



“That Was the Biggest Help”: The Importance of Familial Support for Science, Technology, Engineering, and Math Community College Students

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This study reveals the informal instrumental and socio-emotional support that non-traditional (e.g., Latinx, Black, Indigenous, and first-generation), low-income community college students pursuing STEM majors receive from family members that combat experiences of marginalization and contribute toward their self-efficacy. Family support can be particularly important for underrepresented undergraduate Science, Technology, Engineering, and Math (STEM) students who are at higher risks of dropping out of their program and experience lower levels of success indicators (e.g., sense of belonging, self-concept, and STEM identity) compared to their white and Asian peers. Utilizing a phenomenological approach, we used open-ended questions during focus groups with community college transfer students to gain their experiences with challenges and feelings of belonging in college and STEM. We apply the funds of knowledge framework to investigate the value family support holds for students in navigating STEM challenges and expand the definition of family to include romantic partners and extended family.

Keywords: STEM, funds of knowledge, family support, community college students, instrumental support, socio-emotional support

INTRODUCTION

The underrepresentation of ethnic/racial minorities, non-traditional students, refugees, immigrants, and women in STEM (Science, Technology, Engineering, and Math) majors and careers merits investigation. Previous research shows that Latinx, Black, Indigenous, lower-income, non-traditional, and first-generation college students drop out of STEM degree programs at higher rates than their white and Asian peers (Eagan et al., 2014). Additionally, underrepresented students in STEM have lower levels of sense of belonging, self-concept, and STEM identity (Hausmann et al., 2009; Chang et al., 2011). Therefore, investing in efforts to promote positive factors (i.e., sense of belonging, self-concept, and STEM identity) could increase retention and graduation rates. Engaging in efforts that enhance factors that facilitate interest and success in STEM fields for underrepresented populations can increase representation in academic STEM settings and can aid in diversifying the STEM workforce.

Positive factors that contribute to student success in STEM mitigate the marginalizing barriers (e.g., financial hardships, not feeling like they fit in STEM and academic settings) and challenges (e.g., balancing work and school, childcare needs) that students experience. Although advisors, faculty mentors, and college-going programs can be influential in bolstering retention and graduation rates for underserved college students pursuing STEM degrees by fostering an inclusive environment (Good et al., 2012; Hurtado et al., 2012; Gildehaus et al., 2019) and relationship building with students and their family (Kiyama, 2011), informal familial support is also crucial in promoting STEM persistence and achievement. Socio-emotional (e.g., “receiving specific advice regarding college and career choices, validation, and pep-talks”), and tangible support (e.g., “in-kind financial assistance, such as childcare, housing and transportation”) that comes from family members and friends can act as a resource for navigating the hardships students experience personally and academically (Jabbar et al., 2019, pp. 263–271). Several higher education researchers demonstrate that informal family support promotes positive academic outcomes (i.e., self-efficacy, self-concept, and college adjustment) and plays an important role in university/community college success (Luna and Martinez, 2013; Roksa and Kinsley, 2019). Those forms of support include developing trust, providing information, and housing (Llamas and Morgan Consoli, 2012; Jabbar et al., 2019). Informal family support is a resource that facilitates college students’ academic and personal life and matters for students to persist in their majors. Acknowledging informal familial support as a resource and asset for college students encourages student success, particularly for students who have a marginalized identity and are interested in pursuing STEM fields.

Informal family support through parental involvement and extended family members is vital for STEM interest and persisting in STEM subjects and majors among low-income K-12 and college students. Recent research shows that parental involvement in educational settings not only encourages intent to pursue a college degree (Berbery and O’Brien, 2018), it also promotes STEM interest among Latinx high school students (Simpkins et al., 2020). Informal family support is also salient among Latinx community college students. Specifically, socio-emotional support and instrumental support (e.g., providing childcare and housing while enrolled in school) have been perceived by students as a motivating factor to persist in college (Peralta et al., 2013; Jabbar et al., 2019). Similarly, low-income, Latinx community college and university students reference how the encouragement and high expectations their family has for them is a motivating factor to persist in their major (Duncheon, 2018; Saenz et al., 2018). Latinx students resist unwelcoming and hostile academic spaces by enacting the self-reliance they learn from their parents and focusing on being the first to obtain a college degree to move up the social ladder to financially provide for them (Duncheon, 2018; Saenz et al., 2018). Family can also act as a source of support and inspiration for Latina, and Black STEM college, graduate, and pathway students in their decisions to attend college and pursue a STEM career. The value of giving back to family, receiving academic and personal advice from immediate and extended family, and

