STAYING IN SCIENCE

AN EXAMINATION OF YOUTH PATHWAYS USING SOCIAL NETWORK THEORY AND ANALYSIS

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GOALS

- Understanding of the pathways of STEM-interested high school students from underrepresented groups
- Supports and barriers to youth's trajectories in STEM

TODAY'S FOCUS

Affordances of using community of practice and social network theory to deepen our understanding of students' relationships with their science research mentors and individuals that influence their pathways in STEM.

GAPS WE'RE ADDRESSING

There is very limited longitudinal research that:

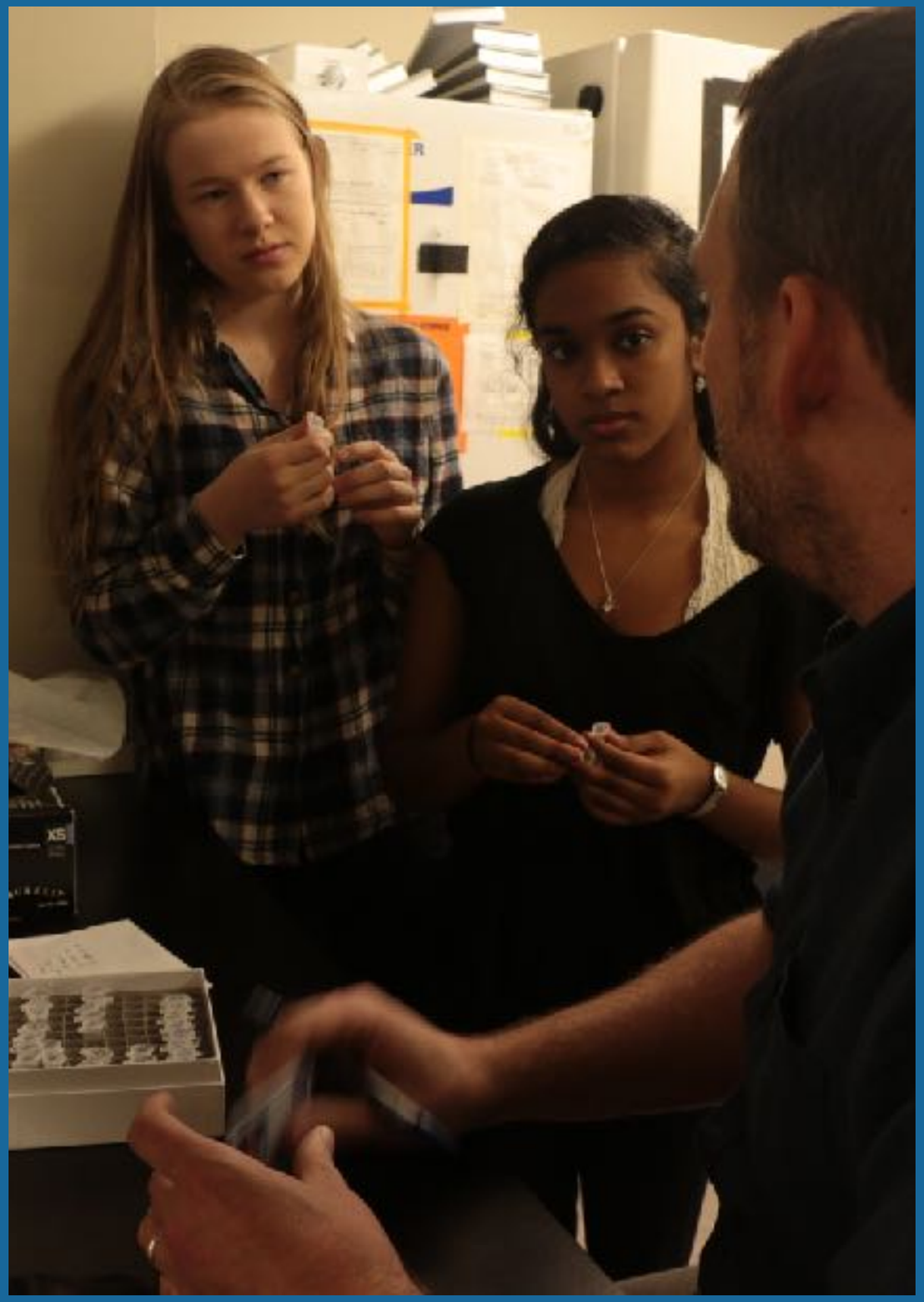
- Explores **students experiences in mentored research programs** at the high school level and how those experiences shape youth's trajectories in science
- Examines **youth's social networks** to uncover the relational features associated with persistence for youth with limited STEM role models and cultural brokers
- Investigates the **role that significant adults** (i.e. science research mentors, parents) play in spacing youth's trajectories in science

