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## A Tale of Two Low-Income, First-Generation Engineering Students: Well-being, Belonging, and the Role of Chosen Family

Justin C. Major Rowan University, Majorj@rowan.edu

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# A tale of two low-income, first-generation engineering students:

Well-being, belonging, and the role of chosen family.

Justin C. Major, Ph.D. Assistant Professor Rowan University 02/07/2024

**First-Generation Symposium** 

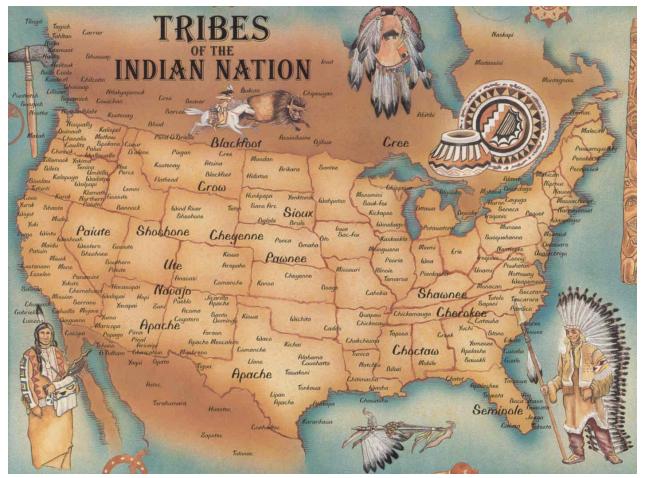








## **Acknowledging Space & People**







#### CW: Many of <u>us</u> are grappling with unbearable hurts that may be elicited by today's discussion.

We may talk about topics such as: Racism. Sexism. Homophobia. Transphobia. Sexual Assault. Domestic Violence. Psychological Violence. Suicide. Kidnapping. Child Abuse. Poverty. Food Insecurity.

> If you need to leave at any time, do so without fear and judgement, and know you are loved.

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#### Thanks to my wonderful students!



Isabel Rivera Graduated 2023 **Rowan University** Engr. Entrepreneurship



**Emmy Sagapolutele** Senior **Rowan University** Mechanical Engineering



**Bria Terrell** Senior Rowan University **Chemical Engineering** 



Narjes Khorsandi Koujel PhD Student **Rowan University** Experiential Engr. Education



Sowmya Panuganti PhD Student **Purdue University Engineering Education** 

- Who do engineering students see as a part of their Chosen Families?
- How do engineering students choose family members?
- What traits do Chosen Family members typically have?
  - In part, how do students' perception of individuals' social justice orientations (SJO) impact whether or not students see them as part of their Chosen Families?
- What physical, social, or emotional resources do engineering students receive from their Chosen Families?
- How else might belonging be thought of in relation to power?



# A tale of two low-income, first-generation engineering students:

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### SDS are underrepresented in EER.

- Only 18% of total college degrees are awarded to SDS to begin with (NCES, 2015).
  - No idea in engineering; SDS were not an NSF priority until 2015 (Smith & Lucena, 2016).
  - SES is still not a priority in ASEE "By the Numbers" Reports; nor are statistics available in the WMPD S&E!
- Higher-income (HI) students are more likely to enroll in engineering (Orr et al., 2011).
  - HI Men are 1.996 times as likely; HI Women are 1.446 times as likely.
- SDS persistence is immeasurable via income after year three (Orr et al., 2011).
  - At year three, SDS odds of graduating were 0.175 while HI students' odds were 0.522.
- STEM is considered "costly" and "risky;" SDS choose pathways that ensure the best chances for the success of themselves and their families (Quadlin, 2016; George-Jackson et al., 2012).

## SD is an intersectional experience and deserves recognition as such.

- Conditions of poverty are more extreme for multimarginalized groups (Pimpare, 2011).
  - Gendered, raced, and classed effects are used to justify multimarginalization (Omi & Winant, 2014).
- The US has a history of demonizing SD individuals as a whole using racist and sexist practices.
  - Effects of redlining keep high-income neighborhoods homogenously White (Rothstein, 2017).
  - Reagan-era politics socially stereotype women of Color as "abusers" of resources (Kohler-Hausmann, 2015).
  - Discriminatory lending practices force SD single-mothers in a cycle of poverty (Pimpare, 2011).
- Intersectional inequality organizes STEM resources.
  - STEM resources are less accessible and of lower quality in SDS' schools (Major, Godwin, & Sonnert, 2018; Major, 2022, *in press*).
  - These patterns are typically reflective of the percentage of Black, Latinx, and immigrant students in schools deemed low-income and otherwise Title I (Major, 2022, *in press*).

