

**THE IMPACT OF ROBUST IMPLEMENTATION OF INTRA-DISTRICT OPEN
ENROLLMENT: A CASE STUDY**

Michael Flicek
Natrona County Schools, Casper, WY

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Abstract

This investigation explored the impact of robust implementation of open enrollment within one school system that served approximately 11500 students. The system did not have attendance areas and transportation was provided to a chosen school. Using mapping software, 5027 elementary students were divided into two groups based on attender status. Near attenders were attending one of the two closest schools to their address and far attenders were not attending one of the two closest schools. Using the proportion of far versus near attenders, schools were classified as neighborhood schools, magnet schools, or unclassified schools. Open enrollment was associated with higher socioeconomic and achievement status at magnet schools and with lower peer status on these dimensions at neighborhood schools. Students in magnet schools, however, unlike students in neighborhood schools, experienced low achievement growth in both reading and math. Overall attender status did not predict reading or math initial status or growth. Within several school types by socioeconomic status subgroups, however, far attenders had lower achievement growth than near attenders. The implications of these findings for future research and open enrollment policy are discussed.

Introduction

School choice has received considerable attention from researchers in several fields including educational, economic, political, and legal. Much of this research has focused upon effects associated with charter schools and voucher programs. This is despite the fact that the second most popular form of school choice is intra-district school choice (Cullen, Jacob, & Levitt, 2005; Ryan & Heise, 2001), which is second only to the most common form of school choice that involves parents selecting a residential address based on the school that children at that address would attend. Ryan and Heise further noted that approximately 8% to 10% of all public school students are involved in intra-district choice plans.

Intra-district open enrollment choice systems are an important part of the school choice policy debate. Proponents of full competition among all schools, both public and private, have noted that, while intra-district open enrollment creates competition among schools within the system, it does not create “full-blown” competition. West (1989), for example, noted that advocates of open enrollment may be only “half-hearted” in their advocacy of competition and that their real motive is to defend against calls for full competition in the form of vouchers for private schools. The characteristics of open enrollment implementation that make it robust, as opposed to “half-hearted”, and the extent that open enrollment actually fends off calls for voucher programs are interesting and researchable questions. Furthermore, Hoxby (2002) argued that intra-district choice

in unlikely to be associated with increases in academic productivity because the schools are fiscally dependent upon one another. This also is a researchable question.

Ryan and Heise (2001) reported that the most intra-district choice involves offering students an opportunity to enroll in one or more specialized schools (i.e., magnet schools). This type of intra-district choice lack robustness in that it may amount to just token choice for most students in a district since the enrollment slots are limited and selective admission criteria are typical. Ryan and Heise (2001) also noted that a more robust form of intra-district open enrollment involves plans where all parents within a district must select a school for their child. Such plans are fairly rare according to Ryan and Heise and they are also fairly radical when compared to plans where school enrollment is primarily a function of a student's address.

Studies of intra-district choice are beginning to emerge. Betebenner, Howe, and Foster (2005) investigated the impact of choice in an intra-district open enrollment system on student achievement and patterns of student enrollment. Students in the district they studied were assigned neighborhood schools but were able to attend schools other than their neighborhood school on a space available condition. Cullen et al. (2005) recently studied open enrollment among high school students in Chicago Public Schools (CPS). The open enrollment system they studied was quite robust in that approximately half of all high school students in CPS opted for schools outside of their neighborhood. At the time of their study few restrictions were placed on a student's choice within CPS. Students were guaranteed slots in neighborhood schools but were

free to apply to other schools. Since their study some geographic restrictions on open enrollment were imposed in CPS. Some CPS high schools were oversubscribed. When this happened lotteries were held. Some schools also required students to submit to written exams and interviews. Both the Betebenner et al. study and the Cullen et al. study illustrate examples of restrictions placed upon open enrollment. Because of the variation in restrictions, it is important for studies of open enrollment to provide detailed descriptions of the open enrollment procedures used within the district or districts under investigation. Effects associated with open enrollment may be related to the robustness of open enrollment implementation within a district.

Hoxby (2002) has noted that *allocation* and *productivity* questions are of fundamental interest to school choice investigators. The question about which students take advantage of school choice is a central allocation question. For example, Betebenner et al. (2005) found that intra-district open enrollment did result in certain schools “skimming” high achieving students. When achievement status, versus growth in achievement, was investigated these schools appeared to benefit from open enrollment. Betebener et al. noted that the higher achievement status at these schools was due to an influx of high achieving students rather than instructional programs at the schools. A second allocation question relates to the impact of school choice on peer group diversity within schools. This has not been widely studied in an intra-district open enrollment choice setting. In other choice environments, the sorting evidence has been mixed. Some researchers have found that students who benefit from choice are more economically advantaged and more academically capable (e.g., Buddin, Cordes, & Kirby,

1998; Goldhaber, Brewer, Eide, & Rees, 1999; Lankford, Lee, & Wyckoff, 1995) while others have found more neutral effects or even advantage for lower income families (e.g., Lee, Croninger, & Smith, 1994; Schneider, Schiller, & Coleman, 1996). Within an intra-district open enrollment setting, Betebenner et al. found that highly able students were drawn from neighborhood schools and into certain high choice schools.

A central productivity question relates to the extent that school choice was associated with increased academic achievement for students opting into or out of assigned or neighborhood schools. Furthermore, how did achievement effects associated with a students' open enrollment status interact with various school types or the socioeconomic status of students? These questions imply that there could be winners and loser associated with school choice. These questions are best answered by focusing upon within-student growth in academic skills as measured on reliable and valid assessment results. Betebenner et al. (2005) failed to find support for the contention that the achievement of students participating in choice within an intra-district open enrollment system would be helped. Specifically reading achievement of the students who opted out of the neighborhood school did not benefit and math achievement only showed benefit for the lowest achieving students in the group. Cullen et al. (2005) studied high school students. They reported that opting out of a neighborhood school was associated with a 7.6% increase in likelihood of high school graduation. Cullen et al. did not report on within student growth in achievement.

