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"Warming up" in the developmental sequence? Upward transfer conditional on dependency status

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"Warming up" in the developmental sequence? Upward transfer conditional on dependency status

Abstract

The purpose of this study was to determine predictor factors of upward transfer for Kentucky community college students enrolled in a developmental algebra course. For independent students, a mother with a college degree, a declared major, a federal work-study position, greater adjusted gross income, and a higher grade point average was positively correlated with upward transfer. For dependent students, a father with a college degree, a declared major, and a higher grade point average was positively correlated with upward transfer.

Keywords: community college, transfer, cooling out, persistence, retention

In a 2010 Chronicle of Higher Education article, two senior leaders at the Carnegie Institute told a story familiar to all those associated with community colleges:

> A high-school dropout and single mother works the supermarket late shift. Motivated to earn a four-year degree so she can have a better life for herself and her 4-year-old daughter, she enrolls in a community college after earning a GED. Three years later, she still hasn't completed the sequence three remedial math courses required before she can take college-level math. Defeated, she says, 'I just couldn't do it anymore.' For this student and too many others, the dream stops here. (Bryk & Treisman, 2010, para. 1)

They go on to describe math as an "insurmountable barrier" for many students, one that extinguishes their desire to earn a college degree. Less than half of all American students earn the ACT College Readiness benchmark score in math each year (ACT, 2013). Unsurprisingly, Bailey, Jeong, & Cho (2010) found that 59% of all entering community college students tested into developmental math, and only 20% of those students eventually passed required college-level math course. In addition, many of these students are required to take as many as three developmental math courses to reach a college-level credit-bearing math course. Bailey (2009) found, at community colleges that offer two levels of remedial math, 28% of remedial math students were referred to the lowest level and at community colleges that offer three levels of remedial math 33% were referred to the lowest level. Only 16% of those students placed in the lowest level completed the remedial math sequence in three years (Bailey, 2009).

The data and the narrative illustrate a phenomenon that has been termed "cooling out" in the research about community colleges. The phrase is a somewhat neutral sociological functionalist term; however, it has gained a negative connotation in educational research because

it seems to suggest that community colleges are failing at their most basic mission, to provide social mobility to underprepared students. In part, the intent of this article is to offer a more optimistic term, "warming up", that might be useful in moving community colleges forward in their work.

Community colleges have served a broad range of students. Also, researchers tend to study community college students based on race/ethnicity, gender, age or other student demographic characteristics. For example, "traditional" and "nontraditional" students are a common dichotomous manner in which researchers define community college students. Traditional students have typically been associated with recent high school graduates enrolling full-time at residential institutions, while nontraditional students have been defined by age, commuter status, and part-time enrollment (Bean & Metzner, 1985) as well as employment status, having dependents, being financially independent (based on the Free Application for Federal Financial Aid (FAFSA)), and secondary credentials (Horn & Carroll, 1996). Based on the National Postsecondary Student Aid Study: 2000, Choy (2002) showed that more than 50% of all nontraditional students were categorized as non-traditional based on their FAFSA dependency status. Thus, this study follows this designation by studying this group of community college students based on FAFSA classification: independent or dependent.

The purpose of this study was to determine academic and non-academic predictors of transfer to a four-year institution for dependent and independent students enrolled in a developmental algebra course at the Kentucky and Community & Technical College System (KCTCS). In particular, interest was given to what the variables suggest about the cooling out function at the community college in effort to broaden the framework for analysis. This article begins with a description of the Kentucky Community & Technical College System, the context

for the study, and a review of the salient research related to the cooling out function and transfer. Then, the methodology is described and the results are presented. From these analytical findings, practical implications are recommended. Last, a conclusion and future research are suggested.

Kentucky Community & Technical College System

KCTCS is a tightly-coupled community college system, marked by a common course catalog, common administrative policies, a common data platform, and common tenure and promotion policies (i.e., tenure decisions are made by faculty committee at the state level, rather than the institutional level). Faculty and staff from across the system are represented on KCTCS committees, and KCTCS administrative offices often provide professional development and support to the various colleges. Individual college leaders meet monthly with their colleagues from other institutions (e.g., Presidents, Chief Academic Officers, Chief Student Affairs Officers, Chief Business Officers), an arrangement that facilitates problem-solving, change, and innovation. Given that, innovations in developmental education curricular offerings are likely to have an effect state-wide more quickly than they do in loosely-coupled or uncoupled state systems.

