The role of undergraduate engineering students' different support networks in promoting emotional well-being: A narrative study

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Abstract

This research paper explores the role of undergraduate engineering students' different support networks. Support of students is integral to promoting a sense of belonging as an engineer, which leads to greater persistence. Our recent work suggests that emotional support may be the most important type of support, impacting students' feelings of recognition as engineers. We focus on two types of family: the traditional family (e.g., the family assigned at birth) and the chosen family (e.g., friends and mentors students choose to call family). We hypothesize that each family type contributes differently to students' well-being. By identifying who supports students and how we can better understand how to support all undergraduate engineering students more effectively. In this work, we used a qualitative, narrative inquiry approach to examine how students experience their support networks. We conducted nine in-depth narrative interviews with undergraduate engineering students from a mid-Atlantic institution. Interviews were guided by a set of narrative prompts that allowed participants to share their personal experiences. After transcription, we restoried the students' accounts and cross-analyzed the final narratives using analysis of narratives. Our findings suggest that engineering students often avoid discussing their emotional needs. When they do, they are more likely to seek out chosen families, where they feel greater authenticity and less judgment given the lack of power dynamics. Positive relationships within traditional families, supplemented by chosen families, contribute to stronger emotional well-being and support students' success as engineers. These results, and others, are discussed further.

Introduction

A sense of belonging strongly affect factors such as emotional well-being, motivation, and academic success of a person [1]. In higher education, especially in more difficult fields such as engineering and computing, a strong sense of belonging to one's field of study has a significant impact on the stability and participation of students [2]. Belongingness is one of the key and influential factors on the academic and social integration of students, which can lead to a better retention rate and academic results [3]. When students feel a sense of belonging to their field, they study more willingly, are interested in participating in extracurricular activities, and look for resources to support themselves in their educational journey.

Student's families often play an essential role in improving students' sense of belonging [3]. Each person's traditional family members, that is, the family they are born into, are an essential support system that provides emotional stability, practical advice, and encouraging behaviors [4]. The existence of these supports is important for students, especially first-generation college participants, who are dealing with the complexities of higher education for the first time. Research shows a direct relationship between strong family support and higher levels of student participation and success [5]. Major [6] investigated the positive effects of family dynamics on students' sense of identity and community in academic settings. Findings showed that students who receive continuous emotional and moral support from their families, feel more valued and recognized in their

academic activities. This sense of credit that students receive from family creates more self-confidence and flexibility, which is one of the requirements for academic success [7].

In addition to the traditional family, the concept of "chosen family" has also been proposed as an additional, vital source of support for engineering students [6]. This term was first coined by Kath Weston [8] in reference to the Queer community [9] and first mentioned by Major [6] in engineering following alternative terms such as *la familia* [10] and fictive kin [11]. Chosen family can include friends, teachers and peers who help the student emotionally and practically [12]. Unlike a traditional family, a chosen family is built on shared experiences, mutual understanding, and personal bonds. These relationships often provide specialized academic support and emotional comfort that can supplement the basic support of traditional family members [8]. To fill unmet needs, students form chosen families. According to our work, "chosen family are people other than the person's traditional family who have individual or organizational power and support the person honestly and empathetically play a role in promoting the individual and, in turn, create a strong sense of belonging for them" [11, p.1]. This definition of chosen family highlights chosen families' unique role in providing deep and empathetic support to engineering students.

Emotional support is the basic foundation of traditional and chosen family networks, which includes understanding, encouragement, and empathy, which greatly help students to manage their stress and keep them motivated [13]. Emotional support or a lack thereof can deeply affect a student's sense of belonging and their ability to persist in dealing with academic and personal challenges [14]. Some researchers emphasize the importance of support in promoting students' well-being and stability [15]. For instance, recent research presented has highlighted how targeted emotional support strategies can significantly enhance engineering students' resilience and academic performance by fostering a supportive learning environment [16]. Students with strong support systems feel more connected to their community and achieve their educational goals [17].

