This occurs by placing reflective narratives in conversation with larger systems of privilege and discrimination…" (p.36)[54].

Critical autoethnography can help white educators reflect on their whiteness, and how that impacts their students [55]. Autoethnography entails the researcher being in a dual role: both as researcher and participant [56]. Collaborative inquiry is related to collaborative autoethnography, but differs in that it employs both action as well as reflection. This refers to how researchers act on what they are learning and experiencing in the research [50]. When conducting research on equity, a researcher's positionality is crucial in how the research was executed, the researcher's influence on the data, and how meaning was made [50]. The concept of diffracting was also applied. Diffracting allows the researcher to interpret and make meaning of the data through the lens of their own identity and perspectives. This is the opposite of bracketing, where the researcher puts aside his or her positionality during the research process in order to be objective [50]. Therefore, diffracting can amplify hidden or subtle themes relative to one's positionality, whereas bracketing attempts to analyze and examine the data objectively. Thus, the authors examined the data from the interviews and shared their perspectives through their own racialized experiences, which allowed for greater meaning making of what was being shared by participants.

Data Collection

This autoethnographic study is part of a larger study of white male allyship in STEM Higher Education. In that study, the research team was composed of the first author, a Black man who has worked in STEM higher education for almost twenty years and a white male graduate student in higher education. The research participants completed a modified version of the critical consciousness scale [48], and either participated in a focus group interview and/or a one-one-one interview. The participants were recruited through the first author's social and professional networks. Dialogue sessions between the researchers were recorded. The researchers documented their perceptions and experiences of conducting focus groups and interviews through recorded discussions and reflection memos. This paper does not detail the

results of the larger study, rather it focuses on the experiences and perceptions of the researchers. The perceptions of the researchers as a result of the data collection, and their engagement with each other were reported. The first author led one of the focus groups (with the second author present), and the second author led the other (with the first author absent). The reason behind this was to compare notes to see if there would be much variability with the facilitator being either a Black male or a white male, with regards to participant response. These were followed up by six one-on-one semi-structured interviews. The first author conducted five, and the second author conducted one. After both focus group interviews, the researchers met on Zoom, and shared reflections on the interviews in order to explore their perceptions about what was shared by the participants. They also met two other times to discuss overall views on the focus groups and individual interviews.

Data Analysis

The sessions after the focus groups were recorded, and the transcripts reviewed for content that addressed the research questions. Dialogue around how they internalized, and responded to feedback from participants regarding race, racism, and whiteness were examined. The authors also submitted written reflections, which are included in the results section below. The concept for this paper developed during these meetings. The original intent was to discuss what transpired during the interviews, what questions needed revisions, which participants were more vocal, quieter etc. However, as they conversed, they realized what they perceived or felt relative to our positionalities was potentially useful information for publication.

Results

Results suggest that the researchers' intersectional identities influence their experiences with the research. The first author had to perform additional work with the discussions during some interviews because he felt it necessary to provide context and share his own racialized experiences. This was due to the level of ignorance and apathy of some of the participants towards the experiences of people of color, and systemic inequity in society as well as in STEM higher education. The other researcher was prompted to be introspective about his connection with people of color, and his frustration with whiteness personally and systemically. Another emergent theme is the positive impact of the developing mentoring relationship between the research assistant and the lead researcher in the research assistant's ally journey. The preliminary results suggest that critical consciousness can be developed in white men through interrogation (self and others) and mentoring of white men by the people of color, within the context of equity social justice research. This can be particularly useful in disrupting whiteness in STEM higher education and creation of racial allies.

First author reflection

In designing this research study, I knew I was entering a charged and potentially harmful situation. I intentionally gathered a group of white men to dialogue about race. I knew a majority of the participants personally and professionally. They already had a certain level of comfort and trust to be honest about their thoughts and feelings. However, based on what might be shared, the relationship between myself and the participants could be altered. During the focus groups, I was less vocal, as the purpose was for them to talk and hear each other. I did not want to take up too much of the conversation with my viewpoint, as this could influence their responses. I also had to remind myself that this was not a session to convince anyone of racism or privilege, but more

so to establish a baseline of what is the prevailing perceptions of these white men. So, I listened and asked some clarifying questions. It was clear that some were more comfortable talking about race compared to others. For some participants that was their first time discussing racialized experiences with me. For the semi-structured interviews, I contributed more to the conversation. Two of the interviewees were also participants in the focus groups, whereas the other four only participated in the critical consciousness survey and one-on-one interviews.

