

Navigating Barriers to Success for Community College Science Students: A Review of Transfer Challenges

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This paper examines the challenges community college students encounter when transferring to four-year higher-education institutions, focusing on the gap between their transfer aspirations and actual success. Despite the availability of substantial financial aid in higher education, transfer students continue to face numerous challenges that impede their integration and success at new institutions. These obstacles arise from a combination of institutional factors and individual student characteristics. Utilizing Pascarella's model, this study underscores the importance of support programs in raising institutional awareness of the diverse challenges transfer students face and the necessity for tailored strategies to facilitate their successful transition and retention.

Keywords: transfer challenges, transfer capital, support services, mentorships, adjustment

INTRODUCTION

As one of the significant metrics for gauging the success of public community colleges, the transfer function has, over time, been viewed as a mechanism that allows access and social mobility for students who otherwise would not begin their postsecondary education at a university. These colleges serve as a

crucial pathway for many marginalized groups, granting them access to transition to four-year institutions and contributing to broader social and economic equity (Laanan et al., 2010).

While public universities increasingly rely on community college transfers for undergraduate enrollment, available data highlights a dire situation needing increased attention. The large number of students with transfer aspirations does not translate to the actual transfers, and even for those who manage to do so, attrition rates are alarmingly high. For instance, only 13 percent of the students who start at a community college earn a bachelor's degree within six years (NSCRC, 2023). What is equally concerning is that a mere 30 percent of community college students succeed in transferring to a four-year institution. This discrepancy suggests that the students face barriers and challenges that need to be identified and addressed to improve their learning experiences and success rates.

Highlighting the importance of providing transfer scholarship funding, substantial resources have been committed to enhancing transfer students' enrollment, persistence, retention, and success. Scholarship initiatives like the S-STEM by the National Science Foundation (NSF) and institutional programs have been established to specifically cater to transfer scholars, ensuring a smooth transition to the four-year university. For example, The authors are engaged in the NSF-funded Earth Sustainability Scholarships (ESS) program at Southern Illinois University, which supports low-income, high-achieving transfer students from community colleges by training them to become geoscience and environmental professionals equipped with in-demand sustainability skills (Southern Illinois University, 2023).

Although such scholarship programs bridge the financial gap for transfer scholars, they still have to navigate other challenges in their new institutions (Ononye & Bong, 2018). These challenges range from institutional factors to student characteristics that hinder their integration and success. This study employs a systematic review (Bettany-Saltikov, 2012) to explore the transfer students' challenges as they transition to four-year institutions and how these institutions leverage different strategies and technologies for a smoother integration. The findings will serve as a reference for institutions to make necessary adjustments and enhance support services to improve transfer students' academic success, retention, and graduation rates.

We seek to investigate the following research questions through a comprehensive literature review utilizing a theoretical model developed by Pascarella (1985):

1. What are the primary obstacles faced by new students transitioning from community colleges to four-year institutions to pursue undergraduate degrees?
2. How can the receiving institutions address challenges faced by new transfer students to enhance their post-transfer and post-college experiences?

Past studies have mostly examined the challenges from the perspective of the transfer shock, marked by low academic achievement at the new institution. This study expands the focus beyond academic indicators by including the social contexts and investigating how technologies help overcome these obstacles. Furthermore, we extend the scope to include the post-graduation preparedness strategies for a smoother transition into further education or the workforce. Identifying the specific challenges transfer students face and developing effective coping solutions enhance our understanding of how universities can ensure fair access to support resources for all students, promoting equity and inclusion in higher education.

Furthermore, by examining how technologies are leveraged to support transfer students' integration and success, this study offers practical insights and evidence-based strategies for creating efficient access to support services. Ultimately, it aligns with broader efforts to enhance student success, foster inclusivity, and improve the transition experience for new transfer students.

Conceptual Framework

Pascarella (1985) developed a theoretical model that explores transfer students' learning experiences and outcomes in college. He hypothesized that students' learning experiences and cognitive development can be conceptualized as a function of the direct and indirect influences of institutional and personal factors. These factors include institutional organization, interactions with socialization agents, student background, institutional environment, and quality of student effort.

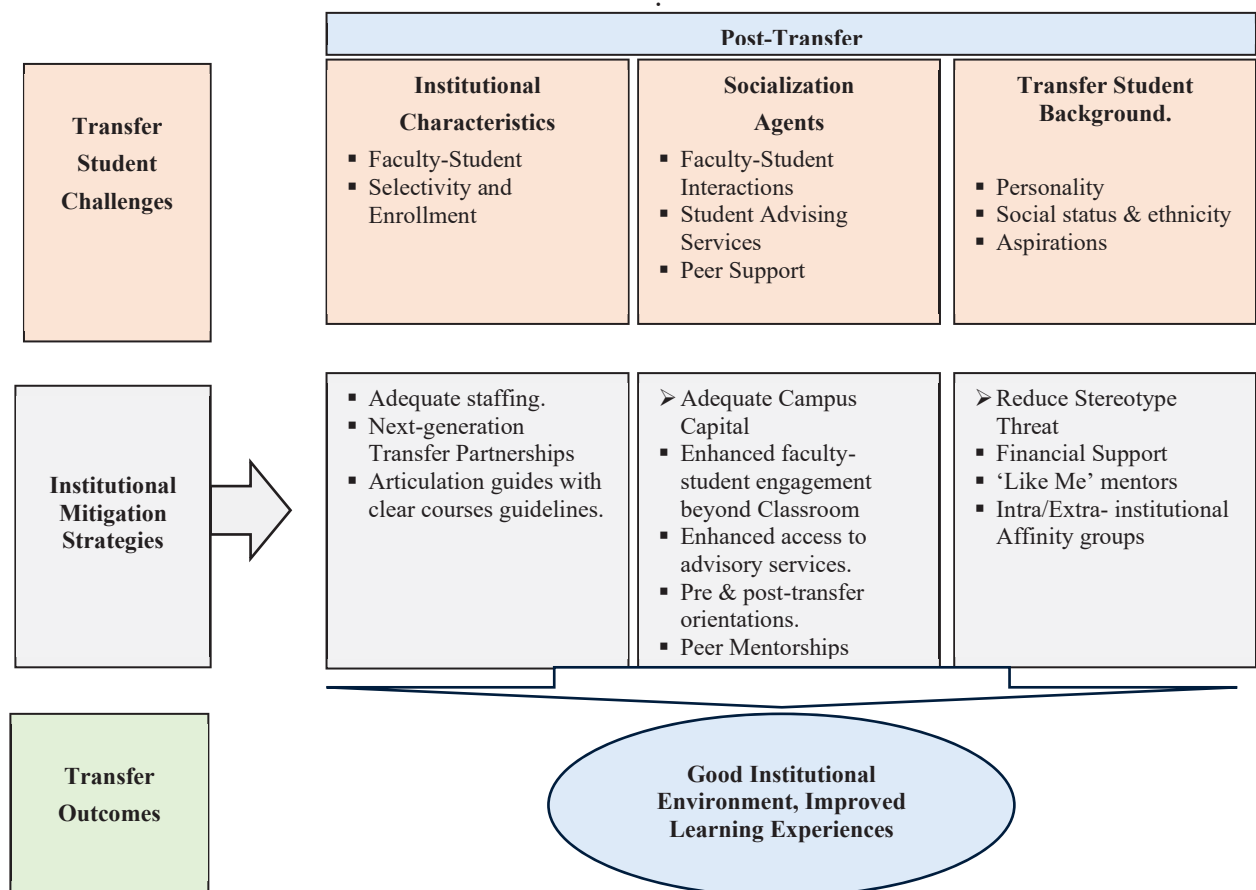
The institutional environment is directly influenced by the background traits that transfer students bring to the institution and the institution's structural and organizational characteristics (e.g., admission requirements, faculty-student ratio, percentage of graduate students, and percentage of residential students). The influence of the organizational characteristics and the college environment are indirect, mediated by interactions with socializing agents and the quality of student effort.

