

# STAYING IN SCIENCE

## AN EXAMINATION OF PATHWAYS OF YOUTH WHO PARTICIPATE IN IMMERSIVE SCIENCE RESEARCH ACTIVITIES

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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**

# GAPS WE'RE ADDRESSING

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- ▶ 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
  - ▶ Utilizes a learning ecosystems perspective that combines longitudinal social network and survey analysis with analysis of matched student data from New York City Public School records in order to examine in-school and out-of-school STEM experiences
  - ▶ Investigates the role that significant adults (i.e. science research mentors and parents) play in spacing youth's trajectories in science
  - ▶ Integrates participating youth as co-researchers of their mentoring experiences

# OVERARCHING RESEARCH QUESTIONS

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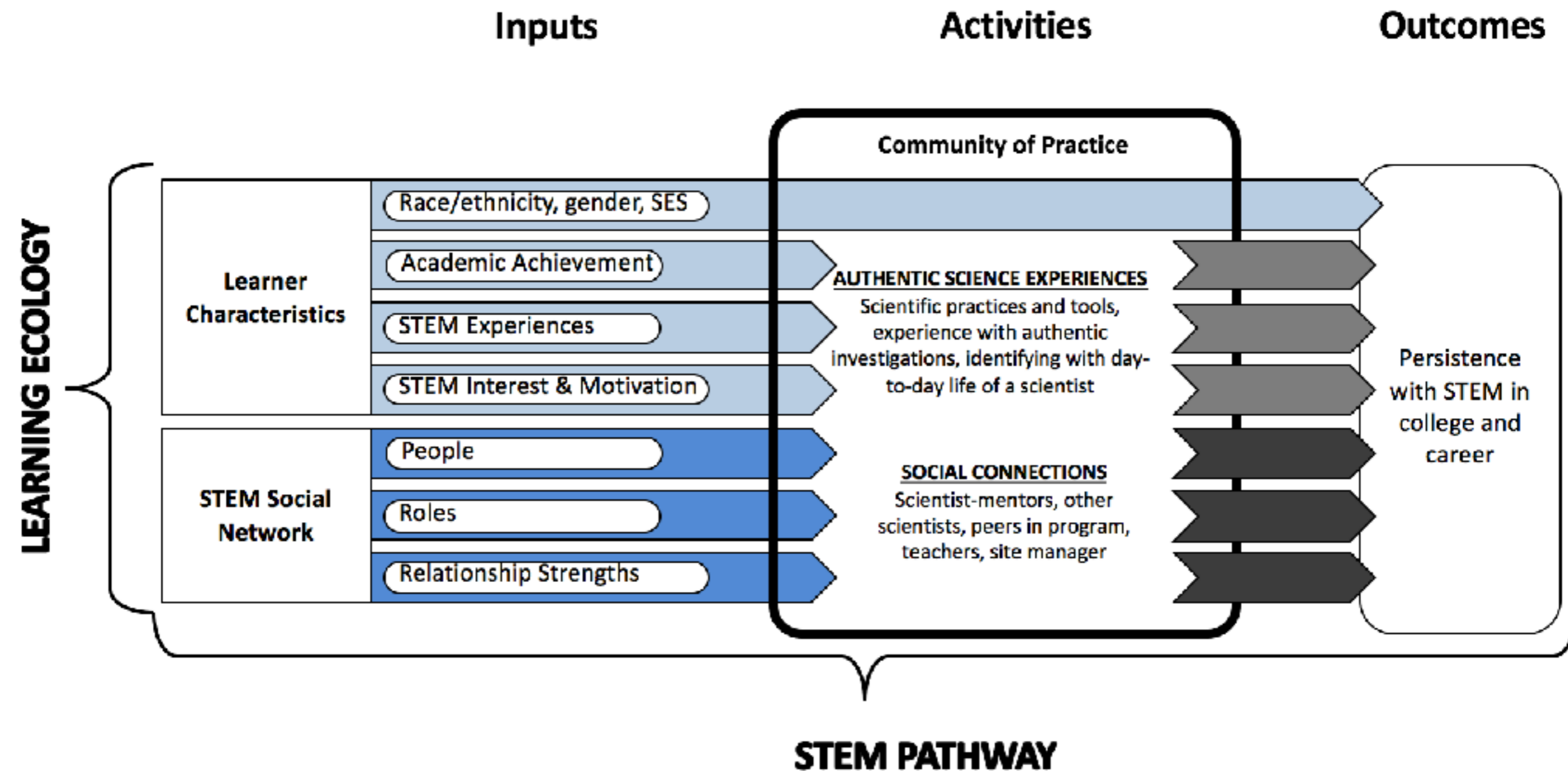
- ▶ **How do youths' social networks develop through their participation in scientists' communities of practice?**
  - ▶ **What characterizes youths' social networks upon entry into the program?** To what extent are STEM connections or supports evident? What variation do we see across different youth in the 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?
- ▶ What are the variations in youth pathways in relationship to learner characteristics, composition of social networks, and features of the community of practice?

# CONTEXT

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- ▶ Three-year longitudinal study of STEM pathways of approximately 1270 NYC youth who show promise in science
- ▶ 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

