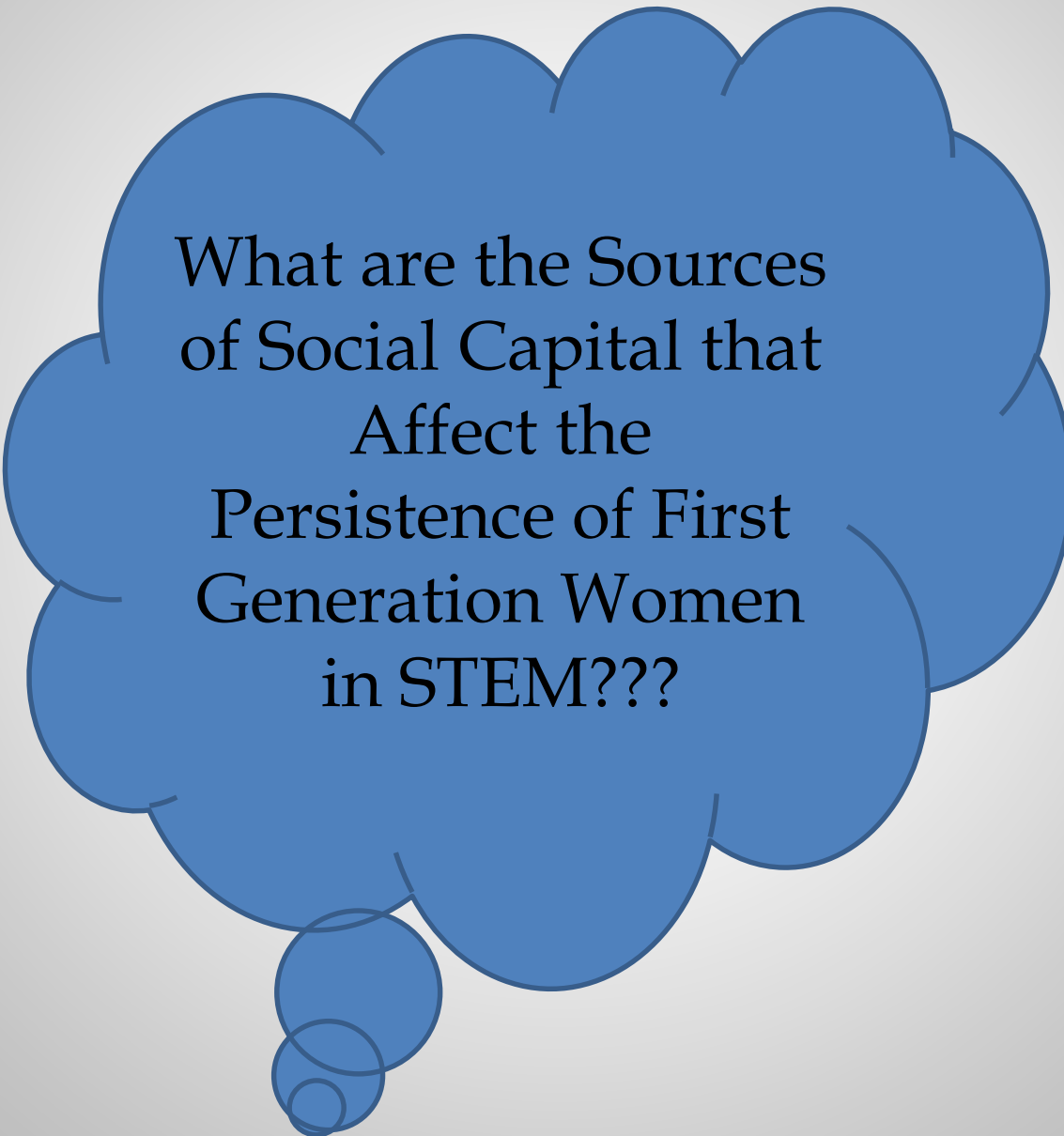


Transforming Institutions: 21st Century  
Undergraduate STEM Education Conference  
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# The Role of Social Capital in the Retention of First-Generation Undergraduate Women in STEM

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What are the Sources  
of Social Capital that  
Affect the  
Persistence of First  
Generation Women  
in STEM???

# Theoretical Framework

## SOCIAL CAPITAL THEORY

(Stanton-Salazar, 2011)

- 
- resourceful relationships and institutional agents
  - providing access to an array of resources, privileges and rewards
  - for first-generation female students in STEM

# Students

## 6-year completion rates at 4-year institutions

- ▣ First-Generation: 46%
- ▣ Continuing Generation: 83%

*Source: BPS: 96/01 in Moving Beyond Access College Success For Low- Income First Generation Students, The PELL Institute 2008*

# Study Population

- ▣ Three Private (4-year) Liberal Arts Colleges located on the East Coast of USA each known as a “top-producer” of Women in STEM (Stage & Hubbard, 2008)

*“...institutions with a focus on undergraduate education are more successful in retaining their undergraduate (STEM) majors.” (Griffith, 2010)*

*“ Small and mid-size independent institutions produce bachelor-level graduates in the STEM fields more efficiently than their public peers.” (Rine, 2014)*

