Intersectionality Between Race and Gender in LSAMP-NSF STEM Program Mentorship

Ms. Jennifer Ackerman, Texas A&M University

I am a third year PhD student at Texas A&M University in College Station, and am a first-generation, queer, female student from New York. I am in the higher education administration program and my research interests include engineering education for underrepresented students, especially women in the field. I am interested in how their mental health is affected by being an outsider in and out of the classroom.

América Soto-Arzat, Texas A&M University

The second author is a Latine queer person of Mexican descent, born and lived in Puerto Rico and also raised in Brazil. She/they has passionately worked as a research assistant on topics like psychosocial effects after Hurricane María, gender stereotypes in faith communities, racism, and racial identities in Puerto Rico. She/they is the co-author of publications in Cruce and Polimorfo journals. She/they is pursuing a Ph.D. program at Texas A&M University, researching about women's power in intimate relationships and the role of education during Covid-19. Also, she/they is working on qualitative research to understand the relationship between mentors and minority protégés in the LSAMP-NSF program across campuses. And is the director of the Aggie Research Program at Texas A&M University.

Dr. Christine A Stanley, Texas A&M University

Christine A. Stanley is Regents Professor of Higher Education and holder of the Ruth Harrington Endowed Chair in the Department of Educational Administration and Human Resource Development at Texas A&M University.

Reuben A Buford May, University of Illinois at Urbana - Champaign

Reuben A. Buford May is the Florian Znaniecki Professorial Scholar, Professor, and Department Head of Sociology at the University of Illinois at Urbana-Champaign.

Intersectionality Between Race and Gender in LSAMP-NSF STEM Program Mentorship

Abstract

Race and gender disparities exist in Science, Technology, Engineering, and Mathematics (STEM) fields, where their intersectionality promotes the greatest achievement gap. Minority students and faculty are less represented in these fields. In engineering, especially, a hostile climate develops if you are a person with disabilities and/or non-cisgender and/or non-White man; and it is highly likely that you will be part of a minority in the field. This can lead to stress, anxiety, and feelings of isolation and hopelessness in a person's academic and career pursuits. We researched if race and gender affect the relationship between mentors and minority protégés participating in the Louis Stokes Alliance for Minority Participation (LSAMP) program, in STEM, across four different universities within a statewide university system, in the United States of America. For this study, we conducted qualitative research based on 33 interviews and transcribed them using the InqScribe software. After coding and analyzing, we found that minority protégés recognize genders and races differences, and they also perceive themselves as the minority in the STEM field. The majority of the participants think that the key to their mentoring relationship is mutual respect and understanding. They value the quality time and the caring given by their mentors. Also, the acknowledgment and validation of their intersectionality, particular struggles, and experiences. A way to reduce race and gender disparities in STEM fields is listening to minority protégés, especially women of color. Be aware of the intersectionality between race and gender and providing open spaces for them to participate and occupy leading positions in academia, recognizes their experiences and intellect.

Keywords: LSAMP, NSF, STEM, minorities, minority, undergraduates, mentors, mentees, protégés, race, gender, women of color, intersectionality, qualitative methods, interviews, mental health, COVID-19, university, United States of America

This research was supported by the National Science Foundation Award No. HRD-1911375

Introduction

In this study, we interviewed 33 mentors and minority protégés participating in the Louis Stokes Alliance for Minority Participation (LSAMP) program in Science, Technology, Engineering, and Mathematics (STEM) across four different universities within a statewide university system, in the United States of America, to learn the following regarding mentoring relationships for minority STEM students: (1) how students respond to ideas and projects, (2) how students conquer challenges and respond to setbacks, (3) how students set and pursue their academic goals, (4) how students describe their undergraduate research mentoring relationship with peers and professors, (5) how students maintain their focus in a professional development program such as LSAMP, (6) how students characterize and describe their academic progress,

(7) how students describe their academic and future career interests during and beyond the program, and (8) how students characterize their social and cultural identity in relation to their academic experiences and mentoring relationship with peers and professors.

Some participants were matched with their mentors and mentees by the program, so we also wanted to learn more about the mentor-mentee relationship to see if race, ethnicity, and/or gender affect their relationship. Considering what it is known from the literature, this is important for mentees in the LSAMP program and STEM fields. The study revolves around grit, which is helpful in understanding why students persist in certain areas related to their career trajectory. We also based our study on intersectionality as an analytic framework, which is explained through LSAMP participant interviews. We research how educational choices are made, who persists in the program and why, and what higher education professionals and researchers can do to make STEM more inclusive. For this specific paper, we focus on protégés' experiences with their mentors, and if race and gender influence their relationships. Also, we highlight what protégés consider a positive and valuable relationship, and what researchers (mentors and/or protégés) can do to make STEM more inclusive.