Despite the emergence of newer theories and research on transfer students, Pascarella's model continues to be highly valued and referenced in academia. It offers a thorough framework that examines different factors affecting transfer students' experiences, such as how institutions are organized, interactions with people who help shape their social skills, and the backgrounds of individual students.

Exploring how the model applies in the contemporary context of technological advancements and social dynamics could yield interesting insights. Considering the evolving landscape of higher education, shifts in learning modalities and campus culture could provide valuable insights into the relevance of Pascarella's model in Figure 1.

The interaction between the agents of socialization and students' traits, as enabled by the institutional environment and student effort, constitutes Transfer Student Capital (TSC). It comprises experiences of transfer students to accumulate knowledge necessary for their success in the new institution (Laanan et al., 2010). This paper reviews the challenges pertaining to vertical transfers from community colleges to four-year institutions.

FIGURE 1
PASCARELLA'S MODEL OF TRANSFER STUDENTS' LEARNING EXPERIENCES AND COGNITIVE DEVELOPMENT



METHODS

We employed a systematic review to investigate the challenges community college students face when transferring to four-year higher-education institutions. The need to perform an expansive search of the literature to generate adequate descriptively rich knowledge prompted our approach (Finfgeld-Connett & Johnson, 2012). The study analyzes findings across 31 studies on transfer barriers and mitigation strategies. It then collates the findings to offer theoretically and practically proven recommendations for a smoother transition and integration of new students in the receiving institution.

Systematic reviews are preferred because they efficiently reduce research costs, have broader generalizability, and allow for the extrapolation of results (Thomas & Erdei, 2018). Also, the need for a thorough literature search to gather adequate descriptively rich knowledge prompted the use of this approach (Finfgeld-Connett & Johnson, 2012).

Information sources

We utilized multiple electronic search strategies in Google Scholar and ERIC to maximize data collection, minimize bias, allow quick access to a large body of literature, and ensure the identification of as many relevant studies as possible (Counsell, 1997). We further enhanced our search by reviewing the reference lists of studies identified through these searches to locate additional relevant research.

Initially, we limited the search to titles and abstracts to quickly identify relevant studies. However, in subsequent stages, we conducted a more thorough search by using specific keywords and index terms to explore the full texts of the documents. The comprehensive set of search terms included “transfer,” “vertical transfer,” “first-year transfer student experience,” “transfer challenges,” and “transfer students.” This approach ensured a more detailed and targeted exploration of literature.

Inclusion Criteria

Our choice of the articles needed that the literature be:

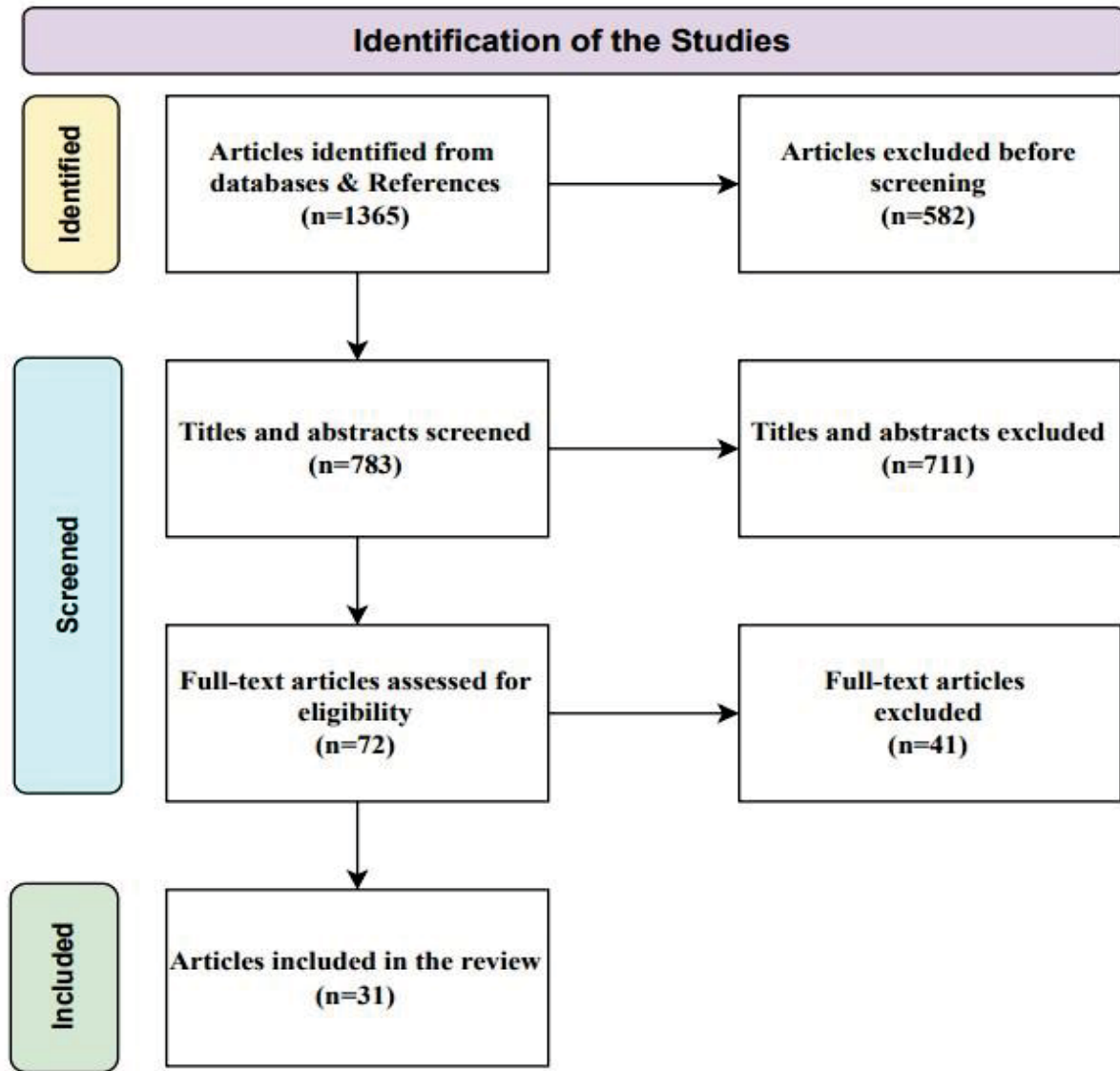
- Written in English.
- Peer-reviewed.
- Investigated vertical transfers from community colleges to 4-year institutions.
- Published between 2010 to 2024.