parents encouraging STEM interest at an early age are sources of capital that provide students the drive to continue in their STEM majors despite personal and academic obstacles (Burt and Johnson, 2018; Rodriguez et al., 2019; Rincon B. E. et al., 2020). A vast amount of research supports the positive impact that informal family support has on student success among K-12 and university/college students, and while few studies have explored the salience of the various forms of informal family support for students pursuing STEM majors and careers (Rinn et al., 2013; Burt and Johnson, 2018; Rodriguez et al., 2019; Rincon B. et al., 2020), none have investigated familial support specifically for community college STEM pathways. The need to further explore familial support is necessary given that these students are more likely to live at home with family and have diverse backgrounds (i.e., racial/ethnic minorities, first-generation, low-income, non-traditional) and experiences (e.g., having to work while pursuing college, or not being able to pursue college after high school due to financial circumstances, immigrant and refugee status), making the role of familial support more salient for this particular population. Gaining a deeper understanding of what informal family support looks like for economically disadvantaged, STEM students in higher education could provide insights into how informal family support enhances academic success and could identify strategies that promote a positive experience in academic settings for students. The current study aims to uncover a deeper understanding of how informal family support is perceived and utilized by students as a tool to make difficult decisions and overcome academic and motivational challenges, using a theoretical framework that centers the family as the main provider of knowledge and resources.

THEORETICAL FRAMEWORK

The Funds of Knowledge (FofK) framework highlights how experiences, knowledge, and resources acquired at home and passed down from family members can be valuable if applied in educational settings (Moll et al., 1992). This framework identifies household chores and tasks learned from family members (e.g., automotive repair, construction, manual labor, gardening, and cooking) as important funds, or resources, to generate knowledge that can be translated effectively into academic learning if properly acknowledged by schools. Although the FofK framework encompasses non-traditional generational and household knowledge, it validates that education does not only happen in an educational setting. Valuing how education can take different shapes and forms is necessary for fostering a more inclusive academic environment for students from underrepresented backgrounds. Being aware of the perspective of students is also crucial for FofK.

While this theory has mainly been applied in K-12 academic settings, research indicates that a recognition of FofK may be a crucial ingredient for student success among low-income, Latinx, first-generation engineering college students. When students felt their in-home knowledge was not valued in their engineering courses, they were more likely to feel they did not belong (Smith and Lucena, 2016). Having universities place a higher

value on theoretical knowledge and discrediting what is learned through physical work, which is a form of thinking, interacting, and being, hinders students' learning. Conversely, engineering students felt their funds were valued and validated when they were able to apply their hands-on skill sets, such as through an internship (Smith and Lucena, 2016). The experiential knowledge that students acquire becomes part of their daily lives. As Smith and Lucena (2016) demonstrate, a form of validation for STEM college students is being able to put knowledge learned from family members into practice in the real world, which is necessary for the learning experiences of STEM college students. Providing students the opportunity to apply their expertise in fixing, designing, and building mechanical devices as well as working with irrigation systems is instrumental to their academic motivation. Building relationships with manual labor coworkers at their internship sites and bridging the communication between those coworkers and their engineering coworkers was also an advantage students possessed. Incorporating into the curriculum and class lectures the expertise that students have is influential in students' persistence in STEM because it is relevant to them.

Discerning how family members activate and pass down their skills is key for academic achievement. As previously mentioned, families transfer their skills through teaching (Moll et al., 1992; Smith and Lucena, 2016), yet making sacrifices and connecting with others are other types of funds. Kiyama (2011) reveals how marginalized families also use their assets through financial sacrifices so their children can go to college and network with family members and friends to learn about the college process. Family members transfer their daily practices to their children by not only teaching their skill sets but also by showing the endeavors they are willing to take for them to pursue a university degree. Although being misinformed about higher education is a barrier many low-income families face, it should not be interpreted as a lack of involvement. As researchers and practitioners start to reconceptualize the strengths family members already possess through a non-deficit perspective, underprivileged families will have an opportunity to use their voice to be involved in their children's schooling.