Literature Review

Intersectionality

"[G]ender, race, and class can be seen as working together to draw boundaries and reproduce complex inequalities in the system as a whole" [1]. So, does being White and a man in academia influence mentor-protégé relationships within STEM? The majority of students (68%) in STEM are learning from a White, man, and Western lens [2]. Often, women of color are silenced in academia by not using their scholarship which has led to the creation of gaps between theory and practice [3], where theory continues to be used to silence various feminist theoretical voices [3]. Scientific theories are continually updated through the findings of new research. But how is it then, even though theory changes, there are still some theories that are established, recognized, used, and others are not? Are these "other" theories not validated or not theoretical "enough" for academia and scholars? bell hooks in "Theory as Liberatory Practice" points out that in academia the standards and theories are based on White supremacy [3]. hooks explains that the new theory, based on the experiences of Black and women of color, results in the perception and even acceptance of "not theoretical enough" for academia; so they point out that doing new theory becomes a "revolution in feminist thought [theory]" [3]. Moreover, hooks pointed out that theory by Black and women of color are intended to interrogate and disrupt the "hegemonic feminist theory produced primarily by academic women, most of whom were [are] [W]hite" [3] and where "most seeks to create a gap between theory and practice so as to perpetuate class elitism" [3]. The participants interviewed are or were part of the LSAMP program which has the goal of "assist universities and colleges in diversifying the nation's science, technology, engineering, and mathematics (STEM) workforce by increasing the number

of STEM baccalaureate and graduate degrees awarded to populations historically underrepresented in these disciplines: African Americans, Hispanic Americans, American Indians, Alaska Natives, Native Hawaiians, and Native Pacific Islanders" [4]. Therefore, we research STEM minority mentees' relationship experiences with their mentors, who also have varied backgrounds.

Black and women of color experiences in academia intersect with race and gender [5]–[6], and, as Crenshaw mentioned: "intersectionality shapes the experiences of many women of color " [7]. Hae Yeon Choo and Myra Marx Ferree mentioned that "women of color argued that their oppression was experienced in a qualitatively different way, their experiences required distinctive attention in order to see "how race, gender, and class, as categories of difference, do not parallel but instead intersect and confirm each other"" [1]. There are multiple ways in which race and gender intersect in shaping structural and political aspects of violence against women of color and it "only highlights the need to account for multiple grounds of identity when considering how the social world is constructed" [7]. If we construct awareness of intersectionality in academia, we can better understand Black and women of color experiences in STEM and, as Crenshaw suggested, "acknowledge and ground the differences among us and negotiate the means by which these differences will find expression in constructing group politics" [7]. Hae Yeon Choo and Myra Marx Ferree maintain "giving voice to the oppressed as an expression of intersectionality" [1] is an attempt to include the experiences of marginalized people. Moreover, hearing and providing open spaces for women of color to talk, participate, and occupy leading positions in academia, recognizes their experiences and intellect. In summary, as Hae Yeon Choo and Myra Marx Ferree point out, ""intersectionality" signifies: the importance of including the perspectives of multiply-marginalized people, especially women of color; an analytic shift from the addition of multiple independent strands of inequality toward a multiplication and thus the transformation of their main effects and interactions; and a focus on seeing multiple institutions as overlapping in their co-determination of inequalities to produce complex configurations from the start, rather than "extra" interactive processes that are added onto main effect" [1].