Exclusion Criteria

- News or opinion pieces.
- Studies addressing pre-transfer contexts.
- Lateral transfers.

This criterion resulted in 31 studies being selected to explore the research questions central to this review, as illustrated in Figure 2 below.

FIGURE 2
FLOWCHART OF ARTICLE IDENTIFICATION AND SCREENING



Data Extraction and Analysis

Our data were extracted from each article using a tool that captured key details such as study context, design, and findings relevant to the review questions. We then organized the information in a Microsoft Excel sheet, with the main findings coded according to our research questions. Findings discussing challenges and mitigation strategies were coded as ‘*challenges*’ and ‘*mitigation*,’ respectively. We then did a thorough analysis to identify and group the data based on key themes aligned to institutional/structural characteristics, socializing agents, and student background factors as outlined in our conceptual framework.

RESULTS

The present review investigates the various obstacles transfer students face at four-year institutions and how these institutions have utilized different approaches and technologies to overcome these hurdles. The results are presented in Table 1.

We categorized the results into four themes: (a) characteristics of the receiving institutions, (b) interactions with socialization agents and transfer capital, (c) individual characteristics, and (d) post-graduation preparation. From this analysis, interactions with socialization agents and acquisition of TSC constituted 42% of the articles. An emerging theme of post-graduation preparation of transfer students was addressed in approximately 10% of the literature. Consequently, we incorporated it as a crucial element of student support services, as summarized in Figure 3 below.

FIGURE 3
LITERATURE FREQUENCY UNDER DIFFERENT THEMES

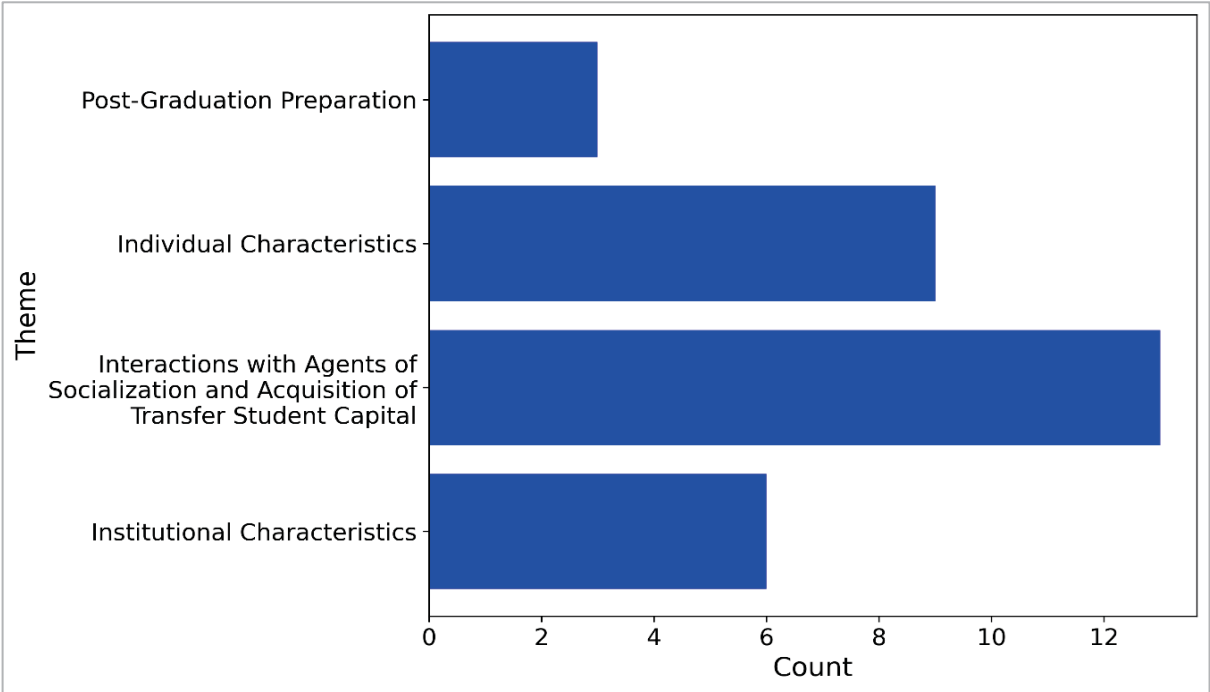


TABLE 1
A SUMMARY OF RELEVANT LITERATURE ON TRANSFER CHALLENGES

Source	Context	Issues Addressed by Article	
		Challenges	Mitigation
Anderson-Rowland, (2011). Bacon & Packard (2018).	Mitigating transfer shock	Low academic achievement	Enrolment in a one-credit course every semester (STEM Academic Success Class).
Sandrin, et al., (2023).	Challenges for Students with Scholarship Support	Intimidating size of university relative to previous community colleges. Institutional assumptions result in failure to access services.	Social and Financial support services.
Shaw et al. (2018). Gauthier (2020).	Transfer Stigma	Feelings of perceived stigma, self-doubt, and inadequacy lead to worries that they might not be good enough.	Pre- and post-transfer orientations help clarify the expectations and create a relatively smooth transition.
Strawderman & Mohammadi (2022).	Student Onboarding and Retention	Difficult transition to university: Financial and social support rated the lowest for transfer students.	Regular meetings/activities focusing on community building. Self-paced online onboarding course within the LMS platforms.
Harper & Thiry, (2022).	Student advising services: Campus Capital	Lack of care, support, and friendliness. Poor advising. Advisors' lack of knowledge in internship and career pathways.	Balanced approach.
Shaw & Chin-Newman (2017).	Transfer challenges and support resources	Poor Social Support/Campus Capital. Students have difficulty knowing which classes to take, how to enroll, and use LMS and university e-mail.	Faculty and staff provide campus capital or the campus-specific information needed to navigate the university successfully.
Townsend & Wilson, (2016).	Institutional factors that enhance/hinder transfer success.	Students who did not get help at the university did not know where and whom to ask for help. The enormous size of the university contributed to initial challenges.	Clear articulation agreements between the community colleges and receiving universities. Orientation/welcome sessions for transfer students.

