

Adjustment Experiences Among Engineering Transfer Students: A Pilot Study at a Four-Year Institution in Florida

Caroline Lubbe, University of Florida

Caroline Lubbe is a second year Chemical Engineering Ph.D. candidate at the University of Florida. She works with Dr. Sindia Rivera-Jiménez within the Engineering Communities & Participatory Change (ECoPaC) research group. Her research efforts center on the post-transfer self-adjustment experiences of engineering community college transfer students.

Dr. Sindia M. Rivera-Jiménez, University of Florida

Dr. Rivera-Jiménez is an Assistant Professor at the Department of Engineering Education (EED) and an affiliate faculty to the Department of Chemical Engineering at the University of Florida. Her research focuses on understanding the role of engineering communities while enacting their agency in participatory and transformational change. She is particularly interested in broadening the participation of minoritized communities by studying the role of professional development in shaping organizational cultures. As an education practitioner, she also looks at evidence-based practices to incorporate social responsibility skills and collaborative and inclusive teams into the curriculum. Dr. Rivera-Jiménez graduated from the University of Puerto Rico at Mayagüez with a B.S. and Ph.D. in Chemical Engineering. She earned an NSF RIEF award recognizing her effort in transitioning from a meaningful ten-year teaching faculty career into engineering education research. Before her current role, she taught STEM courses at diverse institutions such as HSI, community college, and R1 public university.

Ms. Ayla Sevilleno, University of Florida

Ayla Sevilleno is pursuing a degree in Mechanical and Aerospace Engineering at the University of Florida and expects to graduate in Spring 2028.

Justin Ortagus, University of Florida

Justin C. Ortagus is an Associate Professor of Higher Education Administration & Policy and Director of the Institute of Higher Education. His research typically examines the impact of online education, community colleges, and state policies on the opportunities and outcomes of underserved college students. His recent work has been funded by the National Science Foundation, the Bill & Melinda Gates Foundation, and the William T. Grant Foundation and published in such venues as Educational Evaluation and Policy Analysis, American Educational Research Journal, and Educational Researcher. Dr. Ortagus has testified before the U.S. House Committee on Education and Labor on the role and influence of need-based financial aid for low-income students. His work and expertise have also been featured in USA Today, NBC News, Forbes, Teen Vogue, CNBC, and other news media outlets.

Adjustment Experiences Among Engineering Vertical Transfer Students:
A Pilot Study at a Four-Year Institution in Florida

Authors: Caroline Lubbe¹, Sindia M Rivera-Jiménez, Ph.D.², Ayla Sevileno³, Justin Ortagus, Ph.D.⁴

Affiliations: ¹UF Department of Chemical Engineering, ²UF Department of Engineering Education, ³UF Department of Mechanical and Aerospace Engineering, ⁴UF School of Human Development and Organizational Studies in Education

Abstract

The vertical transfer pathway, where students start at community colleges before transferring to four-year institutions, significantly impacts workforce development, contributing 12% to 17% of all engineering bachelor's degrees awarded annually. Because engineering transfer pathways enroll a high proportion of Black and Hispanic students and support economic mobility for lower-income and first-generation learners, understanding their adjustment is critical to advancing equity and student success. This study presents results from a pilot survey of 59 vertical transfer students in engineering at Sunshine University (SU), a large, selective R1 university in Florida. The survey, adapted from the Laanan Transfer Student Questionnaire (L-TSQ), examined students' academic, social, and psychological adjustment. Quantitative analysis showed significant gender differences: women reported more difficulty than men, with notable differences in several adjustment areas. Thematic analysis of qualitative open-ended responses highlighted themes in students' adjustment, such as SU's academic rigor, the importance of community support, and the skills needed for a successful transfer. Findings from this study emphasize the need for targeted institutional support to address gender disparities and enhance community-building among engineering vertical transfer students. Future work will expand the study to include a larger, more diverse sample and investigate longitudinal trends in adjustment experiences to inform evidence-based policies that support vertical transfer student success in engineering education.

Keywords: Transfer Students, Vertical Transfer Pathway, Engineering workforce, Gender Disparities, Academic and Social Adjustment

1. Introduction

1.1 Significance. The vertical transfer pathway, where students begin at community colleges and then transfer to four-year institutions, constitutes 12% to 17% of all engineering bachelor's degrees awarded annually [1]. Compared to traditional engineering students, Black and Hispanic students are more highly represented among engineering community college and transfer students [1]. The vertical transfer pathway is crucial for promoting social and economic mobility by providing affordable access to high-demand engineering careers, especially for lower-income students [2], [3]. Therefore, understanding this important student population is essential to improving engineering student outcomes, including recruitment, persistence, and degree completion.

Different U.S. states have unique demographics, policies, and higher education structures, making Florida's context vital for studying engineering vertical transfer students. Florida's articulation agreements, robust community college system, and 32% vertical transfer participation rates offer a unique perspective on student experiences [4]. These factors make Florida an ideal setting to study the challenges and opportunities for vertical transfer student success in engineering programs. Our focus on Florida's engineering vertical transfer students will yield insights for state-

specific and regional strategies to enhance outcomes. By identifying barriers and effective practices, this study will help institutions strengthen support for vertical transfer students and respond to ongoing challenges in recruitment, retention, and degree completion in engineering.

This study builds on our previous benchmarking study of the same large, selective, research-intensive institution [5]. This previous study revealed inequities in degree completion rates by demographics such as gender, race, ethnicity, and immigration status [5]. We found that women earn engineering degrees at lower rates than men, while international students complete them at higher rates than domestic students [5]. Building on these findings, the present survey pilot study allows exploration of the reasons behind these discrepancies by collecting responses from vertical transfer students. It examines how academic, social, and psychological challenges affect their persistence and success. By linking these experiences to degree outcomes, this work aims to identify strategies that strengthen talent development and expand access to engineering careers.

2. Background

Understanding the adjustment experiences of engineering vertical transfer students requires closely examining the academic, social, and psychological challenges they face, as well as applying theoretical frameworks that illuminate how students navigate these complex transitions. This section reviews research, highlights key adjustment factors, and introduces theoretical frameworks guiding this study. By integrating past insights, we explore factors impacting adjustment and coping processes used by vertical transfer students.

