

When and where: An event history analysis of student flow in postsecondary
education

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To address conceptual and methodological shortcomings in the extant literature on student mobility, this study employs event history modeling to describe and explain how key factors—like academic preparation, student background, college enrollment, financial aid, and pertinent postsecondary policies—affect student movement among all public two- and four-year institutions in Indiana. This project seeks to (a) test, refine, and expand existing typologies of student movement and (b) model how time-varying factors (like those listed above) affect movement in a longitudinal fashion. To-date, relatively little research has investigated student movement via rigorous statistical methods and—moreover—no research has taken into account the dynamic, time-varying nature of enrollment and mobility. This inquiry contributes to recent work on student mobility, (e.g., McCormick 1997; Goldrick-Rab, 2006) while also extending the long line of persistence research (e.g., Bean, 1980; Pascarella & Terenzini, 1980; Tinto, 1975) that seeks to understand and differentiate forms of and reasons for student departure from higher education.

Knowledge about the causes and consequences of student mobility is of importance nationally because the prevalence of student mobility will continue to grow in the coming decades, fueled by demographic shifts (e.g., increasing numbers of adult students) (Anderson, 2003) along with changes in education policy (e.g., financing or transfer and articulation agreements) (Longanecker & Blanco, 2003). Even as mobility continues to grow, relatively little is known about its relationship to academic success. Adelman (1999, 2006) has suggested that not all forms of student movement are equal, noting that some movement (movement that he calls “purposeful”) may contribute to degree attainment, whereas other forms of movement may be negatively related to degree completion. Goldrick-Rab and Pfeffer (2007) label this a ‘*mobility penalty*’, noting that it is more likely paid by students from lower socioeconomic strata and is associated with moving from a four- to two-year institution. Students from higher socioeconomic strata were more likely to move from one four-year institution to another and paid no similar price in regard to degree completion. As Borden (2004) has argued, postsecondary policy-makers and practitioners will need to know how to adapt policy and practice to meet the realities of student enrollment patterns and—importantly—understand how forms of movement relate to educational outcomes.

Growing interest among scholars, policy-makers, and practitioners in student mobility is converging with increased capacity—via student unit record systems—to track students, making this research timely. Among the many challenges associated with studying the enrollment patterns of increasingly mobile students is the challenge of tracking students across institutions. However, the continued development of as well as

interest in student unit record (SUR) systems presents a unique opportunity to follow students as they move among institutions. Overall, 40 states now maintain SURs (Ewell & Boeke, 2007). The recent attention given to SURs by the Spellings Commission and the National Center for Education Statistics is indicative of the growing interests among researchers and policy makers in using unit-record data to illuminate persistent questions in the field. From the early 1990s onward a small but growing cadre of scholars, such as Ed St. John, Steve DesJardins, and others have advocated the use of extant data from SUR systems in research. Advocates argue that such systems enable researchers to model more accurately the complexities of student behaviors along pathways to academic success. Furthermore, researchers and policy makers have long-acknowledged the inadequacy of single-institution data systems in tracking increasingly mobile students across multiple institutions over prolonged periods of time. The portrait of a student attending one institution for four-years no longer reflects the reality of postsecondary education. State and even regional SUR databases are seen as potential solutions in the current milieu of accountability and complexity.

Review of the Literature

Student mobility within postsecondary education is gaining attention among policy makers, campus practitioners, and scholars—and with good reason. Adelman (1999) estimates that the multi-institutional attendance rate now exceeds 60 percent of undergraduate students (compared to 40% and 54% in the 1970s and 1980s respectively). In addition, mobility is not limited to movement from community colleges to baccalaureate institutions, as some may perceive. Goldrick-Rab & Pfeffer (2007) found that 30 percent of students who began at four-year institutions changed colleges at least

once during their enrollment lifetime. Moreover, student mobility is not simply a matter of switching enrollment from one institution to another. Students may move multiple times. In a study of movement among several urban community colleges and a university Bach, Banks, Kinnick, Ricks, Stoering, and Walleri (2000) found that 25 percent of students who had begun at the community college moved an average of just over three times over the span of five years. Most students in postsecondary education enroll in multiple institutions.