# Participants: Females who have completed $\geq 2$ years towards STEM undergrad degree

N=331



## Surveyed

- 276 Continuing Generation STEM Females
- 70% White / 30% Non-White



## Surveyed

- 55 First Generation STEM Females
- 56% White / 44% Non-White



## Interviewed

- 10 First Generation STEM Females
- 9 Traditional Students/1 Non-Traditional

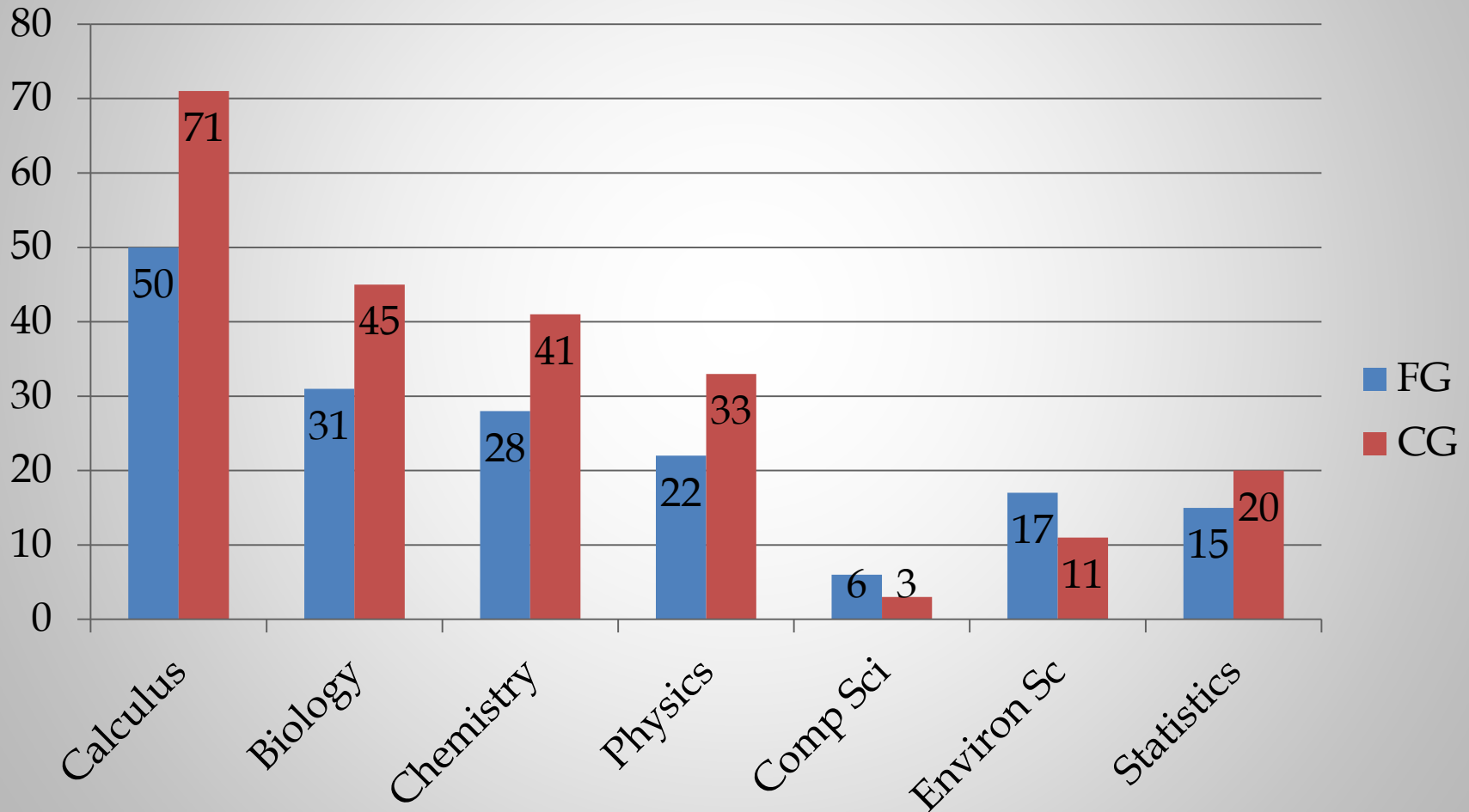
# First Generation Women in STEM BACKGROUND

*“a snapshot”*

- ▣ STEM AP Classes completed
- ▣ Attendance at a STEM Enrichment Program prior to college
- ▣ Involvement with a Community Based or Private College-Prep Program
- ▣ Parents' relationship to STEM