We would like to highlight that Black women have been theoretically erased throughout our history, still marginalized and excluded from academia, and are not considered academic subjects [6]– [8]. Also, Dian Million [9] stated that Native women's experiences have not been recognized either because "scholarship continues to be segregated as a "feminine" experience, as polemic, or at worst as not knowledge" [9]. An interesting point that Million addressed is "[t]here had been no conversation that represented a Native view of the "private sphere" or the "domestic" community conditions that were a daily part of women's and children's survival" [9]. Other scholars such as Martin F. Manalansan, expressed a similar perspective, but regarding the experiences of immigrants and queer subjects [10]. Manalansan did a fieldwork between 1990 and 1995 about strategies of identity articulation and self-formation of Filipino gay immigrants

and highlighted the "private" and "domestic" sphere aspects of immigrants and queer people [10]. Also, similar to Crenshaw and the multiple-axis framework approach when we talk about intersectionalities, Manalansan pointed out that "everyday struggles of queer subjects within a globalizing world form a strategic path leading not to a teleologically determined home but rather to other more exciting possibilities" [10]. And there is value in studying the everyday and the quotidian, as Manalansan stated, that the narrative of daily life in Filipino gay immigrants is "constituted through the drama of survival and the beauty of pleasure and belonging", showing the "ambivalent yet transformative potential of quotidian engagement" [10]. And Dian Million concluded that "once emotions are accepted into sociology, the divisions between private and public, the micro and the macro break down" [9]. In the case of the participants in our LSAMP study, many of them shared similar experiences tied to their academic and personal lives. Hae Yeon Choo and Myra Marx Ferree point out that taking "more attention to system-level complexity can enrich micro-level analysis, tightening the connections among power relations, institutional contexts, and lived experience" [1]. And in our study, these connections are exemplified by the protégés in the conducted interviews.

In STEM and Their Mental Health

Discrimination occurs on college campuses daily for a variety of people, including students, faculty, and staff alike. Certain groups face this significantly more often than others. For the case of students of color in STEM, especially women, hostile environments are common, and this is expressed even more in the engineering context [11]– [12]. A hostile climate is characterized by a lack of support from STEM individuals of any kind, sexist and racist remarks, and other microaggressions towards a specific group [12]. The norm for an individual in STEM, whether a student or professor, is a White, heterosexual, able-bodied cisgender man [11]. Anyone who falls out of those identities is seen as a minority in the field. With sexism, racism, heteronormativity, and ableism in STEM, privileges are heightened [11].

There are both institutional and social barriers that could determine success in the field. Institutional barriers come from an unsupportive academic and social environment, a lack to support systems across campus, and an overall lack of understanding from others [12]. Mental health can be overlooked, as well as the resources that come alongside it. Services that address mental health needs, like university counseling centers and local therapists, for example, are limited in regard to the understanding of women of color in STEM because of a lack of understanding [13]-[14]. Besides a lack of awareness, students are also dissatisfied with long wait times for counseling centers, and they do not always seek the support they need because of the fear they will be perceived negatively [15].

Besides institutional barriers, there are also social obstacles that could inhibit success. Black women, for example, have reported that microaggressions had a negative effect on their mental health and this discrimination also led to an increase in students' perceived stress,

resulting in worsened academic performance [12]. Another study by Muñoz and Villanueva [14] focused on Latino/a STEM scholars and concluded that their experiences with discrimination put them at risk for poor physical and mental health, like depression and anxiety, whether we look at students or faculty. Most professors in this field, especially in engineering, are White men [16]. When students do not have role models like themselves to look up to, this can infer isolation and a negative sense of belonging as well. Group identification, which is a sense of belonging in specific groups with commonalities, has an impact on mental health, and when these interactions are negative, it heightens feelings of isolation and increased intentions to discontinue their respective programs [12]-[14].

To solve issues of belongingness, students need support from their advisors, faculty, and peers, and also their institution itself. Advisor support is most meaningful when they can normalize the struggles and challenges related to social identities, like race and gender [12], and in their study, only 16% of participants, mostly made up of women of color, discussed their distress because they were worried about a judgment in their competency and capability in STEM. Arnold et al. [15] agree, stating the women of color students in their sample felt a lack of interpersonal support because of difficult personal interactions with their advisors who were arrogant, aggressive, and disingenuous, while also coming from a different background from themselves.

Methodology

The current qualitative research is based on 33 interviews of mentors and minority protégés within the Louis Stokes Alliance for Minority Participation (LSAMP) program in Science, Technology, Engineering, and Mathematics (STEM) across four universities within a statewide university system, in the United States of America, and funded by the National Science Foundation (NSF). These 33 participants are from four different institutions under the same system. The lead institution is a public, land-grant research university and predominantly White, having recently been designated a Hispanic Serving Institution. One of the institutions is a land-grant and historically Black college and university (HBCU), and the other two are historically Hispanic Serving Institutions (HSI). The LSAMP-NSF programs, in these institutions, have the mission to focus "on increasing the number of STEM bachelor's and graduate degrees awarded to populations historically underrepresented in STEM fields" [4] and "support for science and engineering education, from pre-K through graduate school and beyond" [17].