#### Extradition sought

## 'Welfare queen' jailed in Tucson

By George Bliss

LINDA TAYLOR, the 41-yearold "welfare queen," was being held in a jail in Tucson, Ariz., Friday at the request of Chicago police in lieu of a \$100,000

She is charged with gran

TUCSON POLICE said that when arrested Linda was going under the name of Constance Green. A department spokes man said that there is evidence she had used some 50 other aliases during her stay in Tucson, including the name of

in Linda Taylor

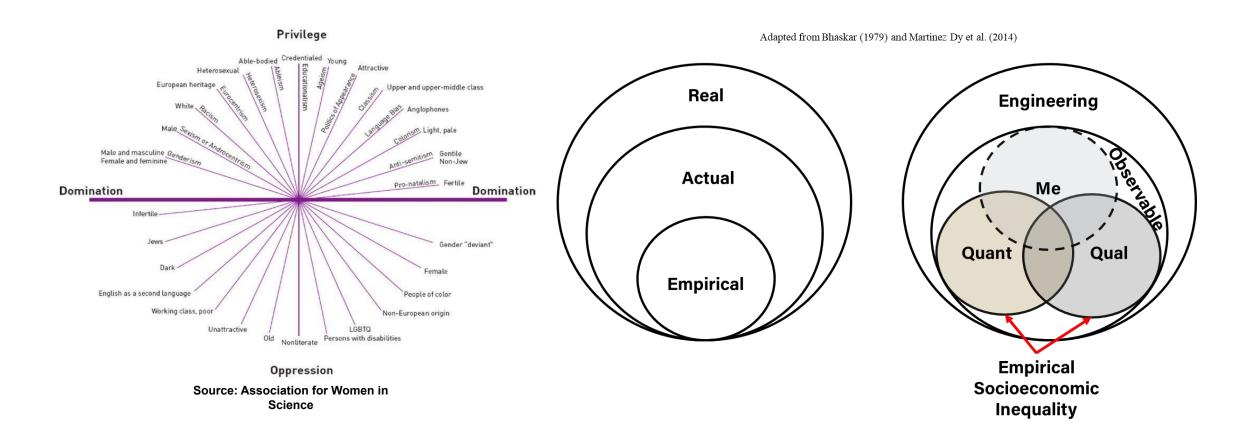
on charges of fraudulent

Source: Chicago Tribune

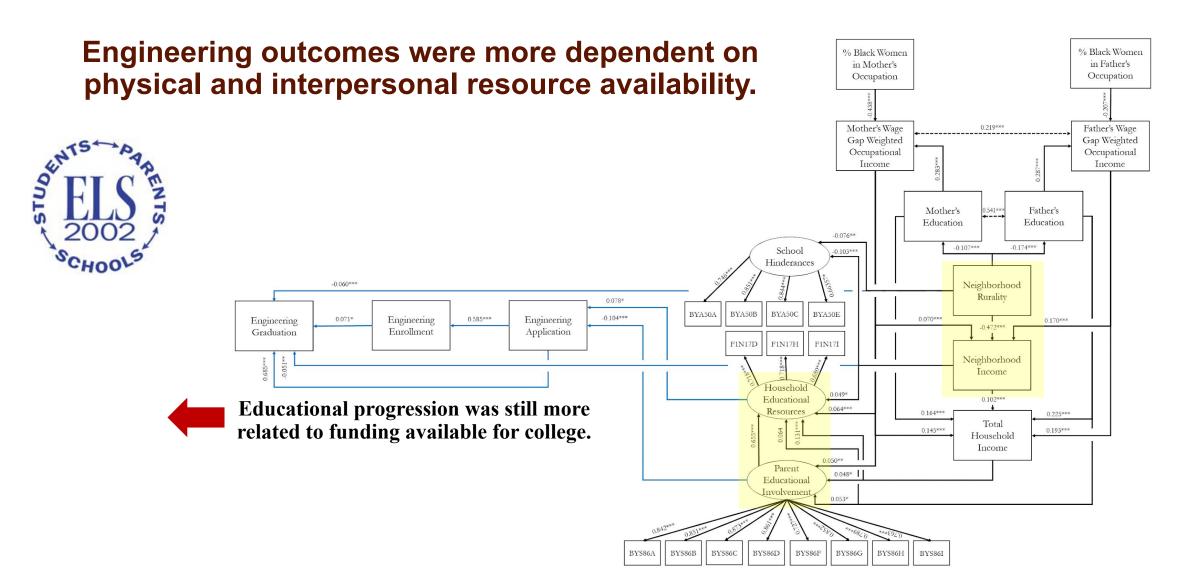




## Intersectionality is a theory keen for understanding how power manifests.







SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002), "Base-year to Third Follow-up, 2012."