Various research indicates that, in the context of discourse-dependent systems, emotional support is essential for various conversational scenarios, such as social interactions, mental health support, and customer service chats [18], [19]. Effective emotional support involves following logical approaches and using different support skills. The Emotional Support Conversation (ESC) framework, which is based on helping skills theory, emphasizes the importance of supportive strategies in providing effective emotional support. This emphasis is evident from the construction of the Emotional Support Conversation dataset (ESConv), which contains a rich annotation of support strategies that highlights the important role of emotional support in conversational systems [18]. In addition, the timing of emotional support during different periods is essential. For example, in entrepreneurship, emotional support is critical in the early stages of venture development [20]. Because entrepreneurs often face high levels of uncertainty, stress, and isolation, and having strong emotional backing during this unsafe period helps them build the flexibility needed to continue through challenges and keep their motivation [21], [22]. This indicates that the effectiveness of emotional support depends on the time and context in which it is provided [20] .

In the broader context of social support and justice, the roles of allies and accomplices are also crucial. As we have contextualized in past work [12], accomplices are people who go out of their way to provide support and remove barriers for an oppressed group [23]. On the other hand, an ally may just empathize with a struggle or stand with an oppressed group [24]. However allies' behaviors and support tend to be more performative than accomplices [25]. Understanding the role of accomplices in support networks helps us see how individuals, especially peers and mentors, can go beyond traditional roles to actively support engineering students. As we have previously described, there are many types of support that go into promoting student success. Support systems can look different for each student and be comprised of traditional family, chosen family, and others. The level and type of support needed and sought out by students can also change depending on the barriers they currently face. Understanding how students navigate support is essential for educators' ability to support them in the ways that best support their participation in engineering.

Purpose and Research Questions

The goal of this study is to gain a better understanding of the nature of the support systems that students have and the type of support these systems provide. In order to further understand this, we explore the following questions (RQs): (1) Who do students engage with for different kinds of support (mental, emotional. academic, physical etc.) and why? (2) What are the defining characteristics of these support systems?

Methods

In order to better understand the structures and uses of students' support systems, we utilized narrative inquiry coupled with inductive coding as part of a broader Analysis of Narratives. Analysis of Narratives is a qualitative method in which common themes are identified across a series of narratives [26], [27]. In order to complete narrative inquiry, we first engaged in semi-structured interviews with nine students (Table 1). Students were recruited via a broad solicitation to the engineering student body at a mid-Atlantic institution. Students were interviewed for around 60 minutes. We provided open ended prompts like "tell us about your support network?" and "tell us about the types of barriers or challenges do you face while pursuing your engineering degree" to prompt the students to tell us about their families, support systems, and any barriers they face in engineering. The open ended questions allowed students to share their full experience and also allowed the participant to control the story [28], which is an important factor for this feminist work given our orientation to social justice. Our interview style allowed for additional follow-up questions to be asked where the interviewer felt necessary. Students were also asked to provide a pseudonym for themselves as well as certain members of their family and friend groups that they mentioned by name. Interviews were then transcribed by two graduate students (Author 1 and 2) using Otter.AI and then cleaned and anonymized.

Table 1. Participant Demographics

Participant	Gender	Race
Alex	Male	White
Avery	Female	Latinx
Doug	Male	Black
Ginger	Male	White
Kevin	Male	White
Link	Female	White
Lawrence	Female	White
Phil	Male	White
Savannah	Female	White

These anonymized interview transcripts were then used to create "constructed narratives" [27]. This process, "restorying", involved our team listening to and organizing the interview transcript to create a story that includes the important parts of the interview. We acknowledge that this method of narrative construction is highly influenced by us as researchers. However, we strived to utilize as many of the participants' own words and language as possible to keep the stories as their own.

Our narratives were constructed as first-person point-of-view, so they read as being told directly by the participant. Narratives should be organized in a way that have the main and crucial details of the story and have a clear plot [27], [29]. In order to tell a coherent story, we spent time understanding the different stories being told by the participant and how they fit together as one. We then took the pieces (or blocks of text) of these interviews that went together either by subject or chronology and placed them together. This allowed us to construct a story that flowed well. Finally, to improve readability, we smoothed the narratives by adding context or filler, that we found fit, where needed to bring the different sections of the story together so that it reads coherently and in first person [27]. Throughout, we regularly checked that what was restoried still fit the participants' original meaning. After finalizing the narratives, we began inductively coding them and creating themes. During this process, members of the team coded each narrative separately and created their own codebooks. We then met and discussed our findings and created a merged codebook that represented our observations and findings. Analysis of these codes allowed us to look for patterns and generate the five themes which will be discussed below. These themes aid in our understanding and answering of our research question.