Tobolowsky & Cox, (2012).	Institutional agents that shape transfer experiences.	False assumptions about the institution/ success of previous transfer students. Inadequate resources, staff, and time to better serve the transfer students. Staff assumptions about the	Staff members with transfer experience leveraged to enhance the success of transfer students.
Hodara, et al.(2017)	Experiences of African American STEM majors	Lack of clarity in categorizing courses among institutions. Misalignment between university missions and state policies.	Establish formal mechanisms for credit mobility through articulation guides.
Laanan et al. (2010) Maliszewski & Hayes (2019) Hayes et al. (2020) Cepeda et al.(2021)	Barriers and challenges students as they built TSC.	Students experienced challenges obtaining accurate information about transfer.	Offering in-person and virtual orientation and transfer-related events to provide more TSC opportunities. Provide avenues for building social networks to boost self-efficacy for transfer as well as adjustment during the post-transfer experience period.
Packard et al. (2012)	Delay experiences in navigating transfer pathways in STEM.	Students took unnecessary courses/could not get into courses timely, resulting in lost time, money, and credit.	Positive interactions with supportive faculty to advise, enhance students' comfort levels, and help them smoothly adjust.
Page & Gehlbach (2017) Barrett et al. (2019).	AI Virtual Assistant	Limited capacity to provide individualized attention due to resource constraints.	Employ conversational AI to support students with personalized text message-based guidance efficiently.
Lancaster & Xu, (2017)	Challenges for African American STEM Student Persistence.	Insufficient human resources resulting in weak, relationships with faculty; inadequate preparation for challenging classes. Large classes and infrequent class offerings.	
Lopez & Jones (2016).	Academic adjustment and success of STEM transfer students.	Non-native English speakers with inadequate proficiency have negative self-perceptions and doubts.	Increase academic and social involvement opportunities to enhance academic and social adjustment.
Meador (2018) Totonchi et al. (2021)	Stereotype threat	Adverse experiences include reduced effort, lower performance	

		expectations, and disengagement among minority students.	
Davidson & Wilson (2016).	Students' sense of belonging	Attrition	Leverage ' <i>like me</i> ' relationships to reduce stereotype threat and lead to increased persistence for students in negatively stereotyped groups
Wang et al. (2020).	Students' exposure to faculty/advisors.		Robust partnerships are key for early information dissemination.
Enriquez, et al. (2014) Thiry et al. (2023) Stebbleton & Diamond (2018).	The success of minority STEM students	Academic, social, and financial challenges.	Students are assigned mentors to participate in group counseling and mentoring programs.
Gartner, et al. (2021)	Cohort building	Inadequate opportunities for student interaction and community building.	Facilitated sessions for students on topics, e.g. value identification, gratitude, and mindfulness.
Ononye & Bong (2018) Das (2022)	Effectiveness of NSF scholarship on minority students' degree attainment and persistence.	Inadequate TSC	Welcome/orientation and social events are held every semester and require the attendance of all scholars.
Owens (2010)	Transfer experiences	Experiences of difficulty finding guidance and learning to navigate the university system.	Visit the receiving institution before admission for firsthand information and inquiries.

Institutional Characteristics

Many incoming transfer students feel intimidated by the enormous size of the university, especially when they receive little support during onboarding at the receiving university (Townsend & Wilson, 2006). Owing to their relatively larger size, the four-year receiving institutions are more complex structurally, making the initial onboarding process difficult for new transfer students. Large student numbers limit the quality of interpersonal interactions and make it harder for the new transfer scholars to know their professors, unlike in smaller community colleges where they were used to closer relationships with their instructors (Sandrin et al., 2023).

Faculty-Student Ratio

In recent years, numerous STEM fields in various U.S. universities have faced a notable shortage in the academic workforce (Sandrin et al., 2023). This shortage presents a profound challenge for institutions in the form of a high student-faculty ratio, often compromising the quality of transfer students' learning experiences. Meanwhile, faculty members are burdened with increased workloads, resulting in unpredictable offering of essential courses. This complicates the paths to graduation by contributing to delays and chronic persistence patterns of STEM transfer students (Lancaster & Xu, 2017).

Selectivity and Enrollment

Top-tier four-year institutions tend to be selective when admitting transfer students to their programs, aiming to uphold internal standards and align with their mission (Tobolowsky & Cox, 2012). Consequently, many talented scholars seeking transfers encounter difficulties securing admission to these institutions. Even upon acceptance, the rigorous academic requirements often pose challenges and intimidate these students, potentially impacting their adjustment.

At the organizational level, the highly formal structure and policy regulations also affect the universities' ability to fully support transfer students. While standards must be maintained, the academic schedule's stringent requirements and time constraints may negatively impact the smooth transition of transfer scholars to four-year universities (Tobolowsky & Cox, 2012). Consequently, transfer students find themselves in situations where they must register for courses after all current students have registered, posing complications for faculty and support staff because they have limited time to assist these new students.

Although formal mechanisms aimed at enhancing credit mobility through articulation guides stipulating which courses are transferable and accepted across in-state public institutions have been established, challenges persist (Hodara et al., 2017; Mullin, 2012). A lack of clarity in categorizing courses among collaborating institutions often results in students forfeiting credits and facing an increased risk of attrition, delayed graduation, or being denied admission (Hodara et al., 2017). Furthermore, misalignment between university missions and government policies sometimes impedes transfers, excluding students from their preferred programs or compelling them to enroll in their second-choice programs.

Interactions With Agents of Socialization and Acquisition of TSC

The incredible diversity in university student enrollment makes it challenging to satisfy individual student needs, hence the need for tailored support programs that enhance interactions to meet these needs. Transfer scholars must contend with being separated from family and friends and starting new social connections. The perceived stigma and self-doubt based on their status as former community college students can easily give rise to worries that they are not as good as their counterparts who enrolled as freshmen in the four-year institution (Strawderman & Mohammadi-Aragh, 2022).

Student Advising

Advising is at the core of transfer student success, providing the necessary TSC. Essential information about course choice, on-campus services, and institutional policies helps transfer scholars navigate campus successfully throughout their study. A well-developed framework for students to acquire TSC is crucial for their success at the receiving institution (Cepeda et al., 2021). Therefore, streamlining the dissemination of advisory services is paramount to ease the transfer process by providing accurate information (Townsend & Wilson, 2006; Tobolowsky & Cox, 2012).

When counselors in resource-constrained institutions are tasked to address students' specific needs, they face limitations in providing individualized attention to each student (Page & Gehlbach, 2017; Hayes et al., 2020). This challenge is severe when there is insufficient ongoing professional development for counselors to thrive in the evolving advising and student support trends. As a result, students miss out on the personalized guidance they need, creating gaps that hinder their academic progress and overall well-being. This inadequacy can also lead to counselor burnout, reducing the quality of student support services.