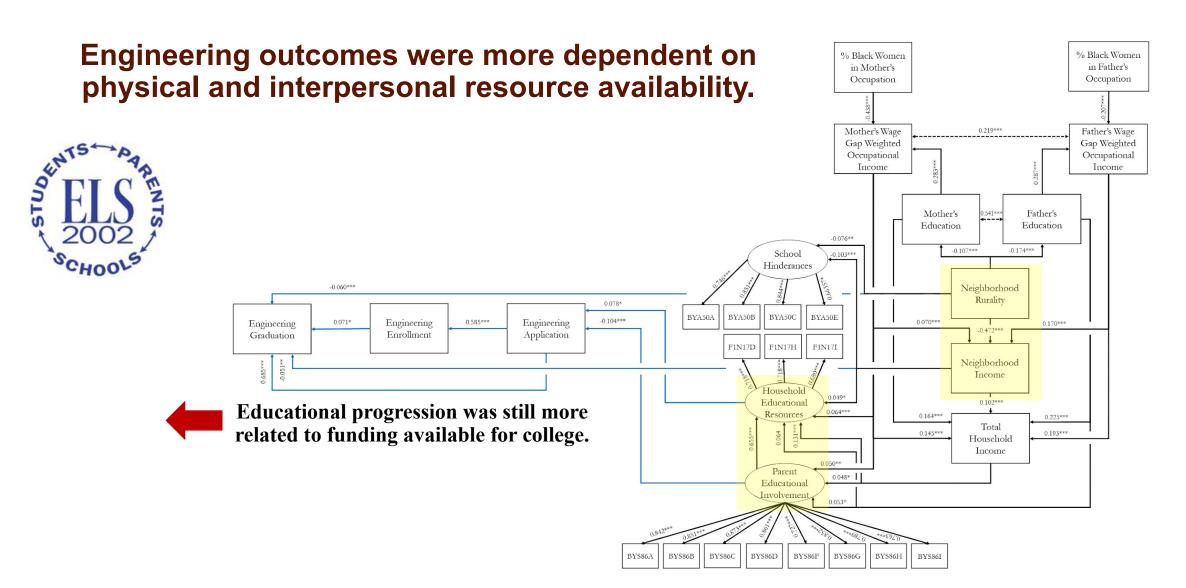
Access to parents who are more involved in one's education, and access to resources necessary for educational pursuit have a significantly greater impact on engineering students' success than non-engineering students.\*\*

> \*\*Traditional measures such as neighborhood income and rurality become more important for engineering graduation, likely due to the eventual barrier of actual cost.









SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002), "Base-year to Third Follow-up, 2012."







#### I interviewed five students who, theoretically, should not be graduating, but were in their fourth/fifth year of their degrees.

Table 6.1. Study 3 participant pseudonyms and demographics.

#### I sought:

- US Born
- Low Hinc
- Low Ninc
- Low HRes
- **Low PInv**
- High Rurality\*

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Science White Eating	
Disorder	

KEY: HRes = "Household Educational Resources", PInv = "Parent Educational Involvement",

HInc = "Average Household Income", PInc = "Average Parent Occupational Income",

NInc = "Average Neighborhood Income", Orient. = "Sexual Orientation", Dis. = "Disability Status"

NOTE: Information shown here, other than Institutional Type & Location, were specified directly by the participants of Study 3.

Adapted from Bhaskar (1979) and Martinez Dy et al. (2014)



## Inequality and belonging are deeply intertwined.

- Belonging has a substantial impact on students
  - Belonging is significantly related to many other factors of student success (Gesun et al. 2021).
  - Belonging may make or break whether marginalized students, including SDS, persist (Foor et al, 2007).
- Inequality impacts whether students feel like they belong
  - Unequal access makes SDS feel more or less empowered; more or less capable.
  - Not all inequality is resource-based, but also interpersonal and can be "passed on".
  - Students who feel they have access to the spaces they are in may feel more able to succeed.



## Trauma can further negatively tip the balance of power.

- Trauma can disempower children just as much as a lack of resources
  - Trauma can cause children to disassociate to protect themselves (Perry, 2006).
  - Trauma has been found to correlate to higher rates of absence and dropout, and lower academic performance (Texas Association of School Boards, n.d.)
- Many socioeconomic experiences are traumatic or come with trauma
  - Homelessness or hunger can make people fear for their lives (Goodman et al., 1991).
  - Indiana Bureau of Justice (2021) found that 32% of women in poverty experienced domestic violence by a romantic partner; 44% for Black women.



## Chosen Family can help re-tip the scales of power in more positive directions.

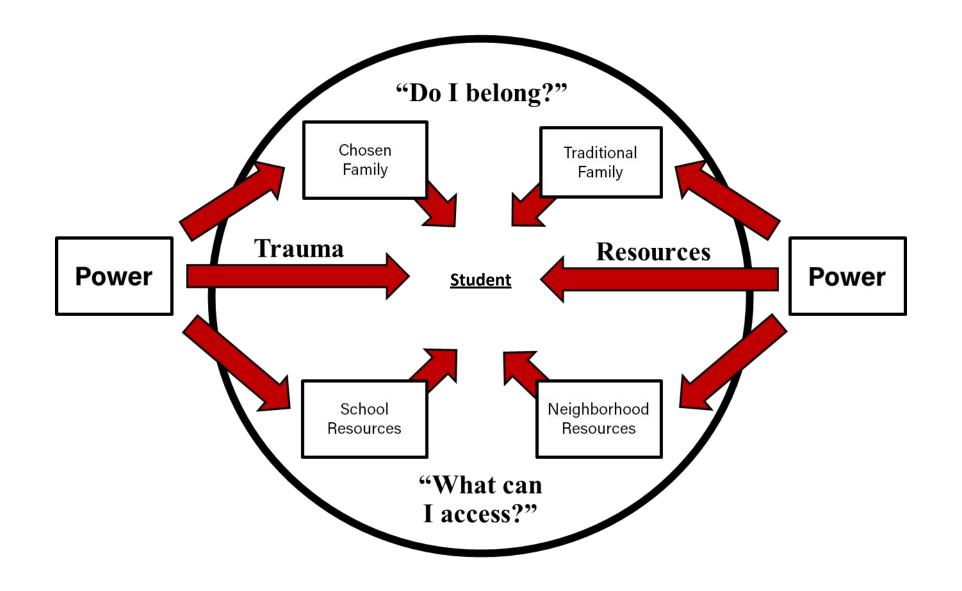
- Chosen Family can link students to resources.
  - Chosen Family are "created family" (Andreassen, 2022).
  - Revelo Alonso (2015) called them "la familia" while Simmons & Martin (2014). called them "fictive kin"
    - Chosen Family relate to students, connect them to resources that might be missing to them, and overall influence belonging.
- Chosen Family can also potentially help students begin to heal from trauma
  - Perry (2007) and van der Kolk (2014) suggest healing from trauma includes helping the person feel safe and supported and helping them regain perceptions of control of their environment.
  - Chosen family can be that first place students feel safe and supported, and their position as a point of access to resources can fill gaps allowing students to gain control.