Results

Theme 1: Authenticity of Relationships

The first theme we identified in our narratives was related to authenticity of relationships. When we refer to authenticity, we point to the feelings that one can be their true self and express themselves fully. In the context of our participants, authentic relationships play an important role in their emotional well-being and academic success. These relationships can exist within both traditional family and chosen family structures, providing students with a secure base from which to navigate their educational journeys.

For example, one of our participants Lawrence, describes the relationship she has with her boyfriend as one that is different than all others she has. She states that she "[relies]on him for a lot like more personal stuff that [she's] not always going to tell other people". Here she highlights the closeness of her relationship with her boyfriend. She can confide in him and express herself to the fullest degree with him. She further describes the relationship she has with him.

> I feel comfortable telling [my boyfriend] anything and knowing, like, he's not gonna go around sharing anything with anyone else. So, I would just say like him just listening to me, that's like all I need. And like, sometimes, you know, he can give me advice. He, sometimes he won't. But like, sometimes that's all I need is just someone to be there to listen to me. I would say just so I can talk it out loud. Like, sometimes that just helps me make sense of something better. And also, like, just to know that he is there for me if I ever do need him.

Lawrence's relationship with her boyfriend is one where she can share anything and everything. Her ability to be herself, be authentic and honest in this relationship, supports her in ways that other relationships do not.

Another example of this type of authentic relationship was seen in Link's narrative. Link describes her best friend Mordecai. Link states that they "have the same brain…the Patrick to my SpongeBob, the peanut butter to my jelly, like we just match." This description of their friendship shows the closeness that the two share where they both can simply be themselves, authentic, which Link attributes to them being very similar. This closeness allows a level of authenticity in their relationship that leads to it being an extremely supportive friendship. Link further states:

> She is a sister to me. She is always there for me when I'm having my hardest things. And she doesn't sugarcoat stuff for me, which I love. She always gives me the real hard truth that I need to know. Because if I don't know that now, the real world is going to be tougher the further I get into it. So, she's, she's always there for me, she always gives me the best advice. And I always do the same for her in return.

Link and her friend Mordecai's honesty and openness with each other allow them to provide support that helps them overcome difficulties. Here we see the idea that

authenticity does not always mean niceties but rather full honesty. Another key aspect of authentic relationships is the presence of transformative friendships. Transformative relationships are relationships where friends do more than just offer emotional support; they actively help each other overcome obstacles and achieve personal growth, transforming together [25]. For instance, one participant, Avery, mentioned how their friends not only provided emotional support but also offered practical advice and solutions to problems they were facing:

> I would say that being able to relate can help with like how you can support someone. Not to say that, like my parents can't relate or anything, but just going through our midterm, in like we're sitting next to each other and all of our classes. And, like, we don't really talk a lot outside of class, but like, when we are in class, we talk, and you're happy to see each other, and that's it. That's really nice. [When]you're kind of going through something with like another person, [you] can kind of bounce off each other. like, bounce ideas off of each other. Or, like, if one of us is confused about something, they can usually explain it.

Authentic relationships often blend emotional and practical support. For example, Kevin talked about how their mentor, who was also part of their Bible study group, provided both professional guidance and personal support:

> I have a mentor. His name's Barrett. He's an electrical engineer. He's either 31 or 33. I forget. So he's a little bit older. I got some advice a little bit ago, "you need people older than you to be like a mentor outside of family". So, I try to take that into account. He also kind of like he helps lead the Bible study I go to, he's on staff. So, we have that and engineering in common. He's a chunk older than me and he can kind of tell me what's going on. We meet like every other week on Tuesdays. And we'll just talk about life, what's going on, what we can do better- things like that. He gives me advice and I can talk to him about things. He helps make sure I'm going down the right path.