2.1 Challenges at 4-year institutions. Past studies on engineering transfer students focus on *transfer shock*, a decrease in GPA after moving to a four-year institution [6]. While this phenomenon is most noticeable in the first semester, it can last longer, indicating a broader process called "transfer norming" [6]. However, the transition is more complex than just GPA decline and requires a comprehensive analysis with various data collection methods to better understand students' adjustment experiences.

In the last decade, significant studies have advanced our understanding of transfer students' experiences at four-year institutions. Ogilvie and Knight studied 1,000 engineering transfer students across four Texas universities, exploring students' post-transfer problems and perceptions [7]. Typical challenges included costs, the transfer credit process, and increased academic expectations. The authors argued that future studies should not focus on "input or output models for predicting transfer students' outcomes" but instead pursue an "increased understanding of transfer students' experiences with post-transfer transition processes" [7, p. 314]. Berhane et al. studied three Black women engineering transfer students from West African countries, discussing the complex interactions among their gender, race, and culture [8]. These studies illustrate the nuances of engineering transfer students' post-transfer adjustment and the need for research to reach a deeper understanding of their identities and experiences.

A 2013 review by Bahr et al. summarized community college students' post-transfer experiences and outcomes [9]. This literature review called for longitudinal research, analysis of transfer student subpopulations, and a focus on various academic disciplines. It discussed aspects of the post-transfer transition, including student involvement, capital, and transfer receptivity. To measure these constructs, the Laanan Transfer Student Questionnaire (L-TSQ) has been widely adopted as a validated survey instrument that incorporates multiple aspects of post-transfer adjustment [10]. L-TSQ has been used previously to identify factors that aid engineering transfer

student adjustment at receiving institutions, including personal networks, resources, skills, and environments [11]. While these studies focused on diverse geographical contexts, including Texas, our study situates these factors within Florida's unique transfer context, where vertical transfer pathways are highly prominent. This allows us to examine vertical transfer student adjustment while incorporating a more targeted and theoretical approach.

2.2 Theories to understand adjustment at 4-year institutions. As Ogilvie and Knight argue [7], more research is needed to understand the challenges and complexities of students' post-transfer experiences. Theoretical frameworks provide essential tools for analyzing how transfer students adjust to four-year institutions. Since the 1960s, researchers have drawn from various disciplines to study these experiences, with more recent work developing transfer-specific theories [12].

Laanan et al. proposed a framework examining academic and social adjustment through four components of transfer student capital: academic counseling, perceptions of the transfer process, faculty relationships, and study skills developed at community college [13]. Transfer student capital was dependent upon four variables: academic counseling experiences, perceptions of the transfer process, faculty experiences at the community college, and learning and study skills acquired at the community college [13]. This framework was later expanded to incorporate Community Cultural Wealth, offering a more critical lens on the experiences of diverse students [14]. The accompanying Laanan Transfer Student Questionnaire (L-TSQ) [10], developed in 2004, remains a widely used instrument for assessing post-transfer adjustment. For example, one study using the L-TSQ found that women in STEM reported more academic adjustment challenges than men [15]. However, the survey alone does not reveal how students cope with these challenges.

To explore coping processes, we apply Spencer's Phenomenological Variant of Ecological Systems Theory (PVEST) alongside Transfer Student Capital. PVEST conceptualizes adjustment through five stages: (1) risk contributors and protective factors, (2) stress engagement, (3) reactive coping methods, (4) emergent identities, and (5) life-stage outcomes [16]. In our study, students' backgrounds, support systems, and transfer capital comprise Stage 1. The stressor, transferring to SU, initiates Stage 2, during which students experience new academic and social demands. In Stage 3, students adopt coping strategies that evolve over time into stable responses and identities (Stage 4). Stage 5 encompasses outcomes such as persistence and degree completion.

Both Transfer Student Capital and PVEST are essential to our mixed-methods study. Students' transfer capital (or lack thereof) serves as a protective factor or risk contributor that shapes how they engage with stressful situations and develop coping strategies. In this study, we use Transfer Student Capital to inform our quantitative analysis and PVEST to guide our qualitative interpretation. Few studies apply PVEST to engineering transfer students, making our approach a novel contribution to understanding their adjustment experiences. By integrating both frameworks, we gain a more comprehensive understanding of the transitional challenges and adaptation strategies of vertical transfer students in engineering.

3. Methodology

3.1 Research Questions. This study employs a concurrent mixed-methods design [17] to explore the following research questions:

RQ1 (Quant): How do vertical transfer engineering students rate their academic, social, and psychological adjustment experiences at a large, public, selective, research-intensive university, and do these reported adjustment experiences differ significantly across demographic groups (e.g., gender, ethnicity, immigration status)?

RQ2 (Qual): How do vertical transfer engineering students describe their adjustment experiences, and what coping strategies or resources do they identify as critical during their transition?

RQ3 (Integration): In what ways do the qualitative findings explain and contextualize the quantitative results regarding vertical transfer students' adjustment experiences?

To address RQ1, we analyzed quantitative survey responses, focusing on the L-TSQ items validated by Laanan [10]. For RQ2, we examined open-ended L-TSQ responses through PVEST, exploring participants' experiences. After analyzing quantitative and qualitative data, we integrated findings (RQ3) by comparing them side-by-side to identify points of convergence and divergence. This approach deepened our understanding of engineering vertical transfer students' adjustment experiences by using qualitative narratives to contextualize the quantitative results.

3.2 Data Collection and Analysis. To explore the adjustment of vertical engineering transfer students, we piloted a modified Laanan Transfer Student Questionnaire (L-TSQ) at SU, a large, public research-intensive university in Florida. The survey focused on students' perceptions of SU and their transfer experiences. Recruitment was through SU's engineering advisors, targeting students from two-year programs. A total of 59 engineering vertical transfer students completed the survey and received a \$10 gift card. This study followed an approved IRB protocol.

This study employed a mixed-methods design, collecting both quantitative and qualitative data simultaneously [17]. The *quantitative component* included Likert-scale items from the validated L-TSQ survey [10], assessing participants' satisfaction and perceived academic, social, and psychological adjustment. Additionally, demographic data (gender, race, ethnicity, immigration status, age, and first-generation status) were gathered to explore potential group differences. Quantitative responses were analyzed using descriptive and exploratory statistical methods, such as confirmatory factor analysis (CFA) for factor structure verification, Cronbach's alpha for reliability assessment, and Mann-Whitney U tests for comparing adjustment ratings across demographic groups. The Mann-Whitney tests were chosen due to ordinal data, non-normal distribution, and unequal variances [18]. These analyses identified patterns in students' adjustment experiences and explored differences among demographic groups, analyzing Laanan's factors from the original L-TSQ. However, these analyses are exploratory, focusing on self-reported experiences rather than predictive or causal relationships.