CONTEXT

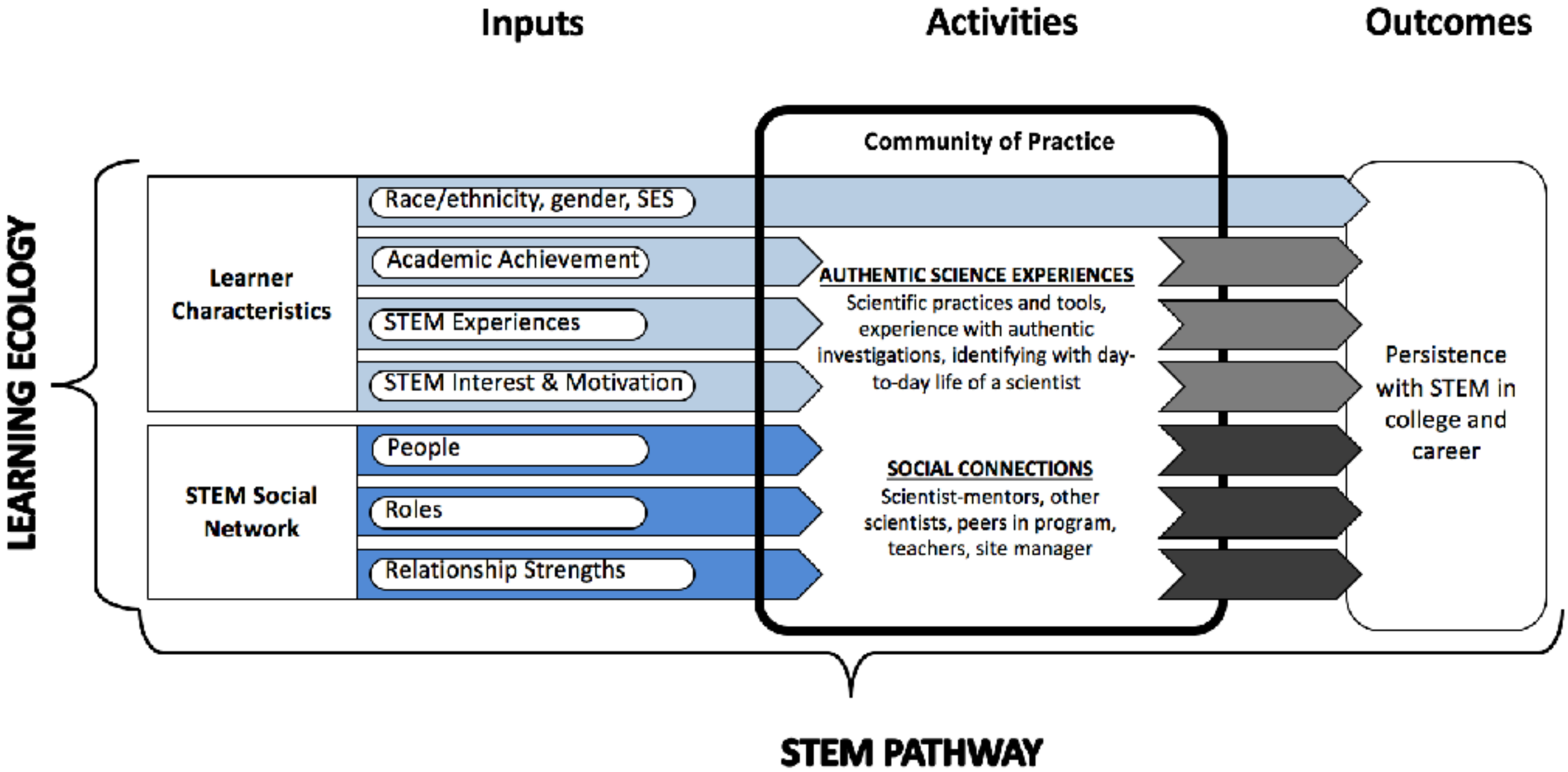
- Three-year longitudinal study of STEM pathways of NYC youth who show promise in science (highly motived, under resourced)
- Youth complete 75 hours of college-level coursework and at least 100 hours of mentored research experience
- Mentoring consortium of 20 sites around NYC providing research opportunities in wide array of STEM fields