As we have identified, authenticity in relationships is a critical component in understanding the support networks of engineering students. Genuine and transparent interactions within both traditional and chosen families provide the emotional and practical support necessary for students to thrive academically and emotionally. These authentic relationships create a foundation of trust and mutual understanding, enabling students to navigate the challenges of their academic journeys with greater confidence and resilience. In the examples above students can express themselves freely with the other person in the dynamic. Not only does this authenticity provide emotional support and other practical advice for both of them, but the authenticity that they experience in them makes these relationships the most reliable and most utilized support system. By highlighting the importance of authenticity, we can better appreciate the role of different support networks in promoting the well-being and success of engineering students.

Theme 2: Who is in the Traditional and Chosen Family
The second theme "Who is in Traditional Family and Chosen Family" explores who make up students' family support networks and what kinds of help they get from each. This theme looks at how these two family types support students differently, showing how each one helps students feel better and do well in school. Understanding the characteristics of the members of the two different family types and the specific support they offer, is key to knowing how different support networks help students' emotional health. This helps show why having different kinds of support is important for students' success in their studies and their overall happiness. By looking into these relationships, the study aims to find out how different supports help students feel like they belong and keep going in their engineering course.

For example, Avery, an electrical engineering student, navigates her academic journey with the support of both her traditional and chosen families. Each group offers individual forms of support that collectively give to her well-being and academic performance. Avery's parents and siblings form her traditional family.

> So my dad is actually an electrical engineer – he has been for like, his whole life. And my brother, he's two years older than me. So he's a senior now and he's studying electrical engineering at another university. So I'm in a family of Electrical Engineers. I would say that, like, my biggest supporters are my parents. I would say that they're definitely encouraging, with like, oh, I think maybe you can use these study habits to help, like, get through these classes a little bit easier

As Avery describes, her traditional family provides emotional encouragement and practical advice, rooted in their own experiences in STEM fields. This foundational support helps Avery feel understood and motivated in her academic pursuits. On the other hand, Avery's chosen family includes close friends and peers who offer academic help and emotional comfort. These relationships are built on shared experiences and support.

> I would say that being able to relate can help with like how you can support someone. Not to say that, like my parents can't relate or anything, but just going through Sophia and I's midterm, like we're sitting next to each other and all of our classes. And, like, we don't really talk a lot outside of class, but like, when we are in class, we talk, and you're happy to see each other, and that's it. That's really nice. Um, I feel like just that, like, you're kind of going through something with like another person–we can kind of bounce off each other, or, like, if one of us is confused about something, the other can usually explain it.

Here, Avery describes how the members of her chosen family help her feel a sense of belonging in engineering as they share similar experiences and struggles.

Traditional families also often provide financial support in addition to emotional support. This is seen in Phil's traditional family who offer him financial stability and encourage him

to pursue his academic goals. He says, "[h]onestly, engineering comes easy to me. I've always had loving people in my life. I've never had to worry about food or having a place to sleep. I've always lived like a princess." His parents offer emotional and financial stability, creating a secure environment that allows him to focus on his studies. As far as academic guidance goes, Phil appreciates the support provided by engineering faculty, describing a mentor's role as pivotal in his personal and professional growth. He says, "Professor Patel is easily my favorite professor. I started doing [design] with him, and we do research projects. You can just tell he's always looking out for his students. he's very personal. He, he's kind of, you know, he feels like a, like a family member in some ways." Here, we can see that while Phil does not receive engineering support from his traditional family, he has found others to support him in this area. This is a clear example of how traditional and chosen families may provide different kinds of support, but all of these various types of support are necessary for student success.

While analyzing who was in both family types, we also noticed that there was often a hierarchy of who students preferred to go to. Participants described having different levels of friendships, with some friends being more central to their support system. This hierarchy often determined who they would turn to for significant help and advice. For example, in Savannah's case, her boyfriend is her top choice to go to.

> My boyfriend is definitely one of my biggest supporters, we've been dating for about two years. You know, if I had to, like, rank everyone in my life, I think he would definitely be at, like, the top. You know, I feel like I can tell him anything, and he's not going to judge me. I feel like most of my support within my network definitely comes from him.

Savannah describes how she goes to her boyfriend for most of her support needs and how he is her go to person amongst all others in her various support systems. Many students expressed how there is one member of either chosen or traditional family who they have a higher affinity for when it comes to sharing their challenges. This highlights that not all support systems are seen as equally useful or important.