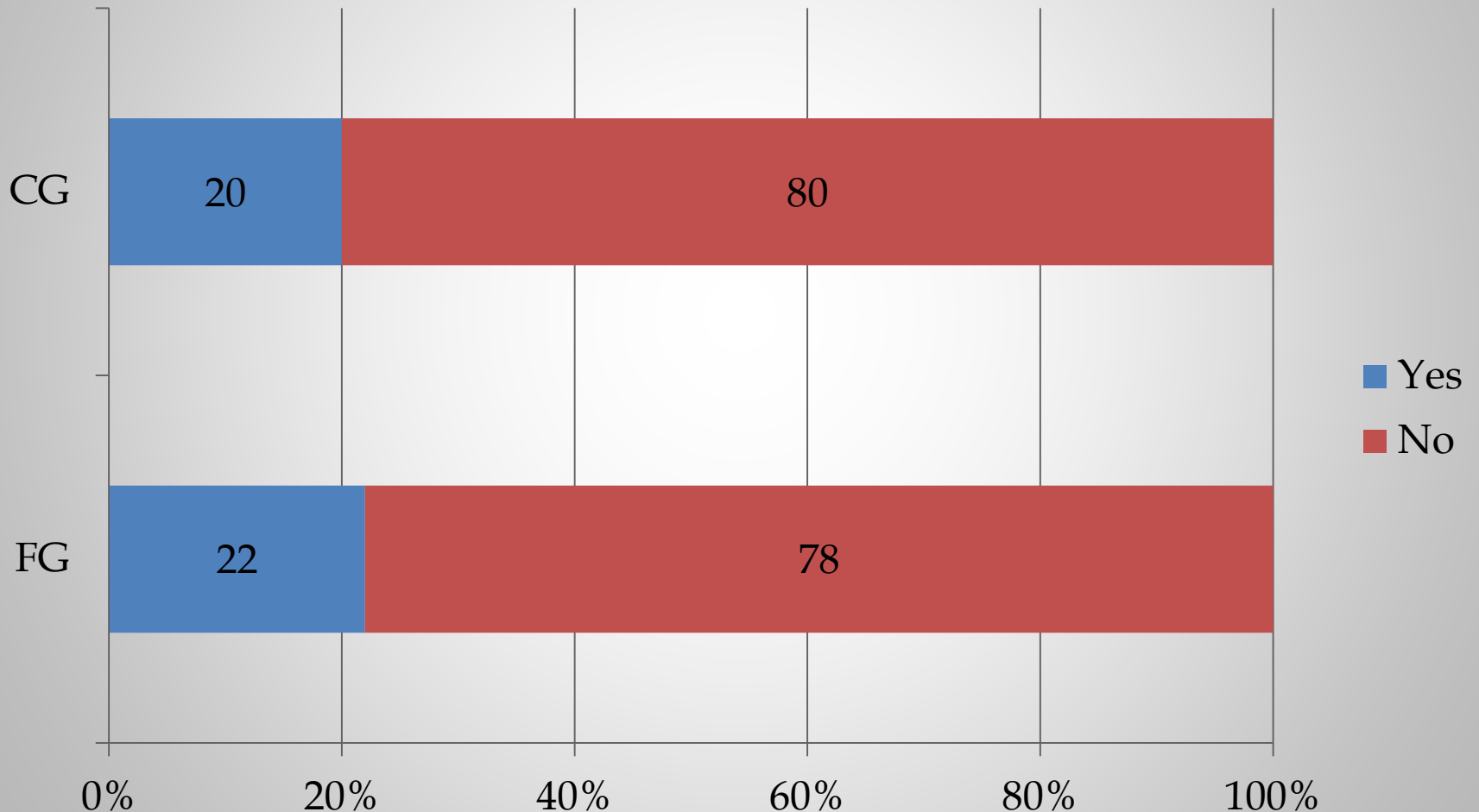
# AP STEM Courses Completed in HS

FG: 1.3 STEM APs/student CG: 2.2 STEM APs/student

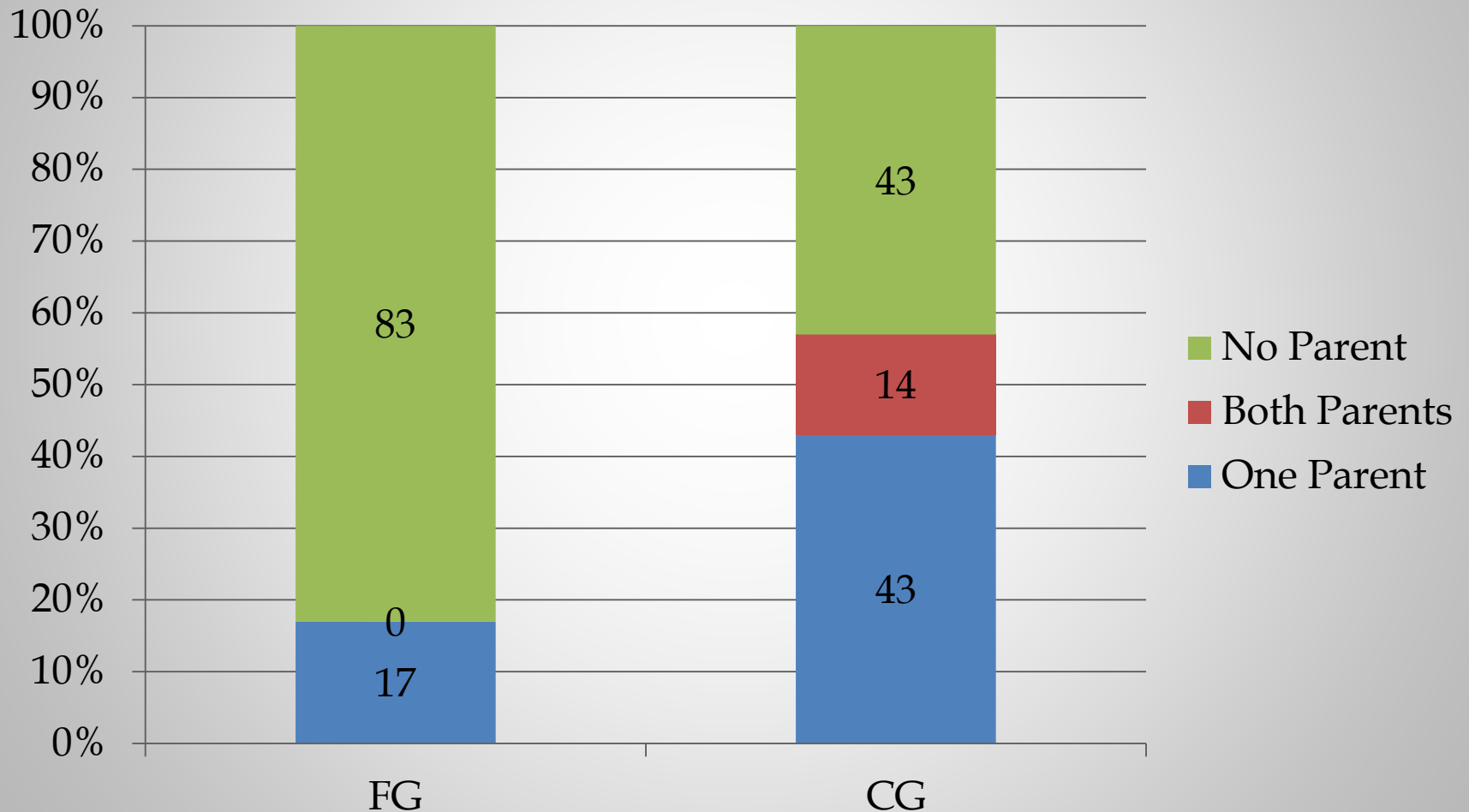




