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Running the STEM Gauntlet: The Complicity of Four-Year Universities in the Transfer Penalty

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Abstract
Students who transfer between institutions of higher education often experience a transfer penalty or a decrease in the odds of degree completion. While the transfer pathway is deemed a responsibility shared between 2- and 4-year institutions, failures in the transfer process are typically attributed to community colleges. The aim of this study was to examine the post-transfer experiences of STEM community college transfer students with particular emphasis placed on how institutional policies and practices at 4-year institutions contributed to the transfer penalty and poorer attainment rates of this population. Implications for future research and interventions are discussed.

Keywords Transfer penalty · STEM · Community colleges

With nearly half of the nation's students matriculated in the 2-year sector (National Center for Educational Statistics [NCES] 2017), community colleges are viewed as a gateway to higher education for a significant and growing number of students. Their teaching-centric missions, open-access admissions policies, locations, and low-tuition rates have enabled them to serve as an alternative pathway to obtaining a baccalaureate degree (American Association of Community Colleges [AACC] 2012). Instrumental in the community college narrative is the feasibility of seamless transfer to a 4-year institution. However, while data indicates 80% of community college entrants begin with intentions to transfer to a 4-year university (McPhail 2011), evidence suggests less than one-tenth go on to earn a baccalaureate degree (Nevarez and Wood 2010; Shapiro et al. 2017). Such poor transfer and attainment rates are indicative of systemic misalignment with the transfer process (Handel and Williams 2012). Exploration of the existing disjuncture in the transfer

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transition is necessary for remediating U.S. trailing postsecondary attainment rates, especially in STEM fields (National Center for Public Policy and Higher Education 2011).

The effects of transferring on student degree attainment has been explored by a sizeable body of literature (e.g. Glass and Harrington 2002; Goldrick-Rab 2007; Johnson 2005; Laanan 2004, 2006, 2007; Lakin and Elliott 2016; Monaghan and Attewell 2014). Scholarly findings support the existence of a "transfer penalty" or the decreased probability of degree completion associated with initial community college enrollment (Adelman 2005; Alfonso 2006; Dougherty 1987; Doyle 2009; Long Kurlaender 2009; Moore and Shulock 2007; Sandy et al. 2006). The transfer penalty has been attributed to a number of factors including college readiness and variations in academic norms, such as variable academic demands, expectations of independent learning, faster pace of instruction, and fewer faculty interactions (Cejda 1997; Elliott and Lakin 2018; Ellis 2013; Johnson 2005; Packard et al. 2011). The transfer penalty also varies by academic discipline with students in business and STEM fields experiencing greater transfer shock (a quantitative change in GPA) and a decreased likelihood in graduation over students in other disciplines (Carlan and Byxbe 2000; Lakin and Elliott 2016).

Much of the transfer literature highlights the role of community colleges in preparing students for transfer and baccalaureate attainment. In fact, failures in the transfer process are typically attributed to community colleges alone (Handel and Williams 2012) despite the transfer pathway being deemed a responsibility *shared* between 2- and receiving 4-year institutions (Gandara et al. 2012; Long and Kurlaender 2009). Little research has examined the role that the receiving 4-year institutions play in transfer and the extent to which post-transfer success is due in part to the actions of these institutions (Mullin 2012). The limited evidence that does exist suggests that receiving institutions neglect to provide support services tailored for transfer students or assist this population in the development of social ties (e.g. Ellis 2013; Laanan 2004; Lazarowicz 2015; Wawrzynski and Sedlacek 2003; Younger 2009). Less explored in the literature is how receiving institutions may be complicit in the transfer penalty by marginalizing transfer students in academic contexts.

The present study aims to address this limitation in the literature by exploring the academic experiences of community college transfers at the receiving institution. The study examined experiences of marginalization and the extent to which receiving institution's practices and policies contributed to experiences of marginalization and the transfer penalty. We focused exclusively on STEM students due to mounting public and economic pressures for the nation to remain globally competitive, evidence suggesting students in STEM fields experience greater difficulties in the transfer process (Cejda 1997; Cejda et al. 1998; Lakin and Elliott 2016), and urgent calls to remediate the underrepresentation of diverse students in STEM fields (Jones et al. 2018).

Theoretical Framework

An extensive body of research has examined the theoretical and empirical factors that influence baccalaureate degree completion (e.g. Adelman 2006; Attewell et al. 2011; Bean 2005; Kuh et al. 2011; Perna 2006; Reason 2009; Tinto 1993). A significant portion of this literature has evaluated college persistence using Tinto's (1993) Model of Student Departure. Despite the ubiquity of this model, criticisms citing its inapplicability to various student subgroups have prompted advocacy and usage of alternative frameworks (Berger 2000; Hurtado and Carter 1997; Tierney 1992). The study, consequently, relies

on a fusion of Cultural Capital Theory (Bourdieu 1986) and Transition Theory (Schlossberg 1984). Cultural capital helps account for the relevancy of institutional cultural capital which serves to preserve existing prestige statuses in the higher education hierarchy while simultaneously marginalizing transfer student who lack institution-specific cultural capital. Thus, cultural capital serves to frame transfer students' marginalized cultural capital and the means by which 4-year institutions utilize their cultural capital to maintain their status in the higher education hierarchy (Berger 2000; Longden 2004; Wells 2008). Transition theory supplements this framework by shedding light on the adaptation process that students undergo when they change educational contexts. Such a perspective is relevant because it acknowledges the shared responsibility between community colleges and 4-year institutions in removing impediments affecting student transfer degree attainment.

Cultural Capital Theory

Cultural capital relates to the symbolic goods (e.g. knowledge, competencies, and social indicia) that signal power, status, and social standing (Bourdieu and Passeron 1979; Bourdieu 1986). It can be conceived of as cultural competency in linguistics, behavior, attitudes, practices, styles of interactions, and other indicia of social standards established and legitimized by dominant classes (Aschaffenburg and Maas 1997; Katsillis and Rubinson 1990; Robinson and Garnier 1985). Through the transmission of cultural competency and symbolic goods to subsequent generations, dominant social classes control and preserve mobility (Lareau and Weininger 2003), thus ensuring reproduction of existing social structures.

Families, especially parents, are deemed the predominant purveyors of cultural capital by helping children assimilate attitudes, preferences and hidden social cues that reflect socioeconomic standing (Lamont and Lareau 1988). However, educational institutions also contribute to the accrual of cultural capital. Within educational settings, Bourdieu and Passeron (1979) have argued that educational institutions mirror the dominant class' cultural capital which reflects knowledge about informal traditions, expectations, and academic standards. Put differently, schools favor and evaluate students on the basis of competencies and behaviors espoused by dominant classes (Lareau and Weininger 2003). By virtue of institutionalized practices that reflect and reward congruent forms of cultural capital, educational institutions contribute to the reproduction of inequality (Mehan 1992). Thus, for children from non- dominant backgrounds, a dissonance exists between the cultural capital valued at home and school (Bourdieu 1986). In the college context, the dissonance can also occur through various levels of schooling, including high school cultures, community college cultures, and 4-year institutional culture. To successfully negotiate educational environments requires adoption of new and divergent forms of cultural capital which explains educational inequity and unequal achievement (Bourdieu 1986; Lamont and Lareau 1988).