This theme explores the importance of both family types in supporting these students. Traditional families offer foundational emotional and practical support, rooted in long-term relationships and shared experiences. In contrast, chosen families provide targeted academic assistance and emotional comfort, often through peers, mentors, and faculty who share similar challenges and goals.

Theme 3: Differences in finding and seeking support
The third theme we found speaks to differences in finding and seeking support. When it came to seeking out support in times of struggle, some students actively looked for support either from friends, family, or the university. Other students felt less inclined to share with others their issues and felt like they should and could support themselves. Often times students sought out maternal care for emotional support and paternal advice for other decisions. As all students were engineers, many of them also sought out support from someone in STEM field. Depending on the types of support needed students also reached

out to professionals for help. We also found that geographic proximity often played a role in how students found support.

For example, Kevin explains when he finds it appropriate for himself to seek help. He states:

> Like I won't even tell my friends my problems. It's just personal, it's not something everyone needs to know. For emotional support, I got some friends. But I don't really talk about my problems. That's probably a very male perspective. To me, talking about your problems doesn't solve it and I know that's like a very like, toxic like male thing to say. But it's just that's too late, it doesn't solve it. At the end of the day you still have the same problems. I'll go to someone if I actually like to think it's solvable.

Here Kevin states that he feels that for most of his emotional problems he does not need external support, and therefore he does not seek out said support. He only seeks out support if he deems the issue "solvable." Kevin later describes that he seeks out help when it comes to coursework. He says, "I needed some tutoring for this chemical engineering class. The department offers free drop-in tutoring. My professor wasn't very good at explaining. So, I went to his office hours–I wasn't being a lazy student or anything." In this passage Kevin demonstrates that when it comes to his engineering struggles, he will seek out support in the form of office hours. However as shown previously, he will not do the same for emotional support.

Phil shares a similar sentiment when speaking to why he does not seek out emotional support. He states, "It's more just my own psychosis of thinking like 'Oh, I just got to be a man and handle it myself.'" Both Kevin and Phil state that while this could be a male trait, they feel that they should handle any emotional issues on their own. They do show that they are more comfortable seeking out help for other issues like academics, and engineering guidance. However, when it comes to emotional support, they both feel they should handle the issue themselves. This could be partly due to the way men are socialized. Society of tells men that they do not need to emotional support and if they do, they are weak [31]. In contrast to Phil and Kevin, Lawrence, describes actively seeking out emotional support when needed. She says, "I would say personally, like, if I ever have an issue, I can go to [my friends] for that. If I ever have, you know, an issue with another friend, I can always either talk to them directly or I can, you know, gain assistance from someone else and gain their input and see, like, figure out what I should do to fix the issue." Lawrence shares a completely different sentiment than Phil and Kevin. Lawrence describes that she feels like she can go to her friends and family for any issue. She also describes looking for help when a challenge arises.

Another subtheme we identified was that the support that students sought out from their different traditional family members and how that supported differed. Here we found gendered components. On one hand, students often went to their mother or mother figure for emotional care. On another hand, they often when to their fathers for other STEM or "practical" advice. Avery describes the support she receives from her mother:

My mom–So, I've had like a couple of setbacks in school. I've had to retake calc two and Intro to electricity and magnetism, and I'm retaking calc three right now. But, like, yes, it's upsetting when like your kid is like, failing these courses. But, she's been supportive. Like, she wasn't like, "oh, you need to switch your major because you're not passing these classes." She's like, "okay, well, let's figure out how we can make this work."

Here Avery shows that her mother provided comfort when she was going through a difficult time at school. Avery receives a different kind of support from her father.

I can easily relate to my dad and [my brother] Zack, because they are both engineers. They're definitely encouraging, with like, "oh, I think maybe you can use these study habits to help, like, get through these classes a little bit easier." [My father] can relate to like, what I'm going through as an engineering student because he's already gotten his degree and also gotten his master's. Um, when I talk about when I'm learning, he's like, "Oh, I remember that." Or, "actually, that's applicable to what I do now."

Avery describes how her father provides engineering advice and how she can relate to him on this matter and go to him for support. She even states that he helps with other everyday needs. In her story we see that Avery seeks out different types of support from each of her parents, just like other students. As we see, this support is gendered.