The *qualitative component* included open-ended questions to gather reflections on students' adjustment, actions their previous institution or SU could have taken to ease the transition, and advice for future transfer students. The data were analyzed using thematic analysis to identify and interpret patterns [19]. An inductive coding approach was employed by the first author to capture emergent themes, ensuring responsiveness to participants' perspectives. A codebook with defined codes and examples was developed and refined through regular debriefing meetings with co-authors, enhancing the analysis's trustworthiness and validity. Two team members then conducted deductive coding independently, applying predefined codes across the dataset. To ensure reliability, the coders held structured reconciliation meetings to address discrepancies and refine definitions.

until consensus was achieved. Spencer's PVEST offered a theoretical framework for interpreting participants' adjustment experiences and coping strategies during their transition to SU.

4. Results and Analysis

4.1. Demographics. As shown in Table 1, the sample was diverse, representing various backgrounds and identities. The high representation of Hispanic/Latino students (53%) aligns with Florida's demographics and our previous benchmark study at SU [5], providing a basis for exploring trends specific to this population. About two-thirds identified as men, with women at 34%, slightly higher than the typical 24.8% reported in national data for engineering students [20]. The sample also included a range of citizenship statuses: 60% were U.S. citizens by birth, 18% were naturalized citizens, 16% held permanent resident visas, and 7% held temporary visas. These variations may reflect legal or institutional challenges that shape students' adjustment experiences. The age distribution at the time of transfer was diverse, with most participants (45%) aged 20–21, 29% aged 18–19, and 20% aged 22–23, highlighting the potential for differing adjustment needs based on life stages and prior experiences.

Table 1. Participant Demographics

Gender	N=58
Men	66%
Women	34%
Race/Ethnicity	N=55
Asian, non-Hispanic	9%
Black/African American, non-Hispanic	7%
Hispanic/Latino of any race	53%
Multiracial, non-Hispanic	2%
White, non-Hispanic	29%
Intersectionality (Race and gender)	N=54
White non-Hispanic men	20%
White non-Hispanic women	7%
Non-White men	44%
Non-White women	28%
Citizenship	N=57
U.S. Citizen, native born	60%
U.S. Citizen, naturalized	18%
Non-U.S. Citizen, w/ permanent resident visa	7%
Non-U.S. Citizen, w/ temporary resident visa	16%
Age at transfer	N=56
18-19	29%
20-21	45%
22-23	20%
24+	7%

Table 2. Parental Education Levels and Degree Aspirations

Parental education level	Mother	Father
N=59	N=59	N=59
Did not finish high school	2%	3%
High school graduate/GED	15%	8%
Attended college but did not receive a degree	14%	8%
Associate or other two-year degree	7%	8%
Bachelor or other four-year degree	32%	32%
Master's degree	20%	22%
Doctorate degree	3%	8%
N/A	3%	3%
Don't know	3%	5%
Highest Intended Degree to Obtain		N=59
Bachelor's or other four-year degree		44%
Master's degree		37%
Doctorate degree		12%
Medical degree		5%
Don't know		2%

We collected data on parental education and students' degree aspirations. Table 2 shows that 32% of both mothers and fathers held a bachelor's degree, and over 20% held a master's degree, indicating high parental education levels. Most participants aimed to complete a bachelor's degree (44%) or master's degree (37%), with smaller proportions pursuing doctoral (12%) or medical (5%) degrees. This data underscores the potential influence of family background on academic

and adjustment experiences, aligning with literature highlighting the role of parental education in shaping students' aspirations and achievements in higher education [21], [22].

These demographic variables served as key comparison groups in our analysis of adjustment factors to explore whether students' self-reported experiences differed by identity, as guided by RQ1. While we highlight some observable differences, such as the proportion of White men (20%) and non-White women (28%), the current sample size did not allow for formal statistical testing of intersectional effects. Future research with larger samples should more systematically explore the impact of intersecting identities on transfer student adjustment.

4.2. Quantitative analysis (RQ1). This study focuses on survey items related to students' perceptions of SU and their post-transfer adjustment. Participants used a 5-point Likert scale from "Strongly Disagree" to "Strongly Agree," with responses coded from 1 to 5, where higher values indicate greater agreement. To address RQ1, we analyzed whether students' perceptions and adjustment experiences differed by demographics, including gender, Hispanic/Latino identity, race, citizenship status, age, first-generation status, and highest intended academic degree.

4.2.1. General perceptions of the receiving institution. The students' general perceptions of SU were analyzed using items grouped into two factors from Laanan's original survey: university satisfaction and stigma as a transfer student [10]. Table 3 presents the items and results of the confirmatory factor analysis (CFA). Internal consistency for both factors was acceptable ($\alpha = 0.78$ for satisfaction, $\alpha = 0.88$ for stigma), indicating that the items within each factor reliably measured a single underlying construct. This strengthens the validity of the group comparisons and supports the use of these scales in understanding transfer students' perceptions of the receiving institution.

To calculate the factor scores, we averaged the relevant items for each participant and performed Mann-Whitney U tests to compare scores across demographic groups. Our demographic comparisons (e.g., gender, race, citizenship) showed no significant differences. On average, participants reported a high level of satisfaction with SU, with responses between the "Somewhat agree" and "Strongly agree". Additionally, perceived stigma as a transfer student was low, with responses averaging between the "Somewhat disagree" and "Neither agree nor disagree".