DATA & ANALYSIS

- **<u>Annual Student Surveys</u>**: Relationship between key features of mentored research experiences, identity and future goals with respect to science, and application of skills in other settings using NGSS eight practices
- **Annual Mentor Survey**: Mentor preparation, goals for self and students, practices and engagement, supports and obstacles
- **<u>Annual Social Network Surveys</u>**: Examines youth's networks with respect to participation in STEM over time
- **Secondary Public School Data:** Data sets from NYC Department of Education & CUNY
- **<u>Student Case Studies</u>**: Identifying key leverage points critical to supporting youth's persistence in STEM



THEORETICAL FRAMEWORKS



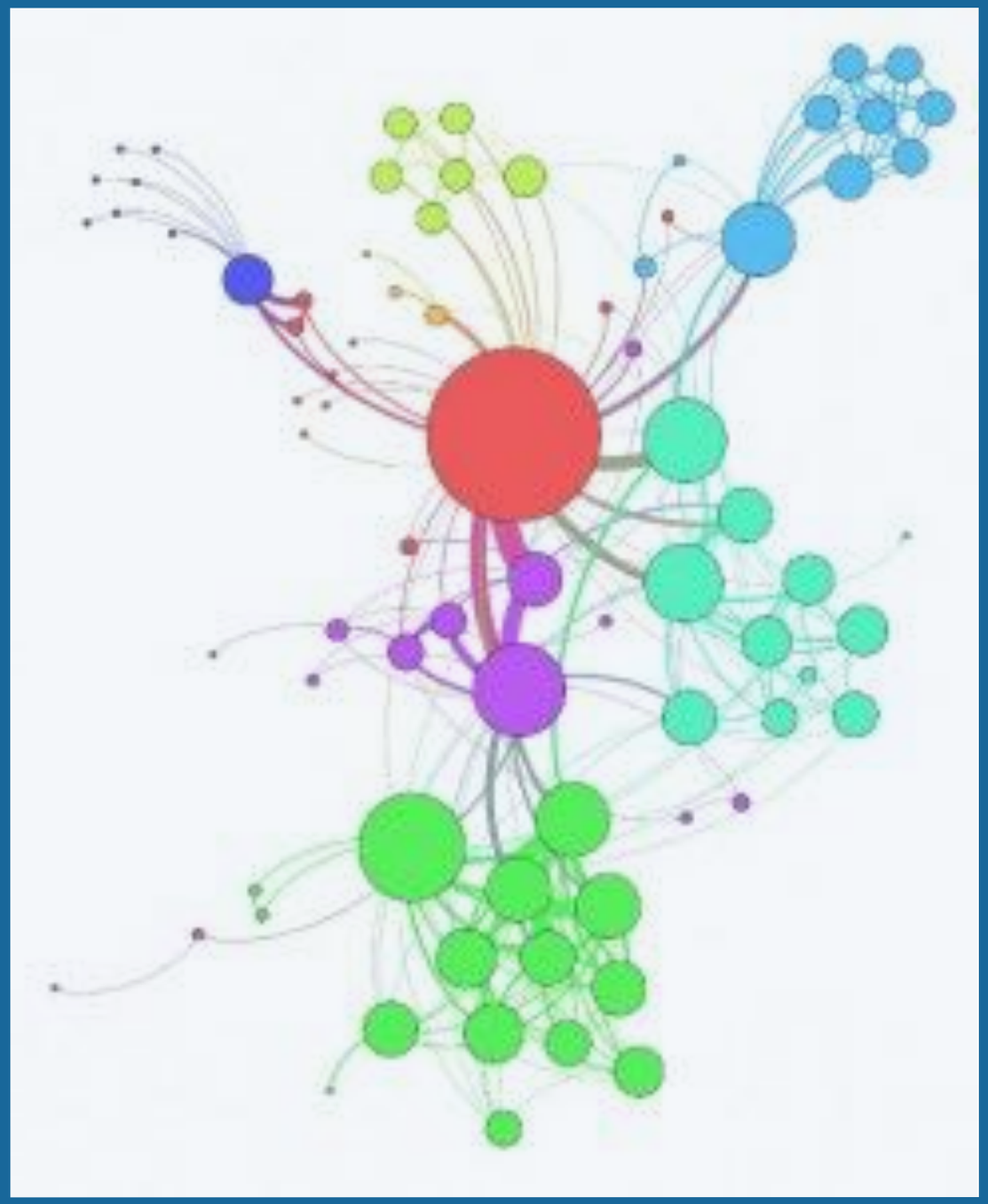
DATA COLLECTION TIMELINE

	Year 1	Year 2	Year 3
Timeline	Sept 2016 - Aug 2017	Sept 2017 - Aug 2018	Sept 2018 - Aug 2019
Current student survey	170		
Alumni survey		170	170
SNA survey	Subset of 75	Same 75	Same 75
SNA cognitive interview	Subset of 13 from pilot		
Case studies - SNA interviews	Subset of 6-15	same 6-15	same 6-15
Case studies	18	18	18
Mentor surveys	80	80	80
