Predictors of Student Mobility and Retention in Charter Schools: 2003 to 2006.

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Abstract

Research has demonstrated that high rates of student attrition are associated with a range of negative academic outcomes, both for students who leave their schools and those who remain behind. The current study focused on mobility among those enrolled in a charter school. Specifically, a multilevel Cox Proportional Hazards survival analysis model was used to identify significant predictors of student attrition from a state charter school system, using factors at both the student and school levels. Results indicated that initial student achievement upon first entering a charter school, student ethnicity, participation in a Title I funded program and average years of teacher experience at the school were all associated with the decision to leave the charter.

Introduction

Student mobility is a critical issue for charter schools. Mobility compromises effective student learning, and it raises important concerns with respect to educational accountability. It is difficult to hold schools accountable for learning outcomes, for example, when student mobility decreases their exposure to the educational "treatment." Although mobility and retention are issues for any school, they may be particularly acute for public schools of choice, such as charter schools. Indeed, we know relatively little about the factors that predict mobility in charter school membership. To this end the present study was designed to investigate mobility and retention in all charter schools within a single state.

Student turnover has been associated with poor academic performance for students in public schools. Mao, Whitsett and Mellor (1997) found that students who changed schools within an academic year had lower scores on the state achievement test in Texas. Osher, Morrison and Bailey (2003) focused on the impact of student mobility on the academic performance and dropout rates of students in grades 9-12. They found that students who changed schools were more likely to have academic problems and eventually leave school without obtaining a diploma. These studies support other findings that associate student mobility with academic and social problems (FowlerFinn, 2001; Reynolds, 2000; Rumberger & Larson, 1998; Mehana, 1997; Eckenrode, Rowe, Laird & Brathwaite, 1995). Reynolds and Robertson (2003) found that high student mobility reduced the effectiveness of a program designed to help at-risk children avoid maltreatment at the hands of care givers. Beyond its impact on the individual who changes schools, high student turnover rates in a school have been shown to have a deleterious impact on the academic performance of those who remain in the school (Hanushek, Kain & Rivkin, 2003).

The study of student mobility effects is not a prominent focus in extant research on charter schools. Indeed, Hassell and Terrell (2006), in their recent survey of 58 comparative analyses of charter school achievement, lamented the lack of research on outcomes other than student achievement,

such as mobility, persistence and attendance rates. Often student mobility is not studied directly but is treated instead as a control variable in analyses that focus solely on achievement. In a recent analysis of California charter schools, for example, student mobility, along with 13 other factors were combined into a composite "School Characteristics Control" variable (Crane, Edwards, et al., 2007).

Yet a number of studies implicate student mobility in assessments of charter school effectiveness. For example, there is evidence that transition into a charter school is associated with achievement decrements (Becker, Gilpatric, Gronberg & Jansen, 2004). In a report comparing student achievement in charter and public schools in North Carolina, Bifulco and Ladd (2004) found that a large reason for the relative poor showing of the charter schools was the much higher rates of student mobility. They report that transferring to a charter school is more disruptive than transferring to a regular public school, and that achievement decrements noted in the first year are not offset by gains in subsequent years. As they note, leaving charter schools is relatively easier than leaving regular public schools, which may be the main reason that student turnover rates in the state's charters was twice that of the public schools. High turnover rates in charter schools were also documented in a study sponsored by the National Bureau of Economic Research (2005). Here it was found that charter schools in Texas had much higher student turnover rates than did regular public schools. Moreover, moving between schools disrupts academic performance, with students frequently losing ground in their first year in a charter school (Gronberg & Jansen, 2001). Indeed, high rates of student mobility in the California charter school system was associated with lower academic achievement, as it was in regular public schools (Slovacek et al., 2002). Finally, Hanuschek, Kain, Rivkin & Branch (2005) showed that the decision to exit a charter school is more sensitive to educational quality than is the decision to exit a regular public school, but mostly in higher income schools. The transactions cost of switching schools was particularly high for low income and minority students, who were less sensitive to school quality.

Given the clear negative impact of student turnover on academic performance and other markers of school success, as well as the relatively higher rates of such turnover found in many charter schools across the country, it is important that policy makers and others have some sense as to what factors most impact the likelihood of a student leaving a charter school. Very little research has been done in this regard. As noted above, it has been shown that minority and poor students are more likely to attend schools with higher student turnover rates. However, it is not known to what extent these, or other, factors impact student mobility in general, and for charter schools particularly.

