

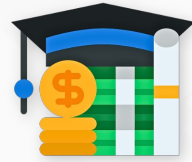
Qualitatively Exploring How Finances Constrain Undergraduate Engineering Student Experiences, Mental Health, and Career Opportunities

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Qualitatively Exploring How Finances Constrain Undergraduate Engineering Student Experiences

Author names and institution are blinded for review.

Note from Authors: We are using the “presentation only” option and submitting our slides in advance with notes. We did our best to include enough notes to help reviewers evaluate our presentation and work. We are under the impression that the presentations are 40 minutes, but we are able to scale to a 10-15 minute presentation if needed.

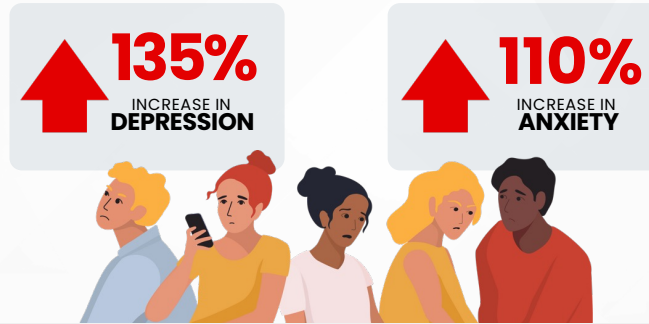
Agenda

- 1 INTRODUCTION
- 2 BROADER STUDY
- 3 METHODS
- 4 FINDINGS
- 5 DISCUSSION

Introduce the flow of the presentation and what structure the audience can expect.

Introduction

BASED ON A SURVEY BY **THE HEALTHY MINDS NETWORK** BETWEEN **2013** AND **2021** FROM **350,000 COLLEGE STUDENTS** AT OVER **300 CAMPUSES**



Introduce the importance of mental health and how there has been a drastic increase in mental health concerns in college-age students.

Context for Reviewers: Our study uses data from a broader study on minoritized students mental health and focuses specifically on how financial constraints interact with student mental health. Importantly, we take a qualitative approach to mental health wherein we asked each participant to define what mental health means to them. In this way, we are investigating mental health in a more colloquial than clinical sense. Other researchers have published useful research about rates of mental health conditions, like depression and anxiety, in college students and engineering students more specifically. We aim to add depth to these findings by sharing rich stories from participants that make visible connections between mental health, minoritized student experiences, and financial constraints.

Introduction

MINORITIZED IDENTITIES

ENGINEERING UNDERGRADUATES

COLLEGE STUDENTS

SEVERAL STUDIES HAVE SHOWN THAT THESE STUDENTS ARE MORE LIKELY TO EXPERIENCE GREATER MENTAL HEALTH CONCERNS

OSWALT ET AL., 2020; LIPSON ET AL., 2022; LIPSON ET AL., 2018

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Emphasize that minoritized students are more likely to have mental health concerns, so that is why we decided to focus on this demographic for our study.

We defined minoritized identity as a non-majority identity in at least one of the following categories: gender, sexuality, racial identity, socioeconomic status, disability, first-generation college student. Our sample is stratified across these groups, with several participants holding multiple identities that have been traditionally minoritized in engineering.

Participants & Setting

21 UNDERGRADUATE
ENGINEERING
STUDENTS
WITH ONE (OR MORE)
MINORITIZED
IDENTITY



PARTICIPANTS WERE **RECRUITED** FROM A
LARGE COMPREHENSIVE RESEARCH-INTENSIVE
LAND-GRANT UNIVERSITY IN THE MIDWEST



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Introduce the larger study and how we interviewed 21 participants at a land-grant university.

Recruitment

FLYERS AND EMAILS RECRUITED STUDENTS WHO IDENTIFIED AS:

