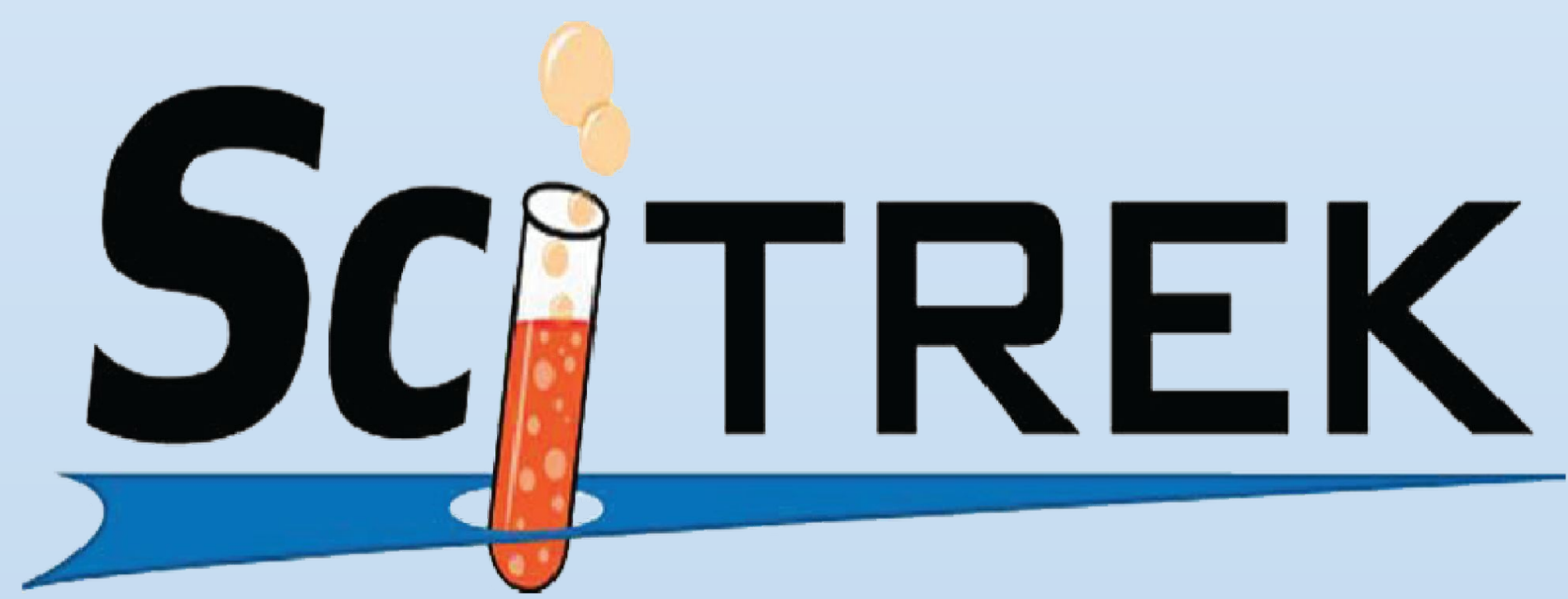




Fostering Positive STEM Outcomes for Undergraduates: The Impact of Mentoring K-12 Students



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Introduction

Prior literature suggests that female-identifying students suffer representation issues, with many scientific role models being limited to males (Li & Koedel, 2017), and that STEM identity is closely linked to retention in the field, and mentoring has been shown to support scientific identity in students.

- Peer-mentoring programs in STEM are effective in helping traditionally underrepresented students (including women) feel more comfortable in a college environment (Trujillo et al., 2015), and other mentoring programs show that all students felt more at ease and prepared for scientific careers with a female STEM mentor (Moghe et al., 2021).
- Science Identity Theory explores how individuals come to see themselves—and be recognized by others—as “science people” with three core components: competence, performance, and recognition by others (Carlone & Johnson, 2007).

SciTrek is a science-based outreach program that sends undergraduate mentors into local K-12 classrooms to guide students in multi-day, mentored, hands-on science experiments where students have voice and choice in the design. Program data indicates that the undergraduate mentors have a positive impact on the K-12 students, and we explored the effect of this mentoring on the STEM undergraduates themselves.

What is the impact of STEM mentoring on the undergraduates science identity, ability to see themselves and others as role models, after serving as mentors to younger students?

Methods

Design
In designing our study, this framework guided both our research questions and our qualitative coding scheme. Our seven parent codes were directly modeled off of the core components of Science Identity Theory, capturing how undergraduate mentors experience shifts in competence, performance, and recognition through mentoring in SciTrek.

Participants & Procedures

- Participants are UCSB undergraduate students who have completed at least 1 SciTrek module in the academic year 2023-2024
- Participants were recruited from a list of undergraduates who filled out our volunteer survey and were interested in further interview opportunities.
- The interviews ranged from 15-45 minutes and participants were compensated with a \$10 gift card.
- Semi-structured interviews were conducted in an office on campus, by an undergraduate researcher
- Ran descriptive statistics on Qualtrics survey data through SPSS