In Kentucky, the percentage of students earning college readiness scores in math over the last five years has ranged from 26% in 2009 to 31% in 2012. Most recently, only 30% of students in Kentucky taking the ACT earned a 22 in math, the benchmark score. Yet, in 2011 61% of graduating high school students in Kentucky enrolled in college the year following graduation (Kentucky Center for Education & Workforce Statistics, 2013). In 2011, 38% of all high school students entering college began at a Kentucky Community and Technical College System (KCTCS) institution (Kentucky Center for Education & Workforce Statistics, 2013).

According to the 2010-2016 KCTCS Business Plan for Transforming Kentucky, in fall 2010, 60% of all developmental math students passed one of the of three required developmental course sequence. That means if 100 students took the first course, 60 passed; if 60 took the second course, 36 passed; if 36 took the third course, 22 passed. The overall pass rate for the sequence would be 22%. The 2015 goal is a 69.2% success rate. These staggering numbers are why remedial education is often associated with cooling out, and viewed as a barrier to degree attainment and transfer for community college students. The 2011 graduation three-year rate for KCTCS institutions was 26.6%, and the transfer out rate was 10.7% (IPEDS, n.d.).

Improving outcomes for developmental education is part of the KCTCS 2010-2016 Business Plan. Colleges are experimenting with paired developmental and credit courses, variations of the Accelerated Learning Program (e.g., Baltimore Community College) model, and curricular revisions that integrate technology and tutoring into the classroom, while the system office is coordinating Learn on Demand (i.e., a modularized online, open-entry, open-exit, course offerings), and Accelerating Opportunity (i.e., a co-enrollment model with adult students seeking a GED through adult education), as well as offering professional development and networking opportunities for developmental educators and leaders. Behind all this curricular innovation is the desire to accelerate the time to degree completion so students do not become discouraged by a lack of progress towards a degree. In addition, online offerings seek to make developmental education more convenient and less repetitive for students. Kentucky, as a tightly-coupled community college system, is an ideal environment for innovating with partnerships and curricular arrangements that support transfer and increase graduation rates.

Conceptual Framework

Cooling Out

In Burton Clark's 1960 article describing cooling out, he names a five step process including (1) alternative achievement; (2) gradual disengagement; (3) objective denial; (4) agents of consolation; and, (5) avoidance of standards. The student enters colleges with high aspirations, but notices more choices and avenues that require less commitment or work. Through a series of barriers (e.g., required courses), s/he sees that achieving the goal is going to take far more investment than originally thought. As the student works towards the goal, barriers and low performance mark the route, which leads academic advisors to counsel the student towards other goals. Finally, the student chooses another route. By the student choosing, the college gatekeepers are not required to officially inform the student that the goal is not possible preserving the belief in democratic education. Clark recognized that cooling out occurred with greater frequency at junior colleges.

From Clark's perspective, cooling out is a positive function of democracy; however, later scholars were more critical of the process. In Brint's and Karabel's (1989) well-known work on the topic, they describe students entering the community college with baccalaureate aspirations only to have those aspirations cooled and vocational options selected instead or as they termed it, the "diverted dream." They concluded

> A more democratic community college would not be a place where the "cooling-out" function has been abolished. Yet this said, there is something deeply troubling, especially in a society that prides itself on its openness, about the covertness of the cooling-out process as it now operates (p. 231).

Brint and Karabel are critics of the opaque nature of the process, but they recognized the process was going to occur. As powerful statistical models became more prevalent, scholars noted that part-time, older, low-income, and minority students were more likely to attend community

colleges and less likely to transfer or earn baccalaureate degrees. Based on these types of studies, the cooling out and social reproduction functions were increasingly viewed as similar social functions (Dougherty, 1992; Grubb, 1991; Pincus, 1994). For example, Nora and Rendon (1990) surveyed community college students in California, Texas, and Arizona to understand how precollege variables are related to course-taking behaviors and to attitudinal factors. Using discriminant analysis, they found that older, white women were least prepared for math and science curriculum at colleges and least interested in seeking support from faculty advisors. In addition, they noted that Hispanic students' parents had lower educational attainment rates than their white counterparts. Given the high percentage of college-going, Hispanic students attending community colleges, the authors note the importance of this institutional type in reducing racial inequities. Viewed differently, the authors are calling for a reversal of the cooling out function at community colleges.

