

Applying the Bowman Strengths-Based Adaptation Model to STEM students: Social Support Networks, Socioeconomic Status, Personal Strengths and Sense of Belonging on Campus



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Abstract

- Racial minorities are underrepresented in STEM fields in higher education and report a lower sense of belonging on campuses.
- Initiatives like NSF’s Michigan Louis Stokes Alliance for Minority Participation (MI-LSAMP) address this underrepresentation, participation, and retention of minority students in STEM at various Michigan colleges.
- Using the Bowman Strengths-Based Model, the MI-LSAMP research program aims to understand multilevel strengths that can help underrepresented students succeed in college.
- This study focuses on how social support networks (SSNs), influenced by perceived socioeconomic status (SES) and personal strengths, affect a student’s sense of belonging on campus.
- A semi-structured interview protocol with questions related to student challenges, sense of belonging, and connections was developed. 14 MI-LSAMP students were interviewed.
- Results show that students feel that a lack of representation and diversity in social support networks can undermine sense of belonging. Students work to overcome imposter syndrome through mentors' guidance and encouragement. Students draw upon personal strengths, motivations, and SSNs to overcome SES challenges. **These relationships between student sense of belonging and their SSNs, SES, and personal strengths can inform programs like MI-LSAMP and aid the development of strategies to increase campus connectedness.**

Introduction

- Students with a low perceived SES might have difficulty experiencing the same sense of belonging on campus as their peers. Students’ sense of belonging might suffer indirectly due to their or their families identified socioeconomic status (Park et al., 2022).
- Personal strengths of students can contribute to resilience in overcoming challenges at school (Bowman, 2013).
- Social support networks (SSNs) at college are vital to student success in maintaining and fostering relationships on campus (Chen et al., 2023).
- SSNs, SES, can contribute to a student’s sense of belonging on campus (Fernandez et al., 2023).
- Students with a higher sense of belonging on campus might have more professional or social opportunities than their peers with a lower sense of belonging, increasing STEM career and educational opportunities as a result of their persistence (Murphy et al., 2020).

Research Question: How do social support networks, influenced by perceived socioeconomic status and personal strengths, affect a student’s sense of belonging on campus?

Acknowledgement

This project is supported by Award Number 2109942 from the Division of Equity for Excellence in STEM, Directorate for STEM Education, National Science Foundation (Tabbye Chavous, PI). The content of this poster is solely the responsibility of the authors and does not represent the official view of the National Science Foundation.

Method

- Participants: 14 MI-LSAMP students from 2021-2023 academic years.
- Students were interviewed about their experiences in college relating to STEM.
- Interview transcripts were memo'ed for content and themes by research students. Memo'ing includes dividing transcripts into sections by question and summarizing what is said.
- Framework for developing codes: Bowman Strengths-Based Model: focusing on factors that contribute to minority students' success in STEM.
- Codes applied: **SES, Social Support Networks, Sense of Belonging, Personal Strengths** (Dedoose software).
- Research team analyzed coded transcripts to develop themes with generated sample ideas from AI.

CODES	DEFINITIONS
Socioeconomic Status	Mentions of structural inequalities due to socioeconomic status
Social Support Networks	Mentions of social support as a strength may refer to family (nuclear or extended); faculty members; college staff; religious/spiritual advisors; therapists; social workers; psychologists; other students; or other community support not related to institutions, policy initiatives, or political forces. Not the feeling that results from these interactions.
Sense of Belonging	Encapsulates students’ relationships with their campus community and others on campus through support, connectedness, mattering, value, respect, and importance. Seen as the result of healthy or unhealthy social support networks.
Personal Strengths	Mentions of personal risks may refer to social or cognitive stressors (e.g., stress, lack of self-efficacy or self-esteem, role stress, loneliness/social isolation, etc.)