Table 3. Factors relating to students' general perceptions of SU

Description of factors	Factor loading
University satisfaction	$\alpha = 0.78$
The courses I have taken at Sunshine University are interesting and worthwhile.	0.79
Sunshine University is an intellectually stimulating place to be.	0.82
I would recommend to other transfer students to go to Sunshine University.	0.89
If I could start over again, I still would go to Sunshine University.	0.60
Stigma as transfer student	$\alpha = 0.88$
Because I am a "transfer student", most students tend to underestimate my abilities.	0.91
Because I am a "transfer student", most faculty tend to underestimate my abilities.	0.88
Because I am a "transfer student", most teaching assistants tend to underestimate my abilities.	0.84
There is a stigma on campus against students who start at another institution or community college.	0.83

4.2.2. Adjustment and social support. As shown in Table 4, we analyzed three factors influencing student adjustment: academic, social, and psychological. Negatively worded items were reverse-coded so that higher scores reflect greater adjustment levels. Cronbach's alpha indicated high internal consistency for social adjustment ($\alpha = 0.86$), moderate for psychological adjustment ($\alpha = 0.62$), and low for academic adjustment ($\alpha = 0.46$). Due to the low reliability of the academic adjustment scale, results related to this factor should be interpreted cautiously. Using Mann-Whitney U tests, we compared factor scores across demographic groups. Only gender yielded statistically significant differences: women reported lower levels of academic and psychological adjustment than men ($p < 0.05$). No other demographic variables showed significant differences. On average, students reported lower academic adjustment (between "Somewhat disagree" and "Neither agree nor disagree") compared to social and psychological adjustment (between "Neither agree nor disagree" and "Somewhat agree").

Table 4. Factors related to participants' adjustment and social support.

Description of factors	Factor loading
Academic adjustment	$\alpha = 0.46$
Adjusting to the academic standards or expectations at Sunshine University has been easy.	0.72
I experienced a drop in grades (GPA) during my first semester at Sunshine University. (reverse coded)	0.76
My level of stress increased when I started at Sunshine University. (reverse coded)	0.59
Social adjustment	$\alpha = 0.86$
Adjusting to the social environment at Sunshine University has been easy.	0.80
It is easy to make friends at Sunshine University.	0.91
I am meeting as many people and making as many friends as I want at Sunshine University.	0.90
I am involved in on campus events and activities at Sunshine University.	0.73
Psychological adjustment	$\alpha = 0.62$
I often feel overwhelmed by the size of the student body. (reverse coded)	0.68
The large classes intimidate me. (reverse coded)	0.83
It is easy to find my way around campus.	0.52
Upon transferring I felt alienated at Sunshine University. (reverse coded)	0.70

4.2.3. Correlation between factors. We calculated Spearman's correlation coefficients to examine relationships among the five adjustment factors. University satisfaction was positively associated with both social and psychological adjustment but showed little connection to academic adjustment. Stigma was negatively correlated with all adjustment outcomes, most strongly with psychological adjustment ($r = -0.44$, $p < .001$). Academic adjustment was moderately correlated with both social ($r = 0.30$, $p < .05$) and psychological ($r = 0.39$, $p < .01$) adjustment, while social and psychological adjustment were strongly correlated ($r = 0.53$, $p < .001$), highlighting the close link between emotional and social integration for transfer students.

Table 5. Correlation matrix. * $p < .05$, ** $p < .01$, *** $p < .001$

	University satisfaction	Stigma	Academic adjustment	Social adjustment	Psychological adjustment
University satisfaction	1.0	-0.23	0.05	0.39 **	0.38 **
Stigma as transfer student	-0.23	1.0	-0.19	-0.37 **	-0.44 ***
Academic adjustment	0.05	-0.19	1.0	0.30 *	0.39 **
Social adjustment	0.39 **	-0.37 **	0.30 *	1.0	0.53 ***
Psychological adjustment	0.38 **	-0.44 ***	0.39 **	0.53 ***	1.0

4.2.4. Analysis of the Quantitative Results. These findings address RQ1 by snapshotting how vertical transfer engineering students adjust to life at a large, research-intensive university. Students reported moderate success socially and psychologically but struggled more with academic adjustment. On average, they felt somewhat connected and emotionally stable, but less confident in meeting academic expectations. Gender differences emerged: women experienced significantly more difficulty with academic and psychological adjustment than men. Other group differences based on race, ethnicity, immigration status, or first-generation status were not statistically significant, possibly due to small sample sizes. Notably, students satisfied with the university reported stronger social and psychological adjustment, while those feeling stigmatized as transfer students faced more emotional and social difficulties. These results highlight the importance of a welcoming environment and stigma reduction in supporting transfer student success, particularly for women in engineering. To understand the challenges behind these findings and how students cope, we now turn to the qualitative results addressing RQ2.

4.3. Qualitative analysis (RQ2). Table 6 summarizes major themes from the open-ended survey responses, mapping them to the corresponding PVEST constructs. These themes, derived from four questions, highlight how vertical transfer students interpret their adjustment experiences along with protective factors, stressors, and coping responses. The full thematic analysis follows.

Table 6. Survey Thematic Analysis

Themes (T)	Alignment with PVEST Constructs
Survey Question 1: What might your previous institution have done to help?	
T1. More rigorous engineering coursework	Protective factors
T2. Guidance and transparency in the transfer process	Protective factors
T3. Facilitation of personal skills and motivation	Protective factors
T4. Nothing could be done	Protective factors; Reactive coping methods
Survey Question 2: What helped you adjust to SU?	
T5. Community and support systems	Reactive coping methods
T6. Personal skills development	Stable coping responses; Emergent identities
T7. Flexibility in campus resources	Stress engagement
Survey Question 3: What could SU have done to ease your transition?	
T8. Treat as an individual, not just a student	Reactive coping methods
T9. Reduce uncertainties during transfer	Risk contributors
T10. Validate past coursework and credits	Protective factors
T11. Limited institutional influence	Reactive coping methods
Survey Question 4: What advice do you have for future transfer students?	
T12. Expect a lifestyle change and build coping skills	Protective factors
T13. Personal encouragement	Reactive coping methods; Emergent identities
T14. Build strong academic and social foundations	Protective factors; Reactive coping methods
T15. Be knowledgeable and plan strategically	Protective factors
Common themes found between survey questions 1 to 4	
T16. Engineering courseload rigor at 4-yr institution	Stress engagement
T17. Community and individualized support	Reactive coping methods
T18. Skills and knowledge aiding their success	Protective factors

Theme 1: Challenge students with more rigorous engineering coursework. Many participants reported that their previous institution's coursework did not adequately prepare them for the academic expectations at SU, a selective, research-intensive university. One student noted, "Coursework could be more rigorous to adequately prepare for SU transition," while others called for more engineering-specific courses with real-world applications, beyond general education in math and science. These reflections suggest that students not only experienced a gap in content, but also in the kind of problem-solving and conceptual thinking expected in upper-level engineering. In PVEST terms, strong academic preparation would function as a *protective factor*, buffering students from the *stress engagement* of adjusting to a more cognitively demanding environment. Without that foundation, students are forced into *reactive coping*, often through trial-and-error learning or increased emotional strain, rather than proactive adaptation. This gap is especially concerning given the uneven distribution of rigorous STEM offerings across community colleges, which may exacerbate equity challenges in transfer success.