Theoretical

Like Townsend (2007) and others, the authors of this article believe the conceptual frameworks for studying marginalized populations must evolve to be more inclusive of family and work responsibilities outside the college campus. Specifically, in this study's context, Kentucky's policy agenda for postsecondary education calls for "more of its people to complete college with the skills and abilities to be productive, engaged citizens," yet the strategies named to accomplish this goal focus on financial aid and college readiness (Stronger by Degrees, n.d., p. 8). They do not address employment, housing, child care, or other barriers to degree completions for marginalized populations, especially women (e.g., Danziger, Wiederspan, & Siegel, 2012; Katz, 2013). Studies have shown these types of factors are closely related to student success. For example, in a study of soldiers attending college, Wilson, Smith, Lee, & Stevenson (2013) found

that the military more effectively incentivizes attaining a college education than do the colleges the soldiers attend. Soldiers were uninterested in affiliating with college activities, but were interested in affiliating with other soldiers attending college for the purposes of promotion and job-related skill attainment. Programs that combined soldiering life with college life were viewed most positively.

Theoretical frameworks used to study the college lives of independent and non-traditional students must be reshaped to include the possibility of college-going partnerships between societal institutions, like the military and colleges. An example of such theoretical framework is the collective affiliation model which sees college as only one societal institution in the life of the college student (Davidson & Wilson, 2013). The model considers whether colleges have been able to integrate into the broader social life of the student, not whether the student has integrated into the life of the college. This is a critical de-centering of the college as an organization in research, and a centering of the student. It allows for a view of the ways various societal institutions promote values and actions that (dis) incentivizes college degree attainment.

Literature Review

Part of the cooling out function is the prevalence of remediation at the community college, and many studies have named remediation as the reason for cooling out or the diverted dream. In a qualitative study, Deil-Amen and Rosenbaum (2002) interviewed developmental students, staff and faculty, and found developmental education is negatively stigmatizing. Students taking developmental courses often believe they are in college credit courses and become disillusioned when they learn they are not taking coursework that will result in a college degree. In a recent study by Scott-Clayton and Rodriguez (2012) on the effects of remediation, they found that remedial classes do not develop academic skills and are diversionary. Students

take remedial courses rather than college courses (see also Calcagno & Long, 2008). Conversely, Bailey, Jeong, and Cho (2010) concluded that students testing into remedial courses but not taking them had much higher success rates than students taking the remedial coursework. Similarly, Melguizo, Hagedorn and Cypers (2008) found that although community colleges are far less expensive than four-year colleges, students spend sizable amounts of aid dollars on developmental coursework; thereby finding transfer too expensive. Specifically, they noted that students average five years at the community college, but only transfer one year's worth of credit. Having used a large proportion of their federal and state aid dollars at the community college on non-college courses, completing a college degree becomes too costly. All of these findings point to the cooling out function at community colleges.

However, Alexander, Bozick, and Entwisle (2008) offer a different view of cooling out, and one that is of interest to the authors of this article. They interviewed low-income, African American high school graduates in Baltimore at age 22 and age 28. They argued that these low-resource youth were not cooled out by their community college experiences; rather they were warmed up or had increased educational aspirations. They concluded that broader frameworks for analysis are needed. Similarly, Townsend (2007) argued that studies criticizing transfer rates at community colleges ignore the possibility that choosing the community college is the rational choice for many community college students, even given the reduced likelihood of eventual transfer. She contended that community college students have fewer financial resources and greater family responsibilities; therefore, they feel the need to stay close to home to attend college. Regression analyses demonstrating that low-income or older students are less-likely to transfer may suggest to policy-makers that four-year colleges might be better able to support these students to graduation; however, as Townsend argues, this is a wobbly inference at best.

Rather, community colleges may be the only postsecondary choice for disadvantaged populations. Community colleges are places where some students may warm up.