In the interviews, I was able to push boundaries. It was easier to do so with just one participant, as the interaction was more conversational, and I already had relationships with the participants. With the focus groups I was mainly facilitating and observing their interactions. During the interviews I took the opportunity to reveal my own racialized experiences. I was then able to challenge participants to think through how racism affects the daily lived experiences of people of color, in contrast to them being insulated from its impacts. Something else I realized is that I wanted more time with them over a period of time to dialogue through discussions on race, privilege and allyship. I could see a light in their eyes when I challenged them to reflect on how their whiteness influenced their racialized perceptions, or inertia towards racialized experiences. It was especially interesting when we discussed racialized perspectives of their parents and other family members. I started thinking about what an allyship development model could look like.

I identified the second author as a white man who was open to engaging in racial discussions. He is engaged in equity conversations in coursework, and has a genuine interest. One question the second author asked me was "why are you doing this work?" The obvious answer was because it was an interesting topic for a dissertation. However, he asked me on two separate occasions. I felt challenged to really think through my motivation for this work. Certainly, the end goal is to inspire white men to be allies in order to broaden participation of minoritized populations in STEM higher education. Along with that, I wanted to give them tools to do anti-racist work. I really had to think through how that was to be accomplished. Conversations with him really began helping me focus not only on how white men feel about race, but also how to get them thinking about how to dismantle oppression in STEM higher education. Moreover, I felt compelled to expose them to the historical context of racism, and how that shows up today. I also realize that I need to manage my expectations. I cannot change anyone's mind, or actions. I have to see the interactions with participants as planting seeds and hopefully moving the needle forward towards non-performative allyship. Non-performative in the sense that they see the work as more than just a required DEI activity that looks good to their peers or superiors.

Second author reflection

My initial experience with this group (research participants) prompted many different reactions/emotions. I participated (in the pilot focus group interview) because I thought I had enough knowledge to add value and I believe in relentless action toward equity and allyship. Participating with the first author in this work has again reshaped my understanding of how white people perceive race and equity in their daily lives. I am frustrated because I felt like I knew enough to have an intelligent conversation about how to support BBI people with other white people, but I recognize my knowledge is very limited. Through this work and my continued learning I hope to feel comfortable engaging with non-white people to support their learning and activism for BBI people. During the focus groups, I felt engaged and directed by the questions for the participants. However, I did not feel confident in my pushback to deeper

clarification and understanding. That feeling was very pronounced when I was doing a follow up interview one on one. Part of me also felt frustrated because of how I perceived his awareness. When I reflect on group interaction, I also recognize my frustration with the participants what I see as a lack of action or interest to be inclusive. However, I remember not being active and right now am what I see as learning, but not doing a good enough job fighting for BBI people. I am not sure how or what that looks like. If I pretend to hear racist language or witness racist acts, I believe I would say or do something without reservation. My bubble is small. School, and school related work keep DEI at the forefront of people's minds in the University of Michigan's School of Education.

Discussion

What makes this work significant is the nature of the collaboration. Minimal research literature discusses experiences of people of color in the role of mentor with a white man with the intention of ally development. Eastman reported on a white professor enrolled in a STEM education program being challenged in his whiteness by a program mentor, who was another white man [4]. In other work, Taylor discusses his ambient mentoring experience from a Black male scholar [3]. In his article he narrated how his causal interaction and observation of a Black scholar colleague caused him to think critically about his whiteness. In this work, the differing epistemologies of the first and second author add to the richness of the work. As researchers from different backgrounds, we were able to examine and understand the data from two different, rich perspectives. The first author saw the data as a member of an oppressed group, while the second author views the data from a member of a privileged group. The first author can diffract based on his positionality, which enables him to tease out the subtle meanings based on the participants' responses. The second author internalized information, evaluating what was being said relative to his own experiences and perceptions as a white man. The authors also had different ontologies. The first author has lived and understands what it means to be marginalized in society. Something neither the participants nor the second author can relate to. He is therefore able to fill in the gaps of the participants and second author's understanding. The second author continuously critically reflected on his whiteness relative to the participants. Continuous reflection on whiteness by placing oneself in an environment where race is discussed (e.g. a course) was key to racial allyship development [22]. The authors note that some participants were saying the right things, but coming across disingenuous. The second author wanted to challenge some responses, but was unsure how to accomplish that without causing offense. The first author continuously reflected on what was being said through a critical lens based on his racialized experiences as a student and a STEM professional. This has been a reported theme regarding marginalized professionals at predominantly white institutions [57]. Rapport also may have played a role in the interactions. The first author had the advantage of having social capital with many of the participants, since he personally mentored several of them. Therefore, he was able to establish trust and rapport prior to the interviews. And was able to extract richer data when he conducted the interviews by challenging some of their perspectives. Mentoring literature discusses that establishing trust was key to successful relationships especially in cross-cultural and cross-gender contexts [58]. The second author's understanding of the endemic nature of racism in our society was affirmed. Critical race theory states that racism is part of the American societal fabric, and whiteness is privileged [31], [59]. The second author saw this in the apathy or canned responses from some of the participants. None subscribed to overtly racist perceptions, but the lack of participation in anti-racist activities reinforces racism. He realized