Faculty-Student Interactions

The most reliable sources of capital are faculty members, peers, and staff, who are readily available to help new students navigate the initial transfer dilemmas (Chin-Newman & Shaw, 2017). Effective engagement with these groups facilitates a smoother transition by enhancing students' knowledge and self-confidence. Engaging with faculty enhances student recognition opportunities while contributing to the persistence of those who require a sense of being cared about and valued.

Faculty advisors provide vital information and guidance on transfer adjustments and class attendance, boosting student knowledge and self-confidence (Packard et al., 2012). However, transfers to larger

institutions present their own set of challenges. The sheer size of most receiving universities often limits interactions and makes it harder for new students to know all their professors (Townsend & Wilson, 2006). The demanding nature of teaching can overwhelm faculty members, reducing their capacity to mentor transfer students beyond regular schedules, especially in departments with bigger workloads.

Additionally, poor coordination among faculty and advisors results in conflicting or inaccurate information being provided to transfer students. The students may perceive faculty or advising staff as unfriendly, impersonal, unsupportive, judgmental, and discouraging. Consequently, the students become confused and make wrong decisions that impact their academic progression (Harper & Thiry, 2022). The issue can be attributed to faculty members' limited awareness of departmental or program-specific opportunities, such as scholarships and support services for transfer scholars.

Peer Support

Students lacking adequate support from established channels often rely on peers for necessary information through social networking events and platforms (Das, 2022). Through such interactions, transfer students acquire valuable information about school processes and support services from fellow students. The experiences of family members who transitioned from community colleges to four-year institutions also benefit the transfer students. Consequently, obstacles to acquiring transfer capital through peers can result in initial struggles that make the students' lives difficult, leading to self-doubt about their academic success at the receiving institution. Such challenges are prevalent during the transfer students' entry, mainly when feelings of inferiority, inadequacy, isolation, and lack of support arise (Harper & Thiry, 2022). All these feelings stem from preexisting beliefs about direct-entry versus transfer students regarding academic readiness, dedication, and life backgrounds. Such tensions may impede the support transfer students receive from direct-entry peers who have been part of the institution for an extended period.

Establishing meaningful relationships early in college is crucial for transfer students' swift integration into the new institution. These connections form the basis for students' sense of belonging and are cultivated in diverse settings. They enable students from various backgrounds to participate in challenging but rewarding campus opportunities (Gartner et al., 2021). Earlier findings by Berger and Milem (1999) suggest that such relationships enhance retention rates and contribute to student success. Notably, students in rigorous STEM programs may experience heightened stress levels, but engaging in a balanced approach involving dedicated study and frequent peer interactions fosters personal development and effective learning, enhancing achievement and persistence (Harper & Thiry, 2022).

Individual Characteristics

Transfer students join the receiving institution with varying levels of preparedness based on their backgrounds. It is more challenging for first-generation students, whose parents have little information about transfers, unlike their continuing-generation counterparts, who benefit from key lessons learned by family to navigate the transfer process (Sandrin et al., 2023).

Personality

While the essential institutional framework ensures that new transfer students have the required information, accessing most support services requires personal initiative. Transfer students' indecision and goal uncertainty, manifested through hesitation to access services, can be attributed to their assumptions that their needs are insufficient to deserve or qualify for support (Sandrin et al., 2023). They may be under the impression that support is reserved for students with acute needs more extreme than their own and that seeking support is competitive and exclusionary.

Social Status and Ethnicity

One reason students start post-secondary education in community colleges is affordability (Laanan et al., 2010). The students' main financial concerns are related to the increase in tuition between community colleges and universities. Transfer scholars enrolled in scholarship programs, such as STEM scholarships, continue to face difficulties meeting expenses beyond what financial aid and scholarships cover (Sandrin

et al., 2023). This is particularly true for non-traditional students, who constitute most transfer students (Anon, 2019).

Additionally, first-generation students from poor backgrounds tend to have limited TSC and, therefore, do not understand the differences between the types of aid (grants/ scholarships/loans) available in the receiving institution. This limited information further exacerbates their financial challenges and alters their budgets and expenditures (Sandrin et al., 2023). Consequently, they are compelled to devise alternative means to secure transfer capital within the receiving institution to navigate the transition.

Relatedly, non-native English-speaking racial minority students may harbor the perception of inadequacy in their English language proficiency to thrive in a four-year educational institution (Lopez & Jones, 2016). These negative self-perceptions and doubts regarding their ability to proficiently speak, understand, and communicate in English impact their willingness to seek help, adversely affecting their motivation to persist and succeed throughout their undergraduate journey.

In extreme cases, these shortcomings can easily lead to stereotype threat, defined as the risk of confirming a negative stereotype about one's social group, leading to adverse experiences such as reduced effort, lower performance expectations, and disengagement from academic goals (Totonchi et al., 2021). In most receiving institutions, affected students find themselves in situations where they interact with fellow students, faculty members, administrators, and advisors who do not share their social identity and, therefore, do not relate to their challenges (Meador, 2018).

However, interventions or strategies that facilitate "*like me*" relationships and reduce stereotype threat among transfer students have been found to lead to positive experiences that increase persistence for students in negatively stereotyped groups (Davidson & Wilson, 2016). These students have demonstrated the ability to outperform their non-stereotyped peers in tests and assignments. Peer mentoring, faculty mentorship programs, and affinity groups create supportive environments where students feel understood and valued.

DISCUSSIONS AND RECOMMENDATIONS

The success and effectiveness of scholarship programs involving the transfer function are anchored on robust collaborative relationships among program personnel, who must work harmoniously to facilitate a seamless transition that minimizes the impact of transfer shock. Some of the pertinent areas that need closer attention include:

Next-Generation Transfer Partnerships

Planning ahead by establishing robust partnerships between community colleges and four-year institutions is a crucial strategy that ensures early information dissemination and enhancement of pre-transfer capital. Such partnerships develop students' greater knowledge of and confidence in transferring, in addition to increased aspirations to persist and graduate (Wang et al., 2020). However, despite these positive outcomes, inefficiencies still exist in the transfer pipeline, resulting in a low transfer success rate. Consequently, it becomes imperative for institutions to invest in innovative technology and establish clear structures to foster transparent expectations and effective communication for an efficient transfer process.

Building TSC

To foster the growth of TSC, an effective strategy involves cultivating opportunities for meaningful engagement with peers, faculty, and university staff. Creating registered student organizations for transfer students can serve as an avenue for social and academic integration while promoting a sense of belonging (Strawderman & Mohammadi-Aragh, 2022). Institutions can design regular meetings and purposeful activities, focusing on community building, and utilize peer mentorship programs for a continuous and supportive network throughout the academic calendar. Such programs help incoming students gain TSC, readjust their expectations, and reduce the stigma associated with the transfer shock (Shaw et al., 2018; Gauthier, 2020).