Academic

Early explanations for cooling out typically centered on academic advising and curriculum, in other words, faculty work. For example, McGrath and Spear (1991) argued that because students entering community colleges were less prepared, faculty responded by reducing curricular expectations. They posit that the community college mission of democratizing higher education has had the negative consequence of cultural disarticulation, or a break between the college cultures of community colleges and other institutional types. This occurs because fewer four-year colleges embrace the open door mission. This break between institutional types has meant a watering down of the community college curriculum. However, this explanation has not been well-tested, probably because the classroom data on rigor would be difficult to gather. Less commonly, researchers consider the effects of college decision-making, activities, programs, or events on transfer decisions. For example, in a study with California community college students, Bahr (2008) found that academic advising had a positive effect on student success, especially students who arrive at the community college academically unprepared. Using student transcript, faculty employment and institutional data from the California community college system, Eagan and Jaeger (2009) found community college students with more exposure to adjunct faculty were less likely to transfer to a four-year institution. They posited that this effect may be explained by the reduced access to quality advising by full-time faculty members.

Wang (2009) studied transfer using national data and concluded that students with higher grade point averages (GPA) and higher income are more likely to transfer to baccalaureate institutions. In addition, researchers commonly consider course-taking behaviors in relation to

transfer. For example, Doyle (2009) used propensity score matching on a sample from Tennessee's community college fall enrollments from 1995 to 2004 found that taking 12 or more credits hours increased the probability of transfer from 11% to 15%. Hagedorn, Cypers, and Lester (2008) analyzed transcripts of more than 5,000 students at the Los Angeles Community College District. They found the following factors increased the likelihood of a student transferring: passed a chemistry, economics or biology course, passed a statistics, physics or calculus course, completed a higher ratio of courses in which they enrolled, spent fewer semesters at the community college and remained continually enrolled. Again, these are findings which point to the cooling out function.

Non-academic

Lee and Frank (1990) found academic performance at the community college was the strongest predictor of transfer and family background and high school factors affected transfer indirectly. Specifically, Lee and Frank suggested that, "students who transferred to four-year colleges were a higher social class, less likely to be a minority and less likely to be female" (1990, p. 184). Similarly, Bailey and Weininger (2002) assessed transfer rates and outcomes of immigrant and native students in the CUNY system. They found females were slightly less likely than males to transfer and race/ethnicity had, "relatively little impact" on success after controls were added (p. 373).

In a study of institutional demographics, Wassmer, Moore and Shulock (2004) used two cohorts of first-time students from the 108 California community colleges. They found that colleges with younger students and colleges that produce a greater share of graduates in general studies or liberal arts/sciences have higher rates of transfer, whereas colleges with higher shares

of females and higher shares of Latino and African American students have lower rates of transfer.

Using a survey instrument with Michigan community college students, Monroe and Richtig (2002) noted the following factors (in this particular order) affected the students decision to transfer: academic program, close location of the four-year institution, students services, affordable with financial aid, ease of degree completion, family and friends attended the four-year institution, "other", right size, family and friends will attend with student, affordable without financial aid, and location far away. In sum, these findings suggest social reproduction of the current class demarcations, an aspect of cooling out for Brint and Karabel.

Policy

Student characteristics and curricular decisions are not the only explanation for the diverted dream. Dougherty's (2001) book on the history of the community college made clear that it is not just a cultural disarticulation between faculty and students or curricular differences that drives the diverted dream; rather community leadership, political power, and business interests drive the cooling out function. Specifically, policy and funding mechanisms emanating at the state and federal levels work to vocationalize community college curriculum and student aspirations. Anderson, Alfonso, and Sun (2006) recently studied transfer articulation policies concluding that a cooling out may also be occurring at the state level in that states are developing transfer policies with the seeming intention of diverting more students to community colleges because they are less expensive for states to operate. Using NELS data, Alfonso (2006) studied the likelihood of community college students earning a bachelor's degree, finding that community college students are far less-likely to complete a bachelor's degree. Alfonso concluded that polices that divert students from the four-year sector to the two-year sector, like

scholarship programs available to students beginning at community colleges (e.g., Missouri's A+ Schools program), may have the cumulative effect of decreasing overall educational attainment in a state.