# Attendance at a STEM Enrichment Program prior to college

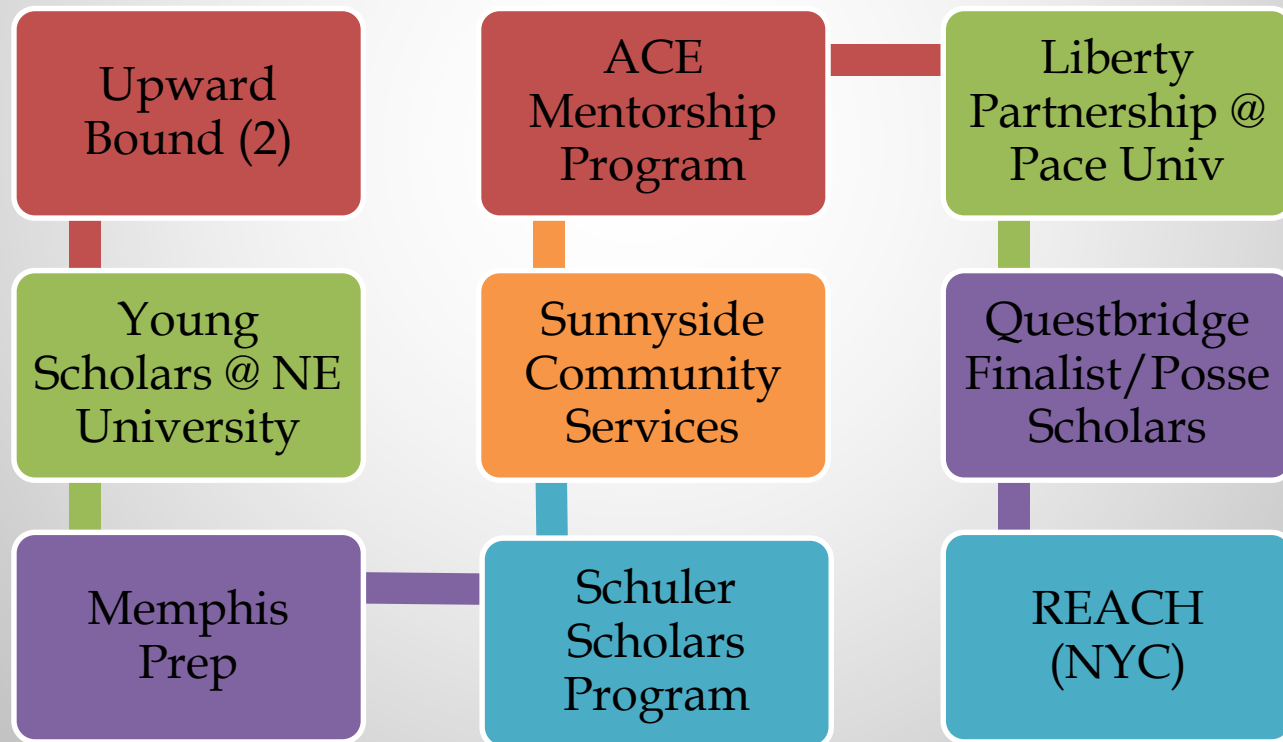


# Parents in STEM related careers



# Participation in Community-Based or