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In-Grade Retention Patterns: 2022-2023 Data

This purpose of this Research Brief is to analyze trends and general patterns of student in-grade retention among students in grades K-8 within the Miami-Dade County Public School (M-DCPS) for the 2022-2023 school year. While in-grade retention in grades 9-12 may occur due to the lack of credit in one or more courses, students often recover these credits in the summer, through online studies, or in subsequent grades. In addition, senior high schools have an incentive of graduating students within four years after they enter grade 9 because the high school graduation rate is used as a component in the school grade calculations.

Because of the existence of the State's mandatory retention law (Florida Statute 1008.25) that stipulates conditions for mandatory retention in grade 3 and describes good cause exemptions from that requirement, retention in grade 3 is qualitatively different from any other grade. In fact, more than one-half (51%) of all 2022-2023 retained students in grades K-8 in M-DCPS were retained in grade 3.

Data

The data on all active students in grades K-8 at the end of 2022-2023 were collected. Their retention status was determined as of October of the following school year to account for the results of the alternate assessment that was administered after summer school for grade 3 and for the results of the summer school credit recovery efforts for students in grades 6-8.

The number of retained students varied by student grade from a low of 37 in grade 5 to a high of 1,942 in grade 3, with 233 as the median. The number of students retained in grade 3 was much higher than that in any other grade because of the mandatory retention policy. For each of the active students as of June of 2023, the following variables were considered as potential predictors of the in-grade retention:

1. Spring 2023 assessment results in English Language Arts (ELA),
2. Spring 2023 assessment results in mathematics,
3. Race/ethnicity,
4. Poverty status as indicated by the eligibility for the free or reduced-price lunch through the direct certification,
5. English Language Learner (ELL) status,
6. Exceptional Student Education (ESE) status,
7. Number of days absent,
8. Number of behavioral infractions as recorded in the Student Case Management system.

In addition, recent immigrant status was considered as a potential predictor of student retention. However, approximately 95% of all students who entered M-DCPS from abroad during the 2022-2023 school year were also ELLs. Therefore, using both the recent immigrant status and ELL status as predictors in the model would be largely repetitious. For that reason, the recent immigrant status variable was not used in the model.

The ELL status variable was initially split into two groups based on the students' ESOL level (ESOL 1-2 vs. ESOL 3-4). However, the data analysis results with these variables were inconsistent across grade levels, and only the ELL status variable was retained in the analysis. Similarly, the ESE status variable was initially divided into three groups (intellectual, physical, or other disability). Again, the results were inconsistent, and only the ESE status variable was retained.

For students in grades K-2, FAST STAR assessments results were used (with Early Literacy for grade K students). Because different assessments were used even within a given subject area, the test results were standardized for each grade level and subject area to have the mean of zero and standard deviation (SD) of one. This standardization was carried out to help in interpreting the results of the data analysis.

Race/Ethnicity was converted into two dichotomous variables, Black and Hispanic, with White, Asian, and other students serving as a reference group. Variables 4-6 on the list above were dichotomized with 1 indicating the presence and 0 indicating the absence of the corresponding characteristic. Number of days absent had a mean of 11.7 and SD of 10.6 days for students in grades K-8 with a slight skew to the right indicating the presence of a few cases with large number of absences. This variable was used as is (not transformed) in the subsequent data analysis allowing for an easier interpretation of the results.

By contrast, the number of disciplinary infractions was a zero-inflated variable exhibiting a large skew to the right (mean = 0.24; median = 0.00). Consequently, it was transformed into the natural logarithm of the 1 plus the number of disciplinary infractions. This transformation is generally used with the zero-inflated data. The mean of the transformed variable was 0.11, the median was 0.00, and SD was 0.35.

Data Analysis

Binary logistic regression model was used to discern the patterns of in-grade retention. In this model, the natural logarithm of the indicator variable corresponding to the student retention status (1 for retained, 0 for promoted) was used as an outcome. Initially, all potential predictors shown in the previous section were used in the model; subsequently, only the statistically significant predictors of the outcome (at the .05 level of statistical significance) were retained. In addition, several interaction terms (such as the interaction between race/ethnicity and behavior variables) were entered in the model initially. They were not used in the final model because of the inconsistent results. The model was fitted separately for each of the grade levels K-8, except for grade levels 4 and 5 where student cases were combined due to the relatively small numbers of retained students.

Spring 2023 ELA and mathematics assessment results were used to control student retention outcomes for the overall student achievement statistically. Although these two variables do not fully account for student achievement, especially for that in other subjects, student assessment results in those other subjects are generally highly correlated with the ELA and mathematics assessment results. Therefore, the combination of ELA and mathematics scores generally accounts for a substantial proportion of the student achievement overall. Since the results of the Florida Alternate Assessment are not used in the analysis, the results are restricted to the standard curriculum students.