Summary

Collectively, the literature makes clear that disadvantaged community college students are less likely to transfer and complete a baccalaureate degree than are students with greater academic preparation, more financial resources, and who began college right after graduating from high school. Remediation is a significant factor in explaining why students do not graduate or do not transfer. In addition, state policy matters in terms of where a student attends college and the likelihood that transfer will occur seamlessly and successfully. This study contributes to the literature by looking at data from one state, Kentucky. By narrowing to a single state, we are able to consider a specific policy and cultural context for student remediation and eventual transfer. This study considers the academic and non-academic variable of traditional and non-traditional students related to transfer.

Methodology

The purpose of this study was to determine academic and non-academic predictor factors of transfer to a four-year institution for traditional and nontraditional students enrolled in a Basic Algebra course at the Kentucky Community & Technical College System. These data were provided by the Office of Research and Policy Analysis (ORPA) at the Kentucky Community and Technical College System Office and originated from two sources: (a) college records and (b) the Free Application for Federal Student Aid (FAFSA). The Statistical Package for Social Sciences (SPSS) was used to compute the data analyses.

Sample

The initial sample ($N = 3{,}912$) was a cross-sectional group of students enrolled in MT065, Basic Algebra, (the second sequential developmental mathematics course) in the fall 2006 or spring 2007 semester. Students who did not complete a FAFSA ($n = 1{,}042$) were eliminated. An additional 76 students were removed due to missing data. This resulted in an analytical cohort of 2,794 students. For analytical purposes, the sample was matched on dependency status (1,521 independent and 1,273 dependent). Dependent and independent students were defined based on the FAFSA categorization.

Outcome Variable

The outcome variable was transfer to a four-year institution between the fall 2006 and spring 2010. Even though this is only a four-year time period and additional students may transfer after year four, 90.9% of all students who started in the fall 2006 transferred, for the first time, by the end of the spring 2010 semester (Hossler, et al., 2012). Only the first time a student transferred from KCTCS to a four-year institution was considered. Therefore, if a student attended KCTCS in the fall of 2006, then transferred to a four-year institution in the spring 2007, but returned to KCTCS in the spring of 2008 the transferred, again, the second transfer was not considered in the analysis. Since the outcome variable was dichotomous, binary logistic regression was selected as a statistical procedure (Pedhazur, 1997; Stevens, 2002) and was coded 1 ("yes") or 0 ("no").

Predictor Variables

The predictor variables were categorized as *non-academic* and *academic.* The *non-academic* variables were: (a) age, (b) children, (c) single parent, (d) federal work-study, (e) wavier/third party, (f) adjusted gross income, (g) parent's adjusted gross income, (h) gender, (i) father's education level, (j) mother's education level, (k) number in household, (l) number in

household in college, and (m) marital status. The *academic* variables were: (n) number of credit hours accumulated, (o) enrollment status, (p) current college grade point average, (q) cumulative college grade point average, (r) MT065 course delivery method, and (s) degree program.

There were 19 total predictor variables in the study. Some variables are collected differently on the FAFSA for dependent (traditional) and independent (non-traditional) students. Adjusted gross income for a dependent student is their family's total (i.e., parent and student) income; whereas an independent student's adjusted gross income is only the student's (and spouse if married) income. Likewise, number in household and number of household members in college were reported differently based on dependency status. When matched on dependency status, 18 variables were considered for independent status (parent's income not included) and 16 variables were considered for dependent students (children, single parent and marital status not included). Shavelson (1996) suggested about 50 cases or 10 times as many cases as independent variables. Stevens (2002) suggested 15 times as many cases as predictor variables for a minimum sample size. All three samples met this criterion.

Multivariate Analyses

Multicollinearity was examined by assessing the variance inflation factor (VIF) and tolerance values as well as a correlation matrix. The largest VIF value was 6.47035 (for *children*); since it was less than 10, multicollinearity is not a concern (Bowerman & O'Connell, 1990; Myers, 1990). Likewise, the smallest tolerance values were 0.15455 (for *children*) and 0.17635 (for *single parent*). Since the values are not below 0.1, these are acceptable values (Fields & Miles, 2010). The correlation matrix showed the highest correlation, 0.78, existed between *current* and *cumulative grade point average*. Since this value is not greater than 0.8 or 0.9, then multicollinearity may not be a concern (Fields & Miles, 2010).