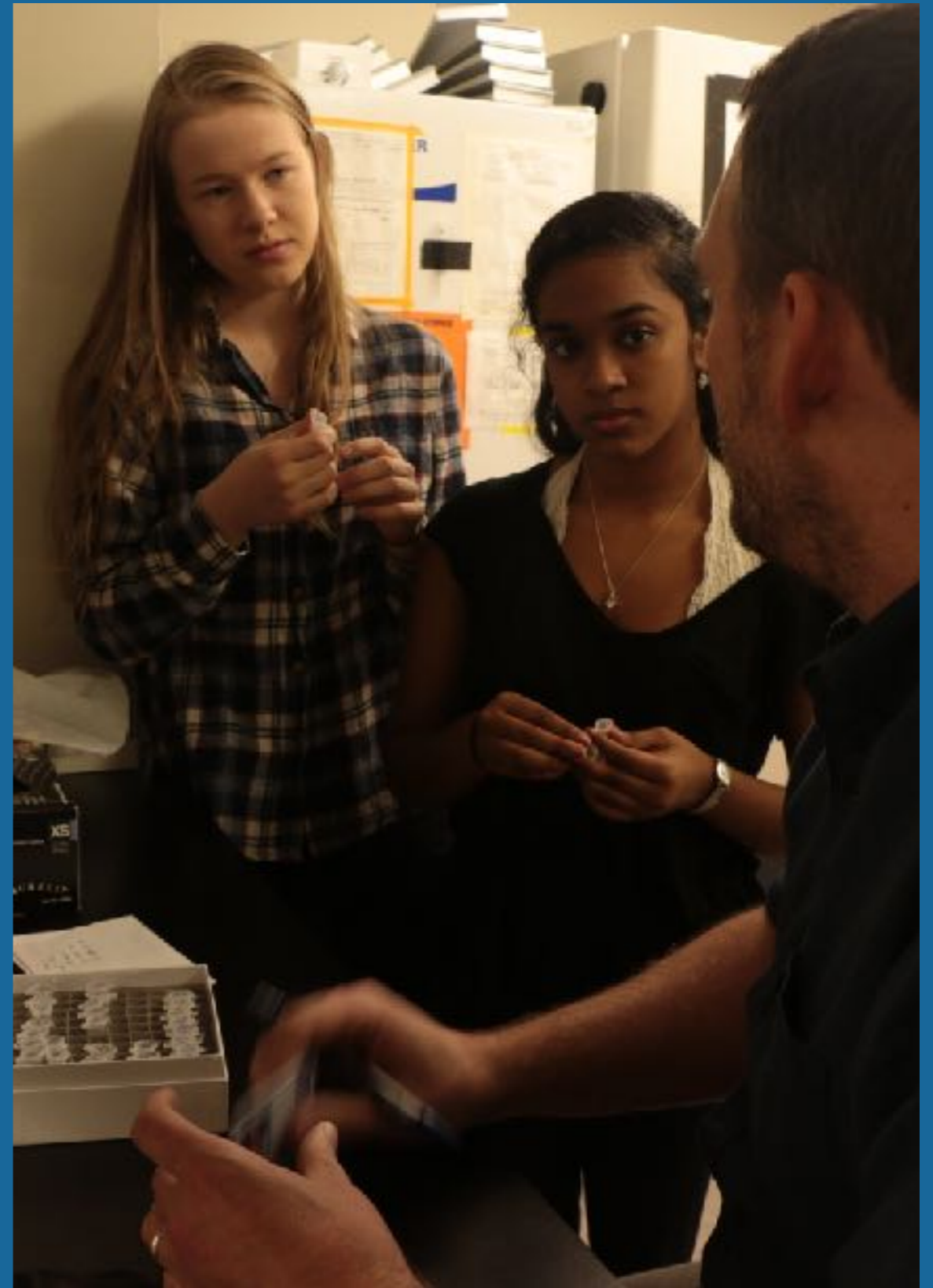
# THEORETICAL FRAMEWORKS





# DATA & ANALYSIS

- ▶ **Annual Surveys:** 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 & LSIE outcomes
- ▶ **Annual Social Network Surveys:** Examines youth's networks with respect to participation in STEM over time
- ▶ **Secondary Public School Data:** Data sets from NYC Department of Education & CUNY
- ▶ **Student Case Studies:** Identifying key leverage points critical to supporting youth's persistence in STEM