Yet, despite the prevalence of students' mobility in attending postsecondary institutions, relatively little is known about the variety and complexity of these movements primarily because very few studies have addressed the broad topic of mobility and even within the voluminous transfer literature most research has focused on linear movement directly from a two- to four-year institution (Townsend & Dever, 1999). A review of the literature on student mobility shows that less than two-dozen studies have addressed the topic. A number of these are conceptual or methodological (e.g., Borden, 2004; Robinson, 2004) or are purely descriptive (e.g., Bach et al., 2000; Barnes & Robinson, 1999; Corrigan, 2003; de los Santos Jr & Wright, 1990). Just a handful of articles have explored student mobility using relatively rigorous statistical methods (Adelman, 1999, 2006; Goldrick-Rab, 2006; Goldrick-Rab & Pfeffer, 2007; McCormick, 1997, 2003).

Moreover, even when considering the substantial body of transfer literature as part of our understanding about mobility, we find that most of this work has focused on students who transfer in a traditional fashion from a two-year college to a four-year institution (Townsend & Dever, 1999), having first earned an associate's degree.

However, even this traditional notion of ‘moving up’ captures only a small slice of the complex reality of transfer. For example, McCormick (1997) found that only 22 percent of students who began at a community college transferred to a four-year institution (though the number was closer to 39% for the one in four students who began with the intention of earning a baccalaureate degree). Furthermore, just over one-third of students who began at a community college and eventually transferred to a four-year institution first earned an associate’s degree. Finally, students who did move to a baccalaureate institution did not transfer right away. On average, students took about 21 months to enroll in a four-year institution after being enrolled in a community college. This suggests that significant gaps exist in the transfer literature with respect to understanding student mobility.

Conceptual Foundations

The student adjustment model provides the conceptual foundation for this study. Characteristic of these models is an explicit consideration of contexts, evident in much of the more recent scholarship on persistence (St. John, Paulsen, & Carter, 2005; St. John, Paulsen, & Starkey 1996; Titus, 2006; Torres, 2006). Efforts to consider the ways in which contexts interact with individual characteristics is in part a response to previously unacknowledged shortcomings with integration (Tinto, 1975) and attrition (Bean, 1980) models, particularly as they were applied to understanding the experiences of underrepresented students or nontraditional students.

Building on prior work that looked at the effects of environmental factors on persistence, Cabrera, Stampen, Hansen (1990), Cabrera, Castaneda, Nora, and Hengstler (1992), and Cabrera, Nora, Castaneda (1993) developed and tested an integrated model

that incorporates elements from both the integration and attrition models. Nora and Cabrera (1996) further developed this *Student Adjustment Model* in testing the effects of prejudice and discrimination on the adjustment of underrepresented students. The Student Adjustment Model conceptualizes colleges as having academic and social domains in which students' experiences can negatively or positively affect their cognitive and affective development, which in turn affects academic and intellectual development, commitment to degree attainment, and institutional commitment. In this model the academic and social domains are seen as interdependent, with students' experiences in one sphere reinforcing experiences in the other. Compared to earlier retention theory, the adjustment model incorporates greater consideration of student contexts, such as structural diversity, as factors in persistence. Titus (2006) extends this model to include institutional resources, including revenue and expenditure patterns.

This thread of persistence research has developed in order to integrate, synthesize, and extend retention theory beyond '*traditional*' students. This conceptual extension is particularly important in the study of student mobility because, as prior research (Goldrick-Sab, 2006; McCormick, 2007) has suggested, movement does not conform to traditional theories of enrollment, which have historically been based on a traditional age student who enrolls in a linear fashion for a specified period of time. In other words, movement is likely conditioned in part on variables such as age, race/ethnicity, income, campus climate, or dependency status—all factors which have not figured prominently into theories of enrollment.

Methods

The complexity of studying the multi-faceted forms of student mobility is substantial. For example, in a study of just over 5,000 undergraduate students attending one of three urban community colleges and university, (Bach et al., 2000) found 48 distinct patterns of attendance over a five year period. The nascent nature of our understanding about student mobility is further evidenced in the array of terms used by researchers to describe it: excursions, swirling, double-dipping, serial transfer, migration, fragmentation, rebounding, discovery, and more. Given the complexities and need for more information about types of movement, the first objective of this study is to test, refine, and expand existing typologies of student movement. The second is to model how time-varying factors affect movement in a longitudinal fashion. Therefore, the first set of research questions explored in this study is descriptive and intended to provide a foundation for multivariate analysis.