The variables were entered in a blockwise method; first the *non-academic* variables then the *academic* variables. Three logistic regressions were analyzed. The first logistic regression used the analytical cohort, the second used the independent students and the third used the dependent students. An omnibus test of model coefficients was used to determine if the overall model was significant ($p < .05$). Any predictor variable that was statistically significant ($p < .05$) was reported.

Limitations

This study used a cross-sectional data collection to regress predictor variables on the outcome variable. Thus, some variables, such as *credit hours accumulated* and *credit hours enrolled,* varied based on the student's prior progress. Therefore, these variables may be statistically significant because of the point in time at which they are collected and favor students who have and are accumulating more credits because they may be closer to a transfer decision.

Even though all of these students were enrolled in Basic Algebra it does not confirm the student was deficient in math. Some students could have chosen to enroll in the course as a means to better prepare for a college level math course. Essentially, course enrollment behavior does not necessary correspond to a readiness level.

This analysis used listwise deletion to handle missing data. Therefore, there may be an implicit selection bias in the analytical cohort and generalization of the findings to the population should take this into consideration. Data were missing on students who did not complete the FAFSA. The group most likely to not complete the FAFSA is the highest income range of students (i.e., independent students earning $50,000 or more and dependent students earning $80,000 or more). The second group most likely to not complete the FAFSA is the lowest income range of students (i.e., independent students earning less than $10,000 and dependents

students earning less than $20,000) (King 2004, 2006). Therefore, this analysis may most closely resemble a lower middle to an upper middle range of socio-economic status community college students.

With regard to the conceptual framework, beyond capturing the statistical significance of the variables, this research offers little by way of understanding how the interaction between the societal institutions of family and college might affiliate into the life of a single college student. These findings could be enhanced through mixed methods, which could further illuminate these relationships.

Results

Descriptive Statistics

Table 1 is the descriptive statistics of predictor variables and outcome variable for the analytical cohort. Number and percentages were reported for categorical variables. Maximum, minimum, and average were reported for continuous variables.

[INSERT TABLE 1]

This analytical cohort was predominately full-time, (74.1%), single (78.1%), and female (67.1%). Full-time, single, females comprised 38.0% of the cohort ($n = 1,063$). Typically about 60% of KCTCS students enroll part-time (KCTCS Factbook, 2012-2013). Nationally, over 54% of two-year students attended part-time for the full year and over 68% attended part-time for part of the year (Horn, Peter, & Rooney, 2002; Provasnik & Planty, 2008). Also, community college students tend to be equally represented by both sexes (Horn, Peter, & Rooney, 2002; Provasnik & Planty, 2008) and KCTCS is about 56% female (KCTCS Factbook, 2012-2013). There were 494 single mothers, which was 88.5% of all single parents. Also, single mothers accounted for almost one-third (32.5%) of all independent students and 43.2% of all independent females ($n = 1,143$).

Horn, Peter, and Rooney (2002) reported more than 53% of students who reported parents with a high school diploma or less attended a two-year institution. Likewise, Provasnik and Planty (2008) reported 40.8% of all community college students reported parents' highest level of education as high school or less. Over 88% reported their father's level of education as of high school or less. Likewise, 72.1% reported their mother's level of education as high school or less. There were about twice as students who reported their mother's ($n = 781$) compared to father's ($n = 468$) level of education as college.

Logistic Regressions

Table 2 presents the statistically significant predictor factors of transfer to a four-year institution for (a) the analytical cohort, (b) independent and (c) dependent students. This table includes the: (a) R^2 values (b) chi-squared value, (c) significance, and (d) sample size for each regression analysis as well as the (e) statistically significant predictor variable and their corresponding (f) coefficient (g) standard error, and (h) odds ratio. Negative odds ratios were converted to inverse odds ratios to make the values more easily interpretable (DesJardins, 2001).

