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Unparallel Pathways: Exploring How Divergent Academic Norms Contribute to the Transfer Shock of STEM Students

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ABSTRACT

The overarching purpose of this study was to explore the post-transfer factors contributing to transfer shock. More specifically, this study sought to understand what academic normative differences exist between community college and transfer institution contexts and how these differences induced transfer shock. The study focused on STEM majors due to existing research showing they experience the greatest shock and increasing policy emphasis on students in STEM fields. Unlike existing literature that focuses on student characteristics associated with transfer shock, this study used a human capital frame to highlight the role of institutional contexts and norms in relation to shock. Participants in this study were transfer students who hailed from 17 geographically diverse community colleges across five states and completed semi-structured interviews. Results highlight substantial normative differences in terms of faculty interactions, divergent exam norms, and expectations of independent learning. Findings underscore the presence of a disjuncture in academic norms between community colleges and four-year transfer universities that helps explain transfer shock and transitional academic issues transfer students experience.

Recent policies to improve access to higher education have prompted a movement toward funding free community college for students (National Conference of State Legislators, 2016). Beginning in 2014, legislation in Tennessee, Oregon, and Minnesota enacted free community college programs; Kentucky will commence a program in 2020. To date, similar legislation has been introduced in another 10 states. In parallel with state legislation, Congress has introduced the America's College Promise Act of 2015 to offer tuition waivers to estimated nine-million community college students (National Conference of State Legislators, 2016). Such an enormous economic investment in higher education augments the pressures associated with accountability and evidence-based practices associated with community college student outcomes (National Conference of State Legislators, 2016).

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One metric consistently used to determine the effectiveness of community colleges is baccalaureate degree attainment (American Association of Community Colleges, 2016). For community college entrants, the pathway to baccalaureate degree completion is contingent on successful vertical transfer. Although not all community college students seek a baccalaureate degree, evidence suggests nearly 80% enter with these intentions (McPhail, 2011), but only 25 to 35% of the community college entrants successfully transfer to a four-year institution (Handel & Williams, 2012). Much literature has been devoted to understanding the effects vertical transferring has on educational attainment (e.g., Duggan & Pickering, 2007–2008; Glass & Harrington, 2002; Johnson, 2005; Lichtenberger & Dietrich, 2017; Monaghan & Attewell, 2015; Laanan, 1996, 2004, 2006, 2007). Although some evidence shows degree completion rates between transfer and native students are comparable (e.g., Adelman, 2005; T. G. Goodman et al., 2004; Long & Kurlaender, 2009; Melguizo & Dowd, 2009), a considerably greater body of evidence shows community college transferees have lower rates of baccalaureate degree completion (e.g., Alfonso, 2006; Doyle, 2009; Long & Kurlaender, 2009; Sandy et al., 2006) especially in STEM fields (Hu & Ortagus, 2019).

Research has linked a number of transfer students' characteristics and experiences to deflated degree attainment rates. Repeatedly, the literature has cited transfer grade point average (GPA) as the most prevalent factor associated with baccalaureate degree completion (e.g., Carlan & Byxbe, 2000; Townsend et al., 1993; Wang, 2009). Other academic factors highlighted in the literature include transfer readiness (Berger & Malaney, 2003), educational aspirations, and high school curriculum (Wang, 2009). Consistent across this research is an examination of characteristics prior to transfer. Exploration of students' post-transfer experiences in relation to academic success has been an under-explored line of inquiry. What is known is that transfer students are confronted with a variety of post-transfer social challenges, such as developing friends and new peer networks (Davies & Casey, 1999; Ellis, 2012). Of greater concern to the present study is research showing transfer students also experience academic challenges and suffer declines in academic performance, termed transfer shock (e.g., Carlan & Byxbe, 2000; Diaz, 1992; Elliott & Lakin, 2020; Glass & Harrington, 2002; Lakin & Elliott, 2016).