FIRST-GENERATION COLLEGE STUDENT

LOW-INCOME

STUDENT OF **COLOR**

LESBIAN, GAY, BISEXUAL OR **QUEER**

WOMAN, TRANS OR **NONBINARY**



**TO PARTICIPATE IN ONE HOUR-LONG
SEMI-STRUCTURED INTERVIEW**

PARTICIPANTS RECEIVED A \$30 VISA GIFT CARD

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BROADER STUDY

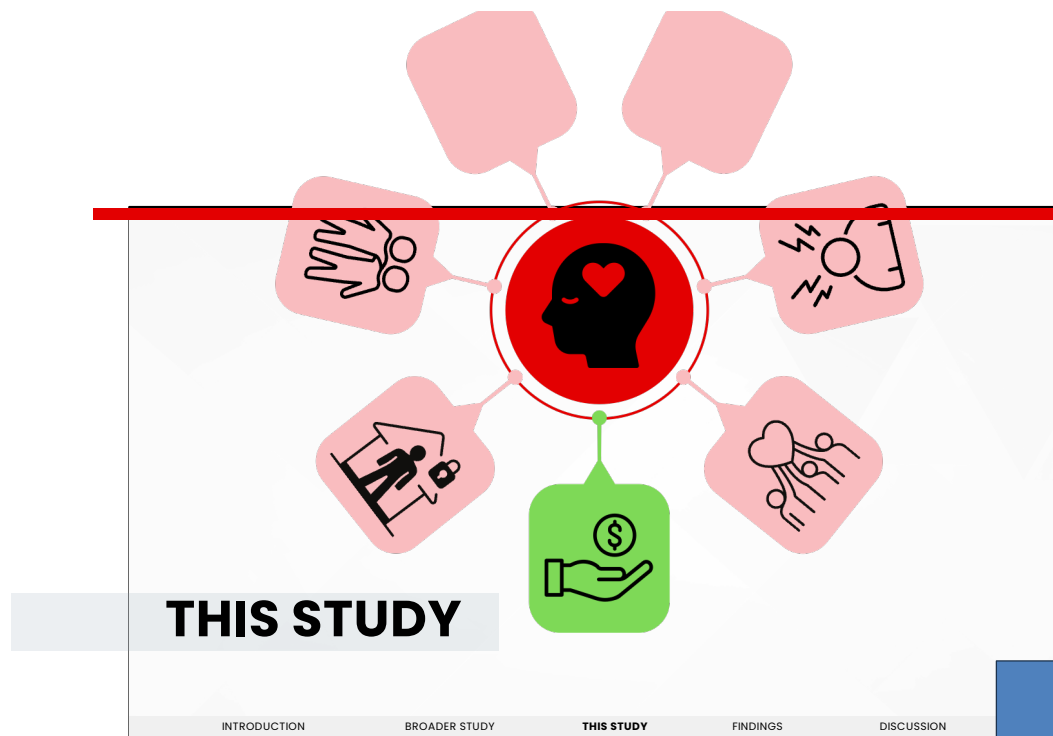
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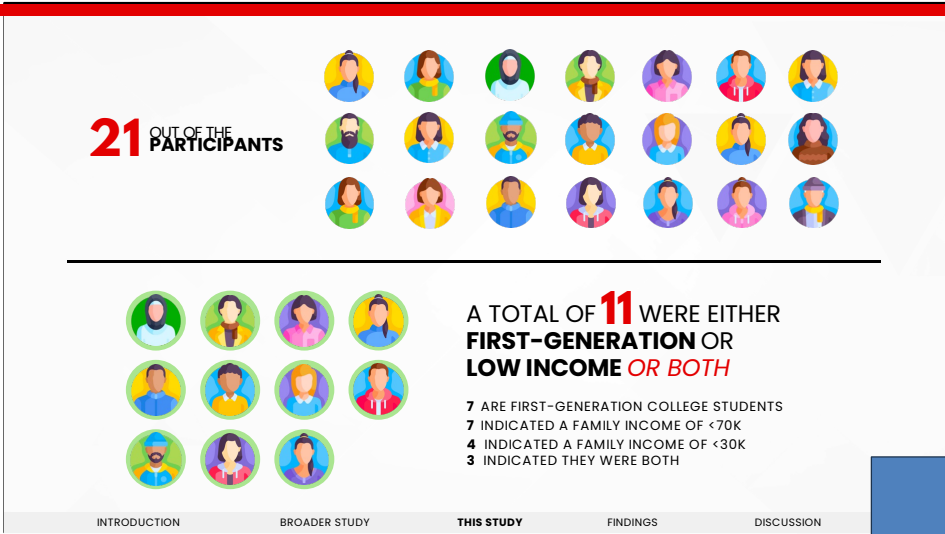
Talk about the recruitment process and interviews. Identify the groups that we targeted for recruitment and the compensation. Explain that we interviewed them inquiring about their mental health overall and what has affected their mental health. Add that the broader study was designed so that different branches of the study could form so we can focus on different aspects of these minoritized identities and not just group it into one big study.