Incorporating the home-based expertise acquired by students through their families may be fundamental for increasing equity for marginalized populations. Applying these practices in school curriculums that students can relate to is influential in boosting their school interest (Garcia, 2018). Learning institutions need to recognize the wealth economically disadvantaged students bring with them through inclusive practices to elevate their academic involvement. The implementation of FofK in STEM curriculums is beneficial for students. Additionally, unveiling how informal family support is a form of asset that is part of students' lives and validates their persistence in STEM is critical for student success. While informal family support has shown to be a resource that helps students navigate the challenges and barriers they face in educational settings, it is unknown how low-income, community college students intending to transfer to a university perceive the familial support they receive. Therefore, discerning how the process of informal support is enacted by family members to provide reassurance to students interested in pursuing STEM fields is necessary. Our study explores how

students perceive family support and is driven by the following research questions:

- 1) How do low-income community college students perceive the value of their family in supporting their efforts to transfer and pursue a 4-year degree and career in STEM?
- 2) How does family support contribute to the FofK framework?

MATERIALS AND METHODS

Data and Methodology

Data collected were qualitative and derived from an investigation conducted for a project entitled - *Bridging Faculty and Student Cultures: Culturally Responsive Support for STEM Students Transferring Between Two- and Four-Year Hispanic Serving Institutions (HSI)*. We applied a phenomenological methodology to understand and describe the phenomenon and arrive at the essence of the academic and personal experiences of STEM community college students. As Creswell notes, "the basic phenomenology is to reduce individual experiences with a phenomenon to a description of the universal essence" (Creswell, 2007, p. 58) This method was appropriate given the aim of the study was to focus on students' lived experiences and obtain a rich description of how these students encounter academic settings, navigate through obstacles, and utilize available supports. Guided by open-ended questions, this approach builds on and explores participants' responses who share similar social contexts with the goal of having participants formulate their own experience on a specific topic (Seidman, 2006). Participants included 27 Pell-eligible students in their last year at the community college currently pursuing STEM majors and intending to transfer to the local university the following year. Less than half (44%) of participants identified as female, 56% identified as Latinx, 26% identified as White, 0.07% as White/Middle Eastern, 0.4% as American Asian Pacific Islander, 0.4% American Indian/Alaska Native, 0.4% Black, 78% identified as first-generation college students, and participant ages ranged from 17 to 38 years old.

The criteria for selecting the participants were their recent acceptance into the Bridging Faculty and Student Cultures STEM Pathway program. Interviews were coordinated *via* email based on availability. Given a phenomenological approach requires a homogenous group of participants, five virtual focus groups were conducted via Zoom in the fall of 2020, which each lasted approximately 1 h and 30 min. The purpose of this research technique was to gain an in-depth understanding of STEM students' personal and academic experiences within the community college context, identify potential challenges in students' academic pursuits, and gain insight into what supports their sense of belonging and success in college and STEM prior to their start in the program. Focus groups were semi-structured and guided by key topics and probing questions related to family stressors and supports, academic challenges and supports, positive and negative experiences at their respective community college, and their self-perception of themselves as STEM students. A team of three researchers transcribed all interviews and applied

a thematic analysis, involving reviewing and examining data for patterns and themes related to the research topic (Glesne, 2011) and derived through coding. We utilized inductive open and focused coding (Saldaña, 2013) to capture the authentic voices and content of the participant responses. The initial step, open coding, involved reviewing and tracking words, phrases, and lines that identify patterns. The second step, focused coding, involved comparing data sets with each other and using the codes to corroborate the appropriate selection of codes and themes. Focus codes that emerged with the highest frequency from each interview were chosen as themes for this study. Memo-writing was also used to support further validation of the appropriateness of codes and themes in representing participants' experiences. In addition, in considering personal biases and maintaining interrater reliability, we took a constant comparative approach in generating core categories (Corbin and Strauss, 2014) related to sources of support, STEM identity, and sense of belonging. Researchers collaboratively discussed discrepancies in coding to arrive at a consensus for each code that emerged. Emerging themes for this analysis addressed how students interpret the support they received from their family members and how these kinds of support relate to their persistence in their STEM majors.