Mentor interviews	6-8	6-8	6-8

COP SURVEY DATA

- What students experience in their communities of practice at their science research site:
  - Engagement in science practices and use of tools in authentic investigations
  - Development of science skills
  - Types of interactions with mentor, peers, other adults
  - Nature of relationship with mentor

SOCIAL NETWORK THEORY



Theories of Social Capital as useful means for measuring:

- Innovation And Brokering opportunity
- Community formation
- Access to Productive resources

OVERARCHING RESEARCH QUESTIONS

- How do youths' social networks develop through their participation in scientists' communities of practice?
- What is the relationship between features of the communities of practice and youths' social networks, measures of academic achievement, and youths' pursuit of a STEM major?
- What are the variations in youth pathways in relationship to learner characteristics, composition of social networks, and features of the community of practice?

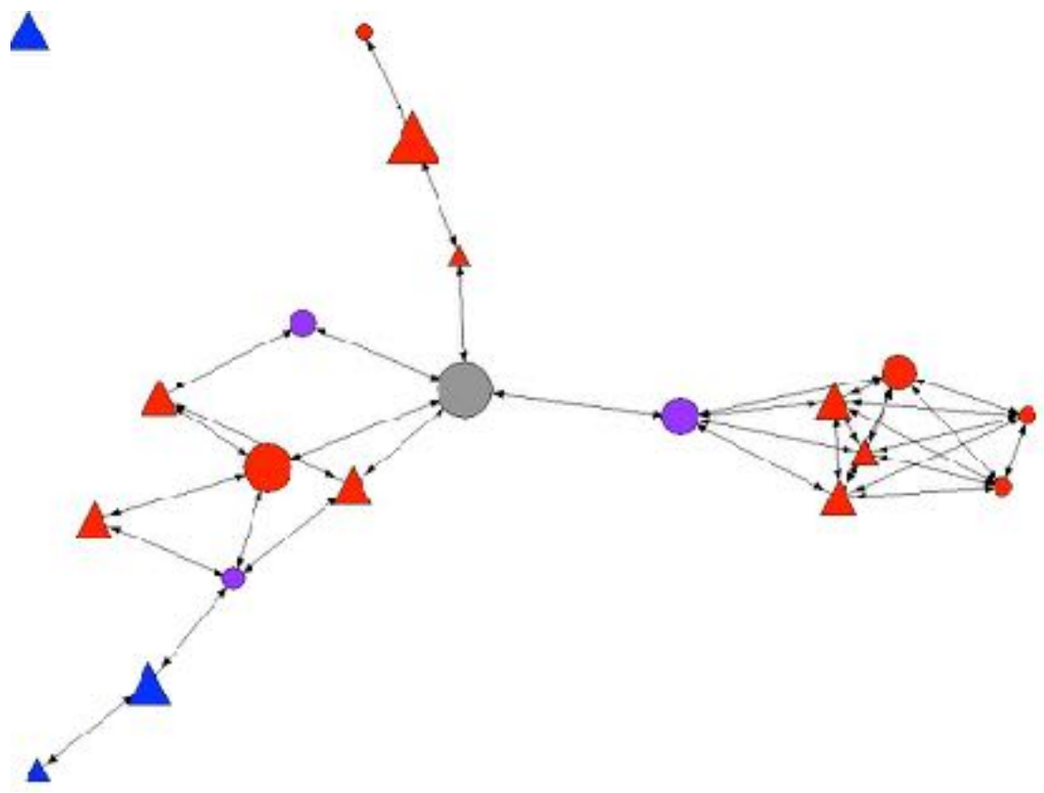
How do youths' social networks develop through their participation in scientists' communities of practice?