- What are the most common forms of student movement among all public two- and four-year institutions in Indiana? What is the temporal profile of these common forms?
- To what extent are forms of movement more or less common by different institutional type (e.g., research university or a four-year branch campus)?

Building on findings from descriptive analysis, our next set of research questions has the goal of better understanding how a variety of factors affect movement in each period of enrollment.

- To what extent do student background characteristics (i.e., race/ethnicity, gender, income, dependency status) affect propensity to move, controlling for all else? How do these variables affect timing of movement? How do these effects change over time?
- To what extent do policies (i.e., high school curriculum, developmental education, financial aid) affect propensity to move, controlling for all else? How do these policies affect timing of movement? How do these effects change over time?

To explore the patterns of student movement as well as the variables that affect movement over time, this study employs event history modeling using a student unit record system containing data for all students enrolled in Indiana's public postsecondary institutions from 1999 to 2007. All first-time, first-year students who enrolled in 1999 in community colleges or baccalaureate degree institutions (approximately 55,000 individuals) were tracked through the end of the 2007-2008 academic year.

Descriptive Analysis

Prior approaches to analyzing complex student enrollment patterns guided the descriptive portion of the project. Bach et al (Bach et al., 2000) and (Robinson, 2004) in their analysis of common forms of mobility, employ a coding scheme that enables them to describe and aggregate varied patterns of enrollment. Robinson's pathway technique, for example, develops a priori codes for different forms of enrollment (e.g., beginning=1, continuing=2), then concatenates codes to develop a longitudinal description of enrollment in each period of observation. Similarly, this study assigned codes to the forms of enrollment (defined here as being reported as enrolled by a postsecondary institution) in each period (academic year). To guide the process some codes were developed a priori based on prior research (e.g., enrolled in a four-year or two-year institution). In addition, through an iterative process of descriptive analysis, additional codes will be developed based on observed patterns. Goldrick-Rab (2006) warns against developing a priori definitions of enrollment that are too restrictive as they might bias the results toward certain groups. For example, defining movement among institutions based on transfer of credits may ignore the movement of low-income students who are less likely to formally transfer.

To describe common forms enrollment six aspects were coded and analyzed for each student in each year: Institutional type, whether a student had a declared major, the credit taking pattern, enrollment intensity, whether the student earned an AA or BA degree and whether or not the student was enrolled each year (See Table 1 for coding information).

Table 1: Characteristics of Enrollment Coding Approach

Institutional type	CC= Community College; RES=Research; STATE= State university, BRNCH=Regional university; URB=Urban university
Declared major	MAJ= Declared Major; UND=Major Undecided
Credit-taking	AY= Academic year only; AYS= Academic year and summer; SO= Summer only
Full- or part-time	1= Full time; 0=Part time;
Degree status	AA= Associate; BA= Baccalaureate
*	Not enrolled

For example, a student might have been enrolled at a research university, had declared a major, taken courses during the academic year only, enrolled full-time, and earned a bachelor’s degree. Once each student’s enrollment characteristics were coded for each year, it was possible to ascertain the number of unique patterns as well as which patterns of enrollment were most common.

Multivariate Analysis

The temporal nature of enrollment is implicitly recognized in the extant literature on educational attainment (e.g., Tinto, 1975; Bean, 1980; Braxton, 2000). Yet despite acknowledging the longitudinal nature of enrollment, most researchers continue to approach analyses in cross-sectional fashion. In fact, relatively few persistence studies employ methods that incorporate temporal aspects into their conceptual and analytic models (DesJardins, Ahlburg, McCall, 2002)

To address this shortcoming, a handful of education scholars have begun applying event history analysis (EHA) techniques developed in other fields—notably, demography, biology, and engineering—to the study of persistence (e.g., DesJardins, 2001; DesJardins, Ahlburg, McCall, 2002; DesJardins, Ahlburg, McCall, 2004; DesJardins, Kim, Rzonca, 2003; Doyle, 2006). EHA, in its most basic form, is the longitudinal analysis of when individuals or organizations experience events of interest (Allison, 1984). Unlike traditional approaches to regression, EHA explicitly incorporates temporal dimensions in estimating coefficients and the overall fit of the model while allowing for variation from period to period in explanatory variables. Perhaps more importantly than the technical improvements offered by EHA, the technique does not constrain the conceptual models we use to understand and map the social process of interest. Rather than modeling persistence in a temporally flat fashion, EHA enables us to specify and account for the temporal aspects of the events of interest.