The study received IRB approval from the researchers' institution, and researchers were careful to protect participants' identities throughout the interview process.



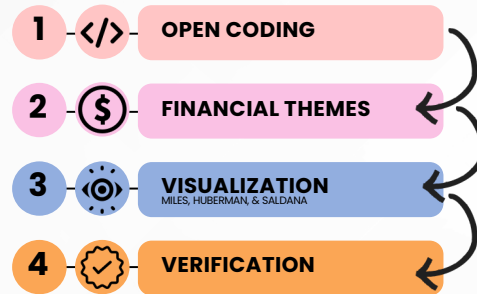
Explain that there was already a publication from this study about what the universities should know about minoritized engineering students' mental health. This publication focused on a thematic analysis of the components that seemed to most impact the majority of the students interviewed. But, this study is focused on the financial components, since first-gen and low-income students were also included as a minority of focus. Through the initial data analysis, the authors noticed ways in which finances constrained what students' experiences could look like in engineering.

Note: This particular analysis focuses on students who are financially disadvantaged, therefore we are unable to draw further conclusions regarding the implications of specific minoritized populations.



Out of the 21 participants, 11 identified as either low-income, first-gen, or both. Also note that even those that didn't identify as one of these still expressed financial concerns and we will talk about that later. We do not share individual-level demographic information in order to avoid identifying the participants, but we can add additional aggregated demographic information as necessary.

Preliminary Data Analysis



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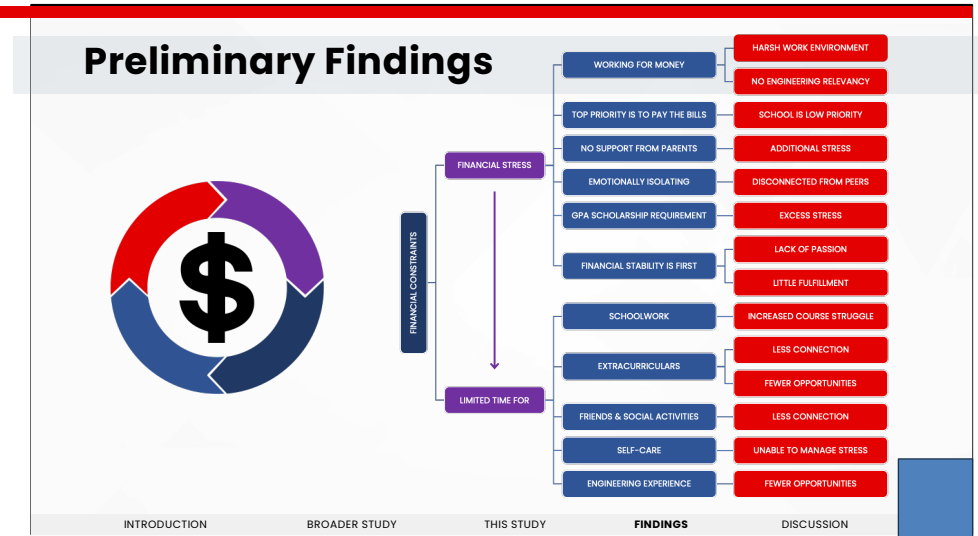
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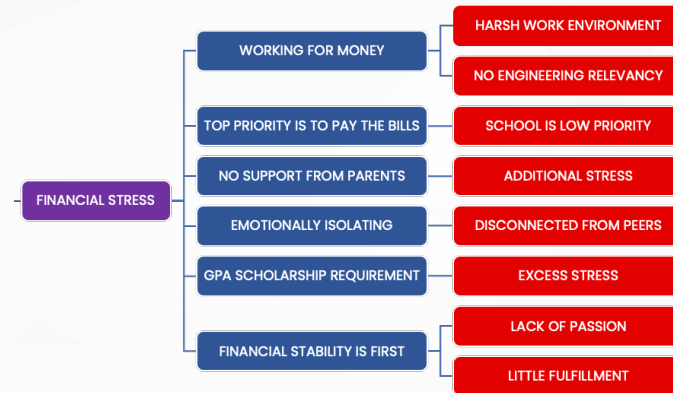
The first author led the efforts to conduct a preliminary data analysis for this conference presentation and developed a visualization to describe trends that they noticed in the data. On this slide, we plan to walk through the data analysis process: open coding, themes, visualization, and verification. Open coding was done with MAXQDA by a 4-author team, financial themes were identified by a 3-author team, visualization was done by a 3-author team, and preliminary verification was done by a three-author team. This big (and small) project has very much function in 'stages' and we are still in a preliminary stage.