Student Survey

- Our project team has regular research meetings in which all of us involved in the program meet.
- I am part of a community where we are all working on the same goals.
- I have the support from my project site that I need to successfully participate in my program.

Social Network Survey

of network members that the student met either directly or indirectly through their participation in a mentored research program



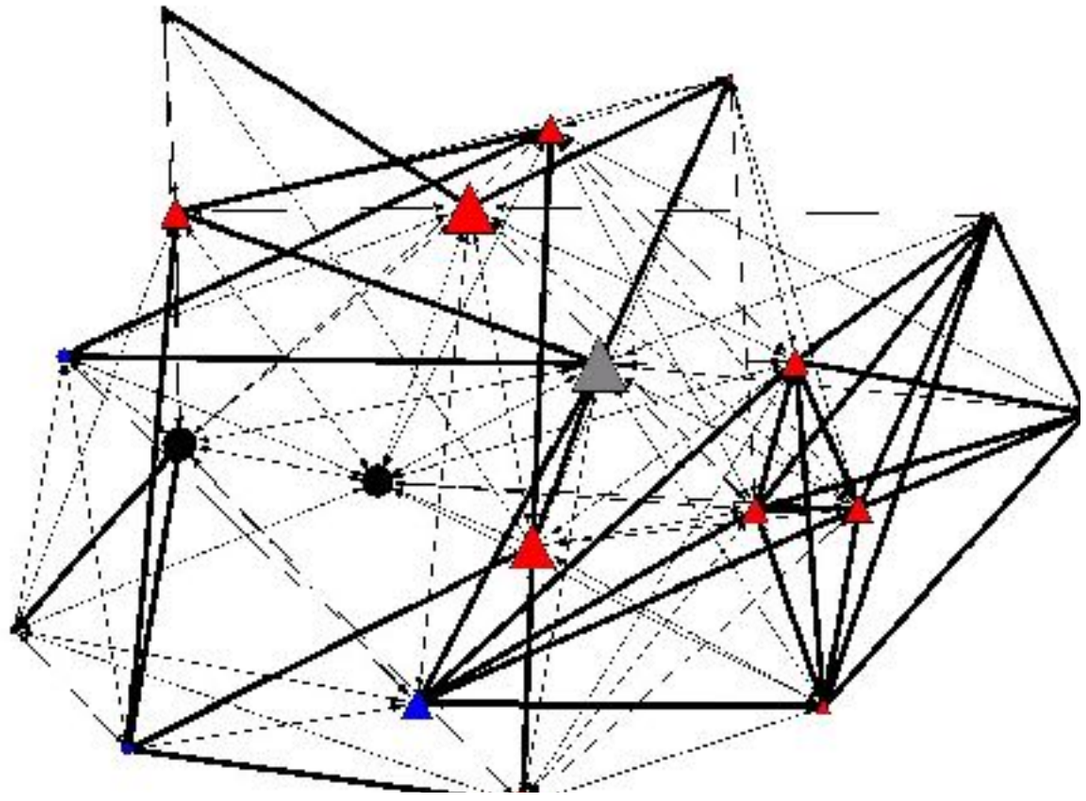
What is the relationship between features of the communities of practice and youths' social networks, measures of academic achievement, and youths' pursuit of a STEM major?