The fourth subtheme we identified was the role that proximity plays in support seeking. Several students described the sentiment that they felt that geographic location played a role in who they sought support from. Doug describes this sentiment.

My relationship with my roommates does feel like everything to me. At least, how I like it if you had to pick the people that you put into the word category, the category of the family at any given moment; at this moment, it would be my two roommates and my closest friends; they are definitely family to me. And we do like everything together. And it means so much to me, and I've changed so much. And obviously, I would think for the better, you know, people sometimes people have friends with bad habits and they rub off like stuff like that, it would be like an example of your, your habits being like negatively affected by the people around me, like. [My roommates] only bring me up and like even if they have stuff that they're also, working on, and I have stuff that I'm working on, we're all just doing separate things like, together at the end of every single day.

Here Doug describes how much he values his roommates and how much he goes to them for support. He states how their closeness arises from the fact that they spend so much time together and live together. When describing his family, he stated how while they do support him, it is limited due to the fact that he does not live at home. He stated that on a daily basis for support he mainly relies on his roommates. This quote shows how much of a role that geographic proximity plays a role in who students seek support from. This theme highlights

support seeking behaviors vary highly from student to student. Additionally, this theme brings light to the idea that there are gendered differences in support-seeking behaviors and gendered differences which manifest in who students choose to approach for support.

Theme 4: Familial Obligation
As we analyzed narratives, we found it very clear that students established a chosen family outside of their traditional family in which they could be their authentic selves. This led us to identifying our fourth theme related to familial obligation and dynamics. We found that part of the reason that students established a chosen family and could be so authentic with their chosen family is because *traditional families often have a sense of obligation*. This familial obligation often restricts students from expressing all their problems, and seeking out the kind of support they need. This obligation may stem from several different factors, one being that oftentimes traditional families provide some sort of financial or physical support, which can create a power imbalance between the student and their family. Another factor that may contribute to a power imbalance and therefore familial obligation are societal standards. One may feel inclined to adhere to certain societal standards and expectations when it comes to their traditional family. Another part of this theme is the difficult family dynamics that create a tense environment for students. This tenseness may also create a space where students do not feel free to express themselves. Chosen Family on the other hand do not have this kind of obligation, tenseness, or high emotions, which allows students to express themselves freely. Oftentimes chosen family members are peers like fellow students, roommates and other friends. This peer relationship may lessen or remove a power imbalance and therefore allow students to be authentic with their chosen family members.

Familial obligation is seen in Kevin's story. While Kevin described having a hard time seeking support in general, he described that his mother would be a good resource.

> My mom's a social worker so she's basically therapist. So that helps. But I don't really talk to her about my problems. I just don't like talking about my problems in general. Maybe a little bit because she's my mom but not exclusive to her, like I won't even tell my friends my problems.

Due to family dynamics, Kevin does not want to share his issues with his mother. He attributes his apprehension of talking to her partly from her being his mom. Kevin describes his home as being filled with tense emotions as well and lots of yelling. This leads him often isolating in his room and not talking. This tense environment in the house does not create a safe place for him to talk and seek support from family. Kevin also goes on to describe that his parents being immigrants is a big motivation for him to do well in school. He says, "Nothing pushes me to harder than like having parents that immigrated here and gave up everything for me." Kevin shares that his parents have struggled and given up so much for him, which while being somewhat motivational, also creates a dynamic in which he feels that he has to repay them by being successful. This power imbalance may lead to students, such as Kevin, not sharing issues with their families.

Phil also shares how his parents have worked hard to give him the life that he has.

> I'm so thankful for my mom, she killed herself with the amount that she sacrificed to raise me and my sister [Sarah]. She pretty much sacrificed her sanity in some ways… So whenever my mom would get angry and emotional, I didn't know how to deal with it properly. My strategy was just to be quiet. and wait until she cools down. I feel like I was there was a bit of a tension at home for a while. When I was younger, I do have a few memories where I remember her getting angry, but nothing out of the ordinary. Just standard parents yelling at their kids every once in a while.

Here Phil describes how his mother has sacrificed her own self-care which has led to emotions running high in his household creating difficult family dynamics. Due to his families' dynamics, Phil described having a very tense relationship with his mother. Having a tense relationship does not foster authenticity for one to truly receive support.