To obtain a list of all mentors and minority protégés who are or have been in their LSAMP program, the LSAMP program coordinators, from each of the four universities, were contacted by the Sociology Research Team Participants. Then, participants were contacted to agree to participate in an interview. After participants signed the informed consent form, pseudonyms were assigned for all of them, including names they mentioned during the interview. We used all reasonable efforts to keep participants' personal information confidential

as required by law and university policy. However, we should note that, as stated in the informed consent, identifying information may be seen or copied by: a) The Institutional Review Board that approved our research study; b) The Office for Protection of Research Subjects and other university departments that oversee human subjects research; c) University and state auditors responsible for oversight of research; d) Federal regulatory agencies such as the Office of Human Research Protections in the Department of Health and Human Services; or e) the National Science Foundation, the founder of this research. Because of this, some participants neglected to participate in the interview. Participants who were contacted and willing to participate in the interview were, in this order: 1) contacted via email and received a description of the project; 2) received a statement of the informed consent and interview date to take place via Zoom; and 3) a Zoom link was sent for the interview. The interviewer answered any questions or concerns that participants had about the project and/or interview. Due to COVID-19, these recruitment steps and interviews were conducted virtually. We used the video conferencing platform, Zoom, to conduct the interviews from Spring semester of 2021 to Summer semester of 2022. Archibald, Ambagtsheer, Casey & Lawless [18] reported, the "viability of Zoom as a tool for the collection of qualitative data because of its relative ease of use, cost-effectiveness, data management features, and security option "allows us to capture perceptions and experiences of participants in innovative ways"" [18].

For the interviews and transcriptions, we used a protocol containing the steps for these processes, important information for the quality of the transcription process [19], code table, shortcuts in InqScribe (the transcription software we use), the interview transcript, and the interviews/transcripts analysis. For the **transcription process** we used the audio of the Zoom recording and adhered to the following steps:

1. Ensure the readiness of the transcription equipment:
    a. Audio file, headphones (optional if the transcription is taking place in a private space), and InqScribe (transcription software) which is coded based on our Code Table below
2. Access to the audio file:
    a. Find the folder in Google Drive that contains the audio of the mentor or protégé and download the audio file to the computer
3. Open InqScribe software:
    a. Look for and select the media source, select the file, mark the audio, and click on "Load" or just drag and drop, and ensure the audio is in the software
4. For transcription ensure and:
    a. Verify that the codes are configured in the *Snippets* of the software. If not, add them (see Code Table below)
5. Begin transcription process:
    a. Apply codes with the implementation of *Snippets* when necessary

b. Save the transcription text in the proper folders in Google Drive

c. Delete the audio from the computer only when the entire transcript is finished

6. Process of transcription edition:

a. Revise any grammar or spelling error on the transcript, if applicable, and the codes

b. Use the following format in the transcript:

i. Header: Project Title

ii. Under the heading:

1. Audio Code: Interview
2. Interview date
3. Transcribed by: Name of the transcriber

iii. Implement codes that were not previously implemented, if applicable

7. If it is necessary to stop and resume at another time:

a. Save and upload the unfinished version in the Drive folder and work on it later

b. Licensed InqScribe will save your last version so you can just open the document that the software generates and continue working on it

c. Save any version in the Drive folder and substitute them for the final one

Code Table

Codes	**Snippets in InqScribe**	**Mac Keyboard:**	**Description**	**Examples**
CAPITAL LETTERS	N/A	Just write in CAPITAL LETTERS	Participant spokes louder or shouted compared to the previous tone. Emphasis	P: WOW
(h)	Shift + 3	Shift + 3	Participant laughed as he/she/they spoke. Laugh.	P: You kn(h)ow P: because I 'm not patient enough (h)

( )		Just type ()	The audio fragment is not understood. Interruption or ambient noise -or if possible, include transcriber interpretation.	P: So I'm doing like the () Ph.D. here [...] P: I was () at that moment. P: I was (in the car) at that moment.
América or Jennifer	Shift + 1	Shift + 1	Interviewer	A: or J:
Pseudonym	Shift + 2	Shift + 2	Initial of participant's pseudonym	P:
…	N/A	Just write the "…"	Pause or spaces of silence.	P: Ph.D. here as if I have no… no master
^ ^	Shift + 6	Shift + 6	Speak quietly.	P: no master studies^^