It is also worth ensuring that all personnel involved in transfer and advising are well-equipped to provide accurate and consistent information to minimize confusion. Program administrators should take the lead in building the capacity of all the key personnel involved in disseminating information to new students to avoid any possibility of inaccurate and conflicting information.

Technology in Orientations and Advising

Orientation programs provide opportunities for the receiving institutions to promote their programs to prospective students from community colleges. Students who attend these programs thrive better than those who do not (Owens, 2010). However, institutions conduct orientations that are often too generalized and may not fully meet individual student needs. Spreading the days and times to accommodate students' varied schedules is crucial to making the sessions more inclusive.

Furthermore, activities like departmental tours should be tailored to showcase facilities that students will frequently utilize, notably the laboratories, the library, and recreational facilities. This approach ensures that the orientation experience is not only informative but also tailored to the specific requirements of incoming students, thereby enhancing the effectiveness of the process.

Besides in-person orientations and advising, the online modality can effectively streamline onboarding. Institutions can implement this through the Learning Management Systems (LMS) to assist students in navigating the complex processes involved in the transfer (Cepeda et al., 2021). Developing self-paced online modules within the LMS platforms enhances informational accessibility for all new transfer students right from the point of admission. The onboarding course would cover diverse topics, including utilizing the LMS, selecting courses, accessing campus resources, and opportunities to connect with fellow students (Strawderman & Mohammadi-Aragh, 2022).

Such a program at the State University of New York organizes mandatory welcome meetings and social events every second week of the semester, with all scholars required to attend (Ononye & Bong, 2018). The sessions cover the semester's goals, planned activities, and expectations. Another similar program at Arizona State University is leveraged to mitigate the GPA shock for transfer scholars on an NSF S-STEM scholarship. The program requires scholars to take a one-credit course called the *STEM Academic Success Class* every semester. They are taught essential learning skills to enhance their academic performance while expanding their understanding of engineering. The curriculum covers various topics, such as writing resumes, securing internships, engaging in research, and networking strategies (Anderson-Rowland, 2011; Das, 2022).

Universities can further harness the power of Artificial intelligence (AI) to streamline the provision of personalized advising services to students. AI can gradually learn to handle various advising tasks independently by integrating with a university's student data system and customizing responses according to students' needs (Page & Gehlbach, 2017). This ensures that advisory efforts to build TSC are tailored to offer reminders, assistance, class scheduling, campus tours, and other forms of guidance precisely when and where students encounter challenges (Barret et al., 2019). Georgia State University has used this system to successfully implement conversational AI that guides undergraduate students on the path to and through college. This has directly enhanced access to information and educational opportunities for many students at risk of non-enrollment or non-completion (Barrett et al., 2019).

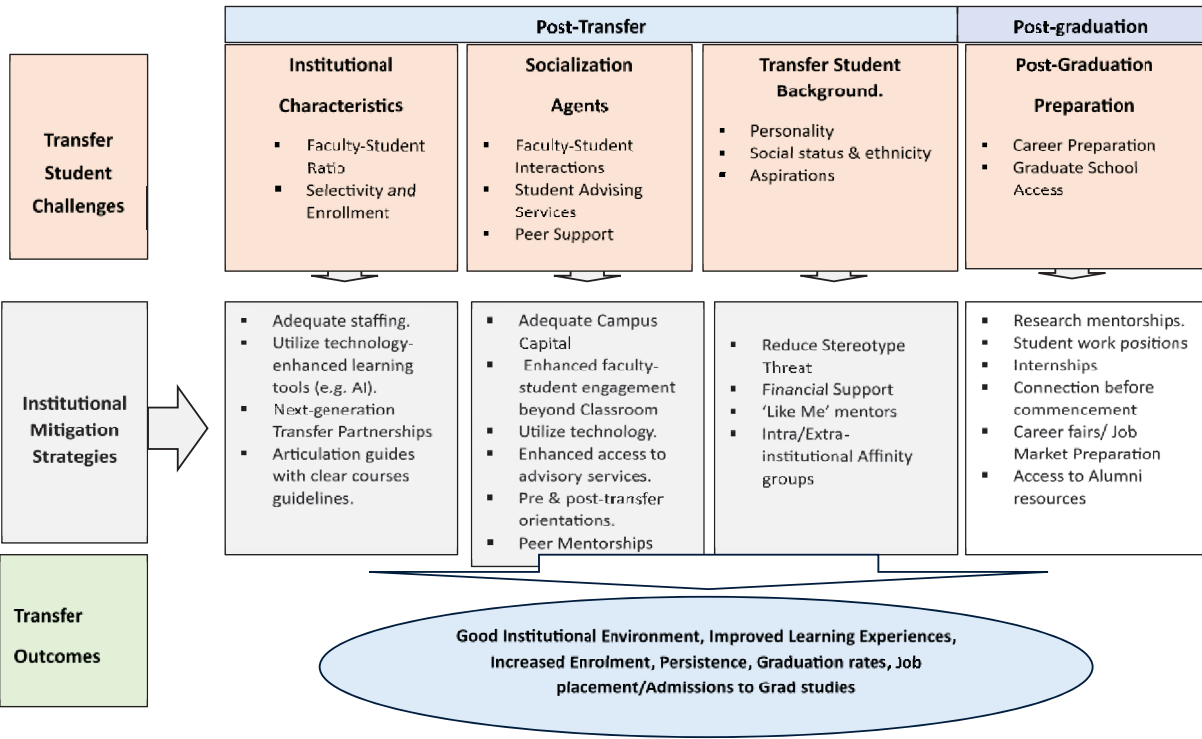
Similarly, virtual communication tools can be leveraged to match transfer students with mentors and peers, allowing for ongoing interactions and support regardless of physical location. Such an approach can provide access to a broader pool of mentors and facilitate communication through video calls, chat platforms, and discussion forums. Furthermore, technology-enabled affinity groups can offer virtual spaces for transfer students to connect, share resources, and discuss their shared experiences and identities. Leveraging technology in such ways enables receiving universities to extend the reach and impact of services for transfer students, ultimately promoting their academic success and integration into campus life.

Mentorship

Academic mentorship programs pair students with mentors based on shared academic interests and specializations. Mentors engage with their mentees in individual or group meetings to collaboratively develop and review educational plans, address academic progress and challenges, and formulate strategies to enhance overall student performance (Enriquez et al., 2014). Recognizing the significance of developing a group of well-rounded scholars, it is essential to formulate mentorship programs that extend beyond academic bounds to address their non-academic needs (Thiry et al., 2023). Faculty and advisors can actively collaborate to establish comprehensive mentorship programs that meet students’ diverse needs and guarantee a smooth transfer experience for new students. An initiative involving the career development center could be pivotal in providing specialized career counseling services for first-year transfer scholars (Stebledon & Diamond, 2018). Similarly, leveraging resources from the financial aid office, scholars can access essential information through budgeting workshops and financial aid sessions.