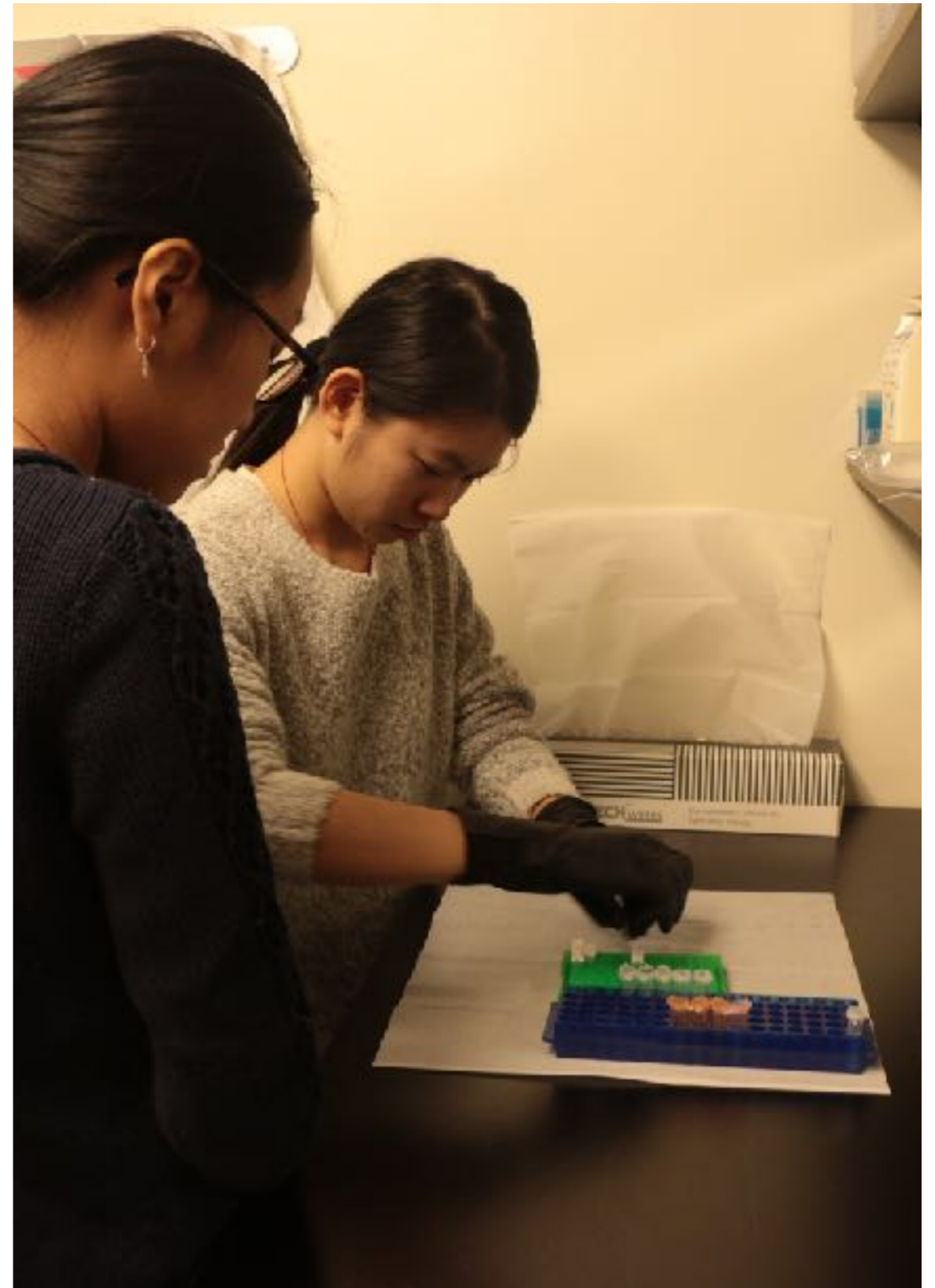
# DATA COLLECTION TIMELINE

	Year 1	Year 2	Year 3
<b>2014-2016</b>			
<i>Alumni surveys</i>	285	285	285
<i>Current student survey</i>	90		
<i>SNA survey</i>	13		
<b>2016-2017</b>			
<i>Alumni surveys</i>		385	385
<i>Current Student Surveys</i>	100		
<i>SNA survey</i>	subset of 75	same 75	same 75
<i>Case studies</i>	subset of 6	same 6	same 6