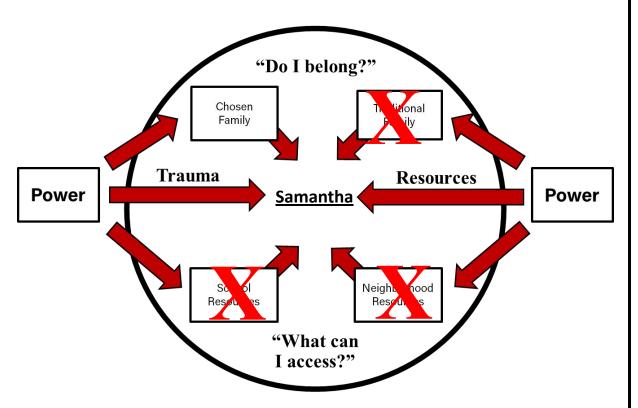


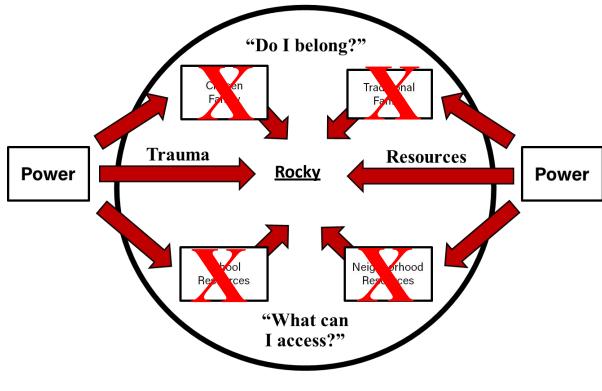
### Chosen family are...

"individuals outside of the person's traditional family with individual or organizational power who use that power to genuinely, and empathetically, support and uplift the person leading to stronger feelings of belonging"

(p.1, Panuganti & Major, 2024, *under review*)







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## The story of Samantha:

"A Phoenix bursting from the flames"



Source: Shutterstock





#### Samantha grew up in a small rural community with her mom and grandfather.

"I grew up in a small rural community in the Midwest; very blue collar, not super educated, only one engineering firm in the city... it was a farming community. Half the town didn't know anything besides get high school degree, and then work in a factory or work in the farm. I grew up pretty normal, but like I grew up, you know, in a rural area; I didn't really have neighbors. I was an only child, my dad was not in the picture, so it was really my mom and her father—my grandfather...

Elementary school, and middle school, I was in a very small two-bedroom home... It was just a front yard, a gravel road for a driveway, and then we had like half an acre behind the house... I had a dog, so I liked to play with my dog in the backyard. I also had a cat. We had a garden, and like I have like, very fond memories of my childhood, partly because I was a kid—I didn't know that all these different things going on with my mom and finances or anything... when I was a kid, I used to be upset...because I didn't really understand..., but now... I [do]."

#### Samantha was extremely gifted as a child but felt pushed through.

"So, as I went through middle school and high school, I consistently performed well despite all the things I had going on. You know, poverty line, food stamps, home insecurity, food insecurity. I consistently, you know, faced discrimination... but I consistently performed well...

When I was in sixth grade there was this state test, and in sixth grade I got a perfect score on the entire thing... Recruiters... were calling my mom like... "Your daughters on track to go to Harvard for a full ride," and my mom's like, "What are you talking about, she's 11?" Like, it was so weird seeing this paradox of how my life was and what people were saying I was on track to do. Through middle school and high school, I just kept doing what I was told... 'Take this AP class. Talk to this engineer,' and it just seemed like a sure done deal that I'd get these grades, go to college, and be an engineer."

## Samantha felt like the weird kid because students knew things she did not.

"Elementary, I kind of had this this ingrained in my brain that like, 'I don't get along with my peers and that's just because I'm a weirdo and also I'm really smart and I don't know why.' That was basically just ingrained in my brain when I was in elementary school.