For the 33 **interviews/transcripts analysis**, similar themes were grouped together under specific codes. With these coded results and with an inductive approach, we identified themes that record the intersectionality framework in minority protégés in STEM fields and their experiences with their mentors, in relation to their race and gender. This method of analyzing data identifying similar themes, comparing them, and grouped them together under specific codes, is a "grounded theory" (Glaser, B.G. and A.L. Strauss, 2017) and with this interpretative and comparative theme analysis we were able to organize (Corbin, J. and A. Strauss, 2008; Denzin, N.K. and Y.S. Lincoln, 2011) the key and valuable aspects for minority protégés in their mentoring relationship.

Two researchers independently coded the data (Emerson, 1995; Williams and Moser, 2019). Then, broad themes were identified such as "good elementary educational experiences," "family impact on education," "mentor influence on aspirations," and "the significance of race, ethnicity, and gender in educational experiences." Later, we compared and agreed on the themes, establishing interrater reliability (Armstrong, 1997), and we started to compare the categorized themes within the same broad themes and across themes. Then, the authors discussed the theme's relationships. The key themes were "mutual respect and understanding," "quality time and

caring," "acknowledgment and validation." Finally, a document with the key themes and participants' quotes were prepared, which is the foundation of the results part of this paper.

Results

Holistic Well-Being

Holistic health encourages individuals to recognize the whole person. This can include the physical, mental, social, emotional, and intellectual traits a student requires. Students described that their personal life experiences were just as important as their academic ones. This was an important theme for several participants in this study. If the mentor, whether this is a student or faculty mentor, gets to know their mentee instead of just answering their questions regarding research and their studies, the student will then in turn feel more comfortable interacting with and asking questions to their supervisor. Bárbara, a White and Cuban female, describes the importance of mentors and their attentiveness to their personal life.

Your mentorship doesn't exist in a bubble, your life exists outside of it, so it's important for your mentor to care about you as an entire person and your experiences, and what you want outside of the mentorship that you're in."

For Lorena, a White and Hispanic female, she also mentions the personal aspect of her mentorship experience on top of her academic one.

"I got really close to my mentor, since she was only a senior, a student mentor, and I got really close to her and she would always help me, not just academically, but personally as well."

For both Bárbara and Lorena, the personal connection they were able to make with their mentors made their experiences more positive.

Freedom of Choice

When we talk about freedom of choice, we are talking about students' ability to be autonomous in their work. Students want the academic freedom to create their own research projects and become a leader in their field. To do this, they still need support from mentors, as well as their peers. Bárbara says,

"She gives me a lot of freedom and making my own decisions for certain things is really nice because it gives me the space to grow and think through everything."

Amber, a White and Hispanic female, also agrees and states that she likes the ability to be independent. Even though her mentors are there to help, she doesn't feel like she is just being told what to do all the time. She says,

"I like how they both let it be kind of self-driven. If there's something I can ask him, I want to start a project or ask the grad student about focusing on a certain area of her research or something, they will kind of guide me through that."

Communication and Time Commitment

Communication is key in any environment, especially in engineering education and in potential careers protégés want to pursue. When students meet with professors, they expect time to be given to them, quality time to be more specific. If the meeting is quick and a quick answer is given, that can just as easily be an email. So, when meeting in person, whether it has to do with general advising, a specific lab meeting, or even a personal conversation, just being there for your student can make a big difference in their lives. Even though mentors may be busy, students will understand that, but also appreciate when quality time is given to them. Selena, a White and Hispanic student, believes that not being judged to ask questions and approach the professor at any time is a key component to success. She says,

"He[mentor]'s very approachable and he's always making sure that everybody in the lab has everything they need and if they have any questions, we can all go to him…I think definitely just the personal characteristics and qualities are I think what I value the most."

Noemí, a Hispanic female, agrees that communication and being available are important traits she looks for in a mentor. Even if someone is not a direct mentor to the student, but someone who the student interacts with, being acknowledged by someone in the field and knowing you exist as a subject, not just another "random" student, can make all the difference. She says,

"I really like that she [mentor] is super communicative. She is super sweet as well. She tries to understand us as teenagers because we were on the trip, she also went with us. We were 30 students, and she was very communicative with all of us. She learned my name and everything. I really liked that she learned my name."