Discussion

- After reviewing the themes, the team concluded that students' perceptions of their college experience can inform programs like MI-LSAMP to enhance their mission of inclusivity and expanding diversity in STEM.
- Programs that enhance representation and expand diversity in social support networks of students can improve sense of belonging. Providing mentors who guide and encourage can help students overcome imposter syndrome.
- Students use personal strengths, motivations, and SSNs to overcome SES challenges. MI-LSAMP can help students realize their personal strengths to overcome obstacles and be prepared for a confident STEM career.
- Educational programs can train their mentors to help students identify their personal strengths so students can be better equipped for a STEM career.
- A diverse staff can better help a diverse body of students.
- Comprehensive DEI training for mentors can foster a sense of belonging in students, potentially improving the college experience.
- In addition to financial aid, programs like MI-LSAMP can support students by offering food pantries, emergency funds, and free or low-costs access to textbooks.

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Findings

THEME 1: Lack of representation and diversity in social support networks can undermine sense of belonging

"I have never met a Latina nurse growing up, so that's probably why, like the first, what, 22 years of my life, I had never considered nursing because I didn't know any nurses. No nurses looked like me. They didn't show up on TV looking like me." (Participant 2176)

"My own neighborhood is predominantly black, and, so with my high school and my middle school and parts of my elementary school. So when I came here, it was a little bit different visually. It was different, of course, and then, like interest wise... I was pretty disconnected because I couldn't understand, or find any fun in the things that were happening." (Participant 2247)

THEME 2: Mentors foster belonging through guidance and encouragement

"During the LSAMP program, in the summer. We were granted a mentor that we could go to and help us...She's always like, 'How are you doing? Are you doing okay? What's your plan for next semester? Oh, if you take this, take it with these teachers - it'll help run things more smoothly,' you know, so in a sense, I still have that support from my mentor." (Participant 2117)

"I do feel like I've talked with my advisor many times in person. I've, you know, gone to many events and she knows my name and it makes me feel supported even if it's sort of just in my head. It just makes me, it has it gives me that little extra, you know, boost of confidence." (Participant 2374)

THEME 3: Personal strengths, motivations, and Social Support Networks used to overcome socioeconomic challenges

"I want better for myself. Be a good example for my boy" (Participant 2136)

"Thinking about how my parents have been stressed about [money] has only made me want to become successful. I think that may have pushed me to do well in a STEM-related field and to go for higher, higher, higher goals because I don't wanna be in that situation if I choose to have kids, and I don't wanna put that onto them because I know that money problems can be really traumatic for people to go through and especially if your brain isn't fully developed." (Participant 2388)

"I lost my job, so I was without work for like a month and a half and I was struggling to make ends meet. Not a little side hustle was only like going so far, you know. And I'm like, you know, I don't know how this lady heard about it, but ... she reached out and she was like, "you are eligible even though you already got your degree and you already don't qualify for the other financial aid. You still qualify for this grant that we offer for engineering students." So she went ahead and paid off the rest of my tuition for me and reimbursed me for what I had already paid in. So that really helped." (Participant 2344)

THEME 4: Overcoming imposter syndrome to find belonging

"There's not really evidence to support my imposter syndrome. Even though my classes are hard and I'm struggling, that doesn't mean I'm a bad student or that I can't do it." (Participant 2369)

"I have imposter syndrome and I worked through that and even my STEM coordinator. She [said], 'You know, you belong here, you can do this, you know you are intelligent for this. You just have to train your brain that way, you know, and there is help available if you do need it throughout your institution, you know.' So I'm like, okay, you know what you're right? Yeah, I do belong here. It's gonna take some more convincing than just, you know, a couple of times telling me you belong here. But yes, that was a challenge." (Participant 2136)

"I know I briefly mentioned the imposter syndrome. But I think that was a really big one for me. Cause I just felt like I just didn't really belong there...Like the first couple of weeks, that was like, first of all, I don't know anybody. I don't have any connections. I didn't even feel like I belong here. I really didn't like that. And, then, the imposter syndrome died down over the year" (Participant 2338)