At the same time, student health services can be incorporated to address scholars’ physical and mental health needs, further fostering student wellness. These collaborative efforts empower students with a comprehensive support system beyond academics, nurturing their personal and professional growth throughout their educational journey.

FIGURE 3
REVISED MODEL FOR TRANSFER CHALLENGES AND SUPPORT SERVICES



CONCLUSIONS

The effectiveness of the transfer pathway is greatly influenced by the degree to which receiving institutions are open and welcoming to new students. Transfer policies and institutional characteristics of the receiving institution affect the nature of resources and support available for transfer scholars. As a result, the challenges faced by transfer students may be unique to an institution or even discipline-specific within a given institution.

Larger receiving institutions with decentralized support services at the disciplinary or departmental level often encounter dissonance, leading to students in different units receiving varied services and, therefore, different experiences. In sum, transfer students arrive at four-year institutions with diverse and distinct challenges that cannot be effectively addressed through a one-size-fits-all solution. These challenges have been proven to jeopardize the student's progress and success within the receiving four-year institutions. Further, advisors' past encounters with transfer students can influence the effectiveness of advising and support services for incoming transfer scholars. Misconceptions about the achievements of previous transfer students can impede advisors' endeavors to assist new ones. Some advisors inaccurately generalize the success of certain transfer students to the entire transfer group, neglecting the unique requirements of individual students.

Nevertheless, there are reasons to expect that the advising staff and faculty can overcome these barriers through coordinated and collaborative efforts that prioritize the students and provide them with a comprehensive support system that goes beyond academic support, nurturing their personal and professional growth throughout their educational journey.

Clear articulation agreements and communication structures can enhance the imperative need for collaborative relationships between community colleges and receiving institutions. This facilitates early information dissemination and significantly enhances pre-transfer student capital. As a result, confidence is instilled in transfer students, nurturing their aspirations for academic success and graduation. The cultivation of transfer student capital is further advanced through involvement in registered student organizations, monthly meetings, and peer mentorship programs. These efforts foster a sense of belonging and provide crucial support for transfer students, creating a supportive environment that encourages their academic journey.

As illustrated in Figure 3, adopting a comprehensive and multifaceted approach extends beyond mere academic success by prioritizing transfer students' personal and professional growth. The potential of this holistic approach, which includes extending mentorship programs to encompass non-academic needs and establishing partnerships with career development centers for specialized counseling services, is significant. Additionally, incorporating resources from financial aid offices, offering budgeting workshops, and facilitating financial aid sessions broaden the support base. Further integration of student health services into this support system addresses both physical and mental health needs, contributing to a holistic and supportive learning experience for transfer students.

Limitations

Although our methodology was appropriate for synthesizing findings from multiple studies to gain a robust understanding of transfer challenges and support services, it had some limitations. First, using only peer-reviewed literature as an inclusion criterion likely led to a narrow focus, potentially missing relevant studies and grey literature that did not meet these criteria but still offered valuable insights.

Another limitation lies in the heterogeneity of the studies included in the review. The diversity in research designs and contexts makes it difficult to aggregate and generalize all the findings about transfer challenges and support strategies, posing a significant challenge in drawing broad conclusions and universally applicable recommendations.

Additionally, while some challenges transfer students face are common across institutions, others are highly contextual and unique to each institution based on its culture and resources. This variability means that our study's findings may not fully capture the specific issues faced by transfer students at different institutions.

Further Research

In future studies, we suggest using large, randomized designs that combine qualitative and quantitative data. Because of the larger sample sizes, this approach can yield more reliable conclusions than systematic reviews of numerous smaller studies. By incorporating qualitative and quantitative data, researchers stand to obtain more comprehensive insights into transfer student challenges and the effectiveness of support

services. This will facilitate the generalization of findings to broader contexts and enhance the reliability and applicability of the support services.

ACKNOWLEDGEMENT

This work was supported by a grant (#2225490) from the S-STEM program in the National Science Foundation.

REFERENCES

- Anderson-Rowland, M.R. (2011). Reducing GPA shock for engineering and computer science community college transfer students. *ASEE annual conference & exposition* (22–28).
- Anon. (2019). Fast facts. *American association for clinical chemistry*.
<https://www.aacc.nche.edu/research-trends/fast-facts/>
- Bacon, S., & Packard, B.W.L. (2018). Supporting the transition of community college transfer students into STEM at a four-year institution. *Understanding Interventions*, 9(2)
- Barrett, M., Branson, L., Carter, S., DeLeon, F., Ellis, J., Gundlach, C., & Lee, D. (2019). Using Artificial Intelligence to Enhance Educational Opportunities and Student Services in Higher Education. *Inquiry: The Journal of the Virginia Community Colleges*, 22(1).
- Berger, J.B., & Milem, J.F. (1999). The role of student involvement and perceptions of integration in a causal model of student persistence. *Research in Higher Education*, 40(6), 641–664.
- Bettany-Saltikov, J., & McSherry, R. (2016). *How to Do a Systematic Literature Review in Nursing: A step-by-step Guide* (2nd ed.). Open University Press.
- Cepeda, R., Buelow, M.T., Jaggars, S.S., & Rivera, M.D. (2021). “Like a Freshman Who Didn’t Get a Freshman Orientation”: How transfer student capital, social support, and self-efficacy intertwine in the transfer student experience. *Frontiers in Psychology*, 12.
<https://doi.org/10.3389/fpsyg.2021.767395>
- Chin-Newman, C.S., & Shaw, S.T. (2013). The anxiety of change: How new transfer students overcome challenges. *Journal of College Admission*, (221).
- Counsell, C. (1997). Formulating Questions and Locating Primary Studies for Inclusion in Systematic Reviews. *Annals of Internal Medicine*, 127(5), 380. <https://doi.org/10.7326/0003-4819-127-5-199709010-00008>
- Das, S. (2022). Experiences of students supported by an NSF S-STEM grant in a robotics and mechatronic systems engineering program. *ASEE Annual Conference & Exposition*.
- Davidson, J.C., & Wilson, K.B. (2016). Community college student dropouts from higher education: Toward a comprehensive conceptual model. *Community College Journal of Research and Practice*, 41(8), 517–530. <https://doi.org/10.1080/10668926.2016.1206490>
- Enriquez, A.G., Lipe, C.B., & Price, B. (2014). Enhancing the success of minority STEM students by providing financial, academic, social, and cultural capital. *ASEE Annual Conference & Exposition*, pp. 24–529.
- Gartner, J., Miller, M., & Rynearson, A.M. (2021). Lessons learned in an S-STEM program: How to improve recruitment and cohort building. *ASEE Virtual Annual Conference Content Access*.
- Gauthier, T. (2020). A Renewed Examination of the Stigma Associated with Community College Career and Technical Education. *Community College Journal of Research and Practice*, pp. 1–15.
<https://doi.org/10.1080/10668926.2020.1758835>
- Harper, R., & Thiry, H. (2022). Advising from community college to university: What it takes for underrepresented transfer students in STEM to succeed. *Community College Journal of Research and Practice*, pp. 1–20. <https://doi.org/10.1080/10668926.2022.2050842>
- Hayes, S., Lindeman, L., & Lukszo, C. (2020). The role of academic advisors in the development of transfer student capital. *NACADA Journal*, 40(1), 49–63. <https://doi.org/10.12930/nacada-18-35>