Student Survey

- What are you overall average grades in the following?
  - Science classes
  - Math classes
  - Writing classes
- Are you planning to pursue a STEM major and/or minor?
- Do you plan to do science research while in college?
- What are some of the obstacles, if any, to your continued participation in STEM-related study/work?

Social Network Survey

In addition to understanding the relative percentage of program peers in youths' networks, we can discern the strength of relationships between connections. Strength of tie is another measure we can use to understand how profound the relationships are among program participants.



What are the variations in youth pathways in relationship to learner characteristics, composition of social networks, and features of the community of practice?

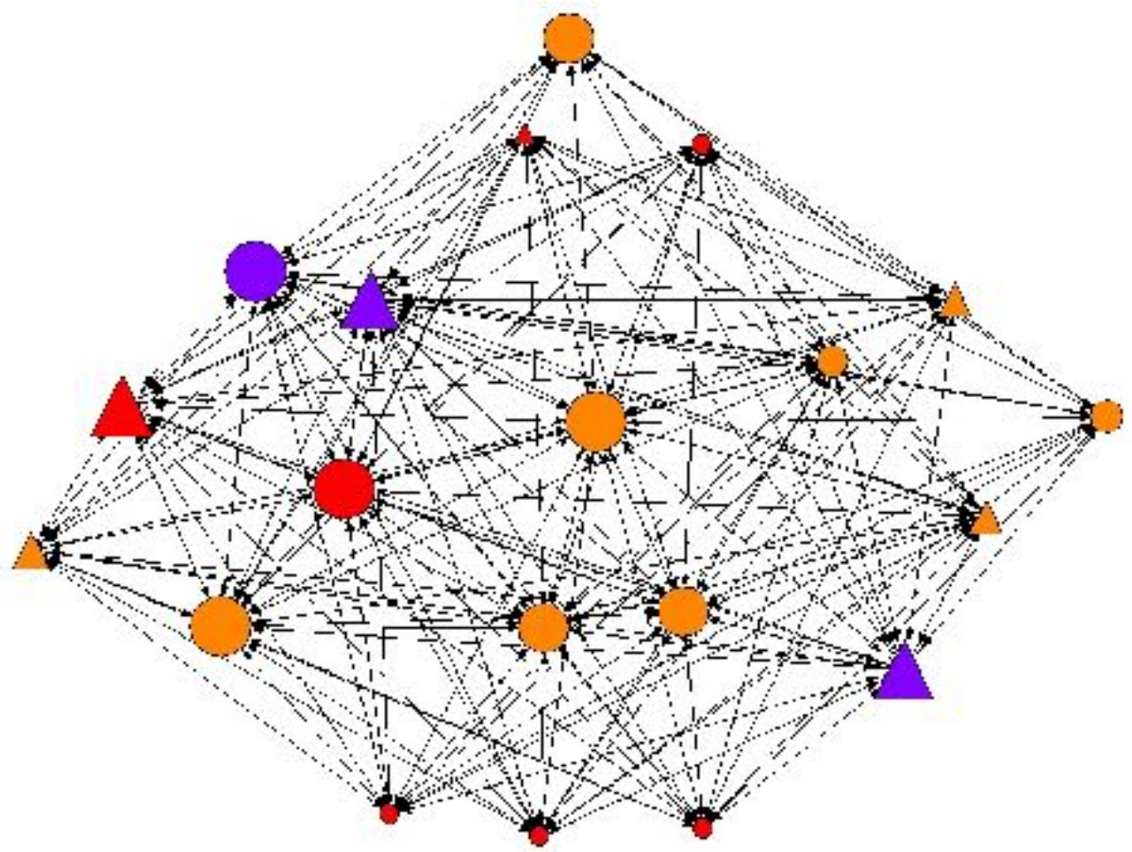
Student Survey

When you think about your relationship with <person 1>, do you feel that they:

- Provide guidance/advice about your academic and/or career plans.
- Introduce and facilitate connections with other people to support the building of your professional network.
- Teach you specific academic and/or work related skills.