To explain our preliminary findings, I found it easiest to visualize it through a flow chart. This visualization is in line with Miles, Huberman, & Saldana’s recommendations for qualitative data analysis.

The experiences tied to financial constraints that students experience normally fall into ‘financial stress’ or ‘having limited time for something’ (where such time constraint is caused/influenced by their financial situation). From these two categories, we identified the standout stories that we were told from the students. From these stories, we noted the consequences associated with each, which can be a good indicator of why their mental health may be declining. These categories can be seen in the flow chart: the top portion of the chart shows financial stressors (in blue) and the consequences associated with each stressor (in red). The bottom portion of the flow chart shows the activities for which financial stressors limited students time (in blue) and the consequences of them not having time to engage in those activities (in red).

Preliminary Findings: Financial Stressors



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Here is a closer look, I know the flow chart might look overwhelming at first glance. The first part that we will cover is the financial stressors. These are the things that cause initial stress for the students that often have a waterfall affect into other aspects of their life.

Financial Stressors

WORKING FOR MONEY

HARSH WORK ENVIRONMENT

NO ENGINEERING RELEVANCY

1

”

EVERY WAKING MOMENT WAS SPENT IGNORING HOMEWORK BECAUSE I WANTED SOME TIME TO UNWIND. AND I COULDN'T UNWIND BECAUSE I HAD TO GO TO WORK. IT WAS A **VERY DEMANDING SERVING JOB** WHERE I WAS **PAID LESS THAN I WAS WORTH AND ENTIRELY OVERWORKED** ... THAT WAS JUST A **VERY TOXIC ENVIRONMENT** THAT I COULDN'T GET OUT OF. I FOUND MYSELF WORKING LONG HOURS & I WOULD GET OFF AT **TWO OR THREE IN THE MORNING** SOME NIGHTS.

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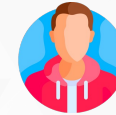
For each quote, I will walk through the quote and explain why it was significant to the given piece of flowchart. This participant, participant 1, had to be in a very difficult work situation for a while. They were getting home at 2-3 in the morning, never had time for anything, overworked, underpaid, and in a very toxic environment. This is important to visualize, because many students share similar experiences. If students can't find well-paying internship, they are often stuck trying to work for money in ways that do not relate to engineering. Students are then put in a situation where they are working a part time, or sometimes a full-time job AND handling a full engineering course load. These intense time commitments can lead to long nights, no time to unwind, and burnout.

Financial Stressors

TOP PRIORITY IS TO PAY THE BILLS

SCHOOL IS LOW PRIORITY

17



"[ENGINEERING] CREDIT HOURS ARE MORE EXPENSIVE ... WE HAVE MORE LAB FEES"



"YEAH, I HAVE SOME SCHOLARSHIPS, BUT IT'S MY RESPONSIBILITY TO GET MY STUDENT BILLS PAID."

"A SIGNIFICANT AMOUNT OF MY CLASSMATES HAVE THEIR PARENTS PAYING FOR THEIR SCHOOL WHICH IS GOOD FOR THEM, BUT DEFINITELY NOT MY EXPERIENCE."

I HAVE HAD JOBS ON CAMPUS SINCE I WAS A SOPHOMORE, AND SO PART OF MY TIME IS BEING SPENT WORKING AS OPPOSED TO WORKING ON [SCHOOL] PROJECTS AND THEN LIKE NOT HAVING TO STAY UP AS LATE AT NIGHT.

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To show how we intend these quotes to be read, this quote reads: "[Engineering] credit hours are more expensive ... we have more lab fees. Yeah, I have some scholarships, but it's my responsibility to get my student bills paid. A significant amount of my classmates have their parents paying for their school which is good for them, but definitely not my experience. I have had jobs on campus since I was a sophomore, and so part of my time is being spent working as opposed to working on [school] projects and then like not having to stay up as late at night."