Sponsored Pre-College Preparation Programs

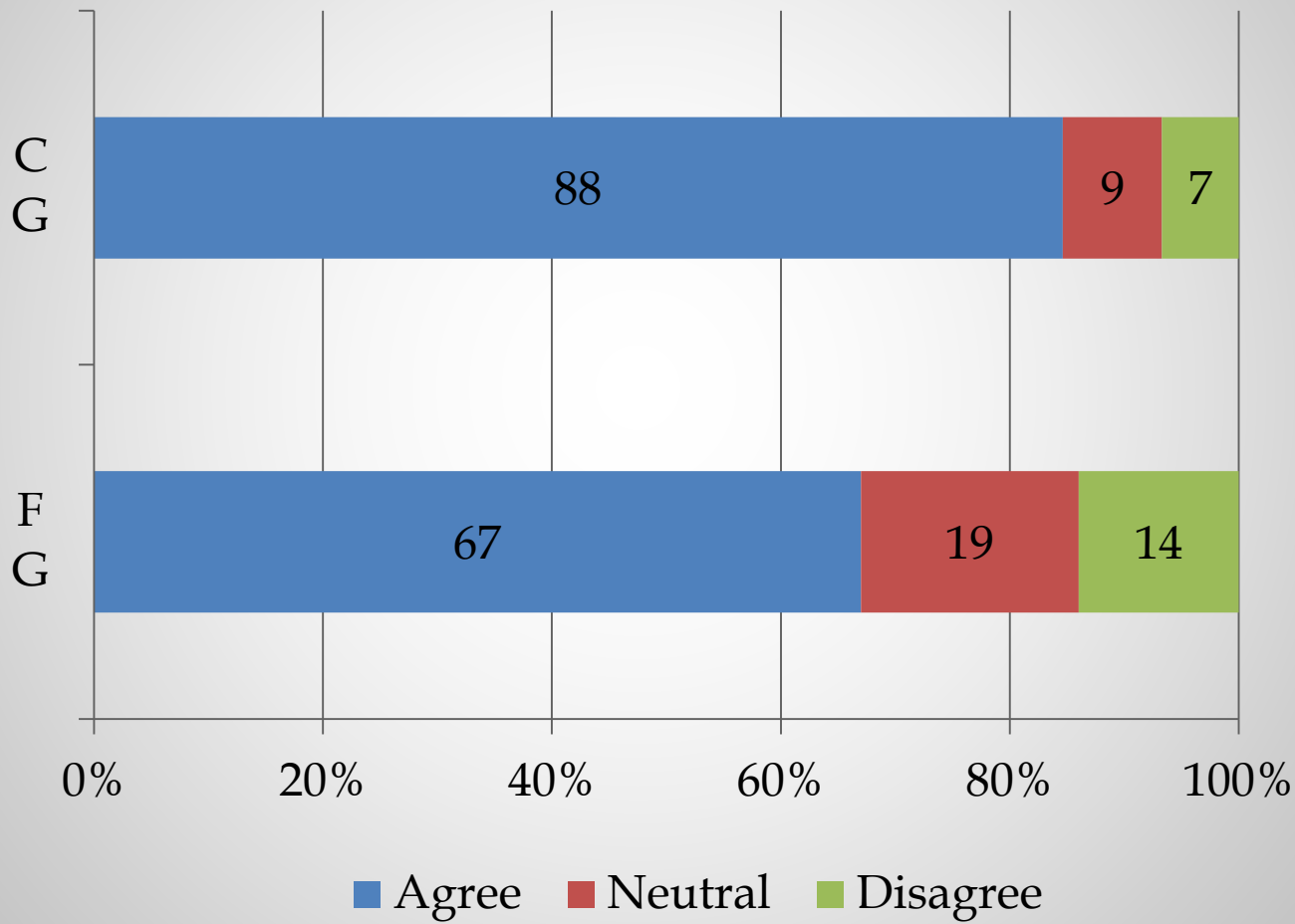
- 8 of the 9 “traditional” students interviewed have close ties to 11 College Prep Programs