The events of interest in this study are student movement (described more below) and earning a postsecondary credential. Analysis time will be measured as academic years because only annual data are available. A discrete-time model will be used to estimate the effects of financial aid on timing to the event of interest. As suggested by Allison (1984) in instances where time is measured in discrete units it is appropriate to employ discrete-time methods. Equation 1 denotes the general form of the model where $h(t_j)$ represents the hazard rate of experiencing the event of interest at a discrete point in time, D represents the baseline hazard intercept parameter at time periods one through eight, and β_1 through β_5 represent the slope coefficients for the predictor variables.

Equation 1. General Form of Discrete-Time Survival Model

$$\text{logit } h(tj) = [\alpha_1 D1 + \alpha_2 D2 + \dots + \alpha_8 D8] + [\beta_1 x1 + \beta_2 x2 + \beta_3 x3 + \beta_4 x4 + \beta_5 x5]$$

The models will control for factors posited by theory and previous research to affect student persistence, including: (a) student background variables (β_1), (b) academic preparation variables (including high school curriculum) (β_2), (c) college experience variables (including developmental education and postsecondary contexts) (β_3), (d) measure of academic momentum (β_4), and (e) financial aid (β_5). Table 2 provides specific variables included in the empirical models, denoting those variables which are time varying.

Table 2: Variables Included in the Empirical Models

Student Background	Academic Preparation	Campus Characteristics ^{ab}	College Enrollment Characteristics ^a	Financial Aid ^{ab}
Age ^a	% Free lunch HS	% Students of Color	Housing ^b	Cost of attendance
Gender	High school rank	% Faculty of Color	Credits attempted ^b	Cumulative loan debt
Race/ethnicity	SAT score		Dev. ed. credits ^b	Applied for aid
Income ^a			Cumulative credits	Received aid
			Declared major ^b	Need-based aid receipt
			GPA ^b	
			Institution type ^b	
			Yrs. Stopped-out ^a	

a denotes time-varying variables

b denotes lagged variables

Note: All aid amounts in \$1,000s

A series of discrete-time models was estimated, beginning with a main effects (ME) of time model, as suggested by Singer and Willett (2003). The ME model generates a fitted hazard profile against which subsequent models can be compared. Next, a proportional hazards model will be estimated. This includes time-constant and time-varying variables hypothesized to affect timing to movement. Like the ME model, a proportional hazards model provides a point of comparison against which additional

hypotheses and models can be tested. In total, five models were run (see Table 3). As discussed above, to avoid establishing a priori definitions that might exclude certain forms of movement, three mobility events were modeled first: Moving instructional homes (i.e., being reported as enrolled at an instructional institution different from the prior academic year); transferring credits (i.e., being officially reported by an institution as having transferred credits); and moving instructional homes with a restart (i.e., changing instructional homes as described above, but starting with no credits and enrolling as a first-time student). These events were based on descriptive analysis.

Table 3: Empirical Models

Model	Event
1	Instructional home move
2	Transferred credits
3	Instructional home move, restart
4	Associate's degree completion
5	Bachelor's degree completion

In addition to these movement events, two models were run with degree completion as the event of interest. Models four and five incorporated as independent variables from the prior models. That is, the forms of movement explored in models one through three were used to help predict likelihood of earning a postsecondary credential. Moreover, earning an associate's degree was included as an explanatory variable in model five, helping predict baccalaureate degree completion.

Data

The combination of a statewide student unit record database and data from IPEDS enabled longitudinal tracking of students along with detailed information about institutional contexts, consistent with the student adjustment model employed here. Data come from the Indiana Commission for Higher Education (ICHE) statewide student

information system (SIS) student unit record database and the National Center for Education Statistics Integrated Postsecondary Education Data System (IPEDS). SIS data are collected from all public universities, colleges, and community colleges in Indiana for enrollment-related transactions and represent the universe of students enrolled from 1999-2006. Specific variables coming from this dataset are listed below.

Enrollment and staffing data from the Integrated Postsecondary Education Data Systems (IPEDS) are used for measures of campus climate (e.g., structural diversity), institutional wealth (e.g., instructional expenditures per student), and net price. Data from 1999-2006 were used.