This is significant because some students are having to rearrange their priorities compared to financially supported students, and that can pose a big imbalance.

Financial Stressors

NO SUPPORT FROM PARENTS — ADDITIONAL STRESS

EMOTIONALLY ISOLATING — DISCONNECTED FROM PEERS

12 

"MY PARENTS WERE ALSO GOING THROUGH SOME **FINANCIAL TROUBLES** ... SO THEY NOT ONLY COULDN'T SUPPORT THEMSELVES, BUT **THEY COULDN'T SUPPORT ME**"

"**I FELT ALONE** AND I FELT LIKE I **COULDN'T RECEIVE SUPPORT FROM THEM**"

”

SO I **JUST KEPT TO MYSELF** EVERYTHING THAT WAS HAPPENING WITH ME AND I **DISTANCED MYSELF FROM EVERYTHING**, I WOULD SAY EVEN MY FRIENDS, AND THAT JUST REALLY CAUSED ME TO BE IN **EMOTIONAL DISTRESS**.

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This is significant because the isolation and emotional distress that results in supporting yourself and not even being able to rely on your parents for support is very daunting by itself, but add engineering school and work to that and you get a recipe for disaster.

Financial Stressors

GPA SCHOLARSHIP REQUIREMENT

EXCESS STRESS

13



"I HAVE A SCHOLARSHIP THAT DEPENDS ON MY GRADES, SO I **COULD ENJOY [ENGINEERING] WAY MORE IF I DIDN'T HAVE TO KEEP THE HIGH GPA.**"

THEY DON'T LIKE CHANGE IT BASED ON THE AVERAGE FOR YOUR MAJOR, IT'S JUST A FLAT 3.5 GPA AVERAGE THAT YOU HAVE TO KEEP NO MATTER WHAT YOUR DEGREE IS.



IT'S **NOT REALLY FAIR FOR THE ENGINEERING STUDENTS.** I'M JUST ABOUT KEEPING IT ... I GOT A 3.7 LAST SEMESTER, BUT THIS SEMESTER IS WAY MORE **CHALLENGING.** SO IT'S TRICKY.

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This is significant because a lot of students complained about having an unfair GPA requirement and how the effort required to get a 3.5 in engineering does not compare to a 3.5 in the college of business. Many students are only able to go to college because of these types of scholarships, but the stress that it adds can be really detrimental and lead to lower retention rates than if it was lowered to the college's statistics.

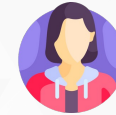
Financial Stressors

FINANCIAL STABILITY IS FIRST

LACK OF PASSION

LITTLE FULFILLMENT

12



"I JUST DON'T WANT THEM TO GO THROUGH LIKE, WHAT I WENT THROUGH LAST SEMESTER BECAUSE **IT WAS REALLY HARD.**"

"I WANT TO MAKE SURE THAT THEY HAVE ENOUGH RESOURCES, ENOUGH MONEY ESPECIALLY, TO GO TO COLLEGE OR TO START A CAREER TO **DO WHAT THEY WANT TO DO.**"



MY FUTURE GOAL IS TO **FINISH THIS ENGINEERING DEGREE** AND **WORK TO SUPPORT MY FAMILY** AS MUCH AS I CAN, ESPECIALLY MY PARENTS, AND MY LITTLE SIBLINGS ... THAT'S MY NUMBER 1 GOAL ... AND THEN FROM THERE, I MAYBE WANT TO GO BACK TO SCHOOL AND **THINK ABOUT DENTISTRY** AGAIN.

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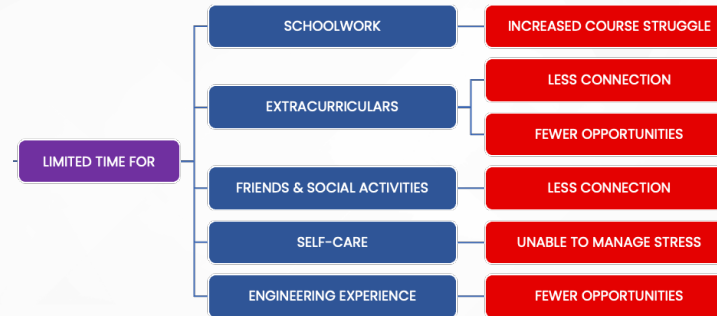
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This is significant because many students are only pursuing engineering school because they know that it will provide them financial stability down the line. It's great that engineering gives them that option, but how can we still be considerate of their limitations or instill passion into their studies?