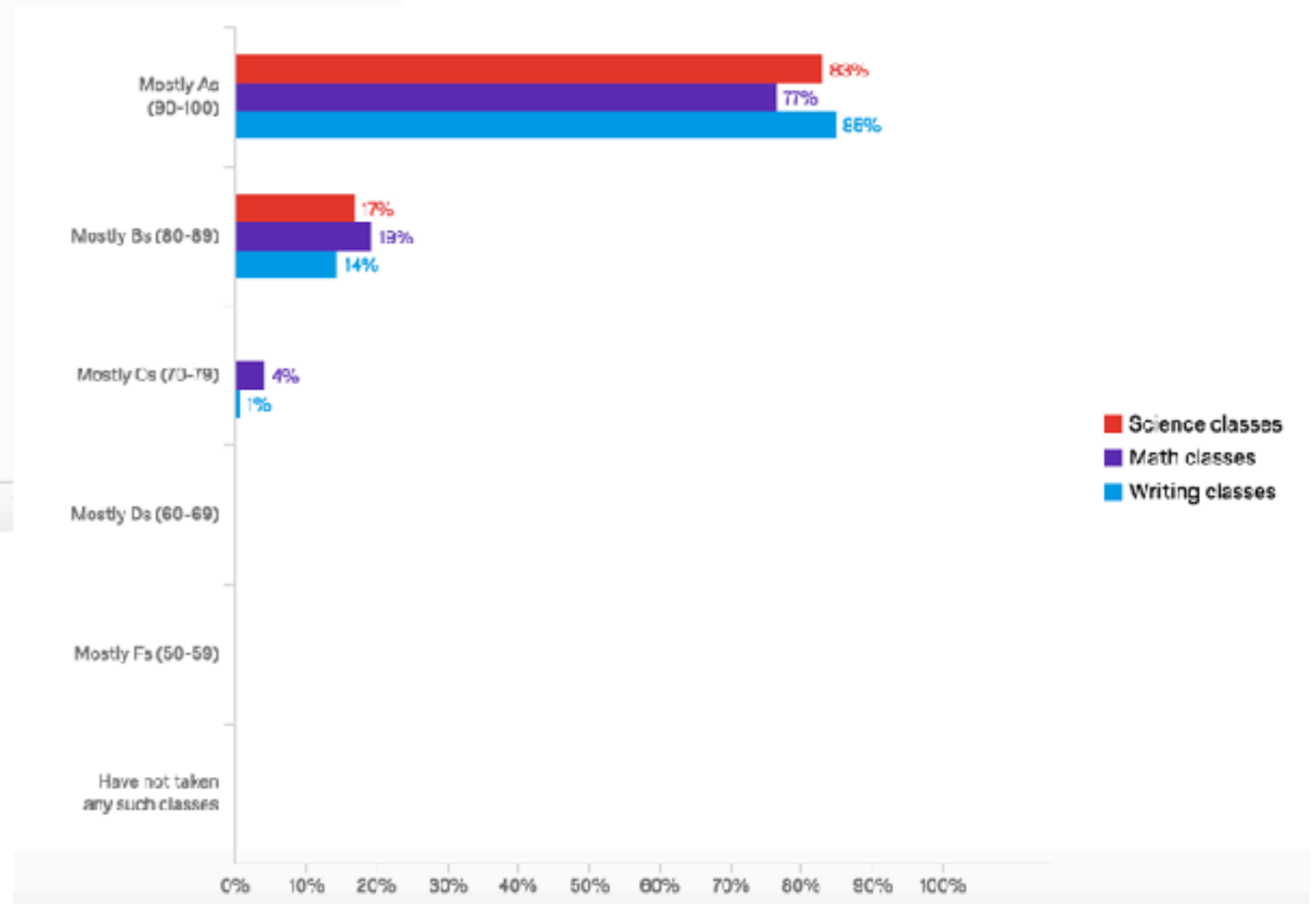
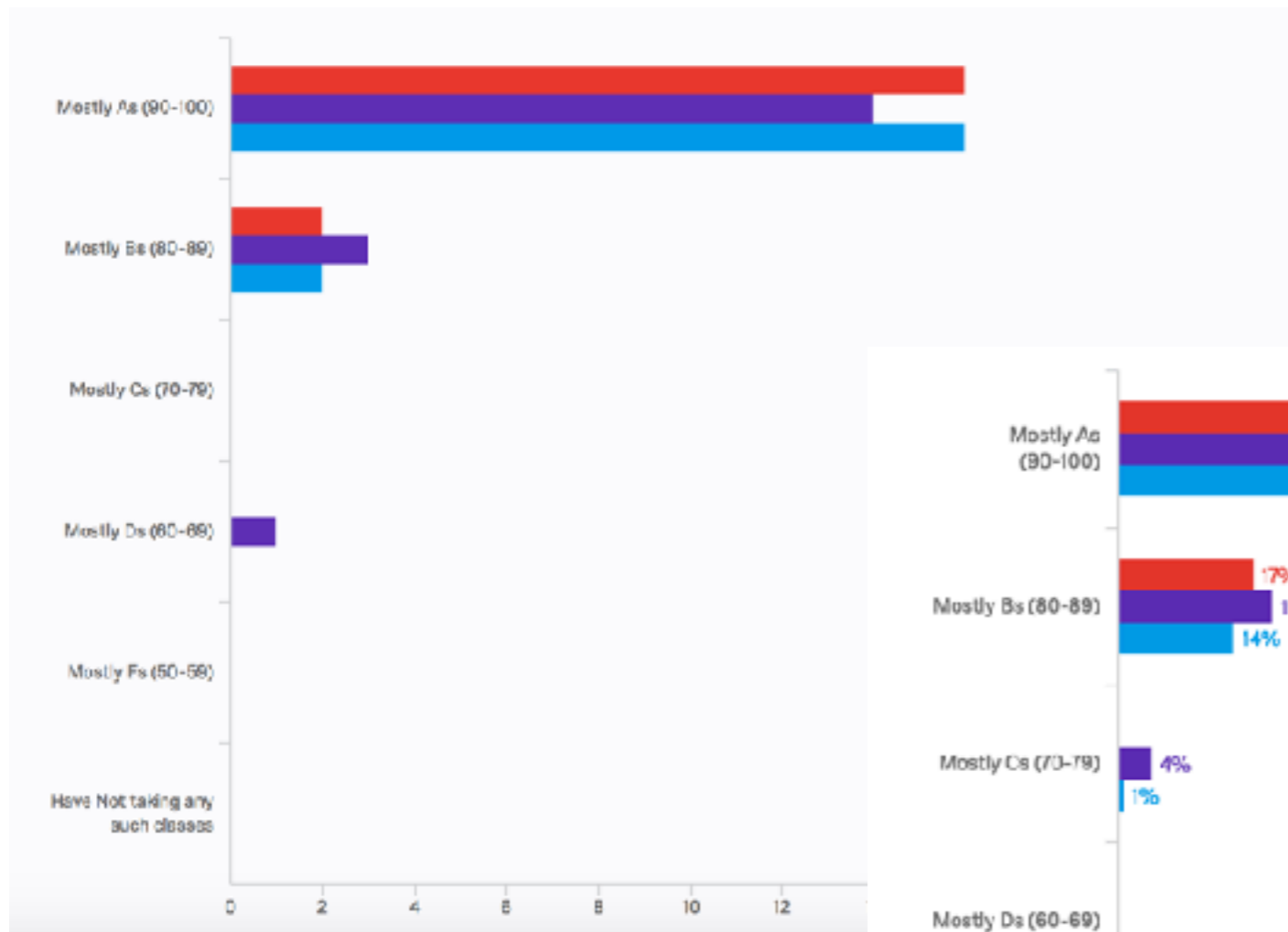
### DATA SOURCES

- ▶ Survey (Alumni & Current)
  - ▶ n=310 alumni, n=92 current
  - ▶ response rate of 52%
- ▶ Social Network Survey
  - ▶ n=13 alumni
  - ▶ response rate of 52%



# PRELIMINARY FINDINGS

## GRADES



# MOTIVATIONS

- ▶ **81%** of current students say that they **wanted to have a STEM major in college and wanted to better prepare** (only 4% reported participation due to parental desires)
- ▶ **44%** of current students reported that they **felt they needed to pursue a mentored research program to get into a good college**
- ▶ **26% thought it would be fun**
  - ▶ "I just love working in labs. It's my dream job."
  - ▶ "I wasn't sure if I wanted a STEM career but I previously had fun in other less serious science programs so I wanted to see if I would enjoy being a part of a real research project."

# GENDER, RACE, ETHNICITY

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## CURRENT

Female	0.8
Male	0.2
non-Hispanic	0.83
Hispanic	0.17
White	0.27
Black	0.16
South Asian	0.2
East Asian	0.34
Am. Indian or Alaska	0.015
None	0.13

## ALUMNI

Female	0.69
Male	0.31
non-Hispanic	0.81
Hispanic	0.19
White	0.41
Black	0.13
South Asian	0.16
East Asian	0.17
Am. Indian or Alaska	0.018
None	0.15

# LENGTH IN THE U.S.

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## CURRENT

Born in U.S.	0.69
Less than one year	0.05
Before kindergarten	0.3

## ALUMNI

Born in U.S.	0.8
Less than one year	0
Before kindergarten	0.48

# PARENTS

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## CURRENT

Parent born outside U.S.	0.78
Dad - Less than grade 9	0.05
Mom - Less than grade 9	0.06
Dad - College degree or higher	0.45
Mom - College degree or higher	0.47