Theme 2: Guidance and transparency in the transfer process. Several participants felt their previous institution failed to provide clear, timely guidance during the transfer process, particularly regarding requirements for SU. Students wanted earlier and more transparent communication about advising, credit transfer, and expectations at the receiving institution. One student stated their institution could have "Provided information on transferring to SU from the beginning. Hold a preview event to teach information on many topics, especially on advising." In PVEST terms, proactive advising and transfer transparency function as *protective factors* that could have mitigated the *stress engagement* triggered by navigating unfamiliar academic systems. The absence of these supports likely intensified uncertainty and hindered students' ability to plan strategically, forcing them to rely more heavily on *reactive coping strategies*. These findings point to a need for improved cross-institutional coordination and early advising interventions that treat transfer as a long-term pathway, not a last-minute decision.

Theme 3: Facilitation of personal skills and motivation. Many participants emphasized that strong personal skills, such as time management, self-discipline, and effective study habits, were critical to their adjustment at SU. One student shared that their previous institution could have "Provided me with the skills needed to be successful when transferring," pointing to a gap in transferable learning strategies. These competencies act as *protective factors* in the PVEST framework, enabling students to engage productively with the academic and social demands of a more rigorous environment. Importantly, these skills were not seen as generic college readiness traits but as context-specific tools for persistence in engineering [23]. Their absence made students more susceptible to stress, especially in courses requiring independent problem-solving, sustained focus, and project-based teamwork. In the absence of structured support, students must rely on *reactive coping*—developing these habits on their own while managing heavy academic loads. The variation in personal skill development across community colleges is often tied to differences in advising models, course design, and co-curricular opportunities [24]. Institutions that do not explicitly support metacognitive skill-building may inadvertently leave transfer students underprepared. These findings suggest that intentional scaffolding of personal agency, through academic coaching, transfer seminars, or embedded skill-building modules, can substantially reduce early stress engagement and improve transition outcomes.

Theme 4: Nothing could be done. Several students indicated that there was nothing their previous institution could have done to ease their transition to SU. These responses fell into two broad categories. Some students felt well-prepared by their sending institution, particularly those from

State College A (SCA), which has a formal engineering transfer partnership with SU. These students credited the structured transfer pathway for providing the support and predictability they needed to transition successfully. In contrast, other students expressed that the challenges they faced, such as commuting, financial independence, or living alone for the first time, were largely personal and beyond institutional control. For example, one student noted, “Nothing, the difficulty is in the longer commute, since I live off campus and don't have a car... and having new challenges from having to live alone for the first time.” In PVEST terms, these responses reflect how students either benefited from institutional *protective factors* (e.g., articulated partnerships) or had to develop *reactive coping methods* to manage stressors outside academic preparation. The variation in responses underscores that not all transfer pathways provide the same structural support, and that many students rely on individual resilience in the absence of formal systems. These findings suggest that while some barriers are personal, expanding institutional support beyond academics, particularly for housing, transportation, and life transition resources, can reduce the burden placed solely on students’ adaptive capacities.

Theme 5: Community and support system. The most frequently reported factor that helped students adjust to SU was having a strong community or support system. This support came from two main sources: pre-existing relationships, such as family members or peers who also transferred, and new relationships formed after arriving at SU, including involvement in student organizations and peer interactions in class. One student shared, “I have friends from my previous institution who have also transferred,” while another emphasized, “Being involved with student organizations and talking with classmates.” In PVEST terms, these social networks represent *reactive coping methods*, resources students actively draw upon in response to stressors associated with transitioning into a new academic and social environment. These connections helped students manage feelings of isolation, navigate campus systems, and develop a sense of belonging. Importantly, not all transfer students have access to the same level of social capital [25], [26]. Those who transfer alone, lack prior ties, or come from under-resourced institutions may find it difficult to build these support systems quickly. This variation highlights the need for structured community-building opportunities at receiving institutions. Programs such as peer mentoring, transfer-specific student organizations, or facilitated social events can play a critical role in reducing adjustment stress and promoting retention among vertical transfer students in engineering.

Theme 6: Development of personal skills. Students mentioned personal attributes aiding in their success, such as persistence, time management, and challenging themselves to try new things. In some cases, participants grew these skills in response to challenges in the SU adjustment process. As their problem-solving strategies solidified into personal attributes, these new skills became part of their *stable coping responses* and *emergent identities*. Other participants mentioned skills they already had, particularly maturity from life experience. These participants were older than the typical college student, and they cited their age or taking gap years as factors helping them in their adjustment process. These participants believed that they had knowledge or wisdom due to their age, which in turn was a *protective factor* that helped them develop *stable coping responses* in their adaptation to SU.

Theme 7: Flexibility provided by Sunshine University resources. Some students highlighted how the availability of flexible campus resources at SU eased their transition. These included 24-hour libraries, quiet study spaces, and multiple modes of course delivery, such as in-person instruction and access to recorded lectures. These resources allowed students to structure their learning environments around their schedules, personal responsibilities, and commuting challenges. Within

the PVEST framework, these institutional supports represent elements of *stress engagement*. As students encounter new academic and logistical stressors post-transfer, flexible resources offer pathways to manage those demands proactively. Rather than feeling overwhelmed by rigid institutional norms, students who access flexible options may be more likely to respond with *adaptive coping strategies*. However, not all students may be equally aware of or able to access these resources. Students with less institutional knowledge, limited peer networks, or external obligations (e.g., caregiving, off-campus work) may struggle to take advantage of available supports. This variation underscores the importance of not just offering flexible options but ensuring that transfer students are explicitly oriented to them. Institutions can strengthen adjustment by integrating resource navigation into onboarding processes, embedding support structures in gateway courses, and tailoring services to meet the unique constraints faced by vertical transfer students.