. . . .

My high school years we were in a suburb of that large city again. It was a huge culture shock—I go from this rural community to now this suburb, and like, I go to school. Like 20% of high school is like not White, maybe 30%. I don't know who Drake is. How do you go to a school that's like 20% Black you don't know who Drake is? So immediately, like, freshman year, like kids are judging you because you're the new kid and like, 'Oh yeah, Samantha can't hang.' So, I have no friends in high school. Like I was consistently the weird one in high school as well.

## Samantha's feelings show in her perceptions of herself as a first-gen "immigrant."

"I consider myself a first-generation college student just because, even though my mom did go to college, she went for something completely non-STEM-related back in the 90s on an athletic scholarship. It's like her experience was completely separate from what my experience was...

. . .

I also consider myself an immigrant... I'm not really an immigrant, but I feel like an immigrant at times. My mom was adopted, but she was a toddler, so she doesn't know the language or culture. I'm the same way, I don't know the language or culture. I jokingly call myself ``Panda Express." I have these Asian ties and, you know, on the outside, I look Asian, but when you kind of dig deeper you realize I'm really ``fake" Asian. Like I'm just American---I'm fake Asian. I feel like I don't feel a sense of belonging in some spaces, just because I look different and have different experiences."

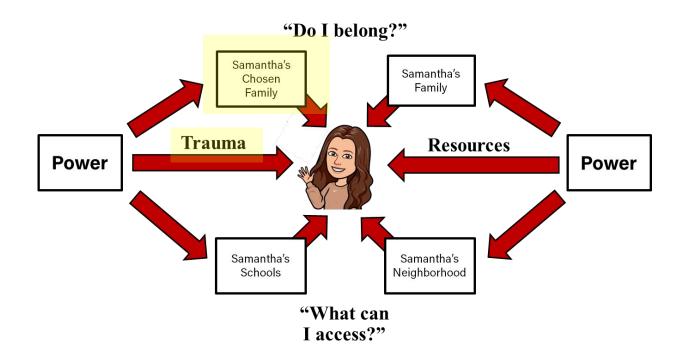
#### Samantha, "like a Phoenix,...burst from the flames"

"When I got to college, I realized that my whole life... I wasn't doing what I enjoyed... I was [doing what I thought] I was supposed to do... I [was] having this crisis. At the same time, freshman year, my grandfather passed away... my father also passed away... I developed a relationship with him [in college]...

I have all this like craziness in my life, and it was this like rude wake up call, like, 'You literally have one shot this life... You shouldn't spend it, not being happy.' I kind of realized, 'Okay, I don't want to be a mechanical engineer, but I want to be an engineer..." So, I changed my major to computer science...

Around the same time, I was like, '...What else in my life doesn't make any sense?...' I kind of realized that religion wasn't really a thing for me... So, I left the church. When I did that, I realized I was only with my boyfriend at the time because the church told me I was supposed to be with a boyfriend. So, I cut off the boyfriend... [Then] I was like...`You know what, I'm a lesbian...'"

## The balance of power in Samantha's trajectory was central to her success.





## Strains on Samantha's mother were unintentionally passed on to her.

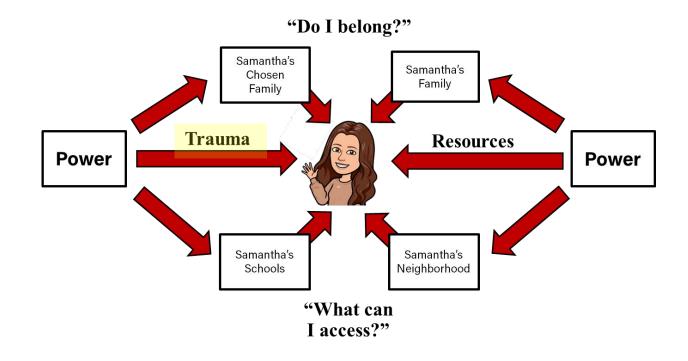
"When I was a kid, I used to be upset at my mom because I didn't really understand what was going on... **My mom had me when she was in college**... My grandparents helped, and my mom worked her butt off. She was on a cross country scholarship. **She** was pre-law and wanting to go to law school...and then she had me. She's like `l can't do both," so she chose me instead of going into law... So, she switched to social work, and then just worked retail jobs because, being a retail manager is like pretty good pay. Then the recession hit, and then it wasn't good pay anymore. She then ended up working in the social work field but then found it was really hard to not bring that stress back... [it] caused her to lash out at me with that stress. She's like `that's not healthy...' she sacrificed so much for me. Like I would do anything for my mom and that's why like I'm really fighting my stepdad Hiram now trying to get her out of this abusive marriage. She lost her 20s and 30s raising me, she's lost her 30s and 40s to Hiram."

#### Samantha's stepfather caused her to be homeless her sophomore year.

"Hiram [my stepfather] asked me for money [sophomore year]... I took the money I'd saved from my first internship... a couple thousand, and I wired it to my stepdad. I thought, 'This is my stepdad. He needs money. He'll pay me back..." He never paid me back. He also failed to tell me that something happened with the taxes, and it screwed up my financial aid. So that semester, I returned to campus, and I couldn't afford the dorms anymore...