Allocation and productivity questions are not mutually exclusive. Some students in an open enrollment system might achieve a peer group (i.e., student body) with significantly higher average family income and significantly higher average academic achievement than would have occurred in the absence of open enrollment. These same students, however, may actually suffer a decrease in within-students academic achievement growth. Because peer group effects in an open enrollment school district could interact with achievement growth in a variety of ways, as suggested by the above example, it would be important for studies examining the effects of school choice to examine both peer group effects and academic growth.

This study explored allocation and productivity questions within a district that had the robust implementation of intra-district open enrollment. Elementary grade students within the district of approximately 11500 students were studied. All students in the sample were classified on attender status (i.e., students were classified as near attenders or far attenders). The extent that poverty (i.e., on free lunch versus not on free lunch) was related to attender status was then investigated. Three school types were also studied. Title I schools were those with at least 45% of students in attendance who were on free lunch. Next, groups of schools were classified as magnet schools or neighborhood schools based on the proportion of near versus far attenders at the school. The change in composition of the peer group within these school types was studied by investigating the free lunch status and reading and math achievement scores for both near and far attenders within these school types. Finally, subgroups of students with reading or math test scores from three successive spring tests were identified. The extent that the

attender status, free lunch status, and school type were associated with initial reading and math status and growth in reading and math was explored using overall HLM models and post hoc models designed to identify the association of attender status to initial status and growth in reading and math for various free lunch by school type subgroups.

Method

District Open Enrollment Practices

The study district had a robust intra-district open enrollment policy that had been in place for several years. There were no neighborhood boundaries for schools and parents were required to choose a school for their child. Parents were asked to choose a school for their child by January 31st each year for the following year. Children for whom no choice was indicated by January 31st remained at the school they were currently attending. Kindergarten students, students new to the district, and students transitioning from elementary to middle school or from middle school to high school were not assigned to a default school. Instead their parents were provided some standard information about all schools. They were then required to select a school for their child. Schools were assigned full time equivalent (FTE) staff positions based on their enrollment. FTEs were rarely adjusted during a school year. There were unique circumstances where students were placed on a waiting list for the school that was their first choice. This probably affected less than 2% of district students. These students nearly all got into the school that was their second choice. Complaints about not getting

into a particular school were nearly nonexistent. Transportation was provided by the district at no cost to parents. School administrators and staff were acutely aware of the competition for students. The prospect of losing FTEs due to declining enrollment was a source of concern among school principals and staff. The district is county-wide and most students live in a central community of approximately 50000. Attending school outside of the district was not a realistic option for the vast majority of students in the community.

Sample

The sample consisted of 5577 students who were attending grades Kindergarten through 6 in a school district with approximately 11500 students. 220 students (i.e., 3.7%) were dropped from the sample because addresses were not available that permitted an adequate match within the mapping software. 57 students (i.e., 1.0%) were in district special education placements for life skills programming. There are 7 life skills classes and 6 of them are in Title I schools. 54 students (0.9%) were in district special education placements for behavior and social skills programming. There are 6 classrooms for behavior and social skills and 5 of them are in Title I schools. The placement of these students occurred due to a special education process following an evaluation. The placement of these students into the schools they attended did not occur as a result of open enrollment. Therefore, these students were removed from the sample before analyses was completed. As such, the sample consisted of 94.4% of enrolled students. A

total of 12 students attended 3 small rural schools. These students were included in the student sample but the rural schools were not included in the schools sample.

Classification of Students

Open Enrollment Status. We were able to identify traditional school boundaries for 5027 of the students. Some students did not have a designated traditional school because 3 schools had closed since traditional boundaries went out of use. Furthermore, some rural students did not have a clearly designated traditional school area. For the 5027 students, however, 40.2% were attending their traditional boundary school and 59.8% were not, which provides evidence of the robustness of open enrollment in this district. In addition, the school nearest to the students address was the traditional school for 77.2% of the sample. Furthermore, the traditional boundary school was the first or second nearest school to the students home address for 93.7% of students and it was the first.

Among the 5577 students who composed the sample for this study, 38.7% of students attended the closest school to their address and 51.3% of students attended one of the two closest schools to their address. A sample of 4528 (or about 82% of students in the study sample) lived in a traditional boundary for a still open school. 1797 (40%) of these students attended the school closest to their address and among this group 1573 (88%) were attending the traditional boundary school for their address. Conversely,

among the 2731 students not attending the school closest to their address, 2448 (90%) were attending a school outside of the traditional boundary for their address. Next, 2366 students in this sample attended one of the two schools nearest to their address and 1856 (77%) of these students attended the traditional boundary school for their address while 2120 (98%) of the 2162 students not attending one of the two nearest schools to their address were not attending the traditional boundary school for their address.

Given the findings presented above, those students not attending one of the two closest schools to their address were classified as far attenders ($n = 2715$). These students were overwhelmingly attending schools different from those that they would have attended had traditional boundaries still been in effect. This suggests that far attenders, as a group, were active choosers of schools. Next, those students attending one of the two closest schools to their home address were classified as near attenders ($n = 2862$). 77% of the near attenders were attending the school that was the traditional boundary school for their home address. Many of the 23% of students in this group not attending the traditional boundary school for their home address were attending a school that was about the same distance from their home as the traditional boundary school. As such, near attenders were attending schools that were generally quite convenient given their address.

Peer Characteristic Indicators. One peer characteristic indicator was socioeconomic status which was a dichotomous variable. Each student was either on free or reduced lunch or not on free or reduced lunch. Students on free or reduced lunch will be referred to as free and students not on free lunch will be referred to as not free for the

remainder of this paper. Free students were more economically disadvantaged than not free students. Minority status was not included as a variable because of the low amount of diversity in the sample and because preliminary findings with minority students mirrored those of free students.