Gender, Race, and Ethnicity Equity

Does a mentor's gender, race, and/or ethnicity affect the way they work with their students, or do students perceive their mentoring differently if they cannot relate to who they are matched with? Especially in engineering, a field made up primarily of men, do women feel pushed to the side or do students have the role models needed to succeed in this speciality? Some students believe race and gender do matter, while others care more about the person's characteristics.

Some students may want only someone who matches them in regard to race, gender, and/or ethnicity, but many just want to be appreciated regardless of who is on the other end. Oralian, a Hispanic female believes that respect is a number one priority. She says,

"I don't mind whether the race may be or your gender. As long as they don't ruin the mutual respect that we have, I'm perfectly fine."

Jocelyn, a White, Hispanic, and Korean female feels the same way. She says,

"How they [advisors] treat other people is very important to me. But I would not say race or ethnicity is a factor if someone can be a good mentor".

The majority of our sample agree that even though they may feel more comfortable with someone like themselves, in the end, what matters most is mutual understanding and respect. Bárbara says,

"I definitely feel much more comfortable with women, sort of the emotional and mental safety, which is why I feel really great that Dr. X does animal behavior".

Amanda, a Black female, agrees that she has benefited from having a female mentor. She says,

"I do like that she [mentor] is a woman. I don't know if that's a really good character, but I would say I like that she is a woman because, you know, she understands what it's like to be a woman in the technology field and no disrespect to men and everything, but a lot of times to me, they come on very strong".

For both Bárbara and Amanda, they had female mentors that made them feel safe, they were able to relate to, and relied on them as women in STEM. They allow them to see a representation of gender, race, and/ethnicity in a space of White men power, as well as a voice in this space. The decisions mentors make will impact students' lives with their best interests in mind.

All in all, students want to feel respected and recognized. This can come from seeing someone that looks like you and has the same characteristics succeeding in the field, or just someone that sees you and understands you. Race and gender do not necessarily matter in deciding who will be the best fit for a mentor-mentee relationship, but letting students have a say in who they want as a role model, can go a long way. Emmber, a White and Hispanic woman, talks about her perceptions of the STEM field. She understands that she is a minority in the field and likes seeing someone like her that has shown success in the field. A big part of this is her experiences with mentoring. She says,

"I think it can be helpful to have a mentor that looks like you or has some shared characteristic with you, especially in fields that are maybe dominated by one gender or race…I think in some cases, it would be helpful to have mentors that have has success in the field that maybe hasn't always welcomed everybody".

Discussion/Limitations

In the holistic well-being section, minority protégés' mentioned that mentors, who care about them beyond the academic life, have impacted them positively. They also expressed, in the communication and time commitment section, that they value quality time given by their mentors. Therefore, we infer that recognizing and caring about protégés' intersectionality and

particular struggles is important for them, as well as acknowledging and validating their experiences. As previously mentioned, "women of color argued that their oppression was experienced in a qualitatively different way, their experiences required distinctive attention in order to see "how race, gender, and class, as categories of difference, do not parallel but instead intersect and confirm each other"" [1]. Supporting, to any extent, mentees in their struggles in life is to also allow them to talk as subjects. In their personal lives and especially in academia, since minorities tend to be silenced [3] and historically Black women have been excluded from academia [6]– [8]. Noemí expressed with a positive tone, in the communication and time commitment section, that "*[s]he [mentor] learned my name and everything. I really liked that she learned my name."*And we would add that listening to minority protégés' experiences in life is also empowering to them, and open paths to make new ways of thinking (or theorizing) [3]. As bell hooks would say, "personal testimony, personal experience, is such fertile ground for the production of liberatory feminist theory because usually it forms the base of our theory-making" [3]. This act from a mentor to listen, talk, and trust protégés, allows them to feel empowered and independent as they express themselves in the freedom of choice section, so they can continue to learn, grow, and create their own ways in research and academia.