The effect of cultural capital on educational outcomes can be seen throughout the educational trajectory. In higher education specifically, the role of cultural capital is prominent in affecting college readiness, college choice, adaptation to college, and ultimately degree attainment (Berger 2000; McDonough 1997). Evidence demonstrates students with optimal levels of cultural capital are funneled into college preparatory tracks (Freeman 1997). Educational experiences in college preparatory courses and both subtle and overt social cues from family and educators shape expectations of college attendance and a sense of entitlement of earning a degree from a prestigious institution (Berger 2000). Expectations and entitlements drive matriculation behaviors. For individuals with lower levels of cultural

capital, matriculation into a community college or 4-year institution are viewed as comparable vehicles to attaining higher education (McDonough 1997). Post-matriculation, cultural capital is instrumental in adaptation to a particular institutional context where those with higher levels of cultural capital will experience greater compatibility with an academic context and community, while those will lower levels of cultural capital will experience more marginalization and challenge. Compatibility, in turn, relates to degree completion, however, cultural capital has a more tempered effect on the persistence of community college students than it does on 4-year students (Wells 2008). In other words, students with lower levels of cultural capital are more successful in community college settings than at 4-year institutions (Wells 2008), and thus navigating between institutional context with differential value for cultural capital become a critical element of the transition for transfer students.

Beyond individual cultural capital, institutional capital is also instrumental in the transfer penalty. Berger (2000) expanded the conception of cultural capital theory beyond individuals to include organizations through its application to the network of institutions of higher education. Cultural capital helps delineate the hierarchical structure of higher education where elite institutions utilize their cultural capital resources to perpetuate and protect their status in the hierarchy (Berger 2000), thus socially reproducing the existing order. Institutions' cultural capital help preserve notions that an education from an elite institution will provide the network, attributes, and dispositions necessary for lucrative and prestigious careers. High schools feed into higher levels of education that are not seen as equivalent pathways: 2-year colleges, non-elite or less selective 4-year institutions, and elite/selective 4-year institutions. It is this form of 'institutionalized capital' that assigns unequal worth and value to degrees garnered from elite institutions versus community colleges (Tierney 1999). The presence of such a hierarchy provides the foundation of unequal access to the cultural capital offered by higher education, particularly for students who attempt to navigate between these institutions. Therefore, the hierarchy operates in concert with initial differences in students' cultural capital to magnify obstacles faced by transfer students. Accordingly, reliance on cultural capital theory helps underscore challenges in the transfer process and how receiving 4-year institutions may devalue cultural capital garnered in community college settings and inhibit the acquisition of transfer institution cultural capital resulting in limited post-transfer success and a transfer penalty.

Transition Theory

To Cultural Capital theory, the study incorporated elements of Transition Theory (Schlossberg 1984) to help shed light on the role that inter-institutional transition may play in educational attainment. Within the context of Transition Theory, a transition is any event that results in changed relationships, routines, assumptions, and roles (Schlossberg 1984). Transitions can be anticipated, such as taking a new job, unanticipated, such as job loss, or a non-event which is an un-materialized anticipated transition. Irrespective of transition type, the transitional process is consistent and conceptualized as three-stage progression of moving in, through, and out (Chickering and Schlossberg 2002; Goodman et al. 2006). "Moving in" relates to the process of deserting an old context or situation and involves engaging with new rules, regulations, norms, and expectations. The heart of a transition lies in the "moving through" stage which is a period of liminality and marks gradual acceptance of new roles, relationships and daily routines. The length of liminality is partly contingent on the impact or degree to which the triggering event impacts daily life and contextual factors,

such as, if the transition is personal or involves someone close. Full assimilation or adaptation and disengagement with prior settings denote the "moving out" stage. The transition process can be conceived of as the evolution from disequilibrium back to equilibrium in which new roles and relationships are integrated.

An individual's ability to cope and successfully navigate through a transition is related to four factors known as the 4 S's: (1) Situation, (2) Self, (3) Support, and (4) Strategies. "Situation" comprises the circumstantial aspects of a transition. The nature of a triggering event or cause of the transition (e.g. divorce, retirement, job lay off) can color how individuals manage and perceive and adapt to a transition. Other situational factors include the permanency of the transition, previous experience with a similar transition, and the locus of control over the triggering event.

"Self" constitutes the demographic and psychological reservoirs that individuals tap in order to cope during a transition. Demographic factors such as socioeconomic status (SES), gender, age, and health can impact individual perspectives during a transition. Equally important are dispositions or personality traits that frame outlook on a transition. Characteristics such as optimism, resilience, hardiness, spirituality, self-efficacy, and positive explanatory style all serve as tools during the initial coping or moving through stage. "Support" relates to the network of family, friends, and community who can affirm and aid individuals as they undergo transitions.

Finally, "strategies" underscore the overt and covert behaviors used to alleviate or respond to the stress associated with transitions. Collectively, the 4 S's can be viewed as assets and liabilities utilized by individuals during transitions which help explain why individuals react differently to changing and stressful transitions. Transition Theory is a natural fit to studying community college transfer due to the complex nature of the transition which requires considerable engagement with new norms. The entire community college experience can be a period of "moving in" to the 4-year experience, with extensive planning and anticipation of future challenges required. The characteristics of the student and their social support structures are also critical to transfer success. At the same time, Cultural Capital supplements Transition Theory by underscoring the magnitude of the challenge transfer students face in "moving in" and "through" 4-year institutions. In addition, it highlights the sense of marginalization and obstacles that may characterize the transition experience of transfer students. Simply learning to thrive in a new context is challenging enough, but when students are marginalized by their lack of knowledge, or cultural capital, and an educational hierarchy working against them, we begin to understand how receiving institutions can impact the success of community college transfer students.

Review of the Literature

From their inception, community colleges were established to form an integral part of a hierarchical and differentiated system of higher education (Altbach 2001). This typology of higher education emphasized institutional variety along a spectrum of characteristics such as selectivity, prestige, curricular offerings, cost, teaching methods, and research focus (Longanecker 2008). Most important to this framework, each institution's mission was accordant with their station in the hierarchy. Within this framework, community colleges' missions have largely centered on the provision of access to higher education vis-á-vis open enrollment policies, vocational education, and serving as an alternate route for baccalaureate degree completion (Palmadessa 2017; Townsend 2001; Witt et al. 1994).

One consequence of this differentiated system with multiple entry points has been unprecedented growth in student demand for higher education which has been most prominent in the community college sector. Since 1960, community colleges have witnessed a 763% increase in enrollment (Provasnik and Planty 2008) and by contemporary figures, they matriculate more than seven million students, constituting nearly half of all undergraduate students (AACC 2018). Equally important, national evidence shows at-risk students are overrepresented at community college (e.g. Phillippe and Mullin 2011) and recent data suggest matriculation rates at community colleges are projected to grow (Hussar and Bailey 2011). By most metrics, community colleges have met the access portion of their mission.