The final peer characteristic variable was academic achievement status which was measured by reading and mathematics scores on Northwest Evaluation Association tests. These tests are adaptive tests and administered to all students in the district each spring. The interested reader is referred to Hauser (2003) for a detailed description of the NWEA tests. A brief description is offered here. The adaptive tests were developed from the NWEA item bank. Each item in this bank has an empirically determined difficulty level that was established using a one parameter Item Response Theory (IRT) model (Rasch model). Item difficulty and person ability are both expressed in Rasch Units (RITs) on a scale, a transformation of the theta scale, which is centered at 200. The RIT scale is an equal interval scale that ranges from about 150 to about 270 or 300 in reading and math respectively. Skills represented on the reading RIT scale span a range from early literacy skills to adult level reading skills. Skills on the math scale begin with early number skills and proceed through algebra II. Items included on the tests are aligned to the instructional goals for the district. An adaptive testing approach was used. Students take items that best measure skills at the level where they are performing rather than items common for all students in a particular grade level. The goal is for each student to respond to a sample of items near to their performance level to minimize testing error. All

items are multiple-choice. RIT scores can be converted into percentile rank scores that are based upon a sample over 1 million students in 733 school districts in 32 states.

Classification of Schools

Next, the percentage of far and near attenders at each of the 23 schools was computed and the results are presented in Table 1. Schools were ranked from highest to lowest by the percentage of near attenders. The six lowest ranked schools had fewer than 32% of students in attendance who were near attenders. These schools were classified as magnet schools. 74.6% of students attending magnet schools were far attenders. Four of the 6 schools classified as magnet schools went through very public transformations at one point in their history where the school was organized specifically to offer a particular kind of program so that parents in the community would have the option of choosing that school on the basis of the program. Schools 285 and 245 established similar programs of mixed age groupings, team teaching, and thematic, interdisciplinary lessons. Schools 190 and 265 established similar programs using Spaulding language arts, Saxon math, and an emphasis on “core knowledge”. A fifth magnet school, school 280, was transformed when a school in one neighborhood was closed due to concerns with the facility. That school had been sharing an administrator with a school in another, somewhat distant neighborhood. Under the administrator’s guidance, the staff from both schools agreed to merge at the remaining building and encouraged students from the neighborhood where the school was closing to choose to attend the remaining school. The final magnet school, school 315, is located in a rural setting 14 miles outside of town. This school is

somewhat unique within the district for the rural culture that it offers. Two of six magnet schools were Title I schools. To be a Title I school in the district a school must have 45% of students on free or reduced lunch. Schools 265 and 280 were the Title I magnet schools.

Next, ten schools in Table I had between 59% and 87% of students in attendance who were near attenders. These ten schools were classified as neighborhood schools. Overall just 31.1% of students attending neighborhood schools were far attenders while 68.9% were near attenders. The remaining seven schools had between 42% and 56% of students who were near attenders. These schools were labeled as unclassified as they fell between the magnet schools and neighborhood schools in terms of the percentage of students who were near attenders. Six of the neighborhood schools were Title I schools.

Results

Poverty and Open Enrollment

Table 2 presents the findings of a series of 2-by-2 attender status by free lunch status crosstabs with Chi-Square results. The first crosstab addressed all students in the sample and shows that the proportion of free lunch students who were far attenders did not differ significantly from the proportion of free lunch students who were near attenders. The finding that free lunch students were equally represented in near and far attender groups mirrors the finding for not free students and suggests that free lunch

students in this district were taking advantage of open enrollment by choosing to attend far schools at a rate similar to that of not free students.

Among those students attending Title I schools, the proportion of free students who were near and far attenders also did not differ significantly. Within Title I schools, approximately 63% of the near attender were free and approximately 64% of the far attenders were free. This provides support for the conclusion that the socioeconomic status of Title I schools was unchanged by the open enrollment practices in this district. Similar analysis at magnet schools led to a different conclusion. The proportion of near and far attenders who were free differed significantly in the Chi-square analysis. Whereas about 40% of the near attenders at these schools were free only 32% of the far attenders were free. As such the far attenders significantly increased the socioeconomic status the student body in the magnet schools. Considering that 75% of the students in magnet schools were far attender the impact of the diminished presence of free students in the far attender group was magnified.

Finally, neighborhood schools experienced a result that was opposite that for magnet schools in that open enrollment was associated with a decreased socioeconomic status. Specifically, the proportion of free students in the far attender group at neighborhood schools was significantly higher than the proportion of free students in the near attender group (Chi-Square = 3.88; $p < .05$). As such, the socioeconomic status of the student body of neighborhood schools decreased.

To summarize, free students were included in the near and far attenders groups in an equal proportion suggesting that free students were as likely to take advantage of open enrollment as not free students. In addition, the socioeconomic status of Title I schools appeared to be unaffected by open enrollment while magnet schools experienced an increase in socioeconomic status and neighborhood schools experienced a decrease in socioeconomic status. As such, there was evidence of socioeconomic sorting in the proportion of free students in the far attender groups at magnet and neighborhood schools. This sorting was associated with the district's open enrollment practices.

Academic Status and Open Enrollment

For these analyses the RIT scores for students in grades 2 through 6 from the NWEA reading and math tests from the most recent spring were converted into grade level specific z scores using the means and standard deviations from the 2002 norm study. This facilitated interpretations of achievement status on the open enrollment, poverty, and school type variables across grade levels. Table 3 presents means and standard deviations for near and far attenders for all students, free students, not free students, and by school type along with effect sizes for the difference in mean z scores within these groups for near versus far attenders. Far attenders and near attenders were very similar in reading and math status for all students, free students, and not free students. In all of these comparisons far attenders differed from near attenders by less than 3% of a standard deviation.

Inspection of Table 3 for school type differences revealed that, among near attenders in both reading and math, magnet schools had the highest mean scores followed by neighborhood schools and then Title I schools. Title I schools attracted far students who were similar to near students in their reading and math status as far students differed from near students by less than 4% of a standard deviation on the reading and math tests. As such, far students did not affect the achievement status of Title I schools.

The findings in neighborhood schools were somewhat different. Far students decreased the achievement status in neighborhood schools by 19% of a standard deviation in reading and 16% of a standard deviation in math. Neither of these effect sizes reached Cohen's (1988) convention that an effect size of 0.20 was needed for an effect to be considered a small effect. Nevertheless, the effect sizes show a tendency for far students to be lowering the overall achievement status of students in neighborhood schools. In contrast, effect sizes for reading and math at magnet schools were both positive with the positive effect for reading being less than 5% of a standard deviation while the positive effect for math was about 12% of a standard deviation. Thus, far attenders tended to increase the math achievement status for magnet schools while at the same time decreasing the achievement status for neighborhood schools in both reading and math.