In both Kevin and Phil's relationships with their family we see a sense of obligation to support the norm and keep things calm. This type of obligation would not allow for one to open up fully and share all their challenges. Additionally, both Kevin and Phil acknowledge that their parents have struggled or given up certain things to give them a good life. These feelings may lead to a feeling of indebtedness, which might prevent authenticity as well. While traditional families often have different obligations and difficult dynamics that do not foster a space where students feel free, the chosen family a student creates may be an escape for them and help fill emotional needs.

Theme 5: Impacts on Agency and Self-Regulation
As we analyzed the narratives, we found that chosen families provide a space where students feel free to be themselves without fear of judgment, which encourages a stronger sense of agency. The absence of obligation allows students to pursue their goals with greater autonomy. An example of this theme is seen in Ginger's story. Ginger describes how his roommates, Jimmy and Dylan, are like a chosen family. He feels comfortable being himself around them, which helps him focus on his studies and hobbies without the pressure of meeting external expectations.

> My roommates are both super smart. One is a civil engineer. He is such a sweet guy. He's not afraid to be like, soft, or anything like that. Always supportive, always friendly. If I'm having a bad day. He's always, you know, got a sense of humor about him. He seems like a he's pretty personable. And, again, really supportive. If I just need to talk about anything, they're always [there]. They're like brothers to me. if I'm having a bad day, I can just go to one of my roommates and say, like, or if I need advice, I can ask them for that, we trust each other.

The expectations within chosen families are often more flexible, allowing students to develop self-regulation in ways that align with their personal and professional identities, especially within demanding fields like engineering.

Chosen families, often include of peers or mentors closer in age, provide relevant guidance that strengthens students' ability to self-regulate and stay on way with their goals. Lawrence highlights how her peers, especially her roommate Christy, who is also a Biomedical Engineering major, help her stay on track academically.

> You want to be around people that want to succeed as much as you do, I would say like, I'm very passionate about trying to progress my future and get there, like, rather early hopefully. I think, like, between my roommate in the same field as me, and, and [my other roommate], I think the three of us understand that the most, we're trying to, make a future for ourselves.

Here Lawrence describes how her and her roommates share similar life perspectives and goals. Their desires to succeed in engineering helps them provide advice to each other. The societal and family-specific expectations of traditional families can limit students' sense of agency, making them feel obligated to follow a certain path, sometimes at the expense of their personal aspirations. According to Doug, his parents maintain a careful balance between being supportive and allowing independence.

> I think my parents struck a very good middle ground a balance between the two. Because the answer is definitely not to, like be involved with everything that your kid does. And the answer is definitely not just let your kid figure it out on their own, it's somewhere in the middle, where you let them solve problems and where you let them mess up.

Here Doug describes that he's happy with the relationship he has with is parents as it has allowed him to form a strong sense of independence. He goes on to describe why it is important for a student's development to have this kind of balance. Communication barriers and a strong sense of family duty can make it hard for students like Kevin to manage their own actions and follow their dreams. Kevin frequently senses the pressure of his parents' expectations, particularly because they moved to the U.S. seeking better opportunities. While they support him, the pressure to justify their sacrifices often hinders him from fully exploring his own interests.

> I receive the most support from my parents, and I want to make them proud. Nothing pushes me harder than knowing they sacrificed everything for me. But sometimes, I wish I had picked an easier major. I'm not sure if I belong in engineering, especially in chemical engineering. It's one of the more challenging majors, and sometimes I feel like I should have switched to civil engineering. But I know ChemE will be good for me [long-term].

In both Doug and Kevin's experiences, we see how traditional family dynamics can either support or hinder agency and self-regulation. Traditional families may provide crucial support, but they also come with expectations and pressures that can limit students' ability to fully explore their own paths. While traditional families often impose expectations and societal norms that can limit a student's sense of agency, chosen families provide flexibility

and relevant support that strengthens students' ability to self-regulate and pursue their goals with confidence

Discussion
Through our analysis, it is clear to us that students need many kinds of support to be successful amongst their journeys. Navigating the college experience is multifaceted and students face many different challenges throughout. It can be difficult for students to find support for all of their needs in the same person, drawing attention to multiple support systems. The two main support systems we focused on in these narratives are chosen and traditional families. Traditional families tend to include a student's parents and siblings, whereas chosen families are made up of significant others, peers, and friends. While different, both family types provide support that help students persist.