Theme 8: Treat as an individual, not just a student. Beyond academic preparation, several students emphasized the importance of being recognized as whole individuals with social and emotional needs, not merely as transfer students navigating coursework. Many called for more opportunities to build community with peers who shared similar experiences. One participant suggested that SU should “Help transfer students meet each other, since we all understand each other,” highlighting a desire for relational belonging. Others recommended proactive outreach, such as check-ins or welcome events tailored specifically to transfer students. In PVEST terms, these responses reflect the use, and absence, of *reactive coping methods*. Students sought support systems that would help them manage the social stress of adapting to a new environment, particularly when their prior networks were no longer accessible. Without intentional community-building efforts, students may struggle to develop the peer connections and emotional resources needed to persist. Importantly, access to these forms of social integration often varies. Students who live off campus, commute, or transfer mid-year may face additional barriers to participating in social activities, compounding feelings of isolation. These findings point to the value of designing institutional practices that not only meet academic needs but also foster human connection, such as cohort-based orientations, peer mentorship, or affinity groups, to support holistic adjustment for engineering transfer students.

Theme 9: Reduce uncertainties during transfer. Many students described experiencing uncertainty during the transfer process, particularly around financial aid, course registration, and institutional communication. One participant reflected, “The only thing was financial uncertainty, specifically making it more clear what scholarships you will be eligible for once you start attending SU. The only thing that made me question transferring was not knowing if I would be increasing my financial burden by doing it.” Other students cited confusion about whom to contact, delays in class registration, and difficulty navigating SU’s website. These uncertainties created additional emotional and logistical stress during a period of significant academic transition. In PVEST terms, these forms of uncertainty act as *risk contributors*, increasing *stress engagement* and complicating students’ adjustment. In contrast, clearer communication, proactive advising, and transparent financial guidance could function as *protective factors* that buffer students from anxiety and empower them to plan effectively. When key information is delayed or decentralized, students must rely on *reactive coping strategies* to manage ambiguity, often with uneven results depending on prior experience or social capital. Systemic differences in institutional resources, advising quality, and transfer agreements may make these uncertainties more acute for students coming from under-resourced or smaller community colleges. These findings suggest that receiving institutions can enhance student adjustment by improving website navigation, streamlining

communication, and ensuring that financial aid and course registration processes are clearly communicated to transfer students well before their arrival.

Theme 10: Validate past coursework and credits. Several students expressed frustration that SU did not fully recognize or apply the coursework they had completed at their previous institutions. One participant noted that SU could be, “More generous with transfer credit, I’m in two classes that are complete repeats of what I’ve already done,” reflecting a broader sense among students that their prior efforts were undervalued. These experiences led some students to feel as though they were falling behind their non-transfer peers, both academically and in terms of time to degree completion. In the PVEST framework, recognition of prior learning functions as a *protective factor*, affirming students’ academic identity and reducing the stress associated with redundancy and perceived inequity. Conversely, when institutions require students to retake content they have already mastered, it creates additional academic and emotional burdens that elevate *stress engagement* and diminish students’ sense of progress and belonging. Students in this position may also begin to question their competence or readiness, prompting *reactive coping strategies* such as disengagement or loss of motivation.

The transfer credit evaluation process often varies by department, and students from smaller or less-resourced institutions may be disproportionately affected by inconsistent policies or lack of articulation agreements [27]. It is recommended that receiving institutions better support transfer students by improving credit transfer transparency, reviewing equivalency policies, and actively validating prior learning to ensure students do not unnecessarily repeat coursework, thereby enhancing efficiency and confidence in the transition [28].

Theme 11: Self-reliance amid limited institutional influence. As in Theme 4, some students felt there was little SU could have done to ease their transition. These responses were often brief, such as “Not much” or “I’m not sure”, and reflected a perception that adjusting to SU was ultimately the student’s personal responsibility. This framing suggests that for some students, the institution played a limited role in their post-transfer adjustment, and they had to rely on their own coping skills to navigate unfamiliar academic, social, or logistical challenges. Within PVEST, this reliance on internal resources reflects *reactive coping methods*, strategies students develop in response to stressors when external supports are perceived as unavailable, inaccessible, or ineffective. While some students may prefer autonomy, others may report self-reliance out of necessity due to low institutional visibility, minimal outreach, or lack of targeted transfer support. This underscores a broader point: student self-sufficiency often masks gaps in institutional responsiveness, particularly for students from backgrounds with less access to advising, mentoring, or insider knowledge of four-year systems. These findings highlight the need for proactive, not passive, approaches to transfer student support. Institutions should not assume that silence reflects satisfaction; rather, efforts to normalize help-seeking, implement structured outreach, and personalize support services can reduce over-reliance on individual coping and improve overall adjustment outcomes.

Theme 12: Expect a lifestyle change and build coping skills. Many students advised future transfer students to anticipate a significant shift in workload and pace after transferring to SU. They described the academic demands of engineering at SU as considerably higher than those at their previous institutions. To manage the transition, students recommended entering SU with a realistic understanding of the expectations and developing strong habits early on, particularly in time management and personal resilience. From a PVEST perspective, knowing what to expect and

arriving with essential skills in place can serve as *protective factors* that facilitate the adjustment process. Without these, students are more likely to experience stress and depend on *reactive coping methods* to keep up. However, not all students have access to preparation that emphasizes these skills. This underscores the importance of both sending and receiving institutions collaborating to communicate academic expectations clearly and supporting students in developing these coping strategies before they transfer.

Theme 13: Personal encouragement. In their responses, many students offered words of encouragement to future transfer students. Some endorsed SU as a worthwhile destination, while others shared affirmations to help peers build confidence during the adjustment period. Examples include: “Relax, everything will work itself out at the end. Just try your best to adjust in the beginning, you’ll have time to get more involved,” “Go for it. It is definitely something that they won’t regret,” and “Believe that you are smart enough to be here. Just because we did not have the same start, does not make us less than others.” These responses reflect students’ recognition that the transition to SU can be stressful, but also that it is manageable and meaningful. From a PVEST perspective, such encouragement represents both *reactive coping methods* and the development of *emergent identities*, where students begin to see themselves as capable and belonging in the engineering environment at SU. Statements like “you are smart enough to be here” suggest a shift toward an adaptive, confident academic identity. While these affirmations may appear informal, they serve an important function in helping transfer students resist feelings of doubt or inferiority, especially in high-performance academic spaces. Not all students enter with the same internalized confidence, particularly those from underrepresented or historically marginalized groups. This insight highlights the value of peer mentorship, storytelling, and student-led messaging as institutional practices that can support identity development and belonging during transfer.

Theme 14: Build a strong academic and social foundation. Participants advised future students to build both academic and social foundations early in their transition. Some emphasized mastering introductory STEM content as essential preparation for more advanced engineering coursework. A strong foundation in core subjects was seen as a *protective factor*, providing students with the confidence and competence to succeed in demanding upper-level classes. Other participants highlighted the importance of making friends and getting involved on campus, noting the dual academic and emotional benefits of having a support system. As one student shared, “Try to talk to people even though you feel intimidated for being the new kid. It is extremely important for your academics and mental health to know people in your same major. That way you can overcome challenges together, but to also hang out.”

In PVEST terms, these strategies function as both *protective factors* and *reactive coping methods*, equipping students to handle academic challenges and providing social buffers during stressful periods of transition. This dual focus, academic preparedness and peer connection, suggests that adjustment is not only about mastering content, but also about developing the interpersonal networks that sustain persistence. However, students’ ability to form this foundation varies based on prior preparation, personality, and access to inclusive social spaces. Students from under-resourced schools or those who transfer mid-year may struggle more to build these networks. These insights underscore the importance of integrating social engagement opportunities into academic programming, such as learning communities, peer study groups, or major-specific orientation events, to help transfer students succeed both inside and outside the classroom.

Theme 15: Be knowledgeable and plan strategically for your goals. In their advice to future transfer students, participants emphasized the importance of gathering information and planning ahead. Their responses pointed to various types of practical knowledge, from selecting the right prerequisite courses to understanding housing options and financial costs. One student advised, “Make sure you are in the proper prerequisite classes for the transfer process. If possible, reach out to current students to understand where good housing is, what's available, and the average cost.” Another suggested, “Do as much research as possible. Visit the campus. Meet faculty/students at Sunshine University.” These responses highlight how early awareness and proactive decision-making can help students navigate the academic and personal demands of transfer. From a PVEST perspective, this kind of knowledge and goal-orientation functions as a *protective factor*, reducing uncertainty and helping students feel more confident and in control during the transition. Planning ahead allows students to anticipate stressors and engage in more *adaptive coping strategies*, rather than reacting under pressure. However, access to this kind of strategic information is not evenly distributed. Students from under-resourced institutions or first-generation backgrounds may have fewer opportunities to connect with mentors or gather insider knowledge about the transfer process [29], [30]. These insights point to the importance of targeted pre-transfer advising, bridge programs, and early outreach from four-year institutions to equip incoming engineering transfer students with the tools they need to succeed.

Theme 16: Engineering courseload rigor at 4-year institutions. Across multiple survey questions, students consistently referenced the high academic demands of SU’s engineering coursework, especially when compared to their previous institutions. They advised future transfer students to be prepared for the increased workload and emphasized the value of building a strong foundation in math and science through core STEM classes. Some participants also reflected that their transition would have been smoother had they taken more technically challenging courses prior to transfer. These findings echo previous research that highlights curricular mismatches between two-year and four-year institutions as a common adjustment challenge for STEM transfer students [11], [31]. From a PVEST perspective, the intense courseload at SU represents a form of *stress engagement*, a stage where students must respond to new academic demands with *coping strategies*. However, when students enter SU with a solid academic foundation and a realistic understanding of the expectations, those conditions serve as *protective factors* that ease the impact of that stress. Not all students have equal access to rigorous pre-transfer preparation [24]. Variations in institutional resources, STEM faculty expertise, and course offerings across community colleges mean that some students, particularly those from under-resourced or rural campuses, may arrive less prepared for SU’s engineering expectations. It is recommended to enhance curricular alignment between institutions, strengthen advising around course selection, and implement bridge programs that allow students to build the content knowledge and study strategies necessary for success in rigorous engineering environments.

Theme 17: Community and individualized support. Across multiple responses, participants highlighted the importance of supportive relationships in easing their transition, both at their previous institutions and at SU. These support systems included family, peers who transferred with them, new friends made through classes or organizations, and, in some cases, hoped-for connections with staff or advisors. Prior research similarly emphasizes that social networks are a critical factor in transfer students’ post-transfer adjustment [11], [31]. Within the PVEST framework, these relationships serve as *reactive coping methods*, resources that students turn to in response to the stress of adjusting to a new academic and social environment. Students who

successfully formed or maintained support systems often described these connections as instrumental in managing the emotional and academic challenges of transfer. Participants also frequently advised future students to get involved on campus to build such connections early. In addition, several responses pointed to a desire for more individualized outreach from SU, such as advisor check-ins or formal efforts to welcome and orient transfer students, to support adjustment. However, access to these kinds of support varies widely. Students who live off campus, commute, or transfer mid-year may face greater difficulty building social networks, while others may come from community colleges with limited transfer advising. These findings suggest that four-year institutions should not rely solely on students to find support independently. Instead, they should invest in proactive, personalized initiatives, such as peer mentoring, cohort-building programs, or structured advisor engagement, to ensure all transfer students receive the community and individualized attention needed to support their transition.

Theme 18: Personal skills and knowledge aiding their success. Across responses to multiple questions, participants described a range of personal skills and types of knowledge that supported their success at SU. These included time management, resilience, proactive planning, and familiarity with the transfer process. Some students reported that their community college did not provide adequate guidance, prompting them to navigate transfer logistics on their own. Others viewed their personal strengths—such as adaptability, persistence, or organizational skills—as key contributors to their adjustment. These insights align with prior research, which finds that students often attribute post-transfer success to their own characteristics and initiative [11], [31]. In PVEST terms, these personal skills and types of procedural knowledge represent important *protective factors* that help students manage stress engagement during the transition. Students with prior experience handling uncertainty or advocating for themselves were more likely to cope effectively with the demands of a selective engineering program. However, not all students enter the transfer process with the same level of preparation or confidence in navigating institutional systems. First-generation students or those from under-resourced community colleges may have less exposure to strategies for time management, self-advocacy, or transfer planning. This variation reinforces the need for institutions to incorporate skill-building opportunities into the pre-transfer experience and to offer continued support after students arrive. Transfer-specific orientations, academic coaching, and workshops on navigating STEM pathways could help level the playing field and reduce reliance on self-acquired skills alone.

5. Discussion

5.1. Academic, social, and psychological adjustment Patterns (RQ1). Our quantitative findings offer a nuanced view of how engineering vertical transfer students rate their academic, social, and psychological adjustment to SU. Students generally reported higher levels of satisfaction and social adjustment compared to academic adjustment. These findings align with previous research suggesting that while transfer students often adapt socially, they may struggle to meet the academic expectations of a research-intensive institution [11]. Notably, only gender yielded statistically significant differences: women reported lower academic and psychological adjustment than men. While other demographic differences were not statistically significant, this may be due to limited statistical power in our pilot sample. These findings contribute to the literature by reinforcing the importance of targeted academic support for transfer students, particularly in STEM disciplines. Programs that provide early academic advising, structured study groups, and academic bridge courses could better prepare students for upper-division engineering coursework. Our results also

suggest that academic and social domains of adjustment are interrelated – support in one area may benefit the other.

5.2. *Coping Processes and Adjustment Experiences (RQ2).* The qualitative analysis provided valuable insights into how students interpret and navigate their transfer experiences. Through the lens of PVEST, students revealed a wide range of protective factors (e.g., strong study habits, previous exposure to STEM content, supportive peers) and reactive coping strategies (e.g., building community, self-directed problem-solving) that shaped their adjustment. Students also described engaging with stress when encountering challenges such as financial uncertainty, unclear transfer pathways, or academic rigor beyond their previous experience. This work contributes to the literature by demonstrating that transfer student success is not solely dependent on academic preparedness; it also relies on access to social networks, institutional transparency, and identity-affirming messages. Educators should consider the role of both relational (peer/community) and procedural (advising/resources) supports in shaping student outcomes. These findings build on prior research that emphasizes the importance of institutional agents and ecological context in shaping transfer student persistence [11], [31].

5.3. *Integration of Quantitative and Qualitative Data (RQ3).* In conducting a mixed-methods study, we wanted to compare the qualitative and quantitative findings to gain a deeper understanding of our data. When analyzing our qualitative responses, we considered the lens of our factors in making meaning.

University Satisfaction and Stigma as a Transfer Student (Factors 1 & 2): Quantitative results indicated that students were generally satisfied with SU and reported low levels of perceived stigma. These findings were supported by the qualitative data: students frequently expressed satisfaction with their transfer experience and, in some cases, recommended SU to future transfer students. Similarly, very few qualitative responses referenced stigma, aligning with the survey data. This consistency across data sources strengthens confidence in the validity of these findings.

Academic, Social, and Psychological Adjustment (Factors 3, 4 & 5): In both datasets, academic adjustment emerged as the greatest challenge, while social adjustment appeared to be a relative strength. Qualitative responses emphasized the rigor of SU's engineering coursework, with students repeatedly highlighting the increased workload and difficulty. In contrast, the social environment was often described positively, with students noting the importance of peer relationships and supportive communities. These trends mirrored survey responses, in which students rated their academic adjustment lower than their social or psychological adjustment. The strong positive correlations between the three types of adjustment observed in the quantitative data were also reflected in the qualitative responses. For example, students frequently described forming study groups with peers in their major, indicating a connection between academic and social integration. These interdependencies reinforce the importance of addressing multiple dimensions of adjustment simultaneously.

5.4. *Study Limitations.*

This pilot study has several limitations. The quantitative analysis was constrained by a relatively small sample size ($n = 59$), limiting statistical power and generalizability, especially for demographic subgroup comparisons. Additionally, one key construct, academic adjustment, showed low internal consistency, indicating the need to refine survey items in future iterations. On the qualitative side, using short-answer survey items limited the depth of participants' responses.

While the coding process began with a single researcher, efforts to mitigate bias included collaborative coding and reconciliation meetings. Lastly, the study focused on early-stage adjustment and did not capture longer-term academic or identity-related outcomes, limiting the application of the full PVEST model.

6. Conclusions & Recommendations

This pilot study explored the adjustment experiences of engineering vertical transfer students at a large, selective public university, using a mixed-methods approach to examine both self-reported outcomes and students' reflections on their transition. Our findings provide insight into the academic, social, and psychological challenges students face, the coping strategies they use, and the institutional conditions that support or hinder their adjustment.

Quantitative results revealed that while students reported generally high satisfaction with the university and minimal experiences of transfer stigma, academic adjustment remained a key area of difficulty, especially for women. Qualitative responses reinforced these trends, with participants frequently citing the rigor of SU's engineering coursework as a primary stressor. In contrast, many students described social support, through friendships, peer networks, and student organizations, as a critical buffer during their transition. The integration of both data sources showed that students' academic, social, and psychological adjustment are interconnected, and that strengths in one domain can support resilience in others.

This work contributes to a growing body of literature emphasizing the importance of contextual, identity-aware, and skill-based support for STEM transfer students. Based on our findings and grounded in PVEST, we offer the following recommendations:

1. **Design interventions targeting risk contributors and protective factors:** Institutions should assess the full ecosystem of stressors students face, like financial uncertainty, delayed course registration, or lack of peer community, instead of only focusing on academic deficits. They should also strengthen protective factors (e.g., transparent advising, affirming spaces, peer-led mentoring). PVEST calls for balance by reducing stress engagement and amplifying protective inputs that influence long-term outcomes.
2. **Center identity development in transfer student programming:** PVEST describes how coping responses shape students' outcomes, such as persistence and belonging. Institutions should create environments for vertical transfer students to develop confident, agentic identities as engineers by validating their nontraditional pathways and avoiding deficit narratives. Structured reflection activities or identity-affirming curricula in early courses can help internalize a sense of capability and belonging.
3. **Use transfer student narratives as institutional data:** A PVEST-informed approach values students' experiences as data, providing insight into adaptation, resilience, and identity development. Institutions should collect and analyze feedback from vertical transfer students to guide structural reforms, such as revising orientation, improving inter-institutional articulation, or enhancing faculty training on inclusive pedagogy.

As a pilot study, our findings are not intended to be broadly generalizable but rather serve as a foundation for larger, more representative research. Future work will build on these findings by collecting data from a wider sample and examining longitudinal outcomes, including degree completion and psychosocial factors.

7. Author Contributions

Conceptualization and supervision: Rivera-Jiménez and Ortagus conceptualized the study, designed the analysis plan, and supervised the student researchers involved in the project. They also oversaw overall project coordination and secured funding. *Data collection:* Lubbe led the data collection. *Data preparation and analysis:* Lubbe and Sevileno cleaned the data, conducted descriptive analyses, and carried out quantitative and qualitative data analysis. Rivera-Jiménez deepened the thematic analysis by applying theoretical framing and clarifying each theme's relevance to practice. *Manuscript preparation:* Lubbe and Rivera-Jiménez co-wrote the manuscript. Sevileno and Ortagus contributed to manuscript revisions and editing.

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