Academic Growth and Open Enrollment

NWEA reading and math testing began during the spring of grade 2. In order to study growth in achievement scores over three spring tests it was necessary to study students in grades four through six. The sample included 2425 students in grades three through six. 419 (or 17%) of these students were missing at least one of the three spring test results that were used in measuring achievement growth in reading and 403 (also 17%) were missing one of the three tests in math. These students were dropped due to not being matched in reading or math.

The impact of the following variables on achievement growth was studied. Of particular interest was a student's open enrollment attender status (i.e., far attender versus near attender). Next, dummy variables for school types were created for neighborhood school (yes or no), magnet school (yes or no), and Title I school (yes or no). Additionally, student characteristics dummy variables included special education (yes or no) and free lunch (yes or no). Finally, dummy variables were created for a student's grade level status on the most recent of the three spring tests: grade 4 (yes or no), grade 5 (yes or no), and grade 6 (yes or no).

A two level model was employed: Test occasion i (level 1) within student j (level 2). Within this two level structure, a series of models were analyzed beginning with the following three: (a) an unconditional means model; (b) an unconditional growth model with no fixed effects; and (c) an unconditional growth model that employed a latent variable regression procedure (to determine if growth was related to initial status which would be an indication that initial status should be controlled in subsequent models).

Then a series of models were fitted to determine which of the predictors made a significant contribution to either the starting reading score (i.e., the intercept) or to reading growth (i.e., the slope). Those predictors with statistically significant t values (i.e., at least $p < .05$) for either the intercept or the slope were retained at the level where they made the significant contribution. Those predictors that did not make a statistically significant (i.e., $p > .05$) contribution were discarded until a final model was obtained.

The unconditional means model was fitted first (Singer & Willett, 2003) in order to partition the variance between the two levels and to serve as a baseline for future models. The model's composite form is presented in equation 1. The equation partitions the reading z score into between-student (ξ_0) and within-student (ε) components.

$$Y_{ij} = \gamma_{00} + \xi_0 + \varepsilon \quad (1)$$

Next, an unconditional growth model was employed which fit a linear trajectory to each student in the data set. This model was employed separately for reading and math. TESTNUM stands for reading or math test number. TESTNUM codes were 2 of the most recent spring test, 1 for the spring test from the previous year, and 0 of the spring test from 2 years earlier, which is the student's starting reading or math level. The composite of the unconditional growth model is presented in equation 2. The residuals ξ_0 and ε are the same as those in equation 1 while ξ_1 is the residual for slope at level 2.

$$Y_{ij} = \gamma_{00} + \gamma_{10} * TESTNUM + \xi_0 + \xi_1 * TESTNUM + \varepsilon \quad (2)$$

For reading the within-person variance in the unconditional means model was 0.154 while the within-person variance from the unconditional growth model was 0.129, suggesting that rate of change over the 3 annual reading scores accounted for approximately 16% of within person variance. When covariance was expressed as a correlation coefficient the resulting coefficient was -0.18, which suggested that the relationship between true growth in reading and initial reading score, while not large, might be statistically significant. For math the within-person variance in the unconditional means model was 0.178 while the within-person variance from the unconditional growth model was 0.150, suggesting that the change over 3 annual math scores accounted for approximately 16% of within person variance. For math, when covariance was expressed as a correlation coefficient the resulting coefficient was -0.23, which suggested that the model might want to control for the relationship between true growth in math and initial math score.

To test the possibility that growth in reading and math was related to initial reading and math scores, unconditional latent growth model were the third model employed for both reading and math. This model entered the starting achievement score as a predictor for achievement growth using the latent variable regression (LVR) procedure. Equation 3 shows the LVR growth model employed.

$$\begin{aligned}\pi_0 &= \gamma_{00} + \xi_0 \\ \pi_1 &= \gamma_{10} + \gamma_{11} * (\pi_0) + \xi_1\end{aligned}\tag{3}$$

In reading the LVR estimated coefficient of -0.035 was statistically significant (t ratio = -3.48; $p < .01$). As a result, LVR was used for all subsequent models so that the impact of starting reading score was controlled when the impact of other predictors of growth were evaluated. The final model used in this study had covariance when expressed as a correlation coefficient of -0.125. Despite this the LVR estimated coefficient of -0.028 remained statistically significant (t -ratio = -2.15; $p < .05$) and the LVR procedure was retained for use in the final model. In math, the LVR estimated coefficient of -0.047 was statistically significant (t ratio = -4.57; $p < .001$). Again, LVR was used in all subsequent math models. Covariance in the final model actually increased as covariance expressed as a correlation coefficient was -0.26.

Subsequent models were used to investigate the contribution of each of the 9 predictor variable to initial achievement status and to growth in achievement. Those predictors that made a statistically significant contribution to the either initial status or growth were retained in subsequent models at the level(s) where they made the contribution until a final model was reached. The predictors were introduced in the following sequences: (a) grade level predictors, (b) student characteristic predictors, (c) the attender predictor, and (d) school type predictors. The final model for reading is presented in equation 4 and the final model for math is presented in equation 5. SPED equals special education, FREE equals on free or reduced lunch, TITLE equals attends a Title I school, NEIGHBORHOOD equals attends a neighborhood school, MAGNET equals attends a magnet school, and GRADE4 equals attends grade 4.

$$\begin{aligned}
Y_{ij} = & \gamma_{00} + \gamma_{01} * SPED + \gamma_{02} * FREE + \gamma_{03} * TITLE + \gamma_{04} * NEIGHBORHOOD \\
& + \gamma_{05} * MAGNET + \gamma_{10} * TESTNUM + \gamma_{11} * GRADE4 * TESTNUM \quad (4) \\
& + \gamma_{12} * MAGNET * TESTNUM + \xi_0 + \xi_1 * TESTNUM + \varepsilon
\end{aligned}$$

$$\begin{aligned}
Y_{ij} = & \gamma_{00} + \gamma_{01} * SPED + \gamma_{02} * FREE + \gamma_{03} * MAGNET + \gamma_{04} * \\
& NEIGHBORHOOD + \gamma_{10} * TESTNUM + \gamma_{11} * FREE * TESTNUM + \quad (5) \\
& \gamma_{12} * NEIGHBORHOOD * TESTNUM + \xi_0 + \xi_1 * TESTNUM + \varepsilon
\end{aligned}$$