I find myself homeless that semester because I can't afford the dorms. Thankfully—at OU we have a mentorship program... But one of the upperclassmen I met through the program, she was on a co-op that semester and couldn't find a sub-letter for her apartment... She's like, 'Samantha, its literally an empty room, there's no furniture, there's nothing there, but like you can crash there...' So, I literally crashed in... this box of a room for a semester... I end up just sleeping on a \$20 air mattress and eating like \$0.50 ramen that entire semester. I lost a lot of weight, and it definitely fed into like, my eating disorder and a bunch of other mental health issues ..."

### Traumas added to Samantha's disempowerment.





## Samantha attributed much of her want to be an engineer to her grandfather.

"My grandfather worked as an aircraft mechanic—I guess you'd call him a machinist — basically he would fix airplane wings... All this stuff was highly technical, but it was all, you know, blue collar work; he just had a high school education. So, I remember growing up as a kid, I would always just hang out with my grandpa because my mom, a single mom, was always working. So, it would just be my grandpa and I, you know, building a shed in the backyard, or fixing a car, or him telling his stories of working on these airplanes...

I always liked tinkering with things; I liked to learn how things worked... I was just always curious as a kid, and I really credit my grandfather with why I stuck in engineering. He always told me, you know, `If there's something you're passionate about, something you're curious about, don't let someone tell you you can't do it.' Those memories... those are what really made it be like, `Wow, I like to build things. I like to create things. I like to work with my hands."

## Samantha's "chosen family" was integral to the additional support she needed.

"I have a good circle of supportive friend... I consider them... my chosen family.

Marie and I met in intro to programming... all of my fondest memories in college have been her and I doing some dumb shit. Marie is my ride or die.

Aurora... lives with me currently. We were roommates on a trip and we... connected... Our personalities mesh so well... I think her parents consider me one of their daughters...

Anabeth... [It was like...] 'We have a lot of mutuals, let's hang out..." Our personalities also mesh... Her dad, for Christmas, made me a candle; like he hand-poured a candle!..

I also have, you know, faculty and staff... who I've considered my chosen family as well, Kya, she's like my, she's my boss for my on-campus job... there's [also] the opposite folks in student success... Jamie and Jenny. Jenny's like an aunt to me, in the family, but not as close as Kya. Kya is my school mom... She invites me to her home... I tell her about my family problems. I tell her about my life, she gets it.

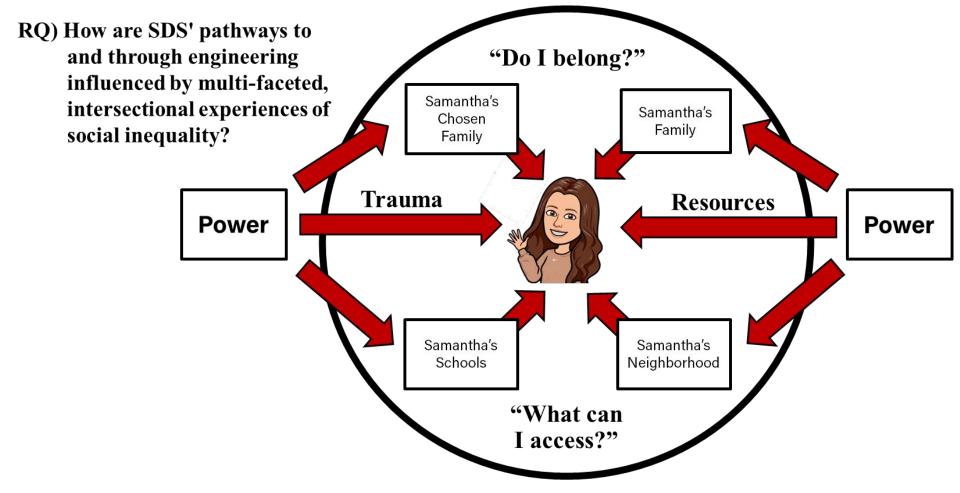
Dr. X... He's always been super supportive of me... Like we'll meet, and I'll tell him about what's going on my life, and he just laughs... it's just nice because I tell people about what's going on my life and they don't really know how to react, which is fair. I don't expect them to relate... It's really refreshing just to hear him laugh at my life because my life at this point is pretty comical."

## SI and trauma complicated Samantha's belonging; chosen family <u>supported</u> it.





## SDS like Samantha exist within a larger Socioeconomic Ecosystem.



## The story of Rocky:

"Those interactions made me like this"









## Rocky felt like she was living a normal life until her father lost his job and the family finances became tight.

My name is Rocky. I'm a Middle Eastern female engineering student in a low-income family. I'm the first one in my family---my brother and I are the first ones in our family---to go to college in the US. He's studying cartooning and animation. I am currently a third-year undergrad student in chemical engineering at Opportunity University. I'm a little behind in my coursework, so I'm sophomore level.