RESULTS

Our initial analyses revealed that socio-emotional and instrumental support is important when received from the college student participants' family members, facilitating their motivation in STEM. Socio-emotional support came through words of encouragement and pride, as well as talking about, listening, and being attentive to their college needs and experiences. Instrumental family support was described by students as having family members ensure they ate throughout the day, planned around their school schedule, and catered to their well-being.

Socio-Emotional

When family members expressed feeling proud of students and encouraged them to persist in their majors, students felt that knowing their family believed in them and supported their career goals was a major influence in motivating them to push through challenges. Students perceived socio-emotional support and felt reassured when their family asked them how they were doing in school and supported them in anything they set their minds to.

Support Through Listening and Validation

Family support was also shown through listening to students explain complex concepts covered in class and sharing their excitement for their STEM coursework. Examples of informal socio-emotional support received are detailed by students:

"I'd have to say the thing that's been... the most helpful, I guess, is probably... just having my mom sit next to me... just being willing to listen to me explain. Like, calc 2 was horrible, cause I had to do it all online. And my teacher did nothing to help us. So, I'd always just... have my mom sit down at the table with me. And I'd be explaining it out to try to, like teach her. Because if I could teach

her, then I know it myself. So, I'd always just try... explaining it to her to get her to understand. And if she could understand, then I was explaining it well enough. So, I think that was the biggest help for me." – Gerardo

"My family has been very supportive. And so that's I don't know it's nice, like, anytime I um, I learn some neat thing in math or science that I think is awesome or exciting, I'll like run to them and be like, uh, check out this cool thing. And even if they have no idea what I'm talking about, they're like, uh yeah, that's pretty cool." – Greg

The family provided socio-emotional support to students through listening and explaining difficult class material, contributing to their learning in STEM coursework. Students also discussed how their family supported them by sharing their enthusiasm for their learning even though they did not understand what was specifically being taught. Many of the students expressed how the validation they received from their families was a contribution to their education, which is influential for STEM success. The majority of the student participants were not only first-generation college students, but the first ones in their family to pursue a STEM degree. Although having a parent who has previously attended college is a form of cultural capital, our findings suggest it is not a prerequisite for STEM success. Even when family members did not know or understand the STEM concepts covered in class, they relied on their FofK which was activated through validating their students' learning and excitement, which is vital for reinforcing a STEM identity.

Support Through Affirmation and Well-Being

Socio-emotional support was also depicted when family members explicitly stated they would help students in whatever way they could, checking up on their well-being, and encouraging social mobility and academic success. The examples below show socio-emotional support received by students through affirmation and well-being:

"I feel like with my parents and everything they've done, I think that's...the most I've like with family, I just told me that oh, you can do whatever you want. Like, just put your mind into it. If you need a support ... in like any kind of support ... that they'd be there for me ... I think that would be the best support I've had." – Leonardo

"And I think it's mostly because of the fact that we are low income. Having a degree can just open so many doors for you and get you better paying jobs and benefits and they definitely just did not want me to continue in the lifestyle that we used to have, um, and in my mom's side of the family." – Fernanda

Informal socio-emotional support was also provided to students by having their families directly stating they would always be there for them, which was perceived by students as a main source of support. Students perceived family members' support as a motivating factor to persist in their STEM major by checking up on their well-being, asking them how they were doing, and encouraging them to persevere in their studies. Across our analysis, students discussed how obtaining a college degree, particularly in a STEM field, was not only exciting for their families, but perceived by their families as a way to move up in

the social ladder. While prior research has approached the role of families on student success among underrepresented populations from a deficit lens (Loera et al., 2011; Stacer and Perrucci, 2013), our current findings challenge this perspective by uncovering how informal familial support is a fund of knowledge students utilize to excel in their academic pursuits. The way students perceive informal family support contributes not only to feeling reassured and validated but also to their academic motivation and willingness to persevere in STEM.