Sample Selection

Students who began as first-time, first-year entrants in 1999 were the population of interest for this study (n=49,331). A number of students representing from five to about eight percent of the cohort in any given year were enrolled in multiple institutions in the same academic year (see Table 4). For purposes of this analysis, this form of mobility was not considered and only what was judged to be the primary institution for these students was included in the analysis. To determine which enrollment record represented the student’s primary institution the temporal sequencing of enrollment was

Table 4: Dual Enrollment Students as a Proportion of the Total Cohort

	<u>Count</u>	<u>% of Cohort</u>
1999	2307	4.7
2000	2818	7.6
2001	2199	7.0
2002	1521	5.5
2003	1092	5.6
2004	623	5.5
2005	403	5.1
2006	365	5.8

analyzed for each student. Each enrollment record was examined to determine whether a student enrolled for a summer term or a fall and spring term, or some other combination of terms. The primary institution was determined to be the one in which the student enrolled the earliest (e.g., fall) and attempted the most credit. For example if a student enrolled for a summer course at one institution but enrolled at another institution during the fall and spring terms, the latter institution was taken to be the institution of primary enrollment. Once dual-enrollment records were excluded, the effective sample size was 46,417.

Sample Characteristics

The sample was nearly equally split between men and women. As might be expected given the racial and ethnic profile of Indiana, the majority of the sample (84%) was white (see Table 5). African American students (7%) were underrepresented relative to the statewide population in 1999 (about 8.25). Just over three-quarters of the sample was under age 21 when they began in 1999. Research universities and community colleges enrolled about 29 percent of the sample each. About one-third of the sample began in Associate degree programs while two-thirds began in baccalaureate degree programs.

Table 5: Selected Characteristics of Sample at Time of Origin

		Count	Proportion
Gender	Female	23,401	50.4%
	Male	23,016	49.6%
Race/Ethnicity	Native American, Other	186	0.4%
	Asian American, Pacific Islander	689	1.5%
	African American	3,318	7.1%
	Hispanic	1,147	2.5%
	Race missing	1,696	3.7%
	White	39,381	84.8%
Age	Under 21	35,190	75.8%
	21-24	3,507	7.6%

	25-29	2,677	5.8%
	30-35	1,904	4.1%
	36 and older	3,139	6.8%
Institution type	Community College	13,344	28.7%
	State universities	6,977	15.0%
	Regional campuses	8,591	18.5%
	Urban university	4,181	9.0%
	Research university	13,324	28.7%
	Student housing	On-campus housing	16,673
Off-campus housing		26,535	57.2%
Lived with parents		3,209	6.9%
Developmental Courses	3,175	6.8%	
Declared Major	37,243	80.2%	
Began in AA Program			35.0%
Began in BA Program	16,226		65.0%
	30,191		

Table 6 displays the means of a number of selected characteristics at the year of origin for students. As might be expected given the demographics of Indiana, the proportion of students of color was relatively low (about 12%) as was the proportion faculty of color (4%). The average income across the entire sample was just over \$36,000 with students taking out a little over \$1,200 in loans during the first year, on average.

Table 6: Selected Means of Sample at Origin, 1999

	Mean
% Students of Color on Campus	11.51
% Faculty of Color on Campus	4.01
% Free Lunch Recipients	12.37
High School Rank	54.62
College GPA	2.27
Credits Attempted, Entire Year	21.77
Developmental Credits	.74
Income	\$36,266
Loans	\$1,255.29
Net Price	\$5,010.00

Findings

Descriptive Findings

Statewide, there were 19,826 unique patterns of enrollment with respect to the six dimensions: Institutional type, whether a student had a declared major, credit taking pattern, enrollment intensity, whether the student earned an AA or BA degree and whether or not the student was enrolled each year. Table 7 displays the five most frequent patterns across all public institutions. We find that the most commonly (n=2,720) followed path was to enroll in a community college (CC), attempt credits during the fall and spring (AY), have a declared major (MAJ), to attend part-time (0), and then enroll again during the observation period (See Column 2, Table 7). The second most common (n=1,116) pattern might be described as a traditional pathway: enrolling in a research university, attempting credit during the fall and spring terms, having a declared major, attending full-time, and earning a baccalaureate degree in four years.