To some extent, the gender, race, and ethnicity equity section is aligned with Shultz, Colton, and C. Colton, Brothers and Knox's ideas about the effect of gender, race, and/or ethnicity in mentors and mentees' relationships [20]–[21]. Some students say explicitly that they prefer women as mentors. Bárbara, for example, says that prefers women because they feel more comfortable and safer. Amanda also talks about their experience with a woman mentor versus a man mentor. She says that her woman mentor "*understands what it's like to be a woman in the technology field and no disrespect to men and everything, but a lot of times to me, they come on very strong."* However, even though mentees recognize genders and races differences, and they also perceive themselves as the minority in the STEM field, the majority of the LSAMP protégés think that the key to their mentoring relationship is mutual respect and understanding. For example, Oralia does not mind about race and gender, as long as mentors *"[...] don't ruin the mutual respect [then is] perfectly fine."* In a similar idea, Jocelyn expressed "[...] *I would not say race or ethnicity is a factor if someone can be a good mentor."*

In conclusion, for protégés in the LSAMP program, gender, race, and ethnicity are recognized but not key for their relationships with their mentors. However, mentors should make the effort to recognize and care about protégés' intersectionalities and particular struggles because it is important for them, as well as acknowledge and validate their experiences. Protégés value quality time given by their mentors and appreciate the mutual respect and understanding in the relationships with their mentors.

In our paper, however, there are limitations that came up throughout our study, as well as directions for future research. First, gender expression is not always so simple. This can be a

complicated form of identity that is open to change at any point in someone's life. For our research, we expressed one's gender through self-presentation, yet never flat out asked how the participants identified themselves. All in all, mentorship is an important aspect for STEM achievement, but it is not guaranteed every mentor/mentee match will be successful. For future research, we will investigate the lack of pronoun use, as well as the colorblindness in STEM. There is the idea that we are all the same and we can see the connection with COVID-19 and expressions like "we are all in this same boat [situation]".

Acknowledgments

The authors greatly acknowledge the support provided by the National Science Foundation (HRD-1911375), the principal investigators Drs. Christine Stanley, Texas A&M University, Room 511 Harrington Tower, College Station, Texas 77843; Telephone: 979-845-2716; email: cstanley@tamu.edu and Reuben May, University of Illinois, Urbana-Champaign, 3120 Lincoln Hall, Urbana, Illinois, 61801; email: rabm@illinois.edu, faculty, staff, and campus coordinators at every four universities for their assistance with this research. Any opinions and recommendations expressed are those of the authors and do not necessarily reflect those of the National Science Foundation (NSF). The authors thank correspondence concerning this article should be addressed to América Soto-Arzat, Texas A&M University, 4351 TAMU 2935 Research Parkway, Suite #311 College Station TX 77843-4351; email: americaarzat@tamu.edu and/or Jennifer Ackerman, Texas A&M University, office address, and telephone; email: jackerm3@tamu.edu.

References

[1] H. Y. Choo and M. M. Ferree, "Practicing Intersectionality in Sociological Research: A Critical Analysis of Inclusions, Interactions, and Institutions in the Study of Inequalities," *Sociological Theory*, vol. 28, no. 2, pp. 129–149, Jun. 2010, doi: 10.1111/j.1467-9558.2010.01370.x.

[2] U. S. Department of Education, "The Condition of Education," National Center for Education Statistics, 2010. Accessed: Feb. 25, 2023. [Online]. Available: https://nces.ed.gov/pubs2010/2010028.pdf

[3] b. hooks, "Theory as Liberatory Practice," in *Teaching to Transgress*, vol. 4, Routledge, 1994, pp. 59–77.

[4] "Louis Stokes Alliances for Minority Participation," *NSF - National Science Foundation*, Jul. 28, 2020. https://beta.nsf.gov/funding/opportunities/louis-stokes-alliances-minority-participation

[5] L. McCall, "The Complexity of Intersectionality," *Signs*, vol. 30, no. 3, pp. 1771–1800, 2005.

[6] N. G. Alexander-Floyd, "Disappearing Acts: Reclaiming Intersectionality in the Social Sciences in a Post-Black Feminist Era," *Feminist Formations*, vol. 24, no. 1, pp. 1–25, 2012.

[7] K. Crenshaw, “Mapping the Margins: Intersectionality, Identity Politics, and Violence against Women of Color,” *Stanford Law Review*, vol. 43, no. 6, pp. 1241–1299, 1991, doi: https://doi.org/10.2307/1229039.

[8] K. Crenshaw, “Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics,” *University of Chicago Legal Forum*, vol. 8, no. 1, pp. 139–167, 1989.

[9] D. Million, “Felt Theory: An Indigenous Feminist Approach to Affect and History,” *Wicazo Sa Review*, vol. 24, no. 2, pp. 53–76, 2009, doi: https://doi.org/10.1353/wic.0.0043

[10] M. F. Manalansan, “Migrancy, Modernity, Mobility: Quotidian Struggles and Queer Diasporic Intimacy,” in *Global Divas: Filipino Gay Men in the Diaspora*, Durham, NC: Duke University Press, 2003, pp. 89–125.