# **Relational Supports that Build Social Capital during undergraduate years**

- ▣ Parents/Family
- ▣ Classmates/Friends
- ▣ Faculty/Advisors
  - ▣ Mentors

# My Parents are a Source of Academic Encouragement

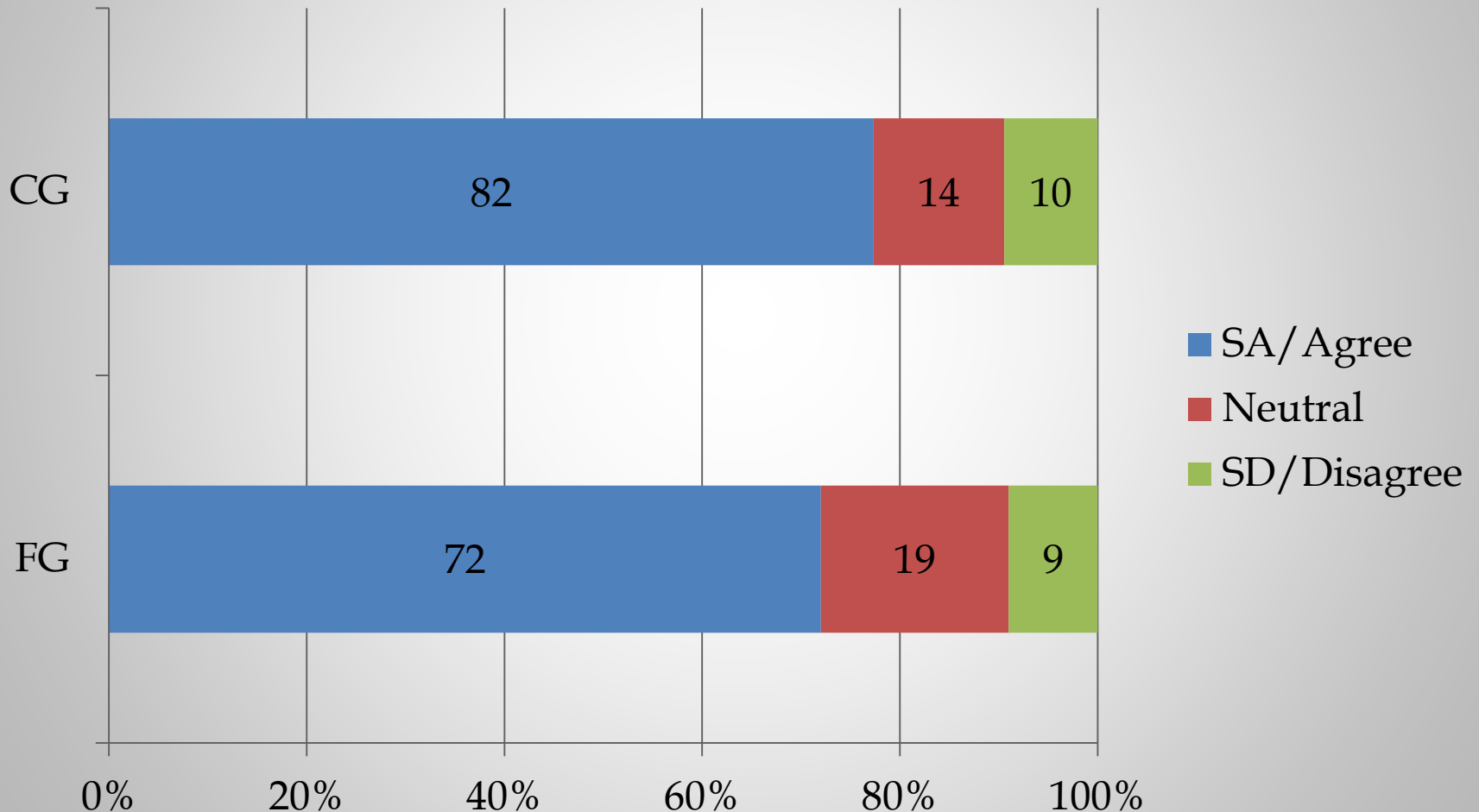


# **Actually...**

## **my parents really don't get it...**

- ▣ But explaining chemical engineering to them and the course load that I have here and why I had to go to college and how good the program was — It was something that I think they're still not getting... I don't think they actually understand the scope of everything — Which is why they're not so encouraging
- ▣ I don't have my mom being like, "Well, you know, you want to be doctor so keep going" and like, "Oh, what are your grades this semester?" like I didn't have that. So it's, it's basically just me trying to push myself and motivate myself.