[INSERT TABLE 2]

Even though more non-academic variables were considered, more academic variables were statistically significant in all three logistic regressions. For the analytical cohort, only two non-academic variables were statistically significant, but father's level of education had the largest odds ratio (1.669). Students who had a father with an elementary level of education have 67% lesser odds of transferring than students who had a father with a college level of education. Also, students with any type of declared degree program (e.g., AA, AS, ASF/AAF) have 38% to 64% greater odds of transferring than students who were undecided.

For independent students, mother's level of education was statistically significant. Independent students who had a mother with a high school level of education have 51% lesser odds of transferring than students who had a mother with a college level of education. Similarly, students with any type of declared degree program (e.g., AA, AS, ASF/AAF) were more likely to transfer than students who were undecided. Also, independent students who were employed in a federal work-study position were more likely to transfer. An increased adjusted gross income, current grade point average, credit hours enrolled, and total credits accumulated were statistically significantly related to increased transfer odds.

For dependent students, father's level of education was statistically significant and had the largest odds ratio (1.953). Dependent students who had a father with an elementary level of education have 95% lesser odds of transferring compared to students who had a father with a college level of education. The number of household members in college, being enrolled in an AS degree (compared to undecided), current grade point average and credit hours enrolled were statistically significant and increased the odds of transfer.

Practical Implications

The findings make clear that Kentucky is fighting the same battle as other states in terms of supporting marginalized populations to upward transfer and progressing toward a four year degree. Specifically, students who have grown up in homes where parents do not have a college-degree are less likely to transfer; while students who have declared a major, are attending full-time, and are earning higher grade points averages are more likely to transfer. These findings replicate findings in other states and other time frames as reviewed earlier. Although the findings support the theoretical framework of cooling out or social reproduction, the authors were interested in interpreting them from the warming up perspective as well.

This study showed that when an independent student is employed in a work study position, s/he is more likely to transfer. This shows the importance of locating important aspects of life, like earning a wage, on the college campus as a means of "warming up" students. In addition, independent students who earn more money and are able to enroll in more credit hours, they are more likely to transfer. These correlations suggest that life arrangements related to aspects like wage-earning and child care are critical for transfer. Federal guidelines allow colleges to partner with businesses on work study positions. These partnerships allow students to get vocation-specific work experience, while earning a living wage. Work-study dollars can be supplemented by the business partner, so the business gets the benefit of work-study funding, the student gets the benefit of vocation-specific experience and a living wage, and the college accomplishes their mission of a pathway to degree attainment and transfer. This study demonstrates the importance of partnering with institutions other than other colleges in supporting transfer.

Again, findings like work-study programs increasing the likelihood of transfer for independent students, and increased credit load positively correlating with transfer suggest that when students are able to re-adjust their lives to center on college activities, they are more likely to be successful. Kentucky's state-wide initiatives like Ready-To-Work, a program for low-income parents seeking to enroll in a KCTCS college, and The Scholar House Program, housing and case management for single parents living in poverty and attending college, have proven effective in assisting small numbers of students to degree completion. The great challenge for college leaders is to resist the thought that a curricular redesign will be sufficient, and to find the resources to invest in partnerships that will support transfer and degree attainment.

For dependent students the father's educational level predicts transfer and for the independent student the mother's educational level predicts transfer. Both correlations point to the importance of family relationships and family mentoring in college decision-making for students. Both variables suggest the importance of having a parent who has experienced college themselves and can guide their child in college decision-making. Community colleges may want to offer more opportunities for families to come to college campuses, and for students to find college mentors.

Conclusion and Future Research

The purpose of this study was to determine academic and non-academic predictor factors of transfer to a four-year institution for traditional and nontraditional students enrolled in a developmental algebra course at the KCTCS. The study showed cooling out or social reproduction functions described the college trajectories for many KCTCS students; however, by re-adjusting our conceptual lens to include the possibility of college students "warming up."

Traditionally researchers have studied college variables and precollege variables; however, equally important for low-income students are variables related to changes in social services programs like SNAP or HUD housing. Studies considering the timing of events, such as a change in employment or a pregnancy, are needed to understand when and how life histories affect college outcomes. In addition, operating from the assumption that community colleges are the rational choice for many non-traditional students (Townsend, 2007), more qualitative studies on smaller programs directed at marginalized populations are needed to understand why program capacity might be increased, which programs should be scaled to larger populations, and how that might be done effectively.