Transfer shock is a prevalent phenomenon that impacts over 75% of the community college transfers (Diaz, 1992), though the degree of transfer shock experienced varies by a number of factors. For instance, some studies have shown transfer shock largely occurs in the first semester following the transfer, though its longitudinal impact has been associated with college withdrawal (Glass & Harrington, 2002; Lakin & Elliott, 2016). We also know transfer shock is inversely related to transfer grade point average (Carlan & Byxbe, 2000; Lakin & Elliott, 2016; Luo et al., 2007; Pennington, 2006; Wang, 2009; Zhai & Newcomb, 2000) and total credits transferred (Ishitani, 2008). In

addition, transfer shock differentially impacts students by discipline. Cejda et al. (1998) showed evidence of greater transfer shock for math majors and findings from a single institution study found that business and science majors experienced more shock than students in education and liberal arts programs (Carlan & Byxbe, 2000). Lakin and Elliott (2016) explored transfer shock across different majors and found students in STEM (science, technology, engineering, and math) suffered the greatest amount of shock, and more importantly, that shock interacted with STEM majors to significantly and adversely impact degree attainment.

The origins of transfer shock are unclear, but a handful of studies suggest it may be attributed to differing academic norms (e.g., Cejda, 1997; Johnson, 2005). Hills's (1965) early research into transfer shock found it was more acute for community college transfers than for lateral university transfers implicating normative differences. Laanan (2007) showed transfer students who sensed greater academic competition among peers experienced more shock. Other literature has hypothesized that transfer shock may be a related class size which influences a transfer student's ability to make peer connections (Johnson, 2005). Although not directed at transfer shock, related research has found that academic integration and pace of instruction are factors adversely impacting transfer students' transitions suggesting normative differences might contribute to transfer shock (Packard et al., 2011; Townsend & Wilson, 2009).

In spite of research demonstrating the prevalence of transfer shock, especially across disciplines, it remains understudied particularly from a qualitative frame. The overarching purpose of this study was to explore the post-transfer factors contributing to transfer shock. More specifically, this study sought to understand what academic normative differences exist between community college and transfer institution contexts, and how these differences induced transfer shock which we conceptualized as a failure or significant underperformance on exams, assignments, and courses. Unlike existing literature that focuses on student characteristics associated with transfer shock, this study highlights the role of institutional contexts and norms in relation to shock. The focus on STEM majors is based on existing research showing they experience the greatest shock (Lakin & Elliott, 2016) and increasing policy emphasis on students in STEM fields. This study contributed to the existing literature by relying on a qualitative frame to provide much needed evidence on how students' educational trajectories unfold (Bahr, 2013). As advocated by Bahr (2013), rich descriptions of students' pathways through higher education and the identification of periods of hardships are a necessary precursor to the establishment of meaningful interventions that ameliorate outcomes.

Theoretical framework

A voluminous body of research has examined the underpinnings of college retention and persistence to degree completion (e.g., Adelman, 2006; Attewell et al., 2011; Bean, 2005; Kuh et al., 2011; Perna, 2006; Reason, 2009; Tinto, 1993). One model frequently cited is Tinto's (1993) model of student departure. This model emphasizes the complex interaction between students' pre-college characteristics and a postsecondary context. Educational aspirations, which are shaped by demographic and academic factors, serve as an initial motivational force for participating in postsecondary education. After matriculation, interactions between student and institutional normative agents (e.g., peers and faculty) serve as a means for integration and assimilation of academic and social norms. Successful assimilation of institutional norms is associated with retention, while repudiation of norms is related to institutional withdrawal.

Though widely accepted as a valid conceptualization of college retention, researchers have questioned the applicability of the Student Integration Model to non-traditional student populations (Hurtado & Carter, 1997; Tierney, 1992). Of concern in the present study is the assumption that successful integration is reliant on adaptation of a single, uniform set of norms within an institution (Tierney, 1992). Such a supposition is problematic for transfer students who enter a four-year context with exposure to two-year college norms where they have demonstrated academic success. As a result of this limitation, we rely on human capital as an alternative frame for understanding the transition of transfer students.

Human capital is rooted in economics and applies the concept of capital to the development of individual members of society (Becker, 1993). Economics traditionally defined capital as goods/commodities, labor, land, and management that contributed to industrial production (Becker, 1993). Unprecedented economic growth in the United States during the 20th century resulted in a reconceptualization and extension of capital to include other elements associated with production (Schultz, 1961). The contemporary economics literature now characterizes capital as a multidimensional construct that includes financial capital, customer capital, innovation capital, social capital, structural capital, relational capital, intellectual capital, and human capital (Edvinsson & Malone, 1997; Nafukho et al., 2004).

Human capital is the acquisition of knowledge, skills, and competencies by an individual that leads to greater productivity in the workforce (Becker, 1993; McMahon, 2009). It equates individuals' learning capacities and knowledge to other forms of capital valued by industry (Nafukho et al., 2004). Schooling is considered the most important investment in human capital (Judge et al., 1999). Through schooling, individuals learn valued skills, industry-relevant knowledge, and workforce readiness competencies such as time management, realistic self-appraisal, and teamwork. Thus, schooling can be viewed as

providing both hard and soft skills valued in multiple employment contexts which leads to greater individual productivity.

Human capital underscores the economic value of education. The rise of the knowledge economy (Powell & Snellman, 2004) has more closely associated the acquisition of human capital to education, especially postsecondary education. Access into many lucrative and prestigious occupations requires a postsecondary credential. From this perspective, the outlaid cost of college attendance is perceived as an investment expected to produce a return (Bettinger & Long, 2010). Evidence substantiates the economic and non-economic returns to higher education are significant (Baum et al., 2012; Hanushek & Woessmann, 2008). For instance, baccalaureate degree completion is associated with a wage premium and lower rates of unemployment (Bettinger & Long, 2010; Institute for Higher Education Policy, 2005).

The returns associated with higher education help explain the continued levels of participation in postsecondary education. For this reason, a robust body of literature has utilized human capital theory to understand students' postsecondary behaviors including college choice and persistence (e.g., Engberg & Allen, 2011; Hai & Heckman, 2017; Perna, 2006). However, research in this tradition also shows the economic benefits associated with the accrual of human capital are moderated by institutional prestige, institutional quality, and field of study (Black & Smith, 2006; Brewer et al., 1996). In other words, degrees earned from more prestigious institutions exhibit greater economic returns than degrees earned from less competitive institutions.[1] Equally important, the effects of institutional quality and prestige on economic returns have increased over time (Bettinger & Long, 2010), though this effect is attenuated for degrees in STEM fields (Langdon et al., 2011).

Human capital theory provides a backdrop for understanding students' motivation and drive for pursuing postsecondary education and degrees in STEM fields. By leveraging human capital theory, we can explore the impetus behind students' pursuit of transfer into selective and competitive four-year institutions, and highlight how differential norms between institution types may disrupt or inhibit the accrual of human capital. The human capital perspective is particularly salient to the present study given prior research has associated transfer shock to departures from STEM fields (Lakin & Elliott, 2016) affecting workforce productivity and private economic prosperity.

In addition to human capital, we relied on Transition Theory (Schlossberg, 1984) to provide insight into the transfer transition process itself. Schlossberg (1984) defined a transition as a full adaptation to an event which alters habits, relationships, and roles. The transition process involves three phases: *moving in, moving through, and moving out* (J. Goodman et al., 2006; Schlossberg, 1984). *Moving in* to a transition consists of early exposure to new norms, roles, and routines due to a transitional event. *Moving through* is considered the essence of the adaptation process where an individual slowly integrates new relationships, routines, and roles into daily life. Schlossberg (1984) contended transitions

prompt disequilibrium and *moving through* can be conceived of as the process for slowly regaining equilibrium. *Moving out* occurs when new roles and relationships have been fully integrated and equilibrium has fully been again achieved.

The ability to adapt to a transition and quickly assimilate new norms, roles, and relationships rests on four factors collectively termed the 4Ss: Situation, Self, Support, and Strategies. Situation involves the cause, timing, and durational conditions as well as prior experience with similar transitions which impact both the pace and ease of the adaptation process. Of particular salience to the present study is prior experience with a transition, such as the transition from high school to college, which can serve as a knowledge base that hastens adaptation. Self reflects personal characteristics such as confidence, resiliency, and self-efficacy that help individuals cope and manage transitions. Support relates to the availability of family and friends who can provide encouragement and relief during a transition. Strategies reflect the means individuals use to cope with difficult transitions and include whether individuals employ dysfunctional (e.g., drinking, drug use), beneficial (e.g., exercise) or non-existent (e.g., doing nothing) strategies.

Existing literature has utilized Transition Theory to understand college transitions (e.g., Flowers et al., 2014; Griffin & Gilbert, 2015) and found it appropriate for conceptualizing how students manage their postsecondary transition. Though a substantial portion of this literature explores the high school to college transition, it is increasingly being used to understand the transfer transition (e.g., Lakin & Elliott, 2016; Rodriguez-Kiino, 2013). We use Transition Theory to draw attention to how students experience inter-institutional transitions. Transfer students' prior experience with college transitions may invoke a muscle memory of personal, psychosocial, and coping characteristics; skills and strategies which can ease the transfer transition. In addition, by virtue of having remained at home during community college, transfer students may have maintained friend and familial support systems which can be relied upon during the transfer transition.

Taken in totality, transition and human capital theories provide a holistic perspective from which to examine the community college transfer transition. Transition theory provides insight into a transfer student's adaptation to a new postsecondary institution and context. Through exploration of academic norms, we can understand how normative variations of academic expectations and requirements influence how transfer students experience transfer shock and *move through* the transfer transition. Human capital helps us comprehend individuals' motivations for continuing postsecondary education beyond the community college. Further, our investigation into academic norms can shed light on how disjunctures in the transfer pathway, such as experiencing transfer shock, may serve to inhibit the acquisition of human capital and decisions to study and stay in STEM fields.

Data sources and sample

Data for this study came from two large, geographically distinct public institutions that possess strong ties with local feeder community colleges and admit a significant number of transfer students. One institution, University A, is located in the Southeast and the other, University B, is in the Mid-Atlantic region. Study sites were specifically selected due to their location in states with statewide articulation agreements that eased transfer through mandated acceptance of general studies curricula (Anderson, 2018) and the presence of transfer guide systems available on the web. In addition, one site was situated in a state that required guaranteed transfer of associate degree programs by major (Anderson, 2018). Within this context, study sites were specifically selected due to substantial transfer volume that comprised 15 to 20% of the entire student body and breadth of STEM degrees offered.

One institution matriculates over 20,000 undergraduate students per year in 10 academic colleges (Architecture, Human Science, Forestry, Nursing, Liberal Arts, Business, Agriculture, Science and Math, Education, and Engineering). The STEM programs matriculate 40 to 45% of the undergraduate population. The other institution matriculates 10,000 students with nearly 30% in the College of Science and Technology which included hard science majors (e.g., Biology, Chemistry, Physics), medical sciences (e.g., nursing, health science), computer sciences, and engineering.

Using institutional contacts, we obtained information on all community college transfer students who met two criteria: 1) they had transferred into the institution during the prior two semesters and 2) they were matriculated in a National Science Board (NSB) classified STEM field.[2] Consistent with NSB, we classified computer, mathematics, biology (inclusive of health fields), agriculture, environmental life sciences, physical sciences, and engineering as STEM fields. We excluded social sciences from our definition of STEM. We contacted all potential participants who met these criteria and invited them to participate. To ensure gender distribution and breadth of STEM degrees within our operational definition, 45 participants were purposefully selected, 37 of which formed our final sample resulting in an 82% participation rate. The final sample included participants from 17 geographically distinct community colleges across five states. Table 1 and 2 provides additional information on our sample. Participants who completed the interview were compensated 20. USD

Table 1. Study site undergraduate demographics.

	University A	University B
Female	50%	56%
Students of color	20%	17%
Traditional age	83%	90%
Full-time attendance status	90%	92%
Receiving financial aid	75%	89%

Table 2. Sample information (N = 37).

Female	54%
Non-White	11%
Community college credits completed (mean)*	52
Sample majors **	Agricultural sciences, chemistry, computer science, engineering, biological and life sciences, environmental science and mathematics.

Notes. * Acceptance of transfer credit varied considerably resulting in sophomore class standing for many participants.
** STEM majors were selected consistent with the National Science Board's classification of STEM fields.

Data analysis strategy

Data for this study was collected through a 60–120 minute semi-structured, open-ended interviews which enabled participants to express their perspective and viewpoints. We relied on Hill et al. (1997) Consensual Qualitative Research (CQR) methodological strategy. CQR employs a four-step process of analysis of data. First, the researchers reviewed the interview data. Second, an initial coding schema was applied by researchers independently to a small portion of the data. Codes were developed on the basis of the relevant literature and themes that emerge from the data. To ensure consistency of code application, code definitions and interpretations were reviewed until consensus was reached. The third step involved development of core ideas which were summaries of participants' statements to facilitate cross-case analysis. The final step was cross-analysis where meta-themes across participants were generated. To establish trustworthiness we employed various approaches (Lincoln & Guba, 2000). All members of the research team participated in coding data and consistent with CQR, met regularly during all three analytical steps to discuss and reach consensus on the application of codes, development of core ideas, and cross-case analysis. In addition, we employed member checking to ensure we accurately captured perspectives. Lastly, to ensure dependability of results, findings were presented to STEM faculty and campus administrators in advising, orientation, and admission offices and an external auditor.

The research team was led by two female researchers with extensive knowledge about STEM education and professional experience in a variety of higher education settings and functions. Both researchers have studied issues related to the community college transfer process and serve as faculty in schools of education. One researcher served as a community college administrator for nearly a decade where she was involved in advising and preparing students for transfer. The second researcher has been involved in institutional efforts to improve outcomes for STEM and transfer students. In addition, a research assistant possessing personal experience with transfer transition assisted with data collection and analysis.

Results

Results highlighted three salient themes that reflected differential academic norms in relation to help-seeking avenues, the nature of exams, academic demands that emphasize independent learning. Each of these was associated with academic failures and underperformance implicating them as viable sources of transfer shock. It is noteworthy that nearly 95% of our sample experienced transfer shock which we conceptualized as failed assignments, labs, or exams, significant academic underperformance, and failed or dropped courses.

Help-seeking avenues

Participants noted one of the greatest normative differences between their community college and four-year transfer institution was norms associated with faculty interactions which had implications for help-seeking behaviors. Community college professors were regarded by participants as more adept at the art of teaching and ensuring participant learning. For instance, evidence showed community college instructors could more effectively determine if concepts being presented were understood and could dedicate class time answering questions and linking course material with prior coursework. Mary, a Nursing major, noted, "[the four-year university] is a bit more cookie-cutter versus [the community college where] where I had personal relationships with my professors and they changed certain lesson plans to fit the class." Participants also regarded community college professors as more caring and approachable and consequently they felt comfortable seeking help directly from them.

Alternatively, academic norms at our four-year transfer institutions prompted difficulty in generating relationships with faculty. Participants felt faculty was more impersonal and less accessible making it harder to develop a relationship. Participants also frequently regarded transfer institution faculty as aloof, uncaring, and unapproachable. These sentiments ranged from "[my professor] doesn't give that 'come to me if you need help' vibe" to hear "figure it out yourself" when questions were asked in class. As a result, when participants experienced academic difficulty they felt isolated and unable to seek help from faculty. One participant, Felix, a Bio-chemistry major, contrasted his help-seeking behaviors between his community college and transfer institution as the following:

> I always went for help [at community college]. Oh yeah! [Faculty] were always available. That was one of the things. They were always available and they were more personable. They knew who you were and you knew them. Here the professors don't really get to know you on like a personal level. Their office hours are really strict. It's like either they are there for their office hours or their door is closed. Trying to answer your question even though it may seem like a stupid question … it's just like easier to talk to [community college faculty].

In this regard, transfer students felt they were at a distinct disadvantage over native students who had taken multiple courses with faculty and had ample opportunity over the course of years to develop relationships.

Results showed that even in instances where participants felt comfortable approaching their instructors, normative differences in help-seeking challenged them. Participants felt faculty offered limited avenues for out-of-class interactions through which help could be sought. Although participants acknowledged and understood that faculty at these large, public institutions were responsible for research and service in addition to teaching; nonetheless, the contrasting levels of availability and approachability were drastic and not inconsequential. Participants spoke of waiting in long lines outside faculty offices only to be given the chance to ask a single question or at best garnering a very superficial understanding of the content for which they initially sought out help. Meghan, a Pharmacy major, noted:

> You can go to faculty office hours, but once their office hours are over you have no chance of seeing them because they are either working on a research project themselves … or on 50 committees. [My professor] knows that he's on 50 committees and knows he cannot put in the time for extreme office hours.

Meghan, Felix, and others similarly remarked that not getting help directly from faculty left them uneasy and in a state of uncertainty. Without this crucial resource to help them assimilate course content, participants struggled on labs, exams, and graded homework assignments which had negative implications for exams and final grades. Steven, a biology major, remarked, "in my case I was very used to how [office hours] were at community college so when I came here it was a culture shock. I really got smacked and now I'm on academic probation." For participants, the process of learning to seek help from academic support services rather than the professor was a significant distinction which had lasting implications for academic success. As Michael a Pre-Pharmacy major noted, he had to learn that, "[at community college] if you needed help, you just went to your professor. But [at transfer institution] you go … to the TA and tutoring." Results suggest once participants had identified non-faculty sources of academic support they were able to improve their academic performance.

Divergent exam norms

Results implicate variable norms were especially apparent in terms of exams which were more extensive and comprehensive at our transfer universities. At the transfer institutions, students were expected to demonstrate mastery of all relevant course content irrespective of its coverage during class which was counter to community college exams which emphasized content covered in class. Community colleges also seem to have provided study guides and practice tests which were closely aligned with actual exams in contrast to

transfer institutions where no such guidance was provided. One participant, Karen, an Engineering major, noted the following in relation to the significant differences in exam expectations:

> My professor didn't specify, 'Oh, yeah, by the way you should probably read the book.' She didn't say that. She just said these are my PowerPoints. I just studied the PowerPoints … and then I failed. So, I'm having to do that adjustment. I'm having to use old tests to encourage and direct my studying. In community college, you don't have to do that. You study the direct material and every single question on that test will be on that direct material. And you have a study guide.

For many participants, expectations that exam norms at their transfer institution would be similar to those experienced at community college resulted in failed tests and quizzes.

Beyond content coverage, norms regarding the very nature of the exams themselves differed considerably. Participants indicated that community college exams were intended to test foundational knowledge and thus were very direct and straightforward. However, at our transfer institutions, participants noted exam questions were intended to comprehensively test understanding of content through an applied format. Emme, a Poultry Science major, indicated that at her transfer institution "a lot of my tests were application based, and it's not like how you did it in the book, you have to actually think about it and use what you know … that was definitely new." Ensuring success on these applied exams required deployment of new study habits to ensure content mastery. Although we repeatedly heard from participants that they studied with greater intensity, because the content of the exam contrasted so greatly from their prior experiences most participants still struggled academically. One participant, Mark a Computer Science major, indicated he studied regularly from the second day of class onward and with greater intensity as the exam grew closer. But, "the test was so different … I still bombed it." These divergent exam norms, which were cited by 70% of our sample, contributed significantly to exam failures and final grades implicating it was a pivotal factor creating transfer shock.

Variable academic demands and the need for independent learning

Findings highlighted profound divergent norm in terms of academic demands and out-of-class requirements of independent learning, adversely impact academic performance on exams and ultimately final grades. Although participants stressed academic demands in community college were challenging, they nonetheless experienced a pronounced difference in demands at the four-year transfer institutions. Academic demands in the form of course requirements at transfer institutions were significantly more extensive. Course content at our transfer institutions comprised comprehensive breadth and depth of a given

topic unlike community college where foundational content on only the most essential topics was covered. Tim, a Biomedical Science major, indicated:

> I feel they go into more detail [at transfer institution] than what they did at [community college] … way more detail … not just the subject being covered but the depth of the subject. So instead of saying this a rock, this is a metamorphic rock and this is how it's formed and this is the crystalline structure of it. [At community college] we may not have gone into crystalline structure or the layout of atoms or the compounds that are in it. We would just say it's a rock and we're done. The depth of knowledge covered here is a lot greater.

These differences were especially pronounced in STEM courses where, for instance, science labs were more intensive, complex, and required successful execution of all aspects of the lab assignment as opposed to simply attempting the lab. Tim, for instance, gained awareness of expectations of content depth after failing his first lab report and earning low marks on a second lab report which ultimately affected his final grade.

At the same time, extensive content required independent learning and heightened effort outside of class. Greater course content translated to more superficial coverage during class which necessitated greater out-of-class reading and homework loads. Content mastery and completion of all assignments required participants to learn material independently which stood in sharp contrast to the shepherding participants experienced at community college. Lawrence, a Computer Science major, indicated that he had to, "put in the hours outside of class, like behind the scenes [because] … when the professor is teaching they try to keep it real dense and like bullet points. They don't spell everything out for you."

While participants had been academically successful in their community college, the need to learn more material independently prompted participants to alter their study habits. Close to three-quarters of our sample spoke of calibrating their study strategies and time management after experiencing failure. Nancy, a Physics major who failed several tests, noted:

> I've had to tweak my study habits more … I've had to put in a lot more reading, a lot of independent [effort] to read, analyze and comprehend the text and not just read chapter … sometimes, you try three or four different methods of studying and after not doing well you're still like, 'Oops. It's not working.'

We found the process for adapting to norms which placed greater out-of-class demands and necessitated more independent learning was not linear. Rather the adaptation process was wrought with failed labs, homework, and exams which prompted continual and heightened independent learning and effort by participants until the desired results were achieved. As a result, these normative differences were associated with poorer academic outcomes and transfer shock.

Discussion

While community colleges are heralded for providing access to millions of students annually, policymakers have expressed ongoing concern over baccalaureate completion rates. One milepost in the trajectory for baccalaureate degree-seeking community college students is the successful transfer to a four-year institution. Although much research has explored community college transfer outcomes, considerably less is known about the factors contributing to transfer shock. The present study aimed to address this gap in the literature by exploring how variable academic norms in community and four-year colleges contributed to transfer shock. The study has focussed exclusively on STEM students due to prior research showing they suffer the greatest shock.

Findings highlighted the presence of a disjuncture in academic norms between community colleges and four-year transfer universities. Equally important, the study found participants held expectations of consistency of academic norms between institutions. Thus, when divergent norms were experienced, participants suffered transfer shock. Three prevalent differential norms experienced by participants were in relation to help-seeking avenues, the nature of exams, and academic demands which emphasized expectations of independent learning. More specifically, participants perceived their community college contexts emphasized teaching-centric academic norms which encouraged faculty availability and approachability thereby facilitating help-seeking directly from faculty. Such a finding is not surprising given prior research has found within community college settings, student–faculty interactions are the greatest predictor of learning outcomes (Lundberg, 2014). In contrast, the research-centric environment with limited office hours, larger class size, and perceptions of unavailable faculty marked the norms experienced at the transfer institutions. As a result, participants felt uncomfortable or unable to seek help from transfer university faculty as they had in community college consistent with Berger and Malaney (2003) who found transfer students had difficulty connecting with faculty for advising purposes. Without the availability of this critical resource, participants' grades were negatively impacted resulting in transfer shock. When one considers the limited peer networks and relative social isolation transfer students' experience (Davies & Casey, 1999; Ellis, 2012), the shift away from seeking help directly from faculty may be doubly problematic for this population. In her work, Flaga (2006) found adaptation to the four-year context included learning about the existence of formal learning resources. Findings in this study elaborated on Flaga's (2006) work by emphasizing successful transfer involved adapting to norms that centered on the utilization of academic support services, such as tutoring, instead of directly seeking help from faculty. In other words, the participants' adaptation process required a change in what Transition Theory would term

support systems. Rather than receive support directly from faculty, the transition necessitated participants redirect support efforts to learning resources.

Results also underscored the presences of normative differences in terms of the nature of exams. Findings showed community college exams were based on clearly defined expectations and generally restricted to content covered during class with unambiguous, direct exam questions. In contrast, exam norms at the transfer institutions emphasized all course content irrespective of its coverage in class. More importantly, exams tested content competency through an applied format that required panoptic mastery of content. Accustomed to community college exam norms, participants only appreciated normative exam differences after underperforming on an exam which adversely affected final grades resulting in transfer shock. Relatedly, findings also showed norms associated with differential academic demands contributed to transfer shock. Courses at our transfer institutions were extensive in terms of content breadth and scope necessitating laborious reading and homework assignments. Comprehending course content and successful execution of homework required participants to exert considerable out-of-class effort and work independently. These experiences contrasted greatly with academic demands experienced at community college where less independent learning was required for academic success. Although numerous participants indicated they expected their transfer institutions would be more difficult, participants were unaware of the vast differences in academic demands. Thus, when participants applied study habits learned in community college to their transfer institution courses, they struggled and often failed multiple exams resulting in transfer shock.

The nature of exams and divergent academic demands experienced by participants triggered alteration and calibration of study habits which was often a non-linear process and had implications for academic success. In response, we found participants placed greater emphasis on independent learning efforts and enacted new methods and procedures for mastering course content to overcome academic underperformance highlighting the strategies factor in Transition Theory. While prior research has noted institutional differences in pace of instruction are associated with transfer shock (Packard et al., 2011; Townsend & Wilson, 2009), results from this study suggest the sources of shock are more nuanced and grounded in normative differences in academic expectations and demands between community colleges and four-year contexts.

Taken together, findings highlight the applicability of Transition Theory. On the one hand, participants' prior experience with college would, according to Transition Theory, suggest an easier transition, however results instead showed participants entered their four-year transfer institutions with misplaced expectations that the collegiate norms experienced in community college would be seamlessly applied to their new academic contexts. The academic normative differences encountered served to dispel these expectations and disrupt existing

cognitive consistency resulting in dissonance. Participants were often cued into the existence of different norms after experiencing academic failure which prompted introspection in terms of exam preparation, academic demands, study habits, and seeking help. Restoring academic success, or what Schlossberg (1984) would term as regaining equilibrium, required participants to assimilate new academic norms and calibrate behaviors. As participants established new patterns of behavior, they enacted new strategies and supports, consistent with Transition Theory, to help them *move through* the transition. When one considers the findings of divergent norms in terms of exam expectations, academic demands, and help-seeking avenues it is not surprising that 95% of the sample experienced transfer shock. The study's outcomes accentuate that differential norms, which contributed to transfer shock, may disrupt the acquisition of human capital. Lakin and Elliott (2016) previously found that STEM majors transferring from community colleges experienced the largest degree of transfer shock and that shock was a significant predictor of change of major. Therefore, transfer shock experienced by virtue of divergent institutional norms could disrupt employment prospects and the economic returns associated with the accrual of human capital.

Limitations

Findings are qualified by two important limitations. First, the study relied on participants from only two institutions. While both institutions were purposefully selected due to their location in states with favorable state-wide articulation agreements and strong ties to local feeder community colleges; nonetheless, variations in experience may exist with students in other states with different transfer policies. Second, results are based on respondents who willingly and voluntarily agreed to be participants and therefore their experiences, on which results are based, may not be representative of all STEM transfer students.

Recommendations for future research

Findings from this study underscored the utility of Transition Theory and particularly highlighted the support and strategy factors of the 4 S's, but little evidence was noted in relation to the self factor. Future research should further explore the role of self, such as which psychosocial characteristics transfer students utilize as they adapt to new institutional norms. In this regard, using quantitative approaches to capture which personal characteristics help individuals manage the transfer transition would advance understanding about the issues transfer students face. In addition, given findings are based on participants from two institutions, the authors recommend future research replicate this study with additional institutions which could provide some level of generalizability to the results from this study.

Conclusion and implications

Findings have important implications for faculty, community college and transfer institution administrators, and policymakers. Results from this study show academic norms differed in considerable and important ways. For this reason, the authors support usage of articulation agreements as a means for prompting and encouraging dialogue about expectations, course demands, and exam norms in addition to course content. In this regard, policymakers in particular can stimulate these conversations by including them as critical aspects of articulation agreements. Since prior research has shown collaborations between faculty at community colleges and transfer institutions reduced transfer shock to a non-significant level (Cejda, 1994), articulation agreements are a viable vehicle for encouraging ongoing conversations about normative differences. The authors also encourage community colleges faculty to consider altering expectations in upper-level courses to make them more congruent with the expectations present at transfer institutions. At the same time, results suggest transfer institutions need to be more aware and sensitive to the needs of transfer students. In particular, given findings participants' help-seeking expectations, faculty at transfer institutions should consider inventorying courses for transfer students as a means for providing insight and directing these students to academic support resources. Institutions should also consider prioritizing transfer students into courses with supplemental instruction as a means for facilitating their usage of tutoring resources.

Based on the results, the authors encourage the development of services specifically geared for transfer students. For instance, evidence indicates not all four-year institutions offer transfer student orientation (Kilgore, 2017) suggesting such services should be implemented. Others do offer transfer student orientation, but rely on content from freshman orientation that emphasizes the importance of class attendance, homesickness, and avoiding self-destructive behaviors (Berner, 2012; Elliott & Lakin, 2020). Such content is less relevant to transfer students and the study's results indicate community college transfer students would benefit from better understanding academic expectations and available resources that might help them acclimatize to new institutional norms faster. Given the increasing reliance on transfer students to combat enrollment deficits and the growing numbers of students electing to attend a community college, the provision of seamless transfer is imperative.

Notes

1. The veracity of the effect institutional quality on outcomes is debated by the literature. Dale and Krueger (2002) adjusted for the selection bias in admission to prestigious colleges and found quality operationalized as institutional SAT score did not result in greater wages, but quality operationalized as average tuition did affect subsequent wages.

2. The National Science Board which establishes policy for NSF, has identified computer and mathematical scientists, biological, agricultural, and environmental life scientists, physical scientists (e.g., physicists, chemists, geoscientists), social scientists (e.g., psychologists, economists, sociologists), and engineers in its STEM indicators.

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