Reading results from the unconditional means model, the unconditional growth model and the final model for reading are presented in Table 4. Inspection of Table 4 reveals that the final model, when compared with the unconditional growth model (model B), was able to account for 31% of the variance in reading initial status and 9% of the variance in reading growth. Certain variables in the final model proved to be important as controls for student characteristics that could have biased findings on the other variables. Specifically, special education status (SPED) had a very large effect on initial status (i.e., it accounted for initial reading status that was 137% of a standard deviation below that of all students). The reading scores were grade specific normative z scores and grade 4 status was associated with moderately higher growth in reading scores (i.e., it accounted for annual reading growth that was 48% of a standard deviation higher than growth for all students) across the three spring test sessions.

For the purpose of this study it was notable that attender status was not a statistically significant predictor of either initial reading status or growth in reading skills. Thus, far attenders did not differ significantly from near attenders on with initial reading

status or reading growth. A student's status as free was associated with initial status that was 33% of a standard deviation below all students. Free status was not associated with a significant effect in reading growth. Next, students attending Title I schools had initial status that was 22% of a standard deviation below all students but they had reading growth that was 19% of a standard deviation above all students. Converse findings were obtained for magnet schools in that students attending magnet schools had initial reading status that was 12% of a standard deviation above all students and reading growth that was 30% of a standard deviation below all students. Attending a neighborhood school was associated with significantly low initial status (i.e., 15% of a standard deviation below all students).

The results of the reading model clearly show the importance of investigating achievement growth along with achievement status. The model agrees with the findings reported in the previous academic status section where Title I and neighborhood schools were found to have lower achievement status among the far students who moved into them compared to the far students at magnet schools. The HLM model also found that magnet schools had significantly high initial reading status while both Title I and neighborhood schools had significantly low initial reading status. The HLM model also indicated that reading growth for magnet schools was significantly low while reading growth for Title I schools was significantly high. From a winners and losers perspective, therefore, those students choosing to attend magnet schools were winners from the perspective of higher reading status but they were losers from the perspective of growth

in reading skills. This illustrates the importance of measuring both achievement status and achievement growth in order to obtain a complete picture of achievement effects.

Math results from the unconditional means model, the unconditional growth model and the final model are presented in Table 5. Inspection of Table 5 reveals that the final model, when compared with the unconditional growth model (model B), was able to account for 19% of the variance in math initial status and 10% of the variance in math growth. Special education (SPED) status and free status in the final model proved to be important as controls for student characteristics that could have biased findings on the other variables. Specifically, special education status (SPED) had a very large effect on initial status (i.e., it was associated to initial math status that was 112% of a standard deviation below that of all students). Free status associated with initial math status that was 23% of a standard deviation below all students and math growth that was 39% of a standard deviation below all students.

As with reading, attender status was not a statistically significant predictor of either initial math status or growth in math skills. Thus, far attenders did not differ significantly from near attenders on initial math status or math growth. Within the final model, magnet school status was associated with initial math status that was 14% of a standard deviation above all students and neighborhood school status was associated with initial math status that was 15% of a standard deviation below all students. In terms of math growth, only free status and neighborhood school status were statistically

significant predictors. Neighborhood school status was associated with math growth that was 50% of a standard deviation above all students.

Post Hoc Method. A wide variety of interaction effects were of interest (e.g., do free students grow more in reading in some types when they are far students versus near students?). In order to explore these interactions, a series of 2-level HLM models were implemented for both reading and math. The HLM model used for this purpose in reading is specified in equation 6. The HLM model used to explore math interaction effects is presented in equation 7. These models were run once for each interaction of interest. The interactions are represented by *IT* in equations 6 and 7 and they were entered sequentially in separate HLM runs. For reading *SPED* was retained as a control variable for initial status and *GRADE4* was retained as a control variable for growth so that the coefficients obtained for *IT* would be free of bias from these influential variables. For math, *SPED* was retained as a control variable for initial status and no variables were used for control for math growth.

$$\begin{aligned}
 Y_{ij} = & \gamma_{00} + \gamma_{01} * SPED + \gamma_{02} * IT + \gamma_{10} * TESTNUM + \\
 & \gamma_{11} * GRADE4 * TESTNUM + \gamma_{12} * IT * TESTNUM + \xi_0 \\
 & + \xi_1 * TESTNUM + \varepsilon
 \end{aligned}
 \tag{6}$$

$$\begin{aligned}
 Y_{ij} = & \gamma_{00} + \gamma_{01} * SPED + \gamma_{02} * IT + \gamma_{10} * TESTNUM + \\
 & \gamma_{11} * IT * TESTNUM + \xi_0 + \xi_1 + \varepsilon
 \end{aligned}
 \tag{7}$$

The purpose of running these post hoc models was to obtain an estimated coefficient for each interaction term. Since the interaction terms were grand mean centered, the estimated coefficients could be converted into effect sizes that represented the extent that the interaction effect differed from the total sample. The effect sizes were computed using procedures recommended by Raudenbush & Xia-Feng (2001). Specifically, for initial status the interaction term coefficient was divided by the standard deviation for initial status from the unconditional growth model and for growth the interaction term coefficient was divided by the standard deviation for growth from the unconditional growth model.

Post Hoc Reading Results. Table 6 presents the coefficient, the standard error, and the effect size for each interaction term and provides a comparison of the effect size differences between far and near attenders in each subgroup category for both initial reading status and growth in reading. When looking at initial status, the most dramatic within group difference between the far and near attenders occurred in magnet schools with students who were not free. The far attenders in this group had initial reading status that was 66% of a standard deviation higher than the near students. This provides additional strong evidence that magnet schools were the beneficiaries of increased peer achievement status associated with open enrollment. Even the far, free students at magnet schools had strong initial reading status compared to all free students. Far, free students in magnet schools had initial status in reading that was 22% of a standard deviation higher than all free students and 24% and 41% of a standard deviation higher than the far, free students attending Title I and neighborhood schools, respectively. This

provides evidence of achievement status sorting even within the subgroup of students who were free.