The bookend to access is the transfer pathway which was created to facilitate the transition of community college students into receiving 4-year institutions and remains a critical and indelible part of community colleges' mission (Handel and Williams 2012). Perhaps for this reason, nearly 80% of community college entrants indicate an intent to transfer to a 4-year institution (McPhail 2011). It is noteworthy that measuring transfer rates is not straightforward due to vertical, horizontal, and reverse transfer patterns (Townsend 2001) and varying conceptualizations of who should comprise the pool of students included in analyses of transfer rates. For instance, using increasingly restrictive enrollment patterns (e.g. enrollment in an academic program, continuous enrollment, full-time enrollment), Bradburn et al. (2001) found that the pool of students to be included in analyses of successful transfer comprised between 36 and 52% of all community college entrants, a substantial range and vastly different from figures capturing transfer intentions at the start of matriculation (e.g. McPhail 2011). Among community college students, national studies have found successful transfer rates range from 21 to 37% (e.g. Adelman 2005; Cohen and Brawer 2003; Handel and Williams 2012; Horn and Skomsvold 2011). Whether researchers use restrictive or inclusive counts of transfer intentions, the transfer rate remains remarkably low and relatively unchanged in the past decade (Handel and Williams 2012).

The Transfer Penalty

Beyond such astonishingly low transfer rates are the equally troubling degree completion rates of community college transfer students. Considerable literature has studied the effects of attending a community college on baccalaureate degree attainment (e.g. Glass and Harrington 2002; Goldrick-Rab 2007; Johnson 2005; Laanan 1996, 2004, 2006, 2007; Monaghan and Attewell 2014). However, findings have been mixed (e.g. Alfonso 2006; Long and Kurlaender 2009; Reynolds and Desjardins 2009). While some evidence shows baccalaureate degree completion rates are comparable for transfer and native students after controlling for demographic characteristics and academic achievement factors (e.g. Goodman et al. 2004; Melguizo et al. 2011), other research supports the existence of a transfer penalty, or the reduced probability of baccalaureate degree completion associated with initial community college matriculation (e.g. Doyle 2009; Long and Kurlaender 2009; Sandy et al. 2006).

Akin to the issues associated with calculating transfer rates, evidence on community college degree attainment can suffer from methodological flaws that result in underestimated figures. Failing to control for initial differences between community college and 4-year entrants or the non-random, self-selection into community college confounds attainment with differences in students' academic readiness and degree aspirations (Alfonso 2006; Long and Kurlaender 2009; Sandy et al. 2006). At the same time, much evidence has

demonstrated that community college students possess multiple factors which place them at risk for non-completion. For instance, national evidence on community college entrants has noted they are disproportionately low-income, of color, non-traditional age, first-generation, and more likely to attend on a part-time basis—factors which have been associated with lower rates of degree attainment (Ma and Baum 2016).

Similarly, ignoring variations in enrollment patterns prevalent among community college students, such as stopping out or part-time matriculation, can result in deflated degree attainment rates (Adelman 2005; Alfonso 2006). Irrespective of estimation method, research indicates that initial enrollment in a community college instead of a 4-year institution is associated with a reduced probability of attaining a bachelor's degree (Adelman 2005; Alfonso 2006; Dougherty 1987; Doyle 2009; Long and Kurlaender 2009; Moore and Shulock 2007; Sandy et al. 2006). By some evidence rates of completion have been estimated to be no higher than 33% (Alfonso 2006).

Research implicates a number of reasons for the transfer penalty. Some originate with students in the high school phase and others during postsecondary experiences. For instance, community college students have lower levels of college readiness (as evidenced by the high levels of remediation) than do students who directly matriculate in 4-year institutions (Adelman 2006; Lichtenberger and Dietrich 2012; Sandy et al. 2006). Other evidence suggests that differences in academic norms between institutions, such as variations in class size, coursework intensity, and faculty interactions, contribute to poorer post-transfer academic performance (Johnson 2005; Elliott and Lakin 2018; Packard et al. 2011). The acceptance, or lack thereof, of transfer credit has also been cited as factor that retards degree completion and has prompted policy makers in advocating for standardized processes of transfer credit practices (Handel and Williams 2012). Finally, some researchers suggest conflicting academic foci as a culprit in the transfer penalty. Specifically, it has been argued that 4-year institutions dedicate disproportionate resources to first-year students due to mounting accountability, admission, and university ranking pressures which limits the availability of services and supports for transfer students (Handel and Williams 2012).

Other research implicates academic discipline in the transfer penalty. Gateway courses have been cited as a formidable obstacle to STEM degree achievement regardless of transfer status (Gasiewski et al. 2012). However, while most departures from STEM majors occur prior to completion of foundational courses (Budny et al. 1997), these factors are inapplicable to STEM transfer students who usually have completed foundational courses before transfer. Another disciplinary difference is the greater curricular requirements of STEM degrees. Evidence shows degree completion for STEM majors is protracted which not only delays career entry but also adds to the financial demands that contribute to the transfer penalty (Fenske et al. 2000).

For all STEM students in particular, grade point average (GPA) is the single greatest predictor of STEM success (Strenta et al. 1994). For STEM transfer students, transfer credit hours and first-year semester GPA at the transfer institution were also among the greatest predictors of earning a degree (Laugerman et al. 2015). This is especially concerning given that Lakin and Elliott (2016) found that STEM transfer students experienced the greatest amount of transfer shock. That is, STEM students experienced the greatest decrements in overall GPA over students in other majors—a factor which significantly contributed to degree completion.

Shared Responsibility of the Transfer Pathway

Although the transfer pathway is regarded as a shared responsibility between 2- and 4-year institutions, failures have been traditionally attributed to the 2-year sector (Gandara et al. 2012; Long and Kurlaender 2009). A scarcity of research has explored how post-transfer experiences implicate the transfer penalty. Existing research delineates perspectives aligned with personal student characteristics, social integration, and institutional support factors (e.g. Laanan 2004; Lazarowicz 2015; Wawrzynski and Sedlacek 2003). For instance, Lazarowicz (2015), who also applied Transition Theory to the community college transfer experience, and Laanan (2004) have highlighted the stress of acclimatization. In this regard, early experiences at the 4-year institution were construed as overwhelming particularly in terms of students' need to quickly acclimate in terms of housing, class expectations, and routines. Other themes in Lazarowics' (2015) work, consistent with Transition Theory, identified personal characteristics, such as maturity, as instrumental in the adaptation to a 4-year institution. Younger (2009) similarly found intrinsic motivation was a factor in the successful transition and degree completion of transfer students.