Codebook & Results

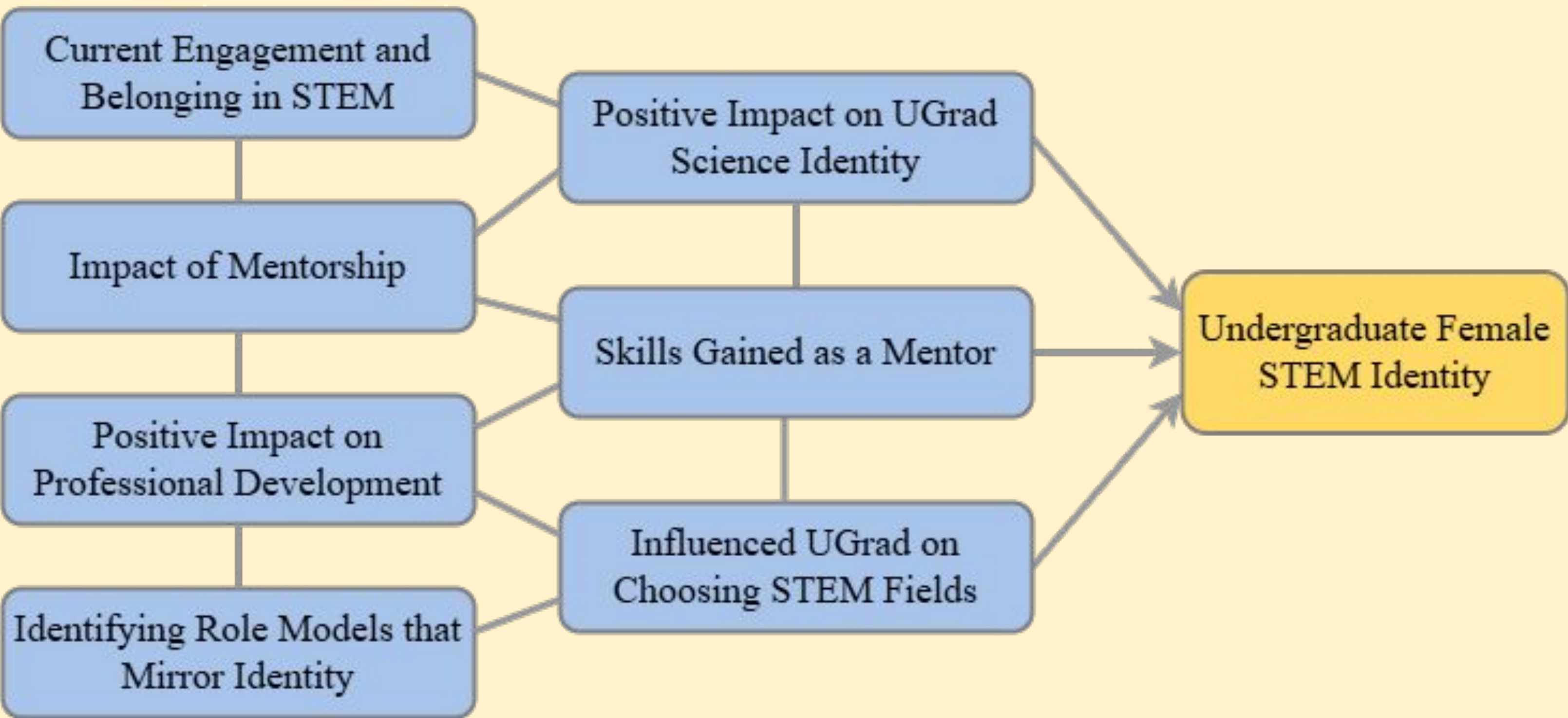
Career Goals		
	Pre-module	Post-module
Teachers	26	35
Graduate school (working with elementary)	40	25
Grad school (working with secondary)	14	24

Societal Beliefs on Who Does Science		
	Pre-module	Post-module
Male	42	42
White Male	14	11
Talent	11	11
Hard Work	4	4

Affected Career Decisions		
	Pre-module	Post-module
Science Interest	37	28
Family	18	26
Activities	13	16
Academics	11	18

How did being a mentor make you feel?	
	Post-module
Self as Role Model	38
Made Impact in Classroom	16
Felt Valued	16
Increased Confidence in Teaching	11
Understood Difficulty of Teaching	11

Codebook Parent Codes



Qualitative Findings

Codes	Quotes
Current Engagement & Belonging in STEM	"Being a mentor to the students made me feel good because I am giving them an example of what they can do if they enjoy science."
Impact of Mentorship	"As a mentor, the students looked at you for a lot of answers and put a lot of trust in you. From this experience, I gained a lot of experience on how it feels like to be a role model and I enjoyed it a lot."
Positive Impact UGrad Science Identity	"The program makes me think of how early on you started doing science and then how in some of these labs that I'm in, we do the techniques that are very similar."
Positive Impact on Professional Development	"It kind of made me realize how much knowledge I have and understanding towards this and, how I can teach it to other people."
Skills Gained by Serving as a Mentor	"You have to explain science in a way that kids have to understand so it really has to make you think and condense it in a way that's tangible."
Identifying Role Models that Mirror Identity	"So cool, I remember looking up to people like this and being a girl and feeling like I could be a role model for other girls who are interested in science is awesome! Also a lot of the schools we go to, the teachers talk about how this kind of gets them excited to go to college since not everyone even feels like that's an option for them, so being able to talk to the students and help them feel confident in their ability to succeed at college definitely is a huge potential impact."
Influenced Ugrad on choosing STEM fields	"Being a mentor to the students made me feel good because I am giving them an example of what they can do if they enjoy science."

Discussion

Preliminary findings suggest that *SciTrek* had a positive influence on undergraduates’ science identity and self-perception as role models. Mentoring 2nd -12th students increased students’ sense of belonging and confidence in achieving STEM career goals.

Undergraduates that participated in SciTrek reported this as a meaningful STEM extracurricular that strengthened teaching skills and fostered a sense of purpose. Undergraduates from marginalized backgrounds noted that mentoring helped them support younger female students in visualizing themselves as scientists. These findings reinforce that mentorship programs benefit not only mentees but also mentors—especially with science identity and self-efficacy.

Further research with a larger sample is needed, but this work supports the development of incentives and expanded opportunities for undergraduates to engage in outreach and peer mentoring programs.

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