- Hodara, M. (2015). The Effects of English as a Second Language Courses on Language Minority Community College Students. *Educational Evaluation and Policy Analysis*, 37(2), 243–270. <https://doi.org/10.3102/0162373714540321>
- Jenkins, D., & Fink, J.K. (2016). *Tracking Transfer: New Measures of Institutional and State Effectiveness in Helping Community College Students Attain Bachelor's Degrees*. Community College Research Center, Teachers College, Columbia University. <https://doi.org/10.7916/d8c24w80>
- Laanan, F.S., Starobin, S.S., & Eggleston, L.E. (2010). Adjustment of community college students at a four-year university: Role and relevance of transfer student capital for student retention. *Journal of College Student Retention: Research, Theory & Practice*, 12(2), 175–209. <https://doi.org/10.2190/cs.12.2.d>
- Lancaster, C., & Xu, Y.J. (2017). Challenges and supports for African American STEM student persistence: A case study at a racially diverse four-year institution. *The Journal of Negro Education*, 86(2), 176–189
- Lopez, C., & Jones, S.J. (2016). Examination of Factors that Predict Academic Adjustment and Success of Community College Transfer Students in STEM at four-year Institutions. *Community College Journal of Research and Practice*, 41(3), 168–182. <https://doi.org/10.1080/10668926.2016.1168328>
- Maliszewski Lukszo, C., & Hayes, S. (2019). Facilitating transfer student success: Exploring sources of transfer student capital. *Community College Review*, 48(1). <https://doi.org/10.1177/0091552119876017>
- Meador, A. (2018). Examining Recruitment and Retention Factors for Minority STEM Majors Through a Stereotype Threat Lens. *School Science and Mathematics*, 118(1–2), 61–69. <https://doi.org/10.1111/ssm.12260>
- Mullin, C.M. (2012). Why Access Matters: The Community College Student Body. *AACC Policy Brief 2012-01PBL*. American Association of Community Colleges.
- National Student Clearinghouse Research Center. (2023). Retrieved from <https://nscresearchcenter.org/>
- Ononye, L. & Bong, S. (2018). The study of the effectiveness of scholarship grant program on low-income engineering technology students. *Journal of STEM Education*, 18(5). <https://www.learntechlib.org/p/182464/>
- Owens, K. (2010). Community college transfer students' adjustment to a four-year institution: A qualitative analysis. *Journal of The First-Year Experience & Students in Transition*, 22(1), 87–128.
- Packard, B.W.-L., Gagnon, J.L., & Senas, A.J. (2012). Navigating community college transfer in science, technical, engineering, and mathematics fields. *Community College Journal of Research and Practice*, 36(9), 670–683. <https://doi.org/10.1080/10668926.2010.495570>
- Page, L.C., & Gehlbach, H. (2017). How an Artificially Intelligent Virtual Assistant Helps Students Navigate the Road to College. *AERA Open*, 3(4), 233285841774922. <https://doi.org/10.1177/2332858417749220>
- Pascarella, E.T. (1985). Students' affective development within the college environment. *The Journal of Higher Education*, 56(6), 640–663.
- Sandrin, S., Nishimura, J., Sexton, M., Barbosa, S., Marshall, P.A., Chapman, A., McCarthy, N., & Tuohy, J. (2023). "I thought it was a little risky": Transfer barriers for students with scholarship support. *Community College Journal of Research and Practice*, pp. 1–18. <https://doi.org/10.1080/10668926.2023.2256249>
- Shaw, S.T., & Chin-Newman, C.S. (2017). "You can do it!" Social support for transfer students during the transition from community college to a four-year university. *Journal of the First-Year Experience & Students in Transition*, 29(2), 65–78.
- Shaw, S.T., Spink, K., & Chin-Newman, C. (2018). "Do I really belong here?": The stigma of being a community college transfer student at a four-year university. *Community College Journal of Research and Practice*, 43(9), 657–660. <https://doi.org/10.1080/10668926.2018.1528907>

- Southern Illinois University. (2023). School of Earth Systems and Sustainability. Retrieved from <https://ess.siu.edu/scholarship.php>
- Stebbleton, M.J., & Diamond, K.K. (2018). Advocating for Career Development and Exploration as a High-Impact Practice for First-Year Students. *Journal of College and Character*, 19(2), 160–166. <https://doi.org/10.1080/2194587x.2018.1445646>
- Strawderman, L., Mohammadi-Aragh, M., Iqbal, U., Knizley, A., Johnson, J., Sullivan, R., & Brauer, S. (2022). Improving engineering transfer student onboarding and retention through scholarship and programmatic interventions. *ASEE Annual Conference & Exposition*.
- Thiry, H., Zahner, D.H., Weston, T., Harper, R., & Loshbaugh, H. (2023). How can universities support STEM transfer students? A framework for strategic planning and action. *Change: The Magazine of Higher Learning*, 55(4), 11–22. <https://doi.org/10.1080/00091383.2023.2213571>
- Tobolowsky, B.F., & Cox, B.E. (2012). Rationalizing neglect: An institutional response to transfer students. *The Journal of Higher Education*, 83(3), 389–410. <https://doi.org/10.1353/jhe.2012.0021>
- Totonchi, D.A., Perez, T., Lee, Y., Robinson, K.A., & Linnenbrink-Garcia, L. (2021). The role of stereotype threat in ethnically minoritized students' science motivation: A four-year longitudinal study of achievement and persistence in STEM. *Contemporary Educational Psychology*, 67, 102015. <https://doi.org/10.1016/j.cedpsych.2021.102015>
- Townsend, B.K., & Wilson, K. (2006). “A hand hold for a little bit”: factors facilitating the success of community college transfer students to a large research university. *Journal of College Student Development*, 47(4), 439–456. <https://doi.org/10.1353/csd.2006.0052>
- Wang, X., Lee, S.Y., Nachman, B.R., & Zhu, X. (2020). It matters long before: How early exposure to faculty and advisors at baccalaureate institutions relates to upward transfer. *Educational Researcher*, 50(2), 105–114. <https://doi.org/10.3102/0013189x20956659>