Research focused on the social aspects of the transition has emphasized the awkwardness and difficulty associated with developing relationships with peers (Ellis 2013; Davies and Casey 1999) or lack of belonging sentiments (Cohen and Brawer 2003; Dowd 2003; Laanan 2001; Townsend and Wilson 2006; Younger 2009). Of particular concern was the difficulty transfer students encountered in developing social networks that may provide access to the knowledge native students possess (Flaga 2006). Collegiality within the major was critical to students, but was sometimes hindered by entering the major at a more advanced stage than students who entered the major as a freshman (Ellis 2013). Thus, access to group study and participation in cohorts were challenges experienced by transfer students. Financial issues also limit access to social networks. Transfer students are more likely to have to balance fiscal matters against social integration (Davies and Casey 1999; Lazarowicz 2015).

A final aspect of the transition is access to resources. Literature has frequently cited the challenge transfer students experience accessing appropriate learning support services and resources (e.g. Davies and Casey 1999; Ellis 2013; Flaga 2006). The distribution (physical and bureaucratically) of resources at many 4-year institutions and the variety of resources have created greater challenges for transfer students (Flaga 2006). The need to search for and access multiple sources of support is not unique to transfer students. In fact, prevalent at many institutions is the assumption that students will proactively seek out help when it is needed (Bensimon 2007). However such a presumption rests on awareness of available resources. Given transfer students' advanced academic standing, their need to quickly assimilate knowledge about resources is especially acute. Thus, part of the stress of moving in to the 4-year institution was learning about these resources and identifying which would be most helpful, a stressor Ellis (2013) also uncovered. In this regard, contact with "transfer agents" (Dowd et al. 2006), or institutional agents at the 4-year institution who share knowledge about resources and support services, can help transfer students access resources and navigate through informational roadblocks (Bensimon 2007; Dowd et al. 2006).

Collectively, the literature underscores the myriad of transitional issues faced by transfer students that lead to the transfer penalty of lowered probability of baccalaureate degree attainment. However, missing from this literature is exploration of transfer students' experiences in academic contexts and the ways in which receiving institutions may be complicit

in the transfer penalty. This perspective can provide a more holistic frame for exploring and understanding the lagging degree attainment rates of transfer students, particularly for students in academic majors, such as STEM fields, that experience greater difficulties in the transfer transition.

The Current Study

Our goal in this study was to add to the limited research on the role of receiving transfer institutions in community college students' transfer transition. More specifically, we sought to understand the ways in which transfer students are marginalized by receiving institutions and how institutional policies and practices contribute to these marginalizing experiences and the transfer penalty. The findings presented in this study are part of a larger project exploring the transfer experience of students in STEM majors. Although the focus of the current study is specific, we feel that our exploration of the transfer experience of STEM students provides universal lessons about the transfer experience. Because STEM majors are known to be among the most challenging and having some of the lowest retention rates (Lakin and Elliott 2016), exploring students making this transition helps highlights the universal challenges students make in transitioning from community colleges to 4-year institutions. To explore the unique role of the 4-year institution in the transfer experience, we interrogated our data using the Cultural Capital and Transition Theory lens. Our focus included the following research questions:

1. In what ways did STEM transfer students experience marginalization during their first-year post-transfer? How did these experiences contribute to the transfer penalty?
2. What transfer institution policies or structures that contributed to experiences of marginalization were reported by STEM transfer students? How did these policies or structures contribute to the transfer penalty?

Methods

Two geographically-diverse, large, public institutions, one in the Southeast (University A) and one in the Mid-Atlantic region (University B), were selected as study sites. These institutions were situated in states with tight transfer articulation policies that require acceptance of the statewide general studies curriculum at all public institutions and statewide agreements to facilitate reverse transfer (Anderson 2018). In addition, University B is subjected to state mandated guaranteed transfer of associate degree programs by major (Anderson 2018). Both states also have online transfer guide systems to facilitate course transfer. Within these states, these sites were purposefully selected due to the robust transfer volume, strong ties with feeder community colleges, rigorous transfer admission criteria, and their reputation for offering STEM degrees highly regarded by industry.

University A serves over 20,000 undergraduate students per year across ten academic colleges with STEM programs matriculating 40 to 45% of the undergraduate population. University B serves 10,000 students with nearly one-third enrolled in the College of Science and Technology which comprises STEM majors. On an annual basis, transfer students comprise approximately 15–20% of their respective student bodies. Both institutions possess similar student demographics in terms of gender, race/ethnicity, age and attendance

Table 1 Study site undergraduate demographics

	University A (%)	University B (%)
Female	50	56
Students of color	20	18
Traditional age	83	90
Full-time attendance status	90	92
Receiving financial aid	75	89

Table 2 Sample information

Female	52%
Students of color	19%
Traditionally aged	89%
Full-time attendance status	100%
Community college credits completed (mean)[a]	52
Sample majors[b]	Agricultural sciences, chemistry, computer science, engineering, biological and life sciences, environmental science and mathematics

[a]Acceptance of transfer credit varied considerably and ranged from 32 to 73. However most participants had sophomore class standing after transferring

[b]STEM majors were selected consistent with the National Science Foundation's classification of STEM fields

status (see Table 1 for demographic breakdown by site). In addition, both institutions provide support services, such as orientation and advisement, for transfer students.

Data Collection and Analysis

Relying on institutional data, we obtained information on all community college transfer students who met three criteria: (1) they had transferred into the institution during the prior two semesters, (2) they were matriculated in a National Science Foundation (NSF) classified STEM field and (3) they were matriculated on a full-time basis at the study site and not matriculated at another institution. All students who met these initial criteria were contacted via email and invited to participate. From those who expressed interest, 45 participants were purposefully selected to provide equitable gender distribution and representation of the breadth of STEM degrees. Our final sample comprised 37 students and represented an 82% participation rate.

Participants in our final sample hailed from 17 geographically diverse community colleges located in five states. Fifty-two percent of our sample was female and 89% was traditional age (see Table 2). Students of color comprised 19% of our sample. Participants, on average, had completed 52 credits at their community colleges, though this figure ranged from 32 to 73. Participants who completed the interview were compensated $20.

This study employed a multi-method data collection approach that encompassed semi-structured interviews to document firsthand experiences and document analysis to provide evidence of institutional practices and help triangulate findings. Interviews lasted

approximately 60–120 min and were fully transcribed verbatim. To analyze student interviews, we employed a semi-structured, open-ended interview format allowing participants to articulate their perceptions or worldview and for issues of importance to emerge. We relied heavily on the research literature to inform and develop a preliminary semi-structured protocol.

We utilized Hill et al's (1997) Consensual Qualitative Research (CQR) methodological strategy. CQR was specifically selected because it incorporates elements from phenomenology (Giorgi 1985), grounded theory (Strauss and Corbin 1998), and comprehensive process analysis (Elliott 1989), and emphasizes the importance of a consensus driven approach to construct meaning in data. The analytical process was comprised of four stages. First, we began by conducting an in-depth review of interview data. Second, we created an initial coding scheme which was applied to 20% of the transcripts. To ensure trustworthiness of findings, coders met to ensure definitional parameters and consistency of code application. Upon reaching consensus, the remaining interviews were coded. Next, we developed core ideas which involved generating condensed, accurate summaries of participants' statements. This intermediary step facilitated subsequent cross-case analysis and served as another mechanism for ensuring code consistency. Finally, we completed cross-case analysis or the process of identifying common themes across cases. To establish trustworthiness we employed member checking and validated our findings with four field experts employed at participating institutions involved in advising, orientating, and registering transfer student. In addition, as recommended by CQR, we relied on an external auditor to help establish dependability of findings.