that outside of spaces where race and equity are frequently discussed, the inertia exhibited by privileged groups to address racism is pretty significant. According to Cabrera: “Is it even possible to refuse whiteness or the societal privileges of whiteness? Why would a person in a position of societal privilege challenge a system from which he or she benefits?” (p. 376) [21].

The first author is beginning to understand that racial allyship development in white men is a slow trickle of awareness and reflection that eventually fills the cup that can lead to action. He recognizes the tax that he is committed to do ‘racial equity labor’ (p. 2) that is, having to explain racial experiences, racial history, inequity, inequality to white people [60]. Not only that, but having to deal with harmful racist rebuttals and indifference that often accompany these discussions.

The project was initiated by the first author, a Black man who sought to study racial allyhip in white men. He enlisted a white man as a research assistant in order to compare notes obtained through interviewing white men in focus groups or one-on-one interviews. What began as a means of gaining validity in data collection has been transformed into a partnership through which this publication was born. Both the first and second authors became both researchers and participants. The second author was able to share his perception as a white man relative to the other participants. He was able to add depth and richness to the study as a member of the group being studied. Being a Black man, the first author moved away from bracketing, and was able to reflect and add his perspective as a Black person to the experience. The first author was able to interrogate the participants by helping them to see racialized realities through his experiences and perceptions. Through a developed relationship with the second author a mentoring relationship is emerging where he welcomes the first author’s guidance towards a greater racialized awareness, and critical action in exposing and disrupting privilege in his own life. This aligns with the Freirean philosophy that the oppressor cannot free themselves or the oppressed except through collaboration [47]. This study can serve as a model for collaborative efforts between scholars of color and white scholars. In addition, this can be a model for interventions to increase equity and justice in STEM higher Education.

Conclusion and Limitations

In sum, both researchers were affected by their engagement in various ways related to how a minoritized PI and a privileged researcher perceive and navigate racialized experiences while conducting research with privileged groups. Specifically, the minoritized PI recognized that being a person of color, there was a dichotomy in navigation. Firstly, he realized that this type of research highlights racial trauma, which he has personally experienced. Therefore, he was able to share his unique perspective to the participants. Secondly, he realized that the work of white men becoming racial allies is a journey. It is his desire to provide the tools to do so through the research, but he cannot control the outcome. The white man perceived that the research caused him to self-interrogate. He also acknowledged that in being white, he was in a position to interrogate other white men toward a better understanding of racial oppression faced by people of color. Conducting social justice work with a person of color can cause white men to be in a position where they become more aware of their role in perpetuating racism, as well as how to disrupt whiteness. A mentoring relationship can develop where they can begin to understand the racialized experiences of people of color, and how to show up for them in helpful ways.

Racial allyship development is key to marginalized populations advancement in STEM fields. Since racism is endemic to our society, privileged groups, like white men must make room for these populations by disrupting privilege within themselves and others. White men can disrupt privilege by engaging with willing people of color, who can mentor them to become effective allies. For white men allyship cannot be constrained to their professional lives, but must invade their personal lives as well. This is particularly important for white male scholars who engage in equity work. They must move from curious researchers to, in a sense, becoming uncomfortable with the privilege they enjoy daily. Engaging in work as the one being reported here can be a means of causing this continuous discomfort and reflection. This model of intentional allyship development can be transferred to allyship towards other marginalized populations. A potential limitation of this study involves the first author having relationships with most of the participants. It will be interesting to replicate the study with participants who are unknown to the first author. Those participants might be less willing to be interrogated and challenged.

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