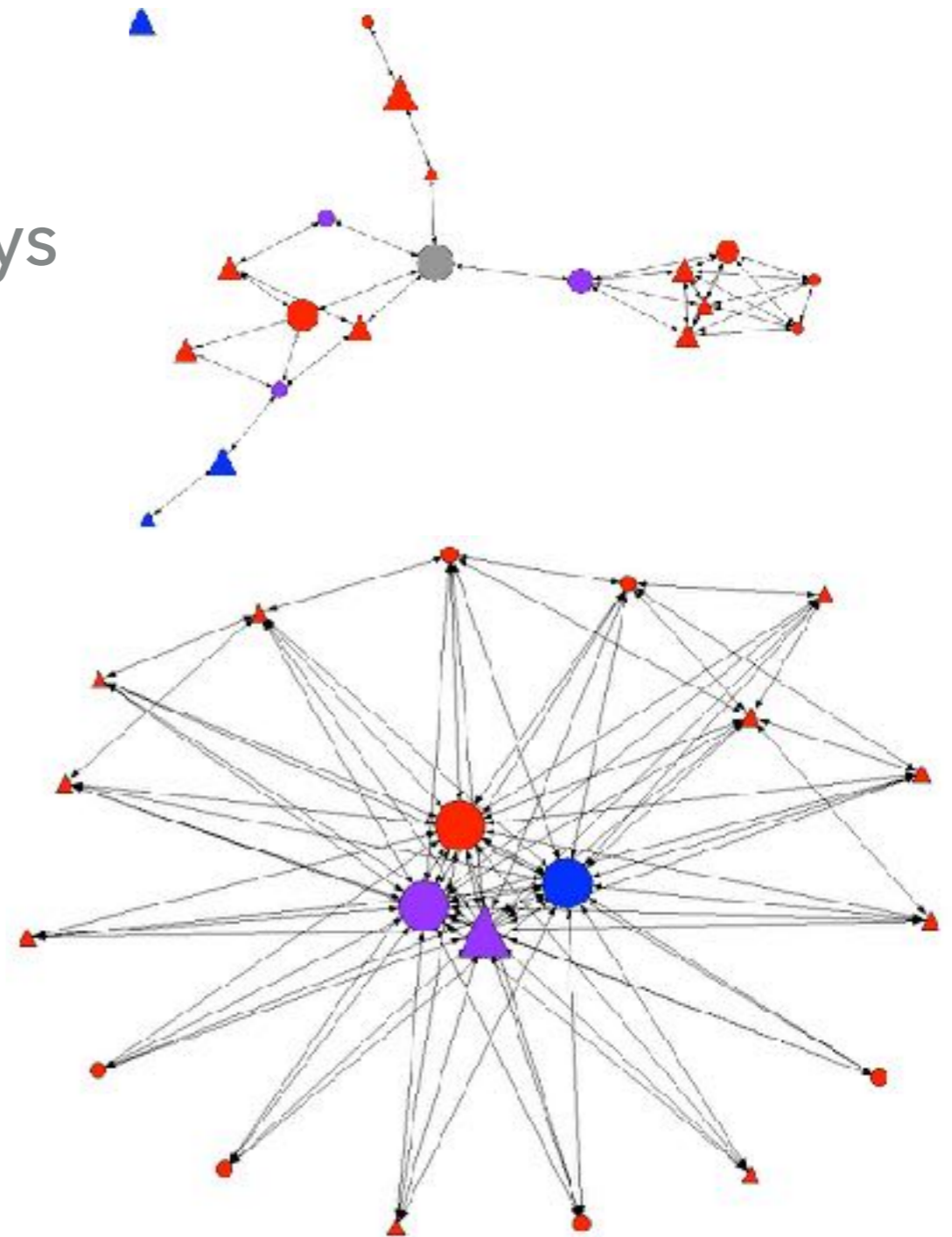
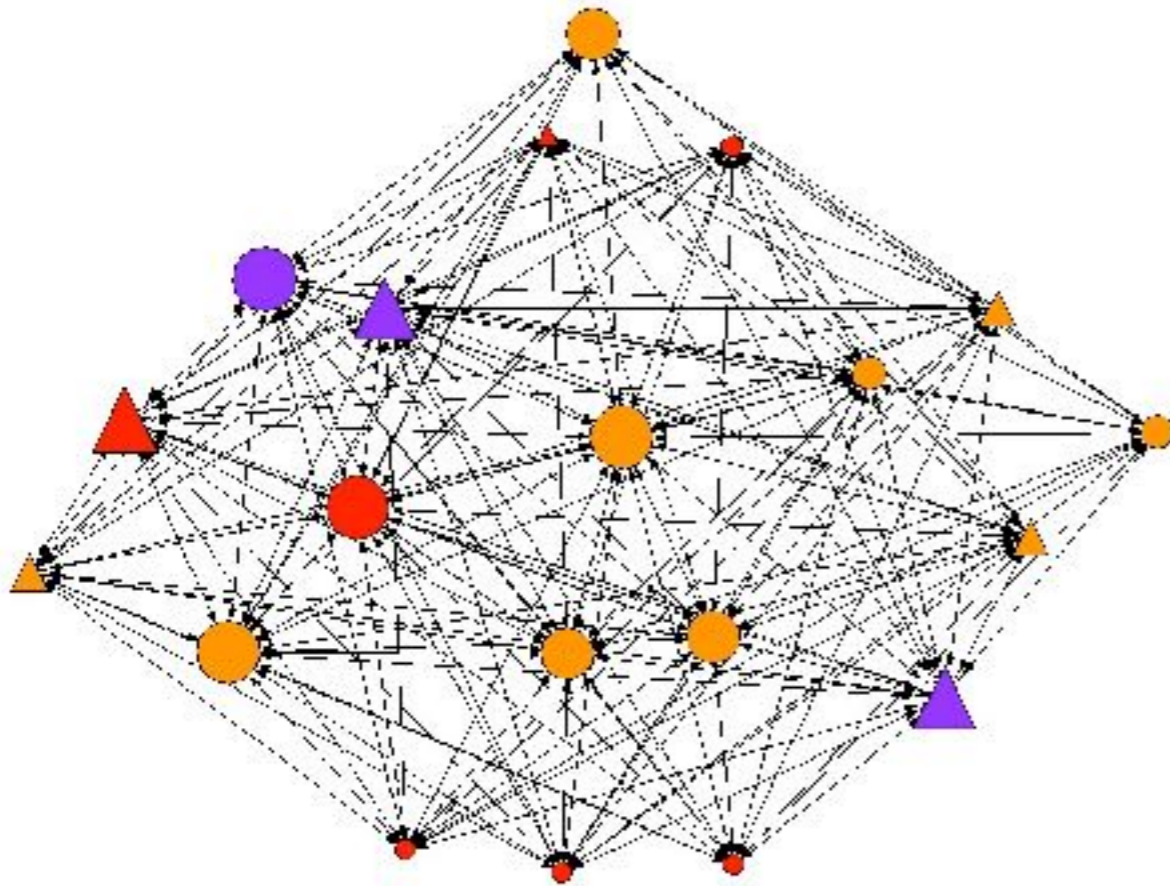
## ALUMNI