# My Classmates are a source of Academic Encouragement

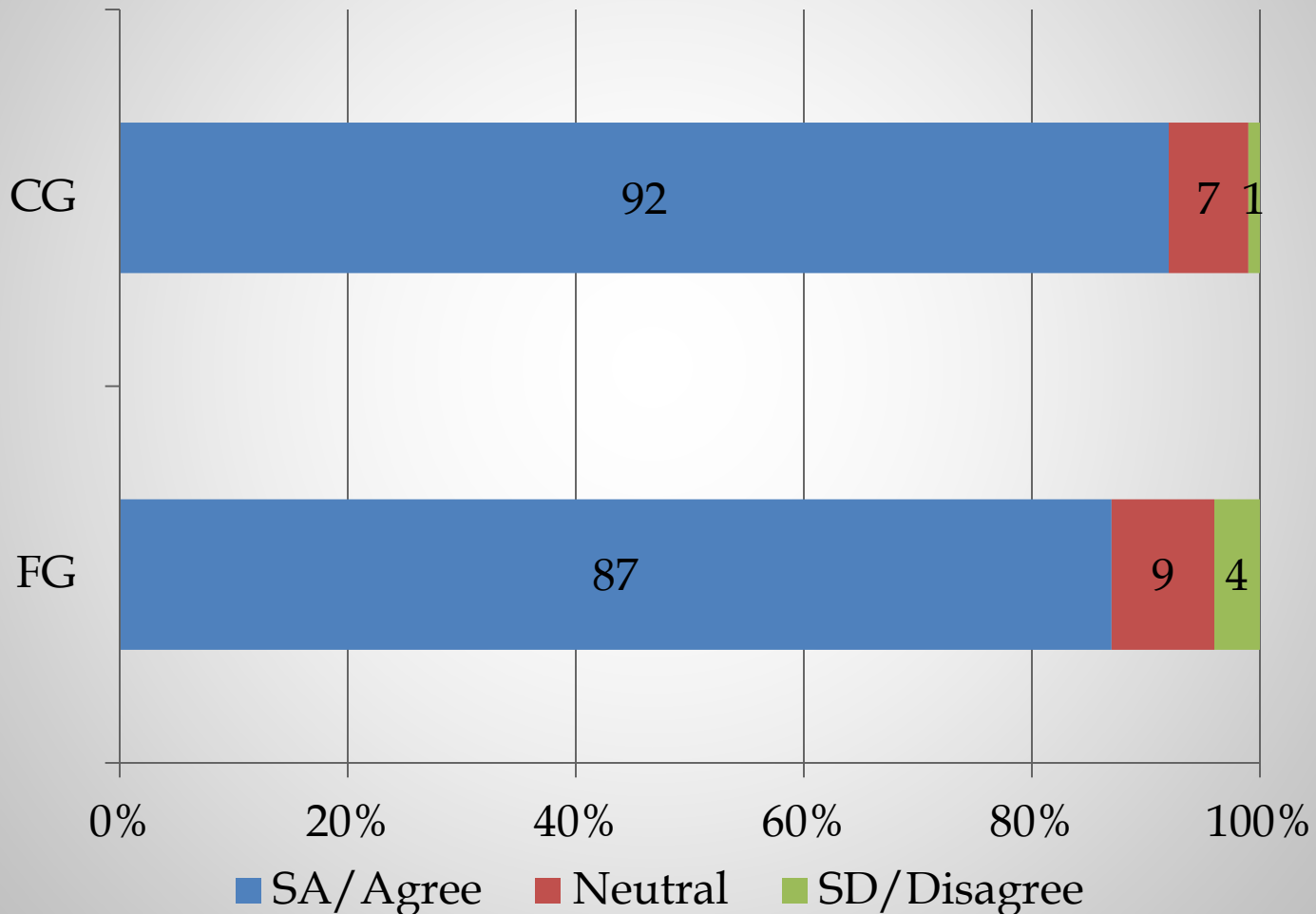


# Friends to “Struggle With”

- ▣ It was just one of the things that you find yourself and you find your friends who are in the same classes as you...to find someone who looks like you or at least comes from the same background as you...because they can really relate. So, **finding people that were in the same struggle** ...I was able to find these people. So, that was really important in building that relationship... I mean, now, I feel like I'm caught up and way more confident.
- ▣ People in my classes, people that I met in freshman year - We just look at each other and say, “Hey, we gotta study together. We gotta figure out how to pass this class.” For sure, if I didn't have that I don't know where I would be.... seeing people that came in with me with the Posse Scholarship excelling just as much as I have, noticing first years that were in my classes **that struggled as much as I did** that are also making it, that are also currently employed. I think all of those things helped me get through.



# My Teachers are a Source of Academic Encouragement



# Relationship to Faculty

“ For many women entering college, engaging teachers in a personal dialogue appears to be critical to the ease with which they can learn and to the level of confidence in the adequacy of their performance”

Seymour, E., & Hewitt, N. M. (1997). *Talking about leaving: Why undergraduates leave the sciences*

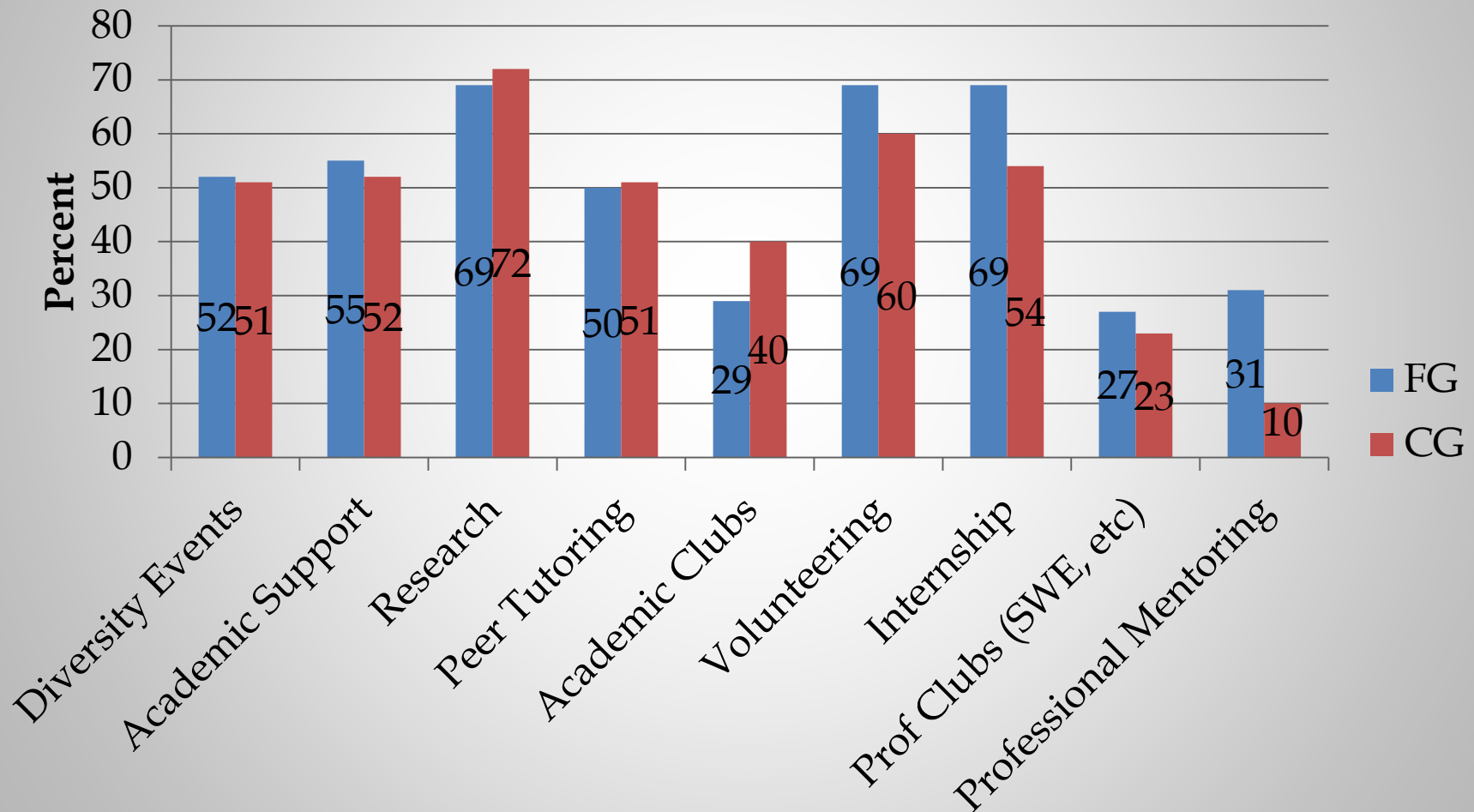
# FACULTY who were accessible...