In the present study we examine these questions using data from extant charter schools in one state. This particular set of schools has been in existence since spring, 2003. In particular we examined the impact of student-level and school-level variables on student turnover in the entire charter school system (CS), using survival analysis of students tracked longitudinally over the course of charter school enrollment.

Methods

Data were collected on 647 students in grades 2 through 6 enrolled at some point during the years 2003 through 2006 in the CS system. The variables included in the data analysis were gender and race (Caucasian/non-Caucasian), free/reduced lunch status (yes/no), special education status (yes/no), participation in Title I funded programs (yes/no), and scores on Northwest Evaluation Association (NWEA) language, reading and mathematics achievement tests taken during the fall of a student's first year in an CS. These academic achievement scores were assessed using the Measure of Academic Progress (MAP) system.

MAP is a computer adaptive test (CAT) that adjusts the items given to individual students based on their ability level. Performance is expressed using a standardized metric based upon Item Response Theory, called the "Rasch Unit score," or RIT score, which range from approximately 150 to 300. At the school level the variables measured were student-teacher ratio, average years of teacher experience, average daily school attendance rate, and percent of students passing the state basic skills test.

The outcome variable of interest was time enrolled in a CS before leaving or being censored out. Censoring refers to the case where a student remained enrolled in an CS at the end of the data collection period. School enrollment was assessed twice a year, and time was then coded as the number

of these enrollment periods that students were in an CS. Those students who remained in a CS at the end of the study period (Spring, 2006) were coded as censored, meaning that as of that time they remained in the charter system.

Data analysis was conducted using a multilevel Cox proportional hazards model. The Cox model allows for the modeling of censored time until the event of interest, in this case leaving the CS system, using both categorical and continuous predictor variables. The results of this analysis are expressed in terms of the strength and nature of the relationship between the independent variables and the time until a student leaves a CS (or is censored) in the form of a regression-like coefficient. Because the explanatory variables were collected at both the school and student level, as described above, a multilevel model was appropriate to ensure that the standard error calculations accurately accounted for clustering of students within their respective schools.

Results

Tables 1 and 2 include descriptive information for the sample of students included in this study. Males and females were approximately equally represented in the sample. With respect to ethnicity, the majority of students were non-white, with most of these being African-American. In addition, 83.2% of the students received free or reduced lunch, and roughly 25% were recipients of some type of Special Education service. With respect to the school level variables, the mean student teacher ratio was 22.77, while the mean level of teacher experience was 5.53 years. Among the schools participating in the study, the mean percentage of students passing the state academic competency test was 43.44%. It is important to note that this value is associated with all students, not just those appearing in the current study.

Of the 647 students included in the study, 350 (54.1%) left the CS system without matriculating during the period under study. The highest rate of student attrition occurred during the first year of attendance in a CS, with a total of 68 individuals (10.5%) leaving before completing their first year in a charter school, and an additional 117 (18.1%) students leaving at the end of year one. Approximately 23% of charter students left the system during or at the end of their second year, while 2.3% left at some point in their third year in a charter school.

As described above, in order to identify pertinent factors for predicting student attrition in the CS system, the hierarchical Cox proportional hazards model was used. In this case, a number of variables, both within subjects and between schools were included in the analysis, with the outcome variable being the time until a student left the charter system, or the data collection period ended. Results of this analysis appear in Table 2. The parameter estimate can be interpreted very much like a slope estimate in regression, so that positive values indicate that as the value of the independent variable increases, so does the likelihood of a student leaving a charter school.

Likewise, negative parameter values suggest that as the independent variable increases in value, the likelihood of a student leaving a charter school declines. In the case of categorical variables such as sex, ethnicity, free lunch status, special education and Title 1, which were coded as 1 or 0, positive parameters mean that the group taking the value of 1 has a higher likelihood of leaving a charter school prior to matriculation. In the case of these categorical variables, the hazard ratio represents the relative likelihood an individual in the group coded as 1 leaving a charter school versus this likelihood for an individual in the group coded as 0. Thus, a hazard ratio of 1 would indicate that members of the two groups are equally likely to leave, while values less than 1 suggest that members in group 1 are less likely to leave than those in group 0 and values greater than 1 would be interpreted in just the opposite way. For continuous predictor variables, such as test scores, the hazard ratio represents the change in the likelihood of leaving the school prior to matriculation for each 1 point increase in the predictor variable (i.e. test score).