Parent born outside U.S.	0.71
Dad - Less than grade 9	0.08
Mom - Less than grade 9	0.06
Dad - College degree or higher	0.47
Mom - College degree or higher	0.54

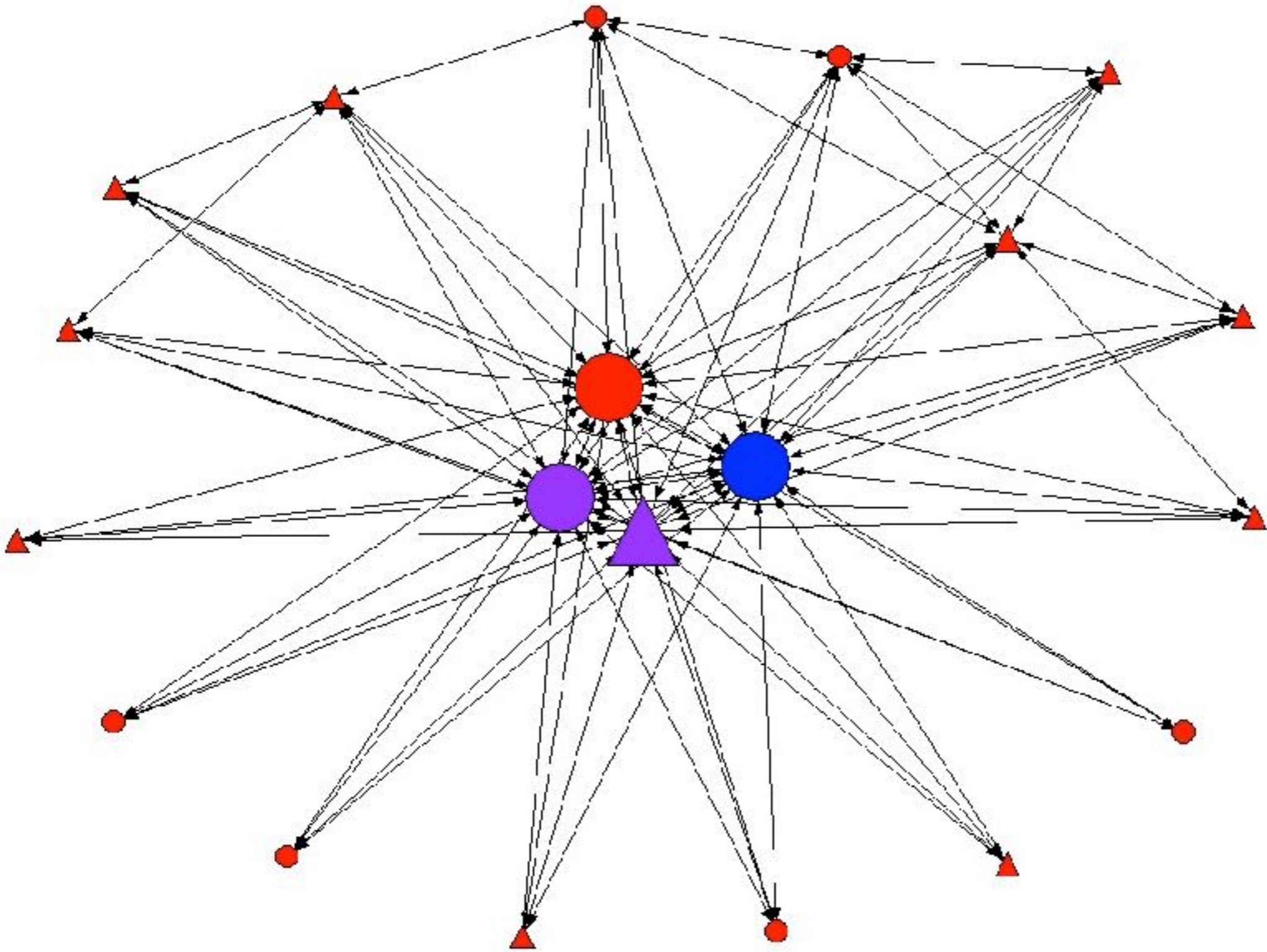


# SOCIAL NETWORK SURVEY PILOT FINDINGS

- ▶ Explore the relational features associated with persistence that may be critical for youth's pathways