Social Network Survey

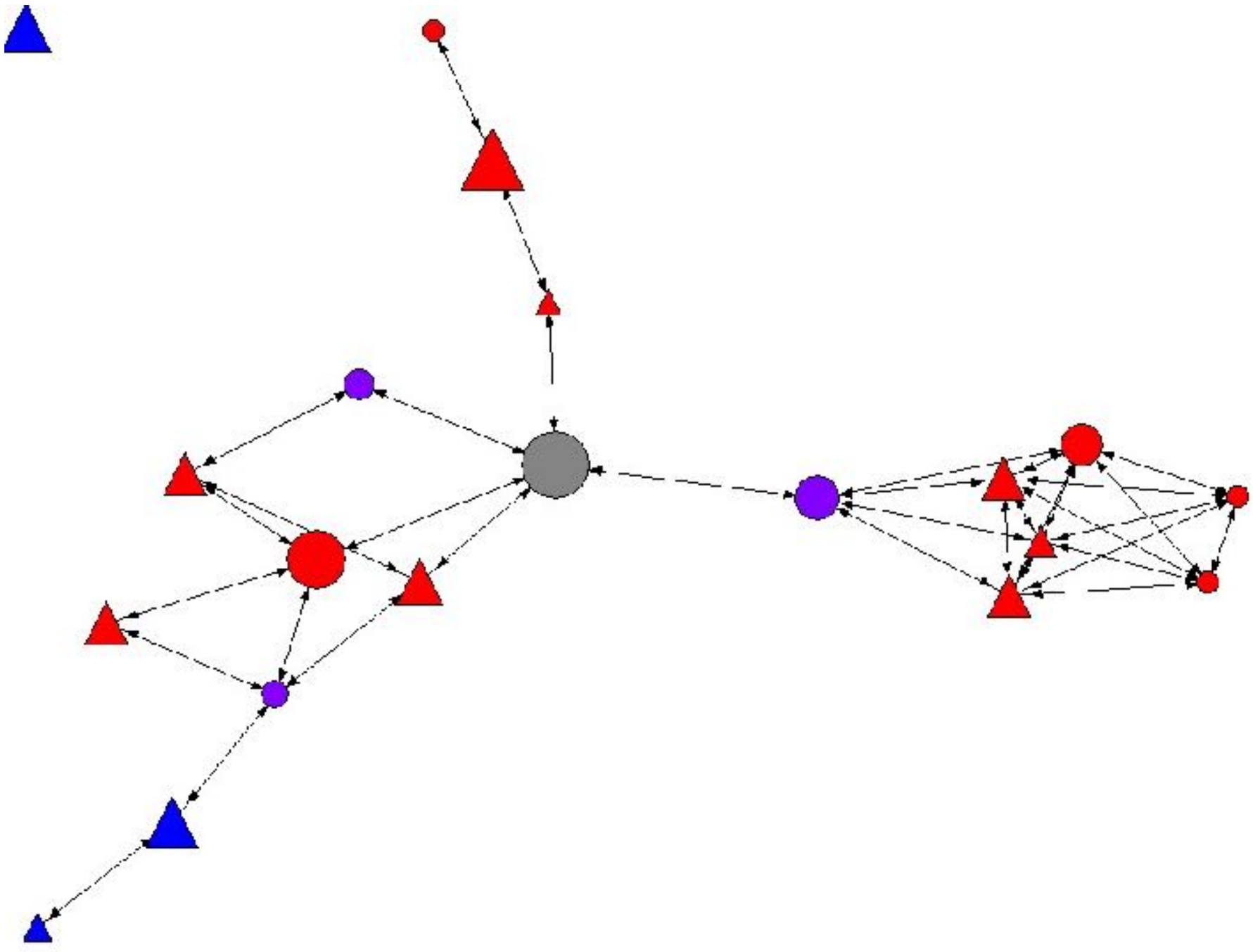
Density measures (0-1) of youth networks allow us to better understand the variation across networks. When paired with student survey findings we can identify the relationship between STEM persistence and network density.



IMPLICATIONS

- Development of mentor survey
- Case studies: allows us to follow trajectories of students in relation to people around them
- Longitudinal: braiding of methodologies allows for understanding of social relationships & science pursuits as students cross critical thresholds

YOUTH PARTICIPANT 305



= FEMALE

= MALE

MENTOR PROGAM

SCHOOL

FAMILY

NEIGHBORHOOD

OTHER