My family was doing okay financially until my father lost his job and he became disabled. His disability and job loss were because of a car accident that resulted in a lot of financial loss. This was like, right around grade school, me entering Middle School. Before the accident, we lived in a nicer neighborhood where I was able to feel included in a lot of my, like, social interactions. My family was also able to afford more things that I had wanted. Growing up, I was always told by my family that they would try their best to get me what I wanted, whether it be a toy or a book.

After the accident my father wasn't able to work anymore due to like, some injuries. That was a huge like, financial loss for my family, because he was the main source of income. Both of my parents are pretty old though and, because of that situation, my mother who was also unemployed at the time, she sacrificed, like, her health, and got a part time job at a grocery store which she's still working now. She clearly like, is not able to do it, but she does it because it helps pay bills, and it just helps keep things more in balance. My father just recently was able to get disability. It was hard to like figure out though because both of my parents weren't raised in the US, so their like knowledge of working with papers or just getting access to things isn't as good. I had to help them figure out how to do that.



## Rocky was a victim of domestic violence in a strained household.

The environment surrounding all of my homes would always be very loud, full of a lot of yelling in our family, and sometimes, like, fights. I think it has affected a lot of my relations with my family members. I think a lot of the yelling was because everyone was really on edge because we all were always like, trying to think of how to better our, like finances.

. . .

It would be a lot of like arguing over what to do, or, at other times, would be the opposite, like, just not doing anything, and then me being labeled disrespectful. In those situations, I've been like, yelled at, and called names a lot, and a few times, I've been hit.

. . .

It could have been common if I didn't like, hide or like, lock myself in my room when situations got tense. Sometimes I would hide somewhere, like in the closet or in the bathroom and like lock the door, or I would like walk out the house and go somewhere like a nearby park, just so I couldn't be reached as easily. But because I found like, those ways to get away I wasn't hit as often—only when I was like already in the moment and had no way to like, run away from it.

#### Rocky was also expected to adhere to unrealistic expectations.

I was labeled disrespectful... [My parents] thought that because I was living in the house that they didn't think it was fair for me to just live here without contributing anything. I remember there was a time, I was like 13 or 14, where I tried to get a job knowing that I can't really get a job at that age that pays well; I still tried to do it.

There were just situations where they thought I didn't deserve to be like, under their roof, or being fed by them, or being, like, given clothes by them, or just basic necessities, which, I don't know, made it harder for me to---I don't know, it was just hard. So I think that's why now I've always been-ever since---I'm very cautious with what I spend, and making sure that it's like from my savings, or I don't ask a lot for financial help. Like, for college, I've paid-I've done everything by myself. During high school, I learned how to develop more of like, a financial independence. I knew that I couldn't rely as much on my family for, like, resources I needed. Although they do help a lot like, I've learned that I can't keep relying on that; I have to become my own source.

# Rocky felt like these interactions made her quiet, depressed, and compliant.

So I think just from this---from like those small interactions of being yelled at for not contributing, made me like this. By that I mean I'm more like, sensitive and I guess, like, I don't expect, much, like, I tried to be more independent and not dependent on my family. So, it's like, I'm in the mindset now that I like want, whenever I have like a stable job, if that's possible, that I, it's my job to like, repay my family, but just because they paid for like a roof over my head or paid for my food, or toys, or clothes.

Like, before, I thought that it was just like "I'm just like a kid, I don't have to worry about that stuff", but now I'm like, simultaneously worrying about that stuff while also trying to pay for my own things. So, I guess it just changed my mindset.

### The chosen family Rocky could have had did not support her either.

Because I was bullied in middle school, that led me to go to a different high school than what my middle school like, targeted us to...

However, when it came to my high school teachers, I feel like they looked down upon me a lot; it's weird to describe. They didn't have like the same like, tone with other students who would talk about where they went or what trips they went on. But every time I'd go to ask teachers for like a recommendation letter or just to talk about, like, my future, they would kind of---I would either get to outcomes like just being declined, or, like a very vague conversation of them just saying, like---not talking with me, but like talking at me, like telling me what I need, or what I need to do. And I noticed their conversations with other students---like, I will say that my high school had most, like half very well-off students, and then half low-income---so when the teacher would be with like, one of my friends who's like, very well off, it will be a lot more lively, enthusiastic, like they actually see like a future for them, a successful future. I didn't really get a lot of motivation from my teachers from that. And I'm not sure if it's just necessarily because I didn't share many other experiences that other students did, or if maybe it's because of what field I want to go into---I don't know if it's necessarily what my financial background is, but at the time I felt like if I had the same experiences, and the same resources and opportunities that these others had, I would probably feel more motivated to do well.

#### All of them...

I do remember reaching out to the counselor a few times---it was moreso just some an office clerk who just gave very like, cliche advice whenever I'd reach out and like have a problem. In one experience, I remember going in after having like, a panic attack in class and they would just tell me "stop feeling what you're feeling," and "everything happens for a reason" or, like, things that would be a lot of commands, like "think positive" or "do this," but it wouldn't be a lot of like, listening. It would just be like telling me "Okay then, if you're feeling sad, stop feeling sad," which, like, didn't help.