# YOUTH PARTICIPANT 203



△ = FEMALE

○ = MALE

MENTOR PROGRAM

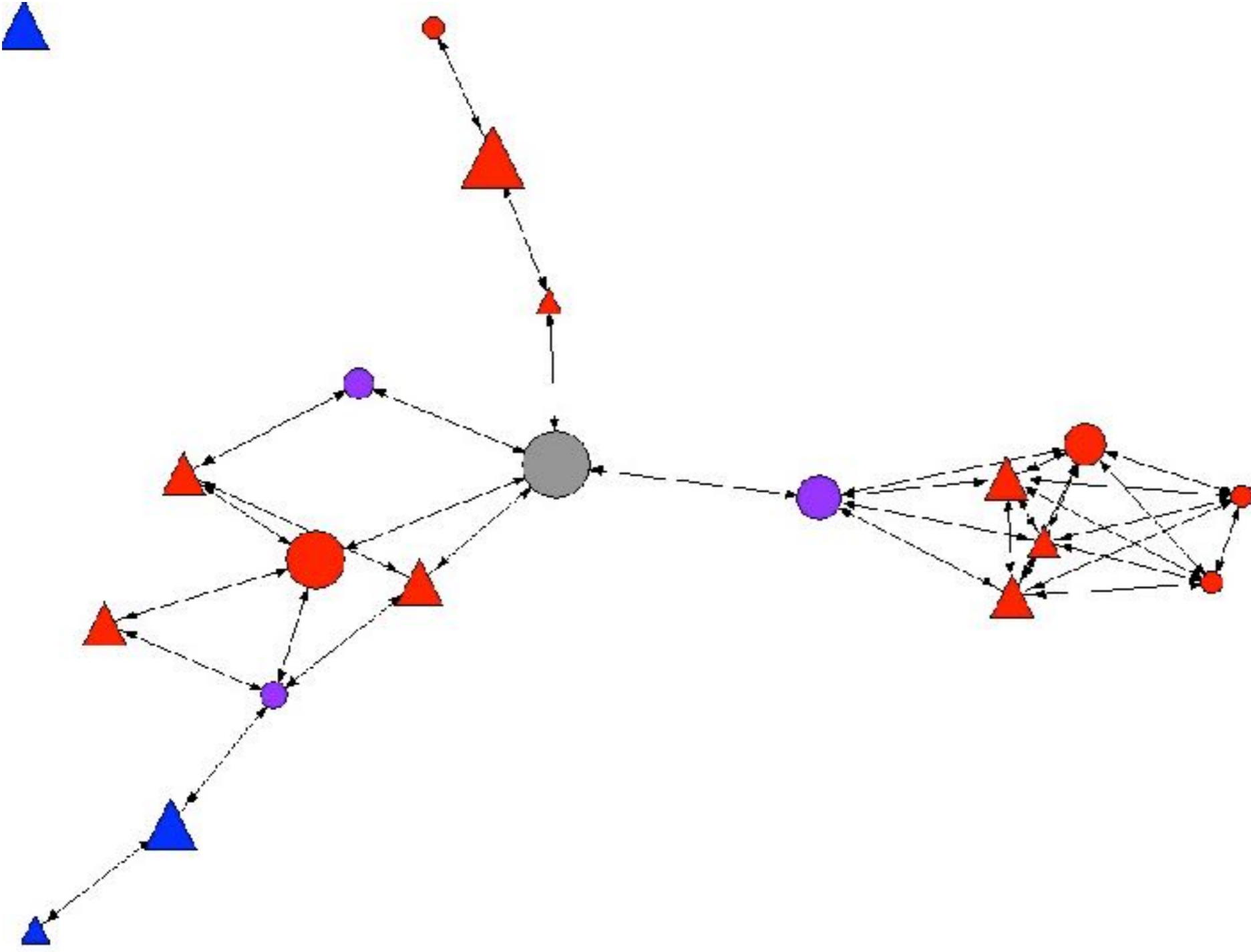
SCHOOL

FAMILY

NEIGHBORHOOD

OTHER

# YOUTH PARTICIPANT 305



△ = FEMALE

○ = MALE

MENTOR PROGRAM

SCHOOL

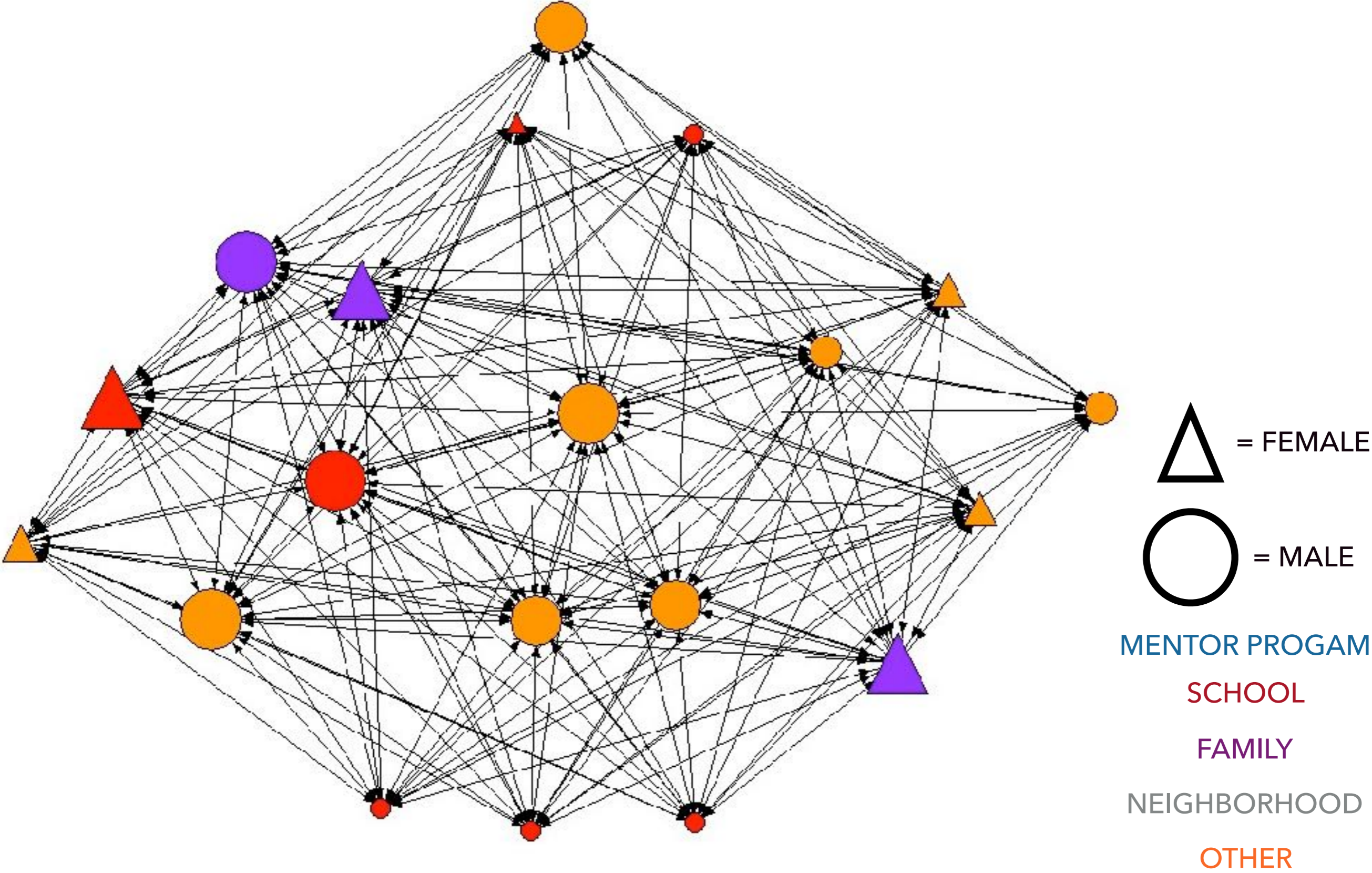
FAMILY