Preliminary Findings: Limited Time



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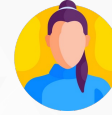
The next category is how students are restricted by their time constraints and how that impacts their experience in engineering and their mental health.

Limited Time

SCHOOLWORK

INCREASED COURSE STRUGGLE

20



IT'S HARD BECAUSE THE **CLASSES ARE DIFFICULT** ... IT'S A LOT ON YOUR PLATE AT ANY GIVEN TIME. I'M IN A LOT OF CLUBS. I'M IN LIKE **EIGHT DIFFERENT CLUBS**, AND I WORK **THREE PART-TIME JOBS**. SO **I HAVE NO FREE TIME**. I DON'T GET A LOT OF SLEEP SOMETIMES BUT I JUST KIND OF HAVE TO **DO MY BEST TO PRIORITIZE** AND LIKE MULTITASK TO GET THINGS DONE IN TIME.

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This is significant because they are sacrificing their sleep, which is often the root of a lot of physical and mental health problems. To work three jobs, be in 8 clubs, and be a full-time engineering student is a workload that no one should have to balance. That pressure to be that involved is also creating stress on students because they feel that if they aren't in 8 clubs, then they aren't doing enough. How can we support a more balanced culture? School should come first, but sometimes it can't.

Limited Time

EXTRACURRICULARS

LESS CONNECTION

FEWER OPPORTUNITIES

12 

“

I WASN'T EVEN ABLE TO GO TO MOST OF MY CLASSES OR PARTICIPATE IN THE CLUBS THAT I WAS PARTICIPATING IN. FROM SEPTEMBER TO THAT DECEMBER, I WAS JUST IN A REALLY DARK PLACE I WAS, I SPENT MOST OF MY TIME ALONE IN MY ROOM. I TRIED TO GO HERE AND THERE BUT IT WAS JUST A **REALLY STRESSFUL TIME** AND IT WAS MOSTLY BECAUSE I HAD I FELT LIKE I HAD TO KEEP IT ALL TO MYSELF AND I COULDN'T SHARE IT WITH ANYONE ELSE.

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This is significant because it shows how dark these students' worlds can get. They can struggle with their mental health so much that it is debilitating.

As a contrast, our participants who were able to participate in extracurriculars (both engineering focused and non-engineering focused) often talked about them as sources of positive mental health (connection with peers, connection to the engineering field, professional preparation, etc.). So, not having time to participate in these clubs can isolate them from the peer connections that could have a really positive impact on their mental health.

Limited Time

The diagram illustrates a cycle of limited time. It starts with two blue boxes: 'FRIENDS & SOCIAL ACTIVITIES' and 'SELF-CARE'. Arrows from these boxes point to two red boxes: 'LESS CONNECTION' and 'UNABLE TO MANAGE STRESS'. To the right of these boxes is a large number '9' and a circular profile picture of a woman. Below this, a quote box contains the text: 'You want to do more, which makes you sacrifice your like self-care time & your time with friends—And I like both of those things. When you sacrifice those, your mental health goes down, and then your mental health goes down because your mental health went down, and it's just Like a cycle that gets worse.'

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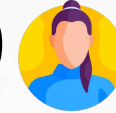
Talk about how the negative cycle can be really impactful and we should focus on how we can support students in reversing the cycle. Self-care and time for friends is CRITICAL in college and throughout life—these should not be the things that they are sacrificing.

Limited Time

ENGINEERING EXPERIENCE

FEWER OPPORTUNITIES

9



”

SEVERAL OF MY CLASSMATES' PARENTS ARE GIVING THEM AN ALLOWANCE OR PAYING FOR THEIR SCHOOL, SO THEY CAN **REALLY FOCUS ON SCHOOL OR GETTING JOBS OR DOING RESEARCH**, LIKE GOOD THINGS TO PUT ON THEIR RESUME ... **THEY CAN PAY MORE ATTENTION TO THEIR SCHOOLWORK.**

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This explains the imbalances that financially disadvantaged students feel compared to their peers that don't have to work and can fully focus on their studies. No wonder those people can get higher grades...they have more time to study and likely fewer life stressors.