Support Through Advice

Support by providing advice was another form of informal socio-emotional support students portrayed. Familial support was provided to students when advice about their educational journey was given, questions related to coursework were answered, and connections to family members who have a STEM background were made. The student excerpts display this specific kind of socio-emotional support:

“In my family. They’re very supportive, particularly my mom and dad. They’ve always pushed the idea of getting higher education. For me, my parents came to America 30 years ago to have children to like for them to have a better education. So, it was always like known that school’s the first thing on our list and to work hard and get a degree. But I was kind of different than my siblings, because my siblings grew up knowing what they want to do and I was always just watching them and trying to see... maybe I want to be like my brother and my sister, but nothing clicked with me. So, they had a lot of patience and were trying to help me. Whether it was through... research or ... telling me hey you should volunteer here and here just to...put my mind on one thing, wider than taking all these classes to pinpoint So they were very supportive and just imagining having to leave everything for...a safer place and coming here for your kids. It’s... everything I’m doing, I’m doing it for them because they dropped everything for me. So, they’re my main.” – Asti

“With family it’s always been like they always supported what I was what I set my goal to, they always search for people who were like, cause, like me going into chemical engineering my parents always talked about ‘Oh your uncle is also like into chem working in chemical engineering’ or I had another uncle who they told me they’re working in agriculture and they’re using chemistry in like the crops to make them to help them grow in many seasons and all that, like I talked to them and they supported me. They told me, ‘No, if you know what you wanna do, just let me know. If you need any help or want to know about anything on like that chemical point.’ And I don’t know, they’ve always been there to guide me in some sort of way. Like, teaching me, I don’t know, I just felt like, it’s been a really great support having them, guide me into everything I’m doing to this point.” – Leonardo

Familial support was given to students through advice and answering questions when they were unsure of what academic journey they wanted to pursue and when they had a STEM course-related question. Students also mentioned how family members showed their support by advising them to connect with extended family members who had a STEM degree and were knowledgeable about their specific STEM career choice. The sacrifices family members have taken to offer more opportunities for their students, such as immigrating to another

country, were perceived as an influential factor in students’ educational pursuits. Students perceived the informal socio-emotional support they received as a form of guidance and acknowledged the patience their family members had with them when they were unsure of what degree to pursue or when they were having difficulty understanding a concept covered in their STEM classes. A few of the students mentioned how a resource they utilized was having immediate and extended family members with a STEM background support them by providing guidance. Our findings show that nuclear, extended family support is just as significant as parental and sibling support for STEM success. Socio-emotional support is noticeable in these examples and demonstrates how students perceive informal familial support as an asset that benefits their drive to continue in their specific STEM major. Given the transition from a community college to a 4-year university could bring its own challenges for students, such as adapting to a four-year institution and feeling like they do not belong in a STEM academic setting, familial support can be advantageous. Informal socio-emotional support is a fund of knowledge that can mitigate the potential challenges by reassuring and reaffirming students they are worthy of not only being academically successful but belonging in a STEM educational and work environment.

Instrumental/Socio-Emotional Support

Having family members (i.e., siblings, partners, parents) adjust their work schedule and plan out their day according to their college schedules was perceived by participants as helpful instrumental support. Other forms of instrumental support involved family members asking if they had eaten breakfast and dinner, financially supporting them by providing a rent-free home, and covering their home-related bills. Regarding childcare, most applicable to non-traditional students, having their partners be accommodating by taking care of school transportation for their child and attending teacher meetings during students’ class time or during exams was another form of support. Furthermore, much of the instrumental support described was fused with socio-emotional elements:

Support Through Spousal Help

The majority of the students that were married mentioned how their spouse supported them so they could focus on their coursework, which contributed to their persistence in STEM. Students described how their husbands and wives supported them:

“So, I have like the most amazing husband that ever walked this planet. ...When I first started, I was working full time...40 hours a week and then some sometimes. Plus doing full-time at Pima and it was just, it was getting really hard. We never got any time together...And then he was like, ‘You know, I could take care of us. You don’t need to work anymore.’ And I’m like, ‘Really?’ So, I’ve been able to quit my job, and he’s just been like the most amazing support system that I could ever possibly imagine. ...He’s always like, ‘Hey, you done with your homework? ... You know you have to do homework.’” – Rachel

“...my wife, as well, is a support in my life. And she’s finishing her degree at the UA right now. But she’s stepping up and she’s

still working. And that's what allowed me to make it this far. And what's gonna continue to allow me to make it all the way to whatever I do at school so." – Richard

Students mentioned how their partners offered to financially support them and their children after observing how time consuming it was for them to balance attending school and working full-time. Spousal support was also described as having their partners adjust their work schedule to fit with their school schedule and taking over childcare responsibilities. While most of the spousal support included childcare and financial assistance, one student commented on how her daughter motivated her to persist in her studies by encouraging her and reassuring her she was capable of pursuing her degree. When romantic partners took over responsibilities that mitigated potential stressors for students, it contributed to students' persistence in STEM. Romantic partner and child support, which previous studies have not addressed, is a resource that is instrumental in reassuring students of their capabilities in pursuing STEM degrees.