The evidence of a peer reading status benefit at magnet schools is stronger here than in Table 3. Table 6 presents findings for initial status which is the first of three spring reading tests while the results reported in Table 3 were from the last of the three spring reading tests. This apparent discrepancy in conclusions is easily explained by the finding of the final HLM model, that magnet schools students had significantly low growth in reading. As such, from the first spring test to the third the low growth in reading moderated the differences between the far and near attenders at magnet schools.

Among free students in neighborhood schools and all not free students, far students grew less in reading than near students by more than 20% of a standard deviation. In none of the groups reported in Table 5 did far students grow more in reading than near students by at least 20% of a standard deviation. As such there were few differences among near and far students in reading growth and the couple of differences that were identified were in a direction favoring near over far students. Finally, as with the final HLM model, the results presented in Table 6 also show the clear advantage in reading growth that was associated with attending Title I versus magnet schools.

Post Hoc Math Results. The post hoc HLM analyses in math initial status generally showed that near and far attenders within the various subgroups were similar in

their initial status. The largest difference between near and far attenders on math initial status occurred for free students attending magnet schools. Far attenders in this group had initial math status that was about 19% of a standard deviation above near attenders. Again it is notable that even among free students; magnet schools were skimming the higher achieving students within that group. The free students in magnet schools had initial math status that was 27% of a standard deviation above the initial math status for all free students.

The findings regarding math growth, however, showed numerous within group differences between near and far attenders. Of the 11 groups on which math growth of near and far attenders was compared, eight groups had differences between the attender groups that exceeded Cohen's "small" effect (i.e., an effect size of 0.20) and seven of these eight comparisons found far attenders growing less in math test scores than near attenders. The one exception to this directional finding occurred for free students attending magnet schools. Far attenders in this group grew 36% of a standard deviation more than near attenders. Both far and near attenders in this group, however, had very low math growth (e.g., even the free far attenders at magnet schools grew about 49% of a standard deviation lower than all students in the sample). Far attenders grew less than near attenders by more than 20% of a standard deviation in the following groups: (a) free, (b) not free, (c) Title, (d) neighborhood, (e) free, Title, (f) not free, Title, (g) free, magnet, and (h) free, neighborhood. These findings are consistent with the direction of findings for the two subgroups in reading that had the largest differences among far versus near attenders in reading growth. These findings are counterintuitive. For

example, Cullen et al. (2005) found that high school far attenders were significantly more likely to graduate from high school, and, when they were in grade 8, they had self-reported a variety of characteristics that would logically be associated with higher growth in achievement. Furthermore, simply by virtue of far attender status, it would be reasonable to expect that the families of this group of students would be more active in directing the education for their students than the families of the near attenders because attending far schools required a more active effort than attending a near school.

Discussion

Open enrollment has not been widely studied despite its being an apparently popular option with parents and students in that the current study and the Cullen et al. (2005) study found school choice is widely utilized within open enrollment systems. In both of these studies about 50% of students were attending schools that were different from the schools that were close to their address or that were considered their attendance area schools. The current investigation directly addressed the impact of open enrollment on both peer socioeconomic and achievement status and academic productivity (i.e., growth in achievement) for different groups of students and for different types of schools within a school system. Students attending magnet schools, for example, were obtaining peer groups with higher socioeconomic and achievement status as a result open enrollment. Students in magnet schools were actually suffering low growth in achievement compared to all students, however, which was most likely an unintended negative consequence associated with open enrollment for students who chose to move

into magnet schools. If the valued outcome for parents in choosing a school for far attenders who attended magnet schools was increased achievement growth, then parents of these students would have been better served by choosing either Title I or neighborhood schools rather than by choosing magnet schools. Indeed confirmation of the findings reported here with subsequent cohorts would present quite a dilemma for parents choosing a school because none of the school types studied had both (a) high achievement growth and (b) high peer status (i.e., both socioeconomic and achievement).

Cullen et al. (2005) predicted that students who opted out of assigned schools (i.e., far attenders) would fare better than those who attended assigned schools (i.e., near attenders). They theorized that far attenders were probably more motivated than near attenders. Far attenders were also presumed to be better on unobservable dimensions like motivation and parental involvement. Indeed, they even presented some self-report evidence for a portion of their sample that supported this contention. They actually found, however, that there was little tangible academic benefit for far attenders. With the exception of career academies that were effective at increasing graduation for all low socioeconomic status students in attendance including the far attenders, they found little benefit associated with far status and they were unable to provide evidence for increased academic productivity related to far attender status. Betebenner et al. (2005) also found little academic benefit on state test results for far attenders in middle schools.

Neither of these previous studies found that opting out of a neighborhood school was associated with negative academic outcomes for students, however. As such the

finding reported here that far attender status when considered as it interacted with other variables was associated with negative growth in achievement for several school type by free lunch status subgroups was unexpected and is difficult to explain. Further investigation to determine if these near versus far attender subgroup findings persist in subsequent cohorts of students in this district might be useful. Additional data collection to obtain information on parental motivations for school selections would be useful to further our understanding of other student and family characteristics associated with attender status in open enrollment districts. Extending this research to other districts with open enrollment would also be useful. If attender status is differentially associated with achievement growth in different districts, further research would help us to understand the characteristics of the districts that are salient to these findings.

Policy makers should expect that nearly half of parents will take advantage of the open enrollment option to send their children to schools outside of their neighborhood. Once this option is made available it may not be easy to rescind. In addition, policy makers may want to anticipate some increased sorting and be prepared to make deliberate decisions around potential sorting. Are they concerned, for instance, about the decreased diversity within schools that might result from open enrollment? If so, would they be willing to institute procedures to diminish the prospect for increased sorting? What would those procedures look like? In addition, there is no definitive guidance for policy makers at this time about the impact of open enrollment on academic productivity. Clearly the current study was not able to support the notion that parents will choose schools that are a good match for their child from the perspective of academic

productivity. Academic productivity is just one outcome, however, and there may be other outcomes (i.e., social, emotional and affective outcomes) that parents value and that are being served by the choices they are making. Future studies could explore this possibility. Finally, policy makers implementing open enrollment may want to have accountability models in place that account for both achievement status and achievement growth as this study makes it clear that increases on one may not be related to increases on the other. It's possible that high status schools are less focused upon achievement growth than low status schools because of widespread use of accountability models that stress status to the neglect of growth. Therefore, policy makers may want to implement an accountability model in a manner that encourages all schools to focus on achievement growth.