Table 7: Most Frequent Statewide Enrollment Patterns

Year	Enrollment Pattern				
1999	CC,AY,MAJ,0	RES,AY,MAJ,1	BRNCH,AY,MAJ,0	RES,AY,UND,0	CC,AY,MAJ,0
2000	*	RES,AY,MAJ,1	*	*	CC,AY,MAJ,0
2001	*	RES,AY,MAJ,1	*	*	*
2002	*	RES,AY,MAJ,1BA	*	*	*
2003	*	*	*	*	*
2004	*	*	*	*	*
2005	*	*	*	*	*
2006	*	*	*	*	*
Frequency	2720	1116	837	750	680

The most common enrollment patterns among those who earned a credential was to enroll part-time for five years at a community college, take courses during the academic year, and earn an Associate’s degree in year five (see Table 8). The next most common was to enroll full time for two years and earn a degree. It was relatively

uncommon for students to transfer from a community college to a baccalaureate degree-granting institution and complete a degree, though among those who did they most frequently moved to a research institution after attending the community college for one or two years.

Table 8: Enrollment Patterns Among Community College Entrants Who Eventually Earn a Postsecondary Credential

Year	Enrollment Pattern				
1999	AY,MAJ,0	AY,MAJ,1	AY,MAJ,0	AY,MAJ,0	AY,MAJ,0
2000	AY,MAJ,0	AY,MAJ,1,AA	AY,MAJ,0	RES,AY,MAJ,1	AY,MAJ,0
2001	AY,MAJ,0	*	AY,MAJ,0	RES,AY,MAJ,1	RES,AY,MAJ,1
2002	AY,MAJ,0	*	AY,MAJ,0,AA	RES,AY,MAJ,1	RES,AY,MAJ,1
2003	AY,MAJ,0,AA	*	*	RES,AY,MAJ,1,BA	RES,AY,MAJ,1
2004	*	*	*	*	RES,AY,MAJ,1,BA
2005	*	*	*	*	*
2006	*	*	*	*	*
Frequency	120	77	47	22	10

Multivariate Findings

Selected results from the survival models are presented in Table 9. Findings pertaining to student background characteristics and student movement are discussed first followed by key policy areas (academic preparation, developmental education, and financial aid).

Student background.

Gender differences in movement and completion emerged from this study. Women were more likely than men to move instructional homes and transfer credits. In addition, women were less likely to earn an associate's degree but more likely to earn a bachelor's degree than men, controlling for all else.

Table 9: Selected Regression Results

	Model One	Model Two	Model Three	Model Four	Model Five
	Campus Move	Credit Transfer	Transfer Restart	Associate's Degree	Bachelor's Degree
Moved Instructional Home				-0.13 (0.05)**	-0.4 (0.05)**
Transferred, Credit Transfer				-1.93 (0.24)**	-1.92 (0.28)**
Transferred, Restart				-3.36 (0.71)**	-2.54 (0.58)**
Women compared to men	0.12 (0.02)**	0.1 (0.03)**	0.05 (0.04)	-0.2 (0.03)**	0.08 (0.01)**
Compared to Whites					
Latino/Hispanic	-0.13 (0.05)**	-0.21 (0.10)**	-0.13 (0.13)	-0.07 (0.09)	-0.08 (0.05)*
African American/Black	0.00 (0.03)	-0.11 (0.06)*	0.11 (0.07)	-0.22 (0.07)**	-0.09 (0.03)**
Asian American/Pacific Islander	-0.22 (0.07)**	-0.34 (0.16)**	-0.27 (0.19)	-0.05 (0.13)	-0.05 (0.04)
Income	0.00 (0.00)**	-0.01 (0.00)**	-0.01 (0)**	0.00 (0.00)**	0.00 (0.00)**
% HS Free Lunch	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.01 (0.00)**
HS Rank	0.00 (0.00)**	0.00 (0.00)**	0.00 (0.00)	0.00 (0.00)**	0.01 (0.00)**
Composite SAT	0.00 (0.00)**	0.00 (0.00)**	0.00 (0.00)**	0.00 (0.00)**	0.00 (0.00)**
% Faculty of Color	1.24 (0.04)**	0.15 (0.10)	0.07 (0.12)	-0.15 (0.09)*	0.07 (0.09)
% Students of Color	-1.55 (0.10)**	-0.96 (0.24)**	-2.8 (0.3)**	0.25 (0.2)	-0.26 (0.15)*
Developmental Credits	-0.02 (0.00)**	-0.03 (0.01)**	-0.06 (0.01)**	-0.19 (0.02)**	-0.34 (0.06)**
College GPA	-0.13 (0.01)**	-0.18 (0.01)**	-0.26 (0.02)**	0.36 (0.02)**	0.31 (0.01)**
Declared Major	-0.29 (0.02)**	-0.35 (0.04)**	-0.11 (0.05)**	0.7 (0.1)**	0.4 (0.06)**
Years Stopped Out	-0.8 (0.01)**	-0.73 (0.02)**	-0.74 (0.03)**	-1.34 (0.04)**	-1.5 (0.03)**
Cost of Attendance (\$1,000s)	0.03 (0.00)**	-0.01 (0.00)**	0.08 (0.01)**	0.02 (0.00)**	0.01 (0.00)**
Cumulative Loans (\$1,000s)	0.01 (0.00)**	0.00 (0.00)	0.01 (0.00)**	-0.01 (0.00)**	-0.01 (0.00)**
Received Aid	0.05 (0.03)*	0.32 (0.06)**	-0.09 (0.08)	0.10 (0.06)*	0.09 (0.02)**
Received Need Aid	0.06 (0.02)**	0.04 (0.05)	-0.08 (0.07)	0.19 (0.05)**	-0.09 (0.02)**
Applied for Aid	0.1 (0.02)**	-0.02 (0.04)	0.05 (0.05)	0.31 (0.05)**	-0.03 (0.02)
Began in Associate's Program					-0.36 (0.02)**
n= 46,417					
Events	22,034	4,700	3,107	4,251	15,613