The Cox proportional hazards model found that with respect to the student level variables, ethnicity, participation in Title 1 funded activities, and scores on the math, language and reading achievement tests were all significantly related to the likelihood that a student would leave the CS system. Specifically, white students were less than half as likely to leave as their non-white counterparts. This result could also be interpreted to mean that non-white students were twice as likely to leave as were white students. In addition, those eligible for Title 1 funding were more than twice as likely to leave as were those who did not participate in such activities. Finally, students who achieved higher test performance in reading, math and language during the first testing cycle in which they were enrolled in a charter school was more likely to leave than were those with lower such scores.

Teacher experience was the only between subjects, or school level variables found to be significantly related to students' departure from the charter system. Specifically, students in schools where the teachers had more experience, on average, were less likely to leave than were those in schools with less experienced teachers. None of the other school level factors were found to be related student attrition.

Discussion

Prior research has demonstrated that student mobility can have a negative impact on a host of academic outcomes for those who switch schools, including achievement test scores and graduation rates. Furthermore, it has been shown that individuals who remain in schools with high levels of student turnover suffer academic deficits despite the fact that they do not change schools. Given that there is some evidence that charter schools may experience higher student turnover rates than traditional public schools, the potential difficulties associated with such attrition become particularly trenchant for them. For this reason, administrators and teachers in charter schools need to be particularly cognizant of factors that might predict mobility among their own students. Armed with such knowledge, charter school leaders can work to mitigate situations that might lead to greater student mobility and in turn improve the educational enterprise in their schools. The goal of this study then, was to provide some sense as to what factors at the student and school levels might reliably predict a student's attrition from charter schools.

The results of this study show that the charter schools included in the study were marked by high rates of attrition, with the largest proportion of those leaving doing so in the first year. Indeed, of those enrolling in a charter school, more than half elected to leave prior to completing the final grade level available at their school. In terms of the student level factors, ethnicity, participation in Title I funded programs and achievement test scores were significantly associated with the decision to leave the charter system. Minority students were more likely to leave than were whites. This outcome is particularly interesting given that the charters in this system have a predominantly minority student body.

Thus, one concern for policy makers is that members of the largest population of students enrolled in the school are also the most likely to elect to leave. Of additional concern in this regard is that as achievement test scores increased, the likelihood of leaving a charter school did as well. This result held true across the three domains tested here, math, reading and language. Thus, charter school administrators may be faced with a situation in which the most academically able students make the decision to leave their schools, and indeed the entire charter school system, at higher rates than do others. Such a situation would have the effect of leaving these charters generally less academically advantaged and potentially more at-risk for sanctions associated with not making AYP under the NCLB guidelines.

In terms of school level factors, only teacher experience appears to have been associated with student attrition. As noted above, schools with more experienced teachers suffered lower levels of attrition than did those with relatively newer teachers. The mean level of teacher experience for those remaining in a charter was 6.34 years as compared to 4.84 years for those leaving. Among the factors that were not associated with higher levels of student mobility were the student teacher ratio, the rate at which students passed the state mandated achievement test and the average daily attendance rate.

With respect to attendance, the level of variation was extremely low as is evidenced by the standard deviation in Table 2. Such a truncated range of values is typically associated with low statistical power and may be part of the reason behind a lack of statistical significance in this case. On the other hand, no such range restriction was in evidence for either student teacher ratio or test passing rates. In the case of the former, such rates ranged from 8.5 to 39.5 with a mean of 22.77, as seen in Table 2. A descriptive comparison revealed that the mean ratio for those remaining in a charter school was 23.21, as compared to 22.4 for those electing to leave. Clearly there is very little difference between the two groups. Likewise, the school level mean state test passing rate for those remaining in the charter system was 45.36 as compared to 41.81 for those opting out. Again, these values are close and serve to highlight the relatively minor difference on this variable between those who remain in the charter system and those who do not.