To supplement and corroborate evidence from participant interviews, we employed document analysis to analyze institutional practices. We culled documentation from institutional websites, policy manuals, articulation agreements, student handbooks and other materials that related to transfer students. In total, we analyzed 17 distinct documents that provided a holistic perspective on the institutional role in the transition of transfer students. To ensure consistency of analysis, we follow CQR for analysis of documents. We conducted a systematic review of documents to begin eliciting meaning and gaining understanding of practices (Corbin and Strauss 2008). We applied codes developed during analysis of interviews, though we also allowed for the emergence of new codes. Next, we developed core ideas in which we condensed policy statements, and finally we conducted cross-document analysis. At each step, we met to ensure consensus was reached and analysis was consistent. We also employed our field experts to validate our findings from document analysis.

The research team was led by two females with extensive knowledge about K-16 educational transitions and professional experience in higher education. 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 where she was involved in transfer student advisement. 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

What emerged from interviews were themes related to the experience of transition due to differential access to institutionally relevant cultural capital in combination with institution practices that marginalized transfer students and contributed to the transfer penalty.

Faculty Assumptions as Cultural Capital

Data show several classroom and academic practices that were based on faculty assumptions about students' academic histories. Put differently, faculty enacted policies and pedagogical practices which were based on assumptions that participants had been students at the receiving institutions for the duration of their academic careers. These assumptions, which we conceptualized as a form of cultural capital, implicated stratification of higher education, highlighted challenges participants experience as they moved through the transfer transition, and contributed to the transfer penalty. Assumptions were divided into those impacting the curricular experience and those impacting access to research and professional development opportunities.

Faculty assumptions impacting curricular experiences

Participants were marginalized by assumptions faculty made about prior knowledge regarding both content and course requirements. Courses at the receiving 4-year transfer institutions were intentionally developed to dovetail one another in terms of coverage. Although participants had taken pre-requisite courses at their community college, the coverage of content frequently differed in terms of focus, depth, or even terminology. As a result, when faculty referenced course content from prerequisite courses, participants were lost. To compensate participants faced a steep learning curve to reconcile old and new course material or frequently re-learn course content using a new approach that was distinct from their prior schooling while simultaneously learning and integrating new knowledge. Vera a BU student indicted:

> Coming in here is very, very difficult because [prior institution] did general chemistry one way. They have their ways of showing it and [transfer institution] is different. So my organic professor is referring back to [this institution's] general chemistry courses...the 'oh do you remember in Chem 115 you did this, well apply that to this'…. I had to figure out how [transfer institution] did it and then apply it, so I was taking what I already knew from General Chemistry having to learn it [transfer institution's] way and then apply it to organic….we're going through something in organic chemistry that refers to something we learned in general chemistry. They throw up a diagram on the board that is totally different than the one that I learned at [prior institution]. Everyone who learned it here, they understand that. I have to go back and relearn it that way in order to understand the diagrams they're using so that I can apply it to organic chemistry. I found that to be very similar with my biology classes and my anatomy and physiology. The way that they did their concepts of biology was very different.

In other cases, departmental and faculty preferences in terms of assignments were problematic. For instance, several participants mentioned the formatting and structure of

assignments were unknown and never explained to them. Amber, an AU student, reporting a particularly traumatic experience:

> [My instructor] made me cry the first day of lab…embarrassed me in front of all of my peers… before every lab we had to have a prelab write up and an assignment within the lab manual that you had to complete and you had to have a set of safety rules, so 3 papers you hand in every time. Apparently this is the procedure for Chemistry 1 that people had last semester [at transfer institution] that I wasn't in. I knew they were due and I did them, but on the assignment I did not know how to answer question 2. So I came in to class 10 minutes early and I said, 'I don't know how to do this' and he said, 'you need to go out into the hall and you're not coming in until it's done.' At first, I went out and then I came back in and I told him I needed guidance. I said 'no I don't think you understand it's not that I didn't do it because I didn't want to… I could sit out there all day, it's still not going to get done. I still don't understand this particular problem.' At this point I was frazzled. So he said 'fine' and he came outside with me annoyed that I didn't have this done and everyone else had. Apparently, he felt like I was wasting his time. It was so overwhelming, it just crushed me, it was just one question on one problem. It was my first week at class and I didn't have any friends at this point, I didn't know who to contact, who to talk to.

Such assumptions, which implicate cultural capital, extended to knowledge of instructional software that enabled participants to access course information, lectures, and grades, or the usage of technology such as clickers for quizzes and attendance purposes. These issues, which may seem minor, led students to experience marginalization from the first day. As Paul, an AU student noted, "figuring out how you can actually contribute to each and every class, especially when you have a [new homework management system] has completely taken over my life and so managing that along with my other classes has been my biggest challenge so far." Academic programmatic practices that assumed all students in the class had taken their coursework at the transfer institution were associated with grading penalties particularly in terms of assignment expectations and poor academic performance especially when curricular gaps were encountered that necessitated participants learn and integrate new course material.

Faculty Assumptions Impacting Access to Research and Professional Opportunities

Many participants elected to attend a community college for financial reasons. In fact, over one-third of our participants specifically cited cost of attendance as a primary reason for community college matriculation. At the same time, over half of the study's participants indicated they experienced financial pressures from unexpected costs associated with attendance at the receiving institutions. Academic program practices regarding student engagement in paid summer employment and funded research opportunities required students attain a minimum GPA and obtain faculty recommendations. At one receiving institution, application to summer research funds required applicants "prepare a proposal with a faculty mentor" while at the other institution access to summer research funds was reliant on "submission of a letter of intent to apply…that includes the name of your faculty mentor and a tentative project title. You should meet with your faculty member to discuss the project before submitting the letter of intent." This letter was due two months after the start of the academic year. In addition, leadership positions within academically-oriented student groups, which could also lead to employment and professional development opportunities,

had similar requirements for participation. Participants, who had yet to establish grades and relationships with faculty which could be utilized to garner a recommendation, felt foreclosed from many of the academically oriented opportunities. Regina, an AU student remarked:

> My problem right now with the School of Pharmacy is that I have to get references from professors [in order to be eligible as a student representative in pharmacy]. Well, I don't feel like I can connect to these other professors yet...so how am I supposed to get this great reference from this professor

Given the shortened timeline to degree completion and junior level entry status, participants were essentially barred from these opportunities which drew them to the institution in the first place.

Similar issues were found in terms of access to departmental scholarships. Evidence showed minimum qualifications for departmental scholarships required between 12–60 credits garnered at the transfer institution and letters of recommendation from two professors. Such qualifications served to exclude transfer students from access to financial support they so desperately needed. In many cases, participants had to assume jobs in order to cover unexpected costs which had implications for their academic success.