Support Through Meeting Nutritional Needs

While tangible support and encouragement from romantic partners and children play a major role in students' persisting in STEM, students also explained how their family members provided tangible support by ensuring they met their nutritional needs. As shown below, students described how their family members ensured they met their nutritional needs:

"...I mean, my family, they supported me every day. When I go to school, they make sure that I have good breakfast. And then when I come home, from school, make sure I have dinner before I study and keep hydrating yourself. So yeah, I got support at home." – Michael

"Everyone along the lines is just on my team and you know whatever they can do, whether it's cooking food while I'm studying to, you know, letting me stay there while I study or just along the line." – Albert

Tangible support was provided by cooking for students, ensuring they were hydrating themselves and eating three times a day. Family members actively supported students by taking over tasks that would allow students to allocate more time toward their schooling. Most of the instrumental support was related to families actively contributing to students meeting their basic nutritional needs. However, one student detailed how her sister supported her by coordinating who would cook for both of them based on their work and school schedules. Family members not only reassured their students but supported their educational pursuits by taking over duties that would otherwise reduce the amount of time students could spend on their studies. The fused elements of socio-emotional and instrumental support are evident in these examples. Although most of their family members did not attend college or have STEM careers, participants noted the FoK their family provided by having their family believe in them and show they care through words and actions, depicting the crucial role of family support for community college students pursuing STEM degrees. Furthermore, the current analyses

show how students staying present with and remembering the support they're receiving from family motivates them whenever they encounter personal and academic challenges, encouraging them to persevere.

DISCUSSION

The literature on formal types of support provided by faculty or targeted programs is substantial and shows how participating in STEM interventions, having positive interactions with faculty, and having opportunities for mentoring are beneficial for STEM persistence (Cole and Espinoza, 2008; Hausmann et al., 2009; DeFreitas and Bravo, 2012; Simpkins et al., 2020; Holloway-Friesen, 2021). However, there is room to expand our understanding of how informal familial support occurs and how it relates to students' perseverance in STEM. The current study specifies how students perceive the value of informal family support in ways that differ from prior research (Loera et al., 2011; Stacer and Perrucci, 2013) by presenting the role family members play in community college students' STEM identity development, persistence in STEM, and by expanding definitions of informal familial support. Incorporating an inclusive curriculum that recognizes knowledge learned through family members could bolster a sense of belonging among STEM students; nuclear, extended, and immediate family members who have a STEM background can also be influential in developing a STEM identity for students. Furthermore, informal familial support was perceived by students when their family members, with or without a STEM background, shared and validated their students' excitement for STEM concepts covered in class, which is crucial for fostering a STEM identity. For students in our study, it was reassuring to know their family members would continue to support them, which contributed to their motivation to persist in their STEM majors. The results also expand definitions of informal familial support beyond parental support by defining family broadly to mean not only students' parents, but also spouses/partners/significant others, siblings, children, and extended family. By describing instrumental and socio-emotional family support, we present a case to invest in efforts to formally involve families in students' college trajectory, specifically low-income and historically marginalized students underrepresented in STEM fields. The current study expands the meaning of family and their influence and also elucidates how informal familial support potentially contributes to students' STEM identity and persistence in STEM. Our findings extend prior research on STEM success (Burt et al., 2020) into the domain where community college and family intersect by introducing instrumental and socio-emotional support and their fusion as important components that contribute to FoK theoretical framework. While students did mention receiving academic support from faculty and peers, they placed equal emphasis on informal familial support. We further find that such support from family members was perceived by students as being reassuring, validating, and motivating. These narratives were consistent across the first-generation and non-first-generation college students and families with or without STEM backgrounds.