“Faculty are great. They’re always there to help you especially in engineering...I don’t think there’s ever been a day on this campus where I walked into the Engineering building and didn’t get a hello from a faculty member, or start a conversation with a faculty member, or just have the ability to pull out a piece of paper from my backpack and say, “Do you have a second to explain this to me?” They’re always there. They’re always there to help you...so I think those relationships exist all the time and exist everywhere within Engineering.”

# FACULTY who fostered inclusive classroom environments

“One thing that I learned last semester that made me not hate Chemistry was fact that my professor would always assign groups for P sets, where you have to work with different people. At first I hated it but then it really did help. I was like, ‘Oh my God, this is so annoying’ ... But it gave me two really good friends who otherwise I probably would’ve never thought to talk to, or never thought to associate with. And I felt like that made the class a lot more enjoyable. Whereas you contrast that to all my other experiences, words like ‘I feel like I'm alone in the class and I feel like I don't relate to anyone.’ And then that just taught me how many times have I been wrong? How many times have I like missed out on the opportunity to really create a bond?”

# Engagement Outside the Classroom



# Effective Mentoring Relationships

“I feel like I have mentors all over the place”  
/

- ▣ Community Based College -Prep Program Advisors
- ▣ Academic Advisors
- ▣ Faculty Mentors (Formal & Informal)
- ▣ Internship Co-workers
- ▣ Research Lab Workers/ PostDocs/PIs
- ▣ Peer/Older Student Mentors
  - First Gen Programs (2 STEM related/1 nonSTEM)

# Every student has an ADVISOR, but those who make a difference...

- ▣ My engineering adviser is just amazing. Oh, she is helpful with everything because I've taken classes with her too. She just, always, when I ask for help on homework or about a concept, or conceptual stuff, she helps me out. Um, I've ask her about internships. And she's given me advice about that. Um, and she's very open too. She, uh, gave me a list of a couple of things to look into and organizations, um, as well as people to go talk to.
- ▣ My adviser, she's been my adviser for about two years, uhmm, you know, we talk about academics and life and she's also my lab adviser so, I spend a lot of time in the lab with her and I work for her in the summer and I've TA-ed for her so, I have a very close relationship with her

# Institutional Programs that build Social Capital

- ▣ “Social Bridge” Program before Matriculation for FG
- ▣ Writing based First-year Seminar for FG students
- ▣ FG STEM related Scholars Program with 2-year funded research position
- ▣ Math support program with links to internships for FG students
- ▣ STEM Peer Mentoring Programs
- ▣ Campus-wide Peer Tutoring program
- ▣ Internship Stipend (for unpaid internships)
- ▣ Campus Groups/Houses that support Cultural/Ethnic Identification
- ▣ Academic Conference expenses paid
- ▣ Links to and with alumnae (talks, internships, etc)



# Characteristics of First-Generation Women in STEM who persist

- ▣ Formally/informally engages with similar ethnic peers
- ▣ Strong bonds with both peers and faculty in STEM
- ▣ Advisory relationship > 1 point of contact
- ▣ 3X more likely to be in mentoring relationship than CG
- ▣ Completed an internship &/or research experience
- ▣ Seek academic support in a culture that seeks support
- ▣ Engage in Peer Tutoring
- ▣ Volunteers
- ▣ Holds Leadership positions
- ▣ Part-time worker on-campus
- ▣ Participated in and maintains close ties to Community Outreach College Prep Program
- ▣ Developing connection to alumnae
- ▣ GPA > 3.0, yet lower than CG females ( $p < .01$ )

“High-ability students born to poor, uneducated parents have the most to gain from higher education and the most to lose as a result of current inequities. We need to remove some of the roadblocks in the present system, especially at selective institutions of higher learning”

**Why colleges' insistence on 'diversity' actually fails disadvantaged kids; It's time for a new strategy**

By Tomiko Brown-Nagin, *The Week* | October 1, 2014

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