Support Services Incongruent with Transfer Students' Needs

Results show evidence of a mismatch between participants' specific needs as transfer students and academic support services rendered at the transfer institutions. The dissonance between needs and services was most prevalent in the provision of orientation and advisement and resulted in informational lapses, struggles to access institutionally-pertinent academic information, and participants feeling they "had to fend for themselves."

Of greatest consequences were issues surrounding accessing appropriate advisement. Institutional practices dictated that students with declared majors would be assigned a faculty advisor for guidance on course selection. These practices operated against participants who were new to the institution. Although participants had been assigned to faculty advisors, repeatedly present in the data was evidence of faculty advisors failing to respond to recurring requests for advisement. Meredith, an AU student, stated "my faculty advisor in biology sucks. No one's talked to me. I've emailed my advisor six times now. She hasn't responded. They're not really advising. And me [having] transferred here, I literally don't know anything and they're not helping me." The vast majority of these participants indicated the lacking personal relationship with their assigned faculty advisors was a culprit in the absence of communication because few participants had taken a course with their advisor or even met them. Confronted with a registration process steeped in competition for specific times and professors, several participants took matters into their own hands and self-advised. Sally, a BU Biology major indicated,

> One of my main problems I've had here is scheduling. My advisor, I've called him twice and emailed him three times with no response whatsoever. My advisor never got back to me so I did everything on my own. I sat down in the library for eight hours. I printed out all the sheets for my gen ed requirements, my unofficial transcript, tallied up how many gen eds I needed, and then searched for classes. It took me eight hours to get everything done and I had no guidance from any professor here. My [peers] were already familiar with professors here from freshman year, I didn't

> have that, I didn't have connections yet… I just don't understand how you don't get back to the person you've been assigned to advise.

As an alternative, participants often sought help from university advisors who provided assistance to undeclared students. Although participants were never turned away, they were equally frustrated by receipt of erroneous advisement by academic advisors. Participants spoke of advisors who lacked familiarity with their unique circumstances as transfer students and especially as STEM transfer students. As one participant noted, "the biggest problem for me has been the advisors just don't know how to help me personally as a transfer student." These participants expressed frustration with advisors who were unable to answer questions about course sequencing, the acceptance of transfer credits, and requirements for degree completion. More importantly, many participants received inaccurate advising on selecting courses for registration. For instance, Nick, an AU student, indicted he registered for Chemistry 2 and Chemistry 2 lab [but] as a civil engineer he didn't have to take Chemistry 2 lab.

> And I went to my adviser and she tells me, 'Oh, I don't know why we put you in Chemistry Lab, but you need to probably drop it because you don't need it.' So, I dropped it and then I got an email that I owed $100.

Interestingly, both institutions placed holds on freshmen to prevent registration without academic advisement, but no such practice was done for transfer students. Collectively, the advising challenges experienced by participants came at a premium which had long-lasting effects. Improper placement in courses frequently necessitated re-evaluation of community college transcripts prohibiting matriculation in advanced courses until a transcript evaluation was completed which delayed program completion. In cases where participants were unable to access advisement with course selection, erroneous self-advisement was costly both time-wise and financially.

Also prevalent in the data was incongruity between transfer student needs or expectations of orientation and the provision of this service. Institutional evidence highlights the existence of an orientation geared for transfer students specifically at each participating university. Institutional documents showed University A offered transfer students a one-day orientation session where students received a campus tour, learned about university services, met with academic advisors, and participated in small group discussions on college student life led by upper-class student leaders. A detailed schedule demonstrated the session included campus trivia and sessions on campus recreation, tips on being a successful student, housing, social programs, and a 25 min session called transfer 101 aimed at "providing information about your transfer student experience and helping you be academically and socially successful." Transfer student orientation was offered regularly throughout the summer. University B also offered transfer students a one-day orientation. The session provided students with an overview of the institution, receipt of identification cards, a review of social programs, and an opportunity to meet for general advisement. Interspersed throughout the day were opportunities to win university "swag" in exchange for correctly answering university trivia. University B mandated attendance at orientation, however, sessions for transfer students were only offered twice annually and therefore students with scheduling conflicts were required to attend a session aimed at incoming freshman.

In spite of orienting services aimed specifically at transfer students, participants felt orientation content was largely irrelevant to their status as transfer students. Participants were seeking academically oriented information that would help them transition more easily including information on class locations, bookstore and library policies, academic majors,

professors' expectations, and academic advice from other transfer students. Instead what they received was an orientation geared toward incoming freshmen with content heavily centered on social clubs, historical culture, and other aspects of social integration. Susan from AU described orientation as:

> cute. It's cute for my mom. She knows if there's a question on TV or the Oprah show she knows you can't step on the seal or you'll be cursed. It's a joke. And we heard about the barbeque in S Hall where the frat boys took a cow up there. The cow couldn't go down down stairs, so they just had a barbecue instead. That's not going to help me. They're cute, cute little facts. What we really needed was to be shown around where our classes were going to be. I didn't know where any of my classes were going to be…We're not here for the freshman experience.

For participants, orientation content seemed to provide guidance to incoming freshman and advice which focused on "not partying" and "learning to focus on academics" was deemed condescending and inappropriate. In the same vein, participants deemed the tone of orientation as unsuitable for them as transfer students. Repeatedly present in the data were sentiments that the orientation session was akin to a "high school pep rally" where participants learned the university fight song and cheers. Such an emphasis, which was considered more relevant for incoming freshman, came at the expense of what participants expected from the session. Jesse an AU student indicated "I wanted less hoopla, It was showy…I don't need all the spirit, I just want the facts. I mean obviously I've come to the school for the learning not for the [football]."

The lack of differentiation in orientation content was a strong point of contention for participants which left them feeling frustrated, lonely, and unguided. One particular source of frustration prevalent in the data, and related to participants' ability to access academically oriented information, was interactions with orientation leaders who were unable to address their specific needs and appeared to not be trained in the types of issues transfer students might face. As Patricia, an AU student, commented, the orientation leader "didn't know half the answers to the questions I had, because she was here as a freshmen and I was like, 'what good are you? How are you good to me?' I mean I felt like a kindergartner." Evidence that orientation leaders should have been better trained particularly since they were leaders at a transfer specific orientation session was seen in the data. Several participants even commented "you should meet another transfer student, so a transfer student alone should be the major qualification in a job like that."

Upon the realization that orienting expectations would not be met, several participants elected to leave because "I [realized] all the questions I had weren't going to get answered." Across the entire sample, evidence indicated that issues related to accessing transfer-pertinent information challenged participants from the inception of their transition. The limited applicability of information learned at the orientation session resulted in delayed access to the necessary academic information and in the need to seek alternative avenues for finding information. As a result, participants often took matters into their own hands and sought out answers from themselves with mixed results. Paul, a BU student remarked:

> you're literally on the university website searching in the search bar for random questions and praying to God you get the right answer... you have to really dig for the answers if you're a transfer student a lot more than if you're a freshman.

Unfortunately, the process of seeking answers to academic questions was not linear to the detriment of participants which left them feeling "shoved around" and as if they had been "thrown into the abyss."