Throughout our themes the importance of having various kinds of support from different people is highlighted. The importance of emotional support is also particularly clear amongst these narratives. Students need support systems and relationships where they can be themselves and be authentic in order to share their challenges and receive help. Sometimes families, both traditional and chosen, are the main providers of emotional support for students. We found there were students who were incredibly close and comfortable with their families and were able to share all of their challenges and receive support. Similarly, other students were not close to their traditional families.

Amongst traditional families, mothers seemed to provide the bulk of emotional support for students while fathers provided engineering knowledge, absent of emotional support. However, this comfort and authenticity in family relationships was not present for all students. We believe this missingness is partly due to familial obligations that often cause power imbalances in family relationships. There are many societal expectations that come along with traditional families that can make it hard for once to express themselves authentically [4]. Additionally financial support, and cultural obligations can make students less comfortable sharing with traditional family members.

We observed that the formation of chosen families supplemented the support the students received from their traditional families. It is common for people to not feel like they can be authentic with all of their support systems (friends, family, etc.) [32]. Inauthenticity can often make students feel like they do not belong [33]. Having authenticity in relationships makes relationships more satisfying for people as well as increasing well-being in those relationships. In our participants experiences, we identified authenticity as a quality that, while not present in all of their supportive relationships, was present in the ones they relied on most. The authenticity related to their level of perceived comfort with a relationship. In their authentic relationships, students felt free to express their challenges both academically and emotionally. While not all support systems and relationships allowed for students to be their authentic selves, those that did seem to be the relationships that were more heavily relied on. According to our work, authentic relationships are based on mutual trust, openness, and "being real," allowing people to feel fully supported and understood.

Within chosen families, we found students felt comfortable sharing all of their issues without any judgement. We believe this comfort came from the authenticity of the relationship. This comfort could also be, in part, because there were no financial dynamics or other societal power dynamics in play in chosen families. Additionally, many chosen family relationships were created with those who were in close proximity, and shared similar struggles. This dynamic allows for a better understanding of what each other is going through and creates a profound sense of belonging. Chosen families seem to provide authentic unconditional support for the students. It is also important to draw attention to the engineering support these students received. While some students had family members who were more STEM oriented that they could go to, not all students had this support readily available. Those students seemed to seek out mentors who were well versed in engineering, or faculty support to help them through their engineering struggles. It is important to point out that students seeking out engineering support did not just need academic support, though this was a large part. They also sought out the emotional and mental support that is needed to help students persevere.

Implications, Conclusions, and Future Work

Undergraduate engineering students' emotional health and academic achievement are greatly aided by the emotional support students receive from both chosen and traditional families. The level and type of support offered by these groups differ, though; students may not feel comfortable asking their traditional families for the kind of authentic, judgment-free emotional support that chosen families frequently offer. We believe educators should take note of students' need for emotional support, as it has significant effects. In order to help students feel more emotionally supported and better prepared to succeed in their academic journeys, educators can foster peer connections, provide mentorship opportunities, and create inclusive environments that allow students to form chosen families. Potential methods for educators to act upon this could include allowing students extra time in class to get to know each other and creating an inclusive classroom culture in which students feel comfortable approaching the educator for various kinds of support. Chosen families provide students an ability to be their authentic self with others. Chosen families also help students find solutions to their problems with others who are likeminded. The sense of belonging resulting from Chosen Family support likely supports students' persistence.

In future research, we plan to deepen our understanding of how support networks impact undergraduate engineering students' success and well-being by talking to more students from different universities. We also want to explore how these support systems change as students move through their academic careers and into the workforce. Next, we see opportunities to talk to students' family members who are both chosen and traditional to understand how they support the student. We expect to identify the processes in which students are mentored and supported. Another goal is to look at how cultural, gender and socioeconomic factors shape students' experiences and support systems. By doing this, we aim to create better guidelines that colleges and teachers can use to support engineering students in different settings. Finally, we could examine how digital platforms and online communities help students form and maintain chosen families, especially during distance learning.

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