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Table 1. The Percentage of Students At Each of 23 Elementary Schools Who Attended the First or the First and Second Closest School to Their Address

Schools	<i>n</i>	% Attending Closest School	% Attending Closest or 2nd Closest School	Open Enrollment School Type
170	149	86.58	87.25	Neighborhood
175	327	55.66	65.44	Neighborhood
180	217	49.31	66.36	Neighborhood
190	380	8.68	19.21	Magnet
200	237	32.49	55.70	Unclassified
210	275	40.00	46.91	Unclassified
215	193	35.23	45.08	Unclassified
220	63	69.84	69.84	Neighborhood
225	157	21.02	42.68	Unclassified
230	164	57.32	59.76	Neighborhood
235	189	57.14	64.55	Neighborhood
237	310	69.03	78.71	Neighborhood
240	379	44.06	78.10	Neighborhood
245	307	18.57	27.69	Magnet
250	221	28.51	42.08	Unclassified
257	308	54.22	61.04	Neighborhood
260	305	41.31	59.02	Neighborhood
265	279	16.85	24.73	Magnet
270	455	41.10	52.09	Unclassified
275	146	26.71	49.32	Unclassified
280	254	19.69	31.89	Magnet
285	118	3.39	21.19	Magnet
315	132	30.30	30.30	Magnet
Total District	5577	38.66	51.32	

Table 2. Crosstab of Attender Status by Free Lunch Status for All Students and Three School Types with Chi-Square Results

Free Lunch Status		Near Attender	Far Attender	Chi-Square	Significance
All Students					
Not Free	<i>n</i>	1650	1537	0.62	NS
	Row Percentage	57.7%	56.6%		
Free	<i>n</i>	1212	1178		
	Row Percentage	42.3%	43.4%		
Title I Schools					
Not Free	<i>n</i>	521	432	0.448	NS
	Column Percentage	37.5%	36.2%		
Free	<i>n</i>	870	762		
	Column Percentage	62.5%	63.8%		
Magnet Schools					
Not Free	<i>n</i>	225	744	6.97	$p < .01$
	Column Percentage	60.3%	67.8%		
Free	<i>n</i>	148	353		
	Row Percentage	39.7%	32.2%		
Neighborhood Schools					
Not Free	<i>n</i>	927	387	3.88	$p < .05$
	Row Percentage	55.8%	51.5%		
Free	<i>n</i>	733	364		
	Row Percentage	44.2%	48.5%		

Table 3. Difference in Mean z Score for Reading and Math for Attender Status by School Type.

	Near Attenders			Far Attenders			Far Mean Minus Near Mean	Pooled SD	Effect Size
	N	Mean	SD	N	Mean	SD			
	Reading								
All Students	2005	0.148	0.845	1928	0.125	0.877	-0.024	0.861	-0.027
Free Students	795	-0.089	0.884	822	-0.106	0.894	-0.017	0.889	-0.019
Not Free Students	1210	0.304	0.780	1106	0.296	0.825	-0.008	0.802	-0.010
Title I School	927	0.021	0.854	829	0.043	0.867	0.022	0.860	0.026
Magnet School	255	0.220	0.824	776	0.261	0.847	0.041	0.841	0.049
Neighborhood School	1139	0.130	0.849	533	-0.039	0.917	-0.169	0.874	-0.193
	Math								
All Students	2004	0.290	0.837	1933	0.281	0.895	-0.009	0.866	-0.010
Free Students	797	0.079	0.826	824	0.056	0.837	-0.023	0.831	-0.028
Not Free Students	1207	0.429	0.816	1109	0.449	0.901	0.020	0.857	0.023
Title I School	929	0.214	0.827	829	0.188	0.865	-0.027	0.845	-0.031
Magnet School	255	0.341	0.941	776	0.448	0.916	0.106	0.923	0.115
Neighborhood School	1139	0.293	0.816	534	0.162	0.853	-0.132	0.830	-0.159

Table 4. Results of Fitting Subsequent HLM Models for Reading Initial Status and Growth ($n = 2006$).

		Parameter	Unconditional Means Model	Unconditional Growth Model	Final Model	Effect Size
Fixed Effects						
Initial Status	Intercept	γ_{00}	0.208	0.263	0.263	
	<i>Special Education</i>	γ_{01}			-1.034	-1.373
	<i>Free</i>	γ_{02}			-0.247	-0.327
	<i>Title</i>	γ_{03}			-0.165	-0.220
	<i>Magnet</i>	γ_{04}			0.090	0.119
Rate of Change	<i>Neighborhood</i>	γ_{05}			-0.110	-0.146
	Intercept	γ_{10}		-0.055	-0.055	
	<i>Grade 4</i>	γ_{11}			0.071	0.481
	<i>Title</i>	γ_{12}			0.028	0.187
	<i>Magnet</i>	γ_{13}			-0.043	-0.295
Variance Components						
Level 1	Within-person	ε	0.154	0.129	0.129	
Level 2	In initial status	ξ_0	0.541	0.568	0.391	
	In rate of change	ξ_1		0.022	0.020	
	Covariance as Correlation			-0.233	-0.256	
	Pseudo R^2			0.161		
	ξ_0 Variance Explained				0.312	
	ξ_1 Variance Explained				0.098	

Table 5. Results of Fitting Subsequent HLM Models for Math Initial Status and Growth ($n = 2022$).