This particular analysis does not address how informal familial support directly influences sense of belonging, STEM identity, and persistence in STEM. However, it is consistent with prior research on the importance of familial support for student success in higher education (Saenz et al., 2018) and STEM settings (Dika et al., 2018; Rincon B. et al., 2020), and it extends our understanding of FoK by demonstrating how familial support gets enacted and STEM students' own subjective understandings of its relevance. When academic environments welcome the application of students' in-home expertise in their STEM courses, students are far more likely to feel they belong in their school and in STEM (Good et al., 2012; Smith and Lucena, 2016). Our study fills gaps in FofK literature and challenges the current literature on familial deficits, as reviewed by Kiyama and Rios-Aguilar (2017), by highlighting the integration of socio-emotional and instrumental support from family members and its relevance to community college academic success in pursuing STEM majors and careers. Our study confirms prior findings on FofK (Kiyama and Rios-Aguilar, 2017; Denton and Borrego, 2021) and extends an understanding of how socio-emotional and instrumental family support manifests itself in a myriad of ways in our community college STEM context. Recognizing the ways in which informal familial support serves as a resource and FoK for STEM college students is a first step in having educational institutions identify ways to integrate the resources, experiences, and knowledge that students bring with them. By stepping out of a deficit perspective, which is a traditional academic lens, educational institutions can reduce the barriers and challenge underrepresented students' experience. Integrating family members in students' academic STEM trajectory will not only assist students in navigating educational systems but also challenge the *status quo*.

Limitations and Future Research

Our study yielded some innovative results, yet limitations need to be acknowledged. Given the study was qualitative, we cannot infer causality with data collected at one time point. The modality of the focus group due to the COVID-19 pandemic is another limitation worth noting. As Maxwell (2013) points out, the setting in which an interview takes place can be a validity threat. The way students formulated their experiences and perceived the informal familial support they received could have also been impacted by the way they reacted to a virtual interview rather than an in-person interview. Given the virtual modality of the focus groups combined with the fact that the pandemic created a learning environment in which students were more intimately intertwined with family life, the fact that participants may have had more contact with their family members over time compared to if they were attending school in-person could have influenced their sense of how important family support was for them.

It should also be noted that participants' responses may have differed due to respondents' reactivity, which is another validity threat. The fact that the focus groups were conducted by a professor located at the university

to which they hoped to transfer and who also was in a lead position of authority in the grant that supplied funding (scholarships) for the students might have caused participants to be more positive than negative regarding their experiences overall. However, measures were taken prior to the start of the focus group to encourage honesty and assure students that they would not be judged for their responses. Incorporating a mixed-methods design by adding a quantitative component, having a larger sample size, and conducting in-person focus groups would be helpful in developing a more precise interpretation of how low-income STEM community college students perceive the informal familial support they receive.

We argue that utilizing socio-emotional and instrumental support from family members is essential to student success in STEM. Our research extends the current literature on FofK by revealing how students activate familial funds to navigate school and personal barriers, which in turn bolsters their persistence in STEM. Having students activate familial funds reinforces their interests and involvement in STEM. We suggest that future research reconceptualize marginalized students' families not as something to be overcome or managed, but as a foundational resource that directly contributes to students' sense of belonging and success, particularly for STEM majors. Future studies should further elaborate our novel contribution of informal family support to uncover their qualitative relevance and quantitative relationship to sense of belonging, STEM identity, persistence in STEM, and other success outcomes.

Implications

The findings presented here reveal the major role family plays in persistence in STEM among underrepresented populations based on students' experiences by explaining how family support is perceived by students and acts as a resource. Researchers and practitioners need to not only acknowledge students' funds but invest in identifying strategies to implement students' cultural strengths in higher education institutions through their STEM curriculum, faculty, and staff. Of equal value is involving students' families and their respective community through educational programming, partnerships, and relationship building to allow them to have voice and choice in students' post-secondary journey. Rather than coming from a place of "fixing" and "assimilating" students to traditional academic settings by censoring their identity and daily practices, two- and four-year institutions need to invest in efforts to be more culturally responsive in their practices by involving families in students' educational trajectory to ultimately increase achievement rates in historically marginalized populations.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the University of Arizona Human Subjects Protection Program. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

AUTHOR CONTRIBUTIONS

EB, SV, and RD-A collected the data. EB, SV, and CJ analyzed the data. EB wrote all drafts and formatted this manuscript. SV checked the references and provided feedback. RD-A wrote the limitations section, provided ongoing feedback for all drafts, and

edited the manuscript. CJ edited and provided feedback for this manuscript. All authors designed the study.

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