The intent of the data analysis was to discover what student characteristics predict student in-grade retention once the substantial portion of the overall student achievement was controlled statistically. Of course, students can be retained for failing a subject despite having a relatively high academic achievement. However, such instances are generally thought to be rare.

In the binary logistic model, the natural logarithm of the odds of being retained is expressed as a linear function of the predictors. Specifically,

$$\ln(Odds\ of\ retention) = C + \sum a_i x_i$$

where x_i are predictors mentioned in the list in the Data section above; C and a_i are determined by fitting the model to the data.

To judge the relative influence of non-achievement factors on student retention, one needs to examine the coefficients a_i in the model. It should be noted that it is the exp (a_i)[1] that has a standard interpretation: each one unit increase in the value of a non-transformed predictor *x* corresponds to a change in the odds of being retained by a factor of exp (a_i). One of the predictors in the model, the number of disciplinary infractions was transformed as mentioned above. Therefore, the coefficient for that predictor must be interpreted differently[2]; this will be illustrated in the next section.

Results

The results are presented first for grade 3 (mandatory retention) and then for other elementary and middle grades.

Grade 3 Results

Table 1 below presents the values of the statistically significant predictors in the model for grade 3 students.

Table 1

Values of Statistically Significant Predictors: Grade 3

Predictor	Coefficient	Exp (coefficient)
Reading/ELA Standardized Score	-1.34	0.26
Mathematics Standardized Score	-0.54	0.59
ELL Status	-0.50	0.60
ESE Status	0.24	1.28
Poverty Status	0.42	1.53
Black	0.54	1.71

It can be seen that the coefficients of the "statistical control" variables (Reading/ELA and mathematics assessment scores) are negative and consequently their exponentials are less than one, indicating that higher performing students are less likely to be retained. This, of course, is to be expected. That the coefficient for ELL is also negative might be surprising at first. However, it should be noted that approximately 40% of all ELL students in grade 3 have been in the ESOL program for less than two years. These students are promoted to grade four because of the relevant good cause exemption to the grade 3 mandatory retention.

Students who are eligible for the free or reduced-price lunch through direct certification, Black students, and ESE students were more likely to be retained in grade 3 than their peers even after student achievement was statistically controlled for. It should be noted that Race/Ethnicity and Poverty Status predictors in the

[1] exp (a_i) represents the exponentiation of a_i, that is the base of the natural logarithm e raised to the power of a_i.
[2] When the number of days absent is n, one additional absence corresponds to the increase in the retention odds by a factor of $(\frac{n+2}{n+1})^a$

model are not independent: approximately 77% of all Black students in grade 3 were also students living in poverty as defined above. By contrast, 53% of Hispanic students, and 30% of White and other students were living in poverty.

This higher likelihood of the grade 3 retention for Black students cannot be explained by the differential success on the alternative standardized testing for grade 3 promotion or by promotion through student portfolios. Of students who scored at the Achievement Level 1 on the FAST ELA Reading assessment in the spring of 2023, approximately 4-5% of Black, Hispanic, or White/other students passed the alternative assessment and were promoted to grade 4. Approximately 2% of students in each major racial ethnic group were promoted to grade 4 through student portfolios. In addition, student absences or student discipline (as measured) were not statistically significant predictors of student retention in grade 3.

The higher likelihood of grade 3 retention for Black students, ESE students, and students living in poverty is likely linked to such students earning failing course grades at higher rates than other students.

Other Elementary Grades Results

Table 2 below presents the values of the statistically significant predictors in the model for grades K-2 separately for each grade and for grades 4-5 combined. The values of the control variables were statistically significant and consistently negative across all grade levels; their exponentiated values varied between 0.43 to 0.64 for reading/ELA and between 0.33 and 0.64 for mathematics. These are not included in the table below.

Table 2

Values of Statistically Significant Predictors: Elementary Grades Other Than Grade 3

Predictor	Coefficient	Exp (coefficient)
	Grade K	
Days Absent	0.02	1.02
ELL Status	-0.41	0.67
Hispanic	0.38	1.46
Disciplinary Infractions Log-transformed	0.30	1.35
	Grade 1	
Days Absent	0.01	1.01
ESE Status	0.26	1.29
ELL Status	-0.74	0.48
Poverty Status	0.39	1.48
Black	-0.50	0.61
Disciplinary Infractions Log-transformed	0.29	1.33
	Grade 2