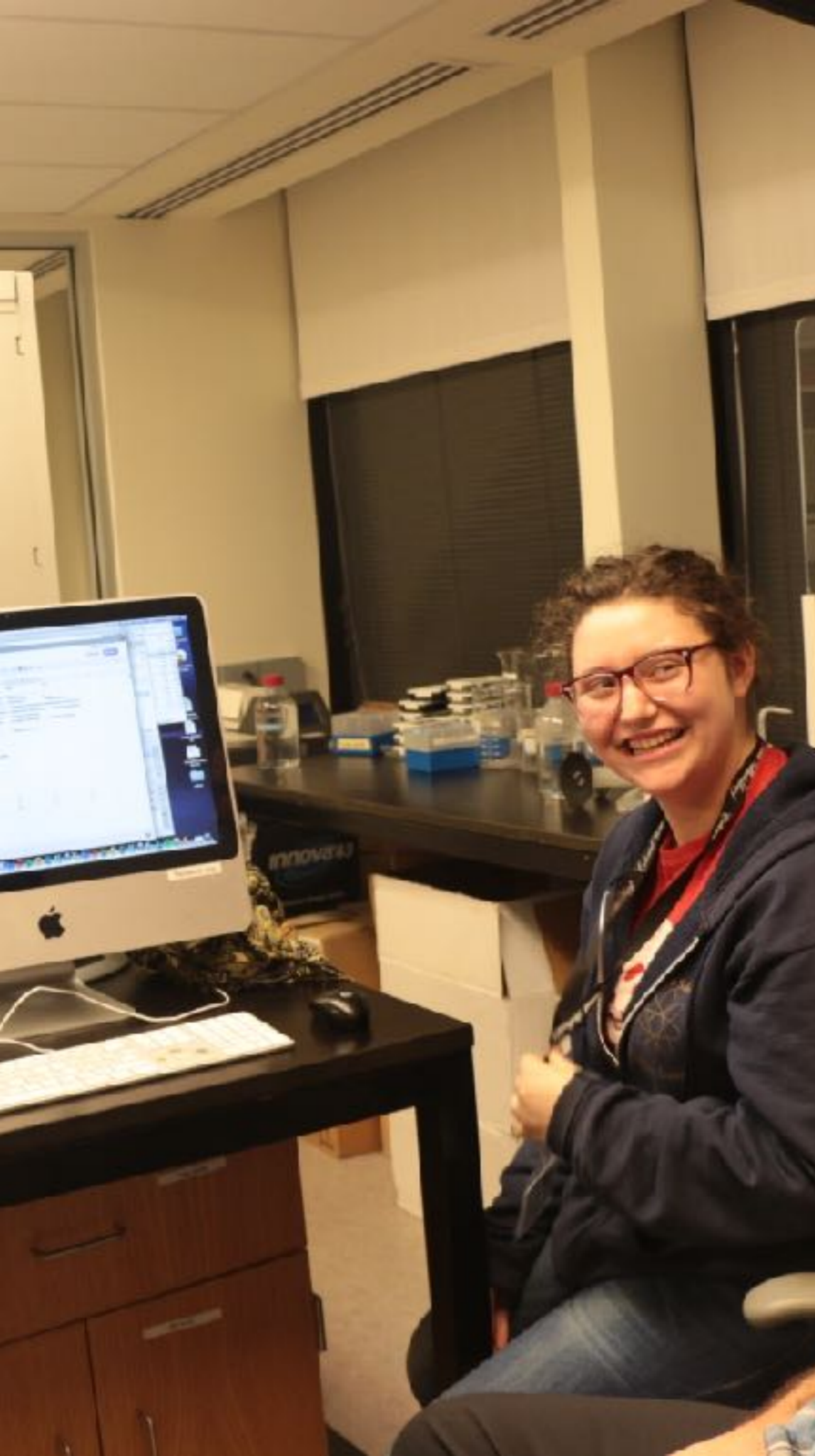
NEIGHBORHOOD

OTHER



# YOUTH PARTICIPANT 314





# NEXT STEPS

- ▶ Full revision of three pilot surveys, implementation June, 2017
- ▶ Development of mentor survey instrument
- ▶ Development of case study instruments