[11] E. A. Cech, “The intersectional privilege of white able-bodied heterosexual men in STEM,” *Science Advances*, vol. 8, no. 24, pp. 1–14, 2022, doi: https://doi.org/10.1126/sciadv.abo1558

[12] K. G. Wilkins-Yel, A. Arnold, J. Bekki, M. Natarajan, B. Bernstein, and A. K. Randall, “I can’t push off my own Mental Health’: Chilly STEM Climates, Mental Health, and STEM Persistence among Black, Latina, and White Graduate Women,” *Sex Roles*, vol. 86, no. 3–4, pp. 208–232, 2022, doi: https://doi.org/10.1007/s11199-021-01262-1

[13] Q. R. Alexander and M. A. Hermann, “African-American women’s experiences in graduate science, technology, engineering, and mathematics education at a predominantly white university: A qualitative investigation,” *Journal of Diversity in Higher Education*, vol. 9, no. 4, pp. 307–322, 2016, doi: https://psycnet.apa.org/doi/10.1037/a0039705

[14] J. A. Muñoz and I. Villanueva, “Latino STEM Scholars, Barriers, and Mental Health: A Review of the Literature,” *Journal of Hispanic Higher Education*, vol. 21, no. 1, pp. 3–16, 2022, doi: https://doi.org/10.1177/1538192719892148

[15] A. C. Arnold *et al.*, “Examining the Effects of STEM Climate on the Mental Health of Graduate Women from Diverse Racial/Ethnic Backgrounds,” presented at the ASEE, Virtual, 2020, pp. 1–20. doi: http://dx.doi.org/10.18260/1-2--34617

[16] J. Roy, “Engineering by the numbers,” ASEE, 2018. Accessed: Feb. 25, 2023. [Online]. Available: https://ira.asee.org/wp-content/uploads/2019/07/2018-Engineering-by-Numbers-Engineering-Statistics-UPDATED-15-July-2019.pdf

[17] “Explore Beta,” *NSF - National Science Foundation*. https://beta.nsf.gov/

[18] M. M. Archibald, R. C. Ambagtsheer, M. G. Casey, and M. Lawless, “Using Zoom Videoconferencing for Qualitative Data Collection: Perceptions and Experiences of Researchers and Participants,” *International Journal of Qualitative Methods*, vol. 18, p. 1609406919874596, Jan. 2019, doi: 10.1177/1609406919874596

[19] C. Davidson, “Transcription: Imperatives for Qualitative Research,” *International Journal of Qualitative Methods*, vol. 8, no. 2, pp. 35–52, Jun. 2009, doi:

10.1177/160940690900800206

[20] E. L. Shultz, G. M. Colton, and C. Colton, "The adventor program: Advisement and mentoring for students of color in higher education," *Journal of Humanistic Counseling, Education and Development*, vol. 40, no. 2, pp. 208–217, 2001.

[21] E. L. Brothers and B. Knox, "Best practices in retention of underrepresented minorities in science, technology, engineering, and mathematics (STEM) in the Tennessee Louis Stokes Alliance for Minority Participation (Tennessee LSAMP)," *Journal of Intercultural Disciplines*, vol. 11, pp. 71–84, 2013.

[22] Glaser, B. G., & Strauss, A. L. (2017). *Discovery of grounded theory: Strategies for qualitative research*. Routledge.

[23] Corbin, J., & Strauss, A. (2008). "Strategies for qualitative data analysis," *Basics of Qualitative Research. Techniques and procedures for developing grounded theory.* SAGE Publications.

[24] Denzin, N. K., & Lincoln, Y. S. (Eds.). (2011). *The Sage handbook of qualitative research*. Sage.

[25] Emerson, Robert M., et al. 1995. *Writing ethnographic fieldnotes*. University of Chicago Press.

[26] Williams, M., & Moser, T. (2019). The art of coding and thematic exploration in qualitative research. *International Management Review, 15*(1), 45-55.

[27] Armstrong, D., Gosling, A., Weinman, J., & Marteau, T. (1997). The place of inter-rater reliability in qualitative research: An empirical study. *Sociology*, *31*(3), 597 606. https://doi.org/10.1177/0038038597031003015