The pattern of results reported in this study suggests that school-leaving decisions are complex, and associated with a variety of factors. For example, the fact that students with higher initial achievement test scores were more likely to leave a charter might suggest a greater sensitivity to educational quality as has been noted in previous research (e.g., Hanuschek et al., 2005). Although Hanushek et al. (2005) reported that sensitivity to school quality was not particularly strong in minority and low-income families, our data shows that minority status, and eligibility for Title I services, also predicted school-leaving in the charter schools examined here.

Indeed, an examination of the mean achievement test scores by race and decision to remain or leave the charter revealed no difference in pattern for white and non-white students. For both ethnic groups, those who left the charter schools had higher mean achievement than those who remained, and the difference between the means for leavers and stayers was nearly identical for both ethnicities. Hence, it appears that academically able minority and non-minority students may leave a charter for similar reasons, at least with respect to academic achievement.

While no surveys were conducted in conjunction with results presented here so that the exact reasons for leaving are not known, it does seem clear that students (and their parents) who entered the charter schools with higher levels of academic performance may have had concomitantly higher expectations regarding the educational opportunities to be afforded them. If these expectations were not met, these students may well have left rather than remaining in schools that they perceived as not meeting their needs. Again, it is important to note that this is supposition at this point, and should be investigated more fully in future studies.

The association between mean years of teacher experience and student attrition in the charter schools is also very interesting. A relative lack of teacher experience may signal poorer educational quality, or at least the perception of poorer quality among students and their parents. Thus, when higher achieving students enter a charter school and are confronted by what they at least believe is a lack of crucial pedagogical experience on the part of teachers; they may decide to leave the system. On the other hand, the student teacher ratio and passing rate on the state exam do not appear to cause particular concern among students and parents in terms of whether they

should remain or leave a charter. In addition, the relative lack of Title 1 programs (or experienced teachers in Title-1 programs) may trigger school-leaving in other students. Hence perception of educational quality and availability of Title-1 programs may point to special vulnerabilities that confront the state's charter schools.

Charter school administrators and others interested in retaining students in these schools clearly need to be aware of certain factors associated with the decision to leave. Specifically, students (and their parents) coming into the school with higher levels of academic achievement need reassurance that the school will meet their needs. Furthermore, in charter systems similar to the one studied here, in which non-white students make up the majority of those enrolled, ethnicity is an important issue. Minority students may need some special attention to ensure that they elect to remain in their school until completing the final grade available to them.

And finally, hiring and retaining more experienced teachers would seem to be a worthy goal in terms of retaining students in a charter school. The lack of significant results for the student teacher ratio reported in this study should not be an endorsement of ever larger classrooms. Rather, this outcome may be a function of the relatively greater importance of some of the other factors just described. Future research in this area should focus more clearly on the impact of student teacher ratio and the decision of students to remain (or leave) a charter school.

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Table 1
Frequencies and percentages for student level variables

Variable	Frequency	Percent
Sex		
Male	321	49.6
Female	326	50.4
Ethnicity		
White	68	10.5
Non-white	579	89.5
Free/reduced lunch		
Yes	538	83.2
No	109	16.8
Special education		
Yes	159	24.6
No	488	75.4
Title 1 funding		
Yes	100	15.5
No	547	84.5

Table 2
Means and standard deviations for student and school level variables

Variable	Mean	Standard Deviation
NWEA Language	186.83	19.53
NWEA Math	186.60	18.723
NWEA Reading	181.13	21.213
Student-teacher ratio	22.77	7.24
Teacher experience	5.53	2.83
Average daily attendance rate	95.46	1.16
State test pass rate	43.44	12.51

Table 3
Parameter estimates, standard errors and hazard ratios for within and between subjects factors with respect to Charter School student attrition

Variable	Parameter	Standard error	Hazard ratio
Within subjects factors			
Sex	-0.069	0.109	0.933
Ethnicity	-0.709*	0.129	0.492
Free lunch status	0.312	0.272	1.366
Special education	0.146	0.192	1.157
Title 1	0.712*	0.116	2.038
Reading score	0.008*	0.002	1.008
Math score	0.010*	0.004	1.010
Language score	0.007*	0.003	1.007
Between subjects factors			
Student teacher ratio	-0.012	0.017	0.988
Teacher experience	-0.071*	0.021	0.931
School attendance rate	-0.074	0.110	0.929
State test pass rate	0.014	0.008	1.014