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Table 1

Descriptive Statistics on Students at the Kentucky Community and Technical College System enrolled in MT065 2006-2007 (N = 2,794)

Predictor Variables	Categories or Explanation	*N*	%	Min.	Max.	*M*
		Non-Academic				
Gender	Male	920	32.9			
	Female	1,874	67.1			
Father's Education Level	College*	468	16.7			
	High School	1,344	48.1			
	Elementary	463	16.6			
	Unknown	519	18.6			
Mother's Education Level	College*	781	27.9			
	High School	1,363	48.7			
	Elementary	400	14.3			
	Unknown	250	8.9			
Dependency Status	Independent	1,521	54.4			
	Dependent	1,273	45.6			
Marital Status	Single	2,183	78.1			
	Married/Separated	611	21.9			
Number in Household	Dependent			2	10	3.5
	Independent			1	9	2.6
Waiver/Third Party	Yes	203	7.2			
	No	2,591	92.8			
Federal Work-study	Yes	83	2.9			
	No	2,711	97.1			
Children	Yes	1,023	36.6			
	No	1,771	63.4			
Single Parent	Yes	558	20.0			
	No	2,236	80.0			
Adjusted Gross Income	Dependent			0	57,868	3,670
	Independent			0	73,867	8,653
Parent's AGI				0	149,119	36,438
Age				16	66	25.9
Number in Household in College	Dependent			1	4	1.2
	Independent			1	6	1.1
		Academic Factors				
Course Delivery Method	Online	62	2.2			
	On Campus w/	1,396	50.0			

	Online Content*					
	On Campus	1,336	47.8			
Enrollment Status				3	22	11.3
Degree Program	AA	617	22.1			
	AS	256	9.1			
	ASF/AAF	700	25.1			
	Undecided*	1,221	43.7			
Credit Hours Earned				3	256	26.9
Current GPA				.000	4.000	2.1
Cumulative GPA				.000	4.000	2.4
Outcome Variable						
Transferred		581	20.8			

Note: * denotes reference category.

Table 2

Statistically Significant Predictors of Transfer to a Four-Year Institution for Independent and Dependent Students

	Analytical Sample		Independent Students		Dependent Students	
	B(SE)	Odds Ratio	*B(SE)*	Odds Ratio	*B(SE)*	Odds Ratio
Constant	-3.266(.375)		-3.427(.537)		-3.516(.908)	
Non-Academic						
Gender						
Father with Elementary Level of Ed[b]	-.512(.181)**	1.669 [a]			-.670(.280)*	1.953 [a]
Mother with High School Level of Ed[b]			-.409(.170)*	1.506 [a]		
Marital Status					-----	------
Number in Household						
Waiver/Third Party						
Federal Work-study			.613(.306)*	1.846		
Children					-----	-----
Single Parent					-----	-----
Adjusted Gross Income	.118(.047)*	1.126	.138(.050)*	1.148		
Parent's Adjusted Gross Income			-----	-----		
Age						
Number in Household in College					.298(.149)*	1.347
Academic						
Course Delivery Method						
Credit Hours Enrolled	.053(.019)**	1.055	.056(.025)*	1.057	.063(.032)*	1.065
Associate of Arts (AA)[c]	.483(.125)***	1.620	.631(.176)***	1.880		
Associate of Science (AS)[c]	.497(.168)**	1.644	.499(.238)*	1.647	.570(.242)*	1.768
ASF/AAF[c]	.324(.124)**	1.383	.415(.174)*	1.514		
Credit Hours Earned						
Total Credits Accumulated	.009(.002)***	1.009	.010(.003)***	1.010	.236(.103)*	1.266
Current Grade Point Average	.187(.056)***	1.205	.158(.067)	1.171		
Cumulative Grade Point Average						
R^2 (Cox & Snell)	.055		.076		.054	
R^2 (Nagelkerke)	.086		.121		.083	
Degree of Freedom	26		25		23	

χ^2	158.911	120.414	70.643
N	2,794	1,521	1,273

Note: [a] Inverse Odds Ratio, [b] Compared to College Level of Education, [c] Compared to Undecided, * $p < .05$, ** $p < .01$, *** $p < .001$.