		Parameter	Unconditional Means Model	Unconditional Growth Model	Final Model	Effect Size
Fixed Effects						
Initial Status	Intercept	γ_{00}	0.343	0.397	0.397	
	<i>Special Education</i>	γ_{01}			-0.879	-1.121
	<i>Free</i>	γ_{02}			-0.182	-0.232
	<i>Magnet</i>	γ_{03}			0.113	0.144
	<i>Neighborhood</i>	γ_{04}			-0.121	-0.154
Rate of Change	Intercept	γ_{10}		-0.054	-0.054	
	<i>Free</i>	γ_{11}			-0.062	-0.391
	<i>Neighborhood</i>	γ_{12}			0.080	0.504
Variance Components						
Level 1	Within-person	ε	0.178	0.150	0.150	
Level 2	In initial status	ξ_0	0.573	0.616	0.498	
	In rate of change	ξ_1		0.025	0.023	
	Covariance as Correlation			-0.233	-0.256	
	Pseudo R^2			0.159		
	ξ_0 Variance Explained				0.191	
	ξ_1 Variance Explained				0.098	

Table 6. The Reading Results of Post Hoc HLM Analyses for Interactions with Effect Sizes and Effect Size Differences for Near Minus Far Students.

Group	Near Attenders				Far Attenders				Effect Difference Far Minus Near
	<i>n</i>	Coefficient	Standard Error	Effect Size	<i>n</i>	Coefficient	Standard Error	Effect Size	
Initial Reading Status									
Free	361	-0.262	0.042	-0.348	382	-0.204	0.042	-0.271	0.077
Not Free	673	0.139	0.034	0.184	590	0.189	0.035	0.250	0.066
Title	435	-0.206	0.040	-0.274	394	-0.168	0.042	-0.223	0.050
Magnet	125	0.099	0.073	0.132	412	0.199	0.039	0.264	0.132
Neighborhood	584	-0.088	0.035	-0.116	262	-0.173	0.046	-0.229	-0.113
Free, Title	239	-0.312	0.049	-0.415	238	-0.225	0.051	-0.299	0.115
Not Free, Title	196	-0.025	0.058	-0.033	156	-0.043	0.064	-0.057	-0.023
Free, Magnet	39	-0.164	0.109	-0.217	119	-0.037	0.065	-0.049	0.169
Not Free, Magnet	86	-0.217	0.090	-0.289	293	0.277	0.045	0.368	0.656
Free, Neighborhood	217	-0.259	0.054	-0.344	106	-0.344	0.070	-0.457	-0.113
Not Free, Neighborhood	367	0.046	0.039	0.061	156	-0.033	0.055	-0.044	-0.105
Reading Growth									
Free	361	0.004	0.017	0.030	382	-0.016	0.016	-0.109	-0.139
Not Free	673	0.019	0.013	0.131	590	-0.012	0.014	-0.081	-0.212
Title	435	0.029	0.013	0.198	394	0.031	0.016	0.212	0.014
Magnet	125	-0.028	0.026	-0.189	412	-0.043	0.016	-0.290	-0.101
Neighborhood	584	0.020	0.014	0.138	262	0.008	0.019	0.051	-0.087
Free, Title	239	0.001	0.020	0.009	238	0.018	0.020	0.125	0.116
Not Free, Title	196	0.021	0.021	0.140	156	0.041	0.024	0.281	0.141
Free, Magnet	39	-0.020	0.046	-0.136	119	-0.031	0.027	-0.211	-0.075
Not Free, Magnet	86	-0.030	0.031	-0.206	293	-0.042	0.018	-0.285	-0.079
Free, Neighborhood	217	0.010	0.021	0.065	106	-0.023	0.029	-0.155	-0.220
Not Free, Neighborhood	367	0.022	0.016	0.148	156	0.027	0.024	0.186	0.038

Table 7. The Math Results of Post Hoc HLM Analyses for Interactions with Effect Sizes and Effect Size Differences for Near Minus Far Students.

Group	Near Attenders				Far Attenders				Effect Difference Far Minus Near
	<i>n</i>	Coefficient	Standard Error	Effect Size	<i>n</i>	Coefficient	Standard Error	Effect Size	
Initial Math Status									
Free	371	-0.022	0.045	-0.028	388	-0.078	0.045	-0.100	-0.072
Not Free	672	0.098	0.038	0.124	591	0.110	0.040	0.141	0.016
Title	442	-0.111	0.044	-0.141	394	-0.034	0.045	-0.043	0.098
Magnet	128	0.147	0.086	0.188	411	0.202	0.043	0.258	0.070
Neighborhood	593	-0.113	0.038	-0.144	266	-0.166	0.052	-0.212	-0.068
Free, Title	246	-0.196	0.054	-0.249	237	-0.089	0.053	-0.114	0.136
Not Free, Title	196	0.023	0.063	0.029	157	0.055	0.068	0.070	0.040
Free, Magnet	42	-0.015	0.109	-0.019	120	0.131	0.072	0.167	0.186
Not Free, Magnet	86	0.222	0.114	0.283	291	0.207	0.050	0.264	-0.019
Free, Neighborhood	224	-0.228	0.056	-0.291	108	-0.240	0.071	-0.305	-0.014
Not Free, Neighborhood	369	-0.010	0.042	-0.013	158	-0.096	0.068	-0.122	-0.109
Math Growth									
Free	371	-0.019	0.017	-0.116	388	-0.075	0.017	-0.471	-0.354
Not Free	672	0.055	0.014	0.342	591	0.011	0.015	0.070	-0.272
Title	442	-0.001	0.016	-0.008	394	-0.055	0.017	-0.347	-0.340
Magnet	128	-0.052	0.028	-0.328	411	-0.036	0.017	-0.227	0.101
Neighborhood	593	0.077	0.015	0.484	266	0.023	0.020	0.147	-0.338
Free, Title	246	-0.031	0.021	-0.195	237	-0.066	0.021	-0.416	-0.222
Not Free, Title	196	0.035	0.023	0.221	157	-0.026	0.025	-0.160	-0.381
Free, Magnet	42	-0.135	0.047	-0.845	120	-0.078	0.028	-0.486	0.358
Not Free, Magnet	86	-0.009	0.033	-0.055	291	-0.012	0.019	-0.075	-0.020
Free, Neighborhood	224	0.015	0.021	0.096	108	-0.043	0.030	-0.271	-0.366
Not Free, Neighborhood	369	0.097	0.017	0.607	158	0.067	0.025	0.421	-0.186