The lack of accurate and timely information appeared to lead directly to experiences of diminished GPA (i.e., transfer shock). Information about courses and materials led to both financial and time costs. Some participants described the confusion of trying to complete homework and identify the correct sources of course information. When native students experience consistency in services and software, it leaves transfer students feeling unique in their challenges and lack of information.

Academic Load as a Burden of Transfer

Across institutions, results highlight evidence of registration practices that were intended to expedite matriculation from an administrative perspective, but ultimately operated against transfer students. While both institutions were situated in states with extensive articulation policies and websites that provided guidance on course equivalencies, evident in institutional documents was evidence that the "evaluation process [of transfer credit] takes time." Policies at each institution indicated that a transcript evaluator would examine and provide credit for courses considered part of the core curriculum, but any courses within a major would be "routed to the respective department for review" resulting in some delay in receipt of credit. In addition to these review delays, the articulation agreements themselves were problematic as the review of syllabi that led to equivalency determinations were not able to detect the stark differences in teaching styles and complexity expectations that led "equivalent" courses to create gaps in readiness for additional coursework.

To manage the timing of credit evaluation against fall registration, results show the first post-transfer semester course registration process was completed without participants' input or involvement. This practice augmented the transitional issues participants faced and contributed to the transfer penalty in several distinct ways. First, participants were registered for multiple difficult courses with labs and onerous course requirements. In other words, little consideration was given to the provision of a balanced course load that consisted of courses of varying reading and assignment demands. Anne an AU student noted,

> And they gave you your schedule, which I thought was great…you know, they've already planned it out for me. I don't have to worry about registering. But I realized later on… they put [me] in the three hardest class in my major the first semester… Anatomy & Physiology, Biochemistry and Microbiology all in the same semester. And it was hard… One of them is a 6-hour credit course and I had 2 labs and it was really rough.

The impact of this practice was doubly troublesome for participants who were already confronted with the previously mentioned curricular challenges. Thus, participants were forced to re-learn course content and integrate new content in multiple courses that were directly tied to their major. Given content in STEM courses was scaffolded, issues arising in lower level classes had implications for higher level courses. At the same time, enrollment in multiple lab- heavy courses had financial implications for participants as well. Review of course materials for lab courses revealed a panoply of required materials beyond textbooks. Ted, an AU student indicated he was struggling to afford all the required materials:

> I bought [the wrong] notebook. So I had to buy another one that cost me $10 that had all the requirements needed for the lab. Then, 'Oh, you have to take pictures you need a camera.' I don't have a camera. I have a tablet [but] a tablet doesn't take pictures good enough. You have to print them in color and paste them in the $10

> notebook. You need to bring your own Sharpie, towel paper, slides…And in Physiology, you have to buy your own scalpels and scissors and you have to bring your own gloves there, too. They'll mark off and make you go home if you don't have your stuff. I have a lot of trouble keeping up with it all financially.

A second effect of institutional registration practices was misplacement of participants which took one of several forms. In the vast majority of cases, participants were either placed in courses they had already taken or placed in courses they didn't need. Barbara, a BU student who had taken three semesters of chemistry at her community college, was "placed into Chem 1 even though [I had] already taken it…I don't know if they didn't look at my transcript…I don't know why they did that." Evidence of course misplacement was visible in the data despite state policies addressing credit transfer transparency. Interestingly, several participants experienced both forms of course misplacement creating a multifaceted problem of attempting to re-engineer course schedules with little guidance. While participants were permitted to appeal the denial of course credit, the practice was one which lacked immediacy. Institutional policies indicated credit disputes were addressed through an appeal process directed to the department chairperson who evaluated the appeal "while classes are in session." Thus, transfer students seeking any credit review were stalled until after courses began which had implications for rectify schedules.

In several cases, misplacement took the form of matriculation in courses out of sequence or in simultaneous registration of sequential courses which meant they were learning foundational and advanced material in the same semester. Chuck, a BU student noted "I'm taking classes together that I should take one before the other…it definitely would have been easier learning experience if I wasn't learning them at the same time." Placement in courses out of sequence or the assignment of heavy course loads produced a conundrum. Academic underperformance created negative repercussions on grade point averages, but at the same time participants were unable to withdrawal from these courses without drastic consequences on their financial aid. Notions of course withdrawal to combat misplacement or heavy course loads were consistent across nearly every participant, however, few participants actually withdrew because "I couldn't drop or I'd lose my scholarship," financial aid, or status as a full-time student. As a result, most participants elected to stay in courses which contributed to poor academic outcomes.

Discussion

Although a robust body of literature on the transfer penalty exists, research in this tradition has focused almost exclusively on deficits attributable to community colleges. Findings from this study present the convex perspective of the ways in which receiving 4-year institutions may contribute to the transfer penalty experienced by community college students. The present study sought to capture STEM students' experiences of marginalization which were related to institutional practices and policies and contributed to the transfer penalty.

The results of this study show that institutional policies and practices were directly associated with the marginalization experienced by participants leading to the transfer penalty. More specifically, programmatic idiosyncrasies manifested in policies and practices were based on faculty assumptions about students' academic histories and familiarity with academic expectations. Specific examples include faculty referring to prior courses in explaining current course content, presuming participants understood course requirement

and under-explained assignment expectations, and assuming students were fluent with academic technologies. When confronted with these assumptions, participants felt isolated, lost, and that they faced a steep learning curve to adopt new technologies, acquaint themselves with expectations, and learn or relearn content while simultaneously acquiring new content. These assumptions by faculty can be conceptualized as forms of cultural capital which were unknown to transfer students, marginalized them, and placed them at a disadvantage early in their transition process.

Another form of cultural capital we identified was access to professional development opportunities, such as scholarships, research grants, summer employment, and vocational student committees. All of these resources were subject to policies that prohibited access unless a specific number of credits and letters of recommendation were obtained. As students new to the institution, participants were either unable to meet credit specifications or garner the requisite letters of recommendation essentially foreclosing them from these professional and economic opportunities. Given many participants elected to attend community college to defray educational expenses, delayed completion or lack of access to scholarships and funded research opportunities diminished the benefits of taking this route. Further, lack of access to on- campus employment resulted in the need to secure other forms of employment which impacted academic success further.

Results highlight a dissonance between academic support services offered by 4-year institutions and the specific needs of transfer students which was most prevalent in the provision of advisement and orientation. Institutional policies routed participants to faculty for advisement, however, participants struggled to connect with faculty advisors and obtain appropriate advisement. The underlying presumption garnered by participants was that faculty advisors were unresponsive and it was difficult to establish the personal relationships they were used to with community college advisors. These results in particular accentuate transition theory and participant's reliance on the 4 S's to "move through" the transfer transition. Evidence that participants proactively and repeatedly reached out to advisors and when they experienced unresponsiveness, sought out other forms of advisement including advisement for undeclared students and self-advisement are indicative of reliance on support systems and characteristics such as self- reliance and self-efficacy to negotiate issues experienced during the transition. Most problematic to these circumstances was the lack of appropriate support services frequently resulted in erroneous course selection, course withdrawal, academic underperformance, and delayed graduation.