*Significant at the 0.10 level
 **Significant at the 0.05 level
 Standard error in parentheses

Latinos and Asian American, Pacific Islanders were less likely than their white peers to move instructional homes or transfer credit. Latinos were less likely to earn a bachelor's degree. By comparison, African Americans were less likely to transfer credits than their white peers, and also likely to earn any form of degree. Although some statistically significant differences emerged between movement and measures of socioeconomic status (i.e., income and proportion of free and reduced lunch recipients at the high school of origin), the size of the effect was practically negligible.

Academic preparation.

Students' academic preparation, as measured by composite SAT and high school rank, was significantly related to both propensity to move as well as likelihood of completion. For example, as composite SAT score and high school rank increased, so too did the likelihood of moving instructional homes and transferring credit. However, the size of the effect suggests that academic preparation had a negligible practical significance on propensity to move or complete a degree, controlling for all else.

Developmental Education.

Interestingly, taking developmental courses was negatively related to all forms of movement. As the number of developmental credits attempted increased, likelihood of moving instructional homes, transferring credits, and restarting enrollment decreased, though again the effect was practically minor. Developmental education was negatively related to degree completion as well. This suggests that developmental education may indirectly affect completion through lowering the likelihood that a student will move, given that all forms of movement were negatively related to degree completion.

Financing.

Financial aid and the costs of attendance appeared to have the largest effect on propensity to move among students. As the cost of attendance increased, the likelihood of moving instructional homes also increased whereas the likelihood of transferring credits decreased. Cost was positively associated with likelihood of restarting as well. Interestingly, cost of attendance was positively related to earning a postsecondary credential of any type, even after controlling for institutional type. Cumulative loans was positively associated with likelihood of moving instructional homes and negatively related to degree completion, though again the practical significance is limited given the small effect. Receiving any form of need-based aid was positively associated with propensity to move instructional homes and positively related to receipt of an associate's degree, though it was negatively related to receiving a bachelor's degree.

Conclusion

Findings from this study demonstrate the complexity of student movement and suggest that a priori typologies may be inadequate for fully capturing the multitude of ways in which students attend postsecondary education. For example, counting movement as only that in which credit is formally transferred would overlook the almost 3,600 students in this study who moved institutions and effectively restarted their enrollment.

Moreover, the mixed findings with respect to how factors such as student background and financial aid affect movement suggests that while all forms of movement are negatively related to degree completion that movement may also be a deliberate strategy to reduce costs or gain a fresh academic start for certain types of students. If this is the case, then policy solutions to address movement must take into account the underlying causes of movement rather than merely addressing the symptoms.

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