Discussion: Key Takeaways

- The realities of being an engineering student with **financial constraints** is a **very serious concern**.
- Many students who were not first-gen college student or low-income still illustrated similar difficulties regarding lack of time for their basic needs (like sleep). **How does this get amplified when working is a necessity?**
- Interview questions were not focused on financial aspects, yet **we heard many stories about students' struggles**. What would we learn if we asked them more about the impact of their financial struggles?

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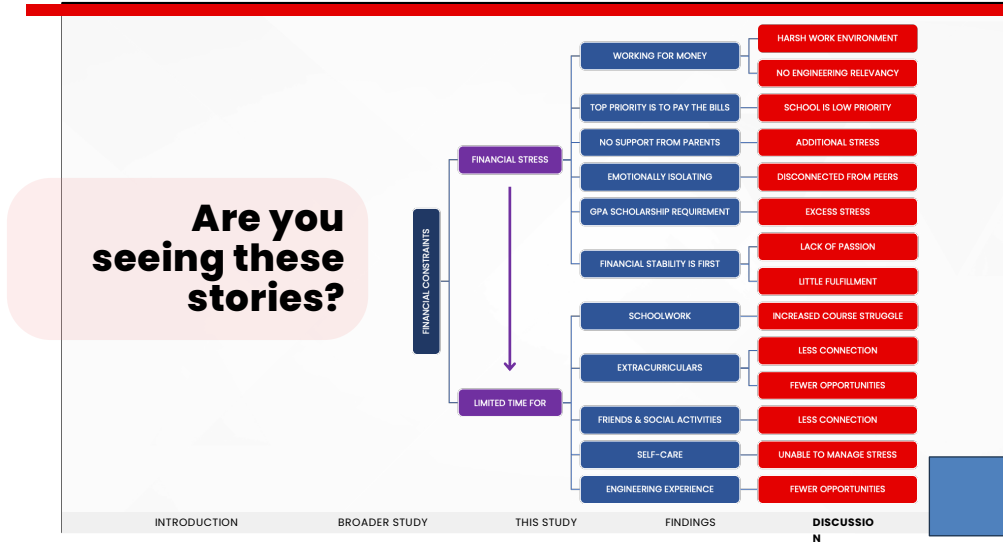
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See text on slide.



Lead discussion

Think, Pair, Share:



What are you doing to create equitable experiences for your students experiencing financial stress? What could you change?

...are these discussions happening where you are?

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Lead discussion

What Now?

Future Data Collection Opportunities:

- Follow-up interviews
- Focus groups
- Qualitative survey



How can we learn more about their stories?

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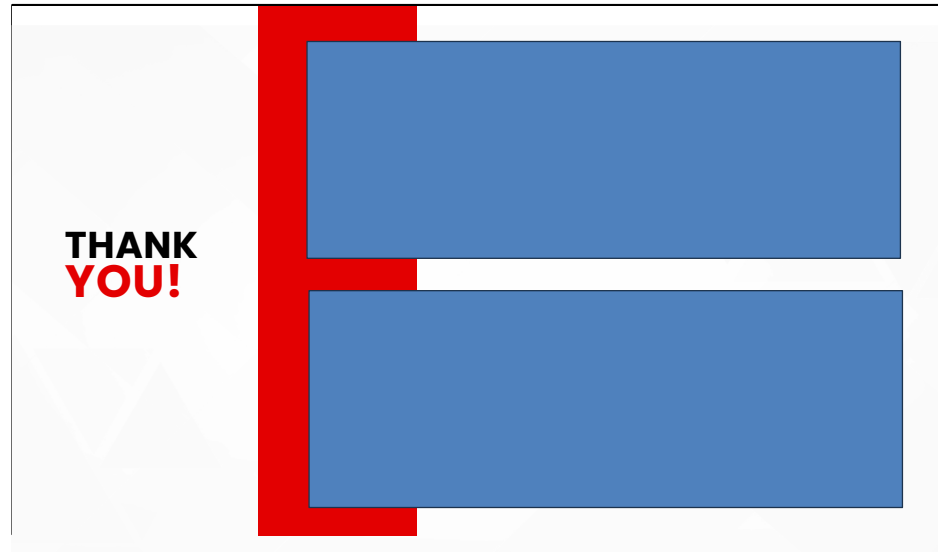
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Thank you for listening! If you have any additional thoughts, please email us!