But because I didn't get listened to, I didn't really---yeah, I never really reached out to like my school staff. I think, just being able to connect with others, without automatically feeling like you're in a lower, like hierarchy like, like, talked down upon.

#### Rocky had relationships, but no chosen family friends.

Through my classes so far, I've done a lot of group work, and gotten to meet different kinds of people, and all within the same engineering field, I've enjoyed it. I'm fortunate that I got to join some like, engineering related organizations which has helped me develop like a greater network of people I can just go to or like, start connections with. I think what helps is, with my school my major is very small, so it makes it makes it easier to connect with others who are studying the same thing. And so far, I've enjoyed it, even though it's been challenging; I've enjoyed, like learning along the way.



#### Rocky tried to commit suicide in 2019 and was unsuccessful.

Where I am now is not the same mentally where I was like, a few years ago, like, at the start of my college career in 2018. In 2019, I had a suicide attempt, and yea, it's just been me trying to be more stable now. And like, nothing much has changed, it's just more like being a little bit more positive about what I have to handle, that I know I can reach this even though I'm on a financial struggle, or even though I'm not doing well academically. I'm just trying to stay at the... I guess the, the line that doesn't cross me being like, mentally out of control, and just trying to stay stable overall. Because I know, if I don't, if I fall back to that low point, it will affect my like, continuation of college. I'll have to stay longer, I'll have to like, pay more, which in turn is kind of hard---I don't know. I feel like if I focus on one thing, if I focus on college, I feel like I'm not paying enough attention to like my other problems, my mental health or my financial situation. But then if I focus on my financial situation, and mental health, then I feel like my grades and my college career suffer. Currently I'm just trying to find a balance between those two, because I know if one is impacted a lot, then the other worsens, and vice versa.



#### Rocky's college had little support for mental health too.

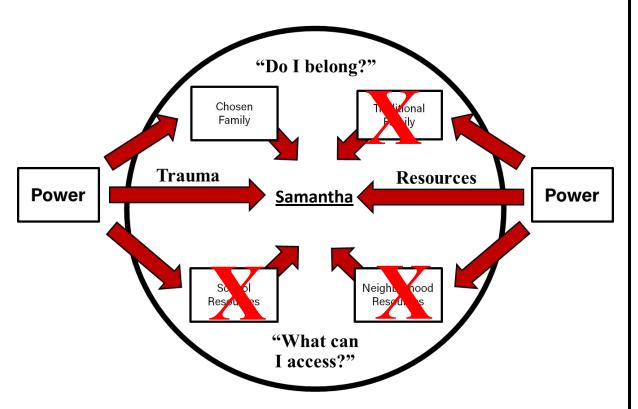
Within our medical center, we have like, a thing for students to reach out for like mental health support, but it's not a good system. Some students go to it to like, share their family issues or just like, emotional trauma, or physical abuse. I've known people who try to use that as a source for those kinds of situations and it's not accessible, or very hard to access. Every time I reach out, or try to reach out, there's always like, a waitlist, and I've been on it for months. And it's like known by students that it's not a good, like, it's not reliable. A lot of other students share the same experiences. It's become, like, a running joke among students that the university offers this, but it's not even accessible, and it's probably one of the things that needs to be accessible, especially like during COVID.

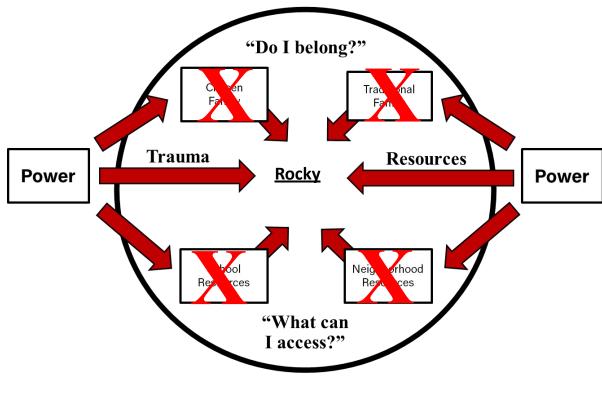
It's not even just the waitlist---the waitlist is already like a barrier-but even after the waitlist, it's very hard to, like, just get help. You're given like a pamphlet of just exercises to do, you're not even talking directly to a person. It's bad even if you're in the same room as them. There was a time where I had like a breakdown in the room with the person I was talking to, but they said they had to stop the meeting---the meeting was only five to ten minutes. That's when I felt like I couldn't---like it wasn't helpful at all because it was just them talking to me and not listening and then telling me ``I'll just prescribe you this medication or this."

They weren't actually listening to what my problems were.

### I want to give folks a moment...









# aspire

Advancing Student Pathways through Inequality Research in Engineering



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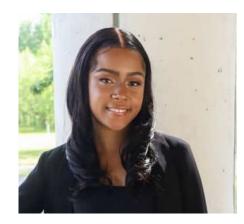
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- Who are (or could be) part of first-gen Rowan students' chosen family?
- What roles do chosen family play for first-gen students?
- How can we help first-gen Rowan students build chosen family?