Also prevalent in the data was incongruity between transfer student needs and the provision of orientation. While both institutions offered specific orientations for transfer students, the content and tone of these sessions was inappropriate for participants' needs. Participants were seeking and expecting access to academically-oriented information which would help them transition and succeed academically. Instead, orientation focused on social integration and was described as a "pep rally." The minimal academic guidance provided to participants was limited to remarks on balancing academic and social demands. Students felt this advice was unnecessary or condescending given participants' prior academic success. Participant interviews suggest transfer student orientation was nothing more than freshman orientation in sheep's clothing, without an essential understanding of the views and needs of transfer students. Again, when orientation informational channels failed to produce the academic guidance participants were seeking, they deployed dispositions such as resilience and hardiness to help them "move through" a transitional issue.

Finally, evidence shows institutional registration practices for transfer students operated against participants' best interest. Practices that automatically assigned course schedules to transfer students without their input resulted in placement into multiple demanding courses

or that was erroneous. Registration into multiple courses with heavy reading and lab loads affected participants' ability to manage and balance course requirements. When confronted with these loads, participants struggled academically and faced either academic underperformance or course withdrawal which delayed graduation. Equally important the additional required course materials necessary for lab courses affected participants financially. Misplacement took several forms including registration for unrequired courses, courses already taken, or courses out of sequence all of which affected participants' transition, ability to succeed academically, and also had financial implications.

Findings implicate a lack of cultural capital as a major culprit in the transitional issues, marginalization experienced by participants, and the transfer penalty. One the one hand, results provide evidence that receiving transfer institutions perpetuate and protect their status in the higher education hierarchy through the adoption of policies and practices which marginalized transfer students. For instance, the acquisition of professional and research opportunities was based on policies which required faculty mentors and grades which placed participants, who were new to the institution, at a distinct disadvantage. In doing so, institutions perpetuated notions that initial matriculation at that institution was advantageous. Other policies associated with automatic registration of transfer students, delays in receipt of transfer credit, and academic advisement similarly not only thwarted academic progress and contributed to the transfer penalty, but also reinforced the existing hierarchical institutional structure.

Contemporaneously, participants lacked cultural capital as it related to institutional norms and expectations which contributed to feelings of marginalization and academic underperformance. Evidence of curricular differences and departmental and faculty preferences for assignments were all reflections of cultural capital distinct to the institutional context. Since participants were evaluated and rewarded on the basis of their adoption and ability to conform to forms of cultural capital valued by an institution, participants, by virtue of their unfamiliarity with these norms, experienced academic underperformance.

The marginalizing experiences felt by participants highlight the salience of transition theory. The very challenges experienced by participants related directly to engaging with new norms and expectations or "moving in" to the transfer transition. Further, as participants attempted to "move through" the transfer transition they deployed and employed tactics to help them cope and adapt to their new environment. Participants relied on support services that were available to them, enacted dispositional traits including self-reliance and resilience, and used strategies to help them negotiate the transfer transition. Most problematic is deployment of the 4 S's often resulted in receipt of misinformation which lengthened the period of adapting to their new educational environment and detracted from "moving through" the transfer transition.

While existing research has examined transitional challenges faced by transfer students, much of this research has focused on the difficulties transfer student experience in developing peer relationships and social networks (e.g. Ellis 2013; Davies and Casey 1999; Younger 2009) or feelings of belonging (Cohen and Brawer 2003; Dowd 2003; Laanan 2001; Townsend and Wilson 2006; Younger 2009). A much smaller body of literature explored the transfer transition as through a lens of how students manage the stress of acclimatization and focused on personal traits that eased the transition including maturity and motivation (e.g. Laanan 2004; Lazarowicz 2015). Finally, a few studies found transfer students struggled to access learning support services and resources (e.g. Davies and Casey 1999; Ellis 2013; Flaga 2006), findings which resonate with this study's results on difficulties accessing appropriate advising.

The present study contributes to this growing body of literature by highlighting the academic challenges STEM transfer students experienced. Collectively, findings substantiate the notion that receiving 4-year institutions also contribute to the transfer penalty in meaningful ways that ultimately thwart progression to degree completion. In totality, these research findings suggest the existence of a chasm of sorts between community colleges and receiving transfer institutions that can only be ameliorated through on-going policy discussions and future research that emphasizes the shared responsibility between 2- and 4-year institutions for the transfer transition. This notion is particularly important given community colleges tend to attract diverse students and the relative dearth of diverse students in STEM fields. As higher education strives to achieve its objectives of providing access to diverse students, instances of the devaluation of the educational avenue most commonly utilized by diverse students should also be recognized and addressed. To that end, we recommend future research explore if experiences of marginalization varied by gender or race/ethnicity as well as across academic disciplines. We also note that experiences of marginalization may vary as a function of institution and recommend future research replicate this study with other institutions of varying research intensity. Lastly, findings of marginalization were centered on the student perspective; future research should explore faculty and practitioner viewpoints which might serve to counter the perspectives of marginalization presented in this study.

Our findings have important implications for policy-makers and practitioners alike. As matriculation rates at community colleges continue to increase, policy-makers must hold 4-year institutions accountable for their role in the degree attainment of transfer students. A primary mechanism for this may be through articulation agreements that detail curricular alignment to avoid incongruences in content coverage, focus, and terminology. This recommendation is particularly relevant given our results accentuating that existing articulation agreements are insufficiently addressing these issues. Additionally, articulation agreements might springboard conversations between 2- and 4-year faculties on academically oriented transitional issues faced by transfer students. At the same time, findings emphasize the need for faculty at 4-year institutions to develop an awareness of the ways in which their actions or inactions might marginalize transfer students. This evidence suggests the need for on-going professional development for faculty in upper level courses where transfer students might be more prevalent. Relatively small interventions, such as asking for transfer status on the first day of class, an annual review of transfer student characteristics, or administratively denoting who are transfer students on course rosters, can create awareness and keep transfer student issues on the forefront on consciousness.

Results also highlight the need for institutional awareness of the impact of policies and practices on transfer students. Findings on accessibility to professional development and research opportunities, faculty advisement, orientation programming and registration practices implicate the need to review and revise policies and structures from the transfer student perspective. Practitioners can be especially impactful in this regard by providing transfer students with a voice and opportunity to participate in programmatic development. Data from this study also implicate the need to devise services specifically tailored to transfer students administered by individuals who possess expertise on transfer issues. The provision of institutional agents to transfer students would help abate feelings of isolation and marginalization through resources that aid in information distribution and the assimilation of norms. Mentoring relationships that are predicated on the cultural capital that transfer students bring to the STEM curriculum may be a particularly beneficial way to address this issue. Given the increasing use of community colleges as a pathway to STEM careers (Starobin et al. 2010), more and more potential mentors to future transfer students

will be available to ease the transition and create meaningful orientation to the 4-year institution. Through all of these efforts, we can promote the success of such students and have a substantial impact on increasing the numbers of STEM graduates in the U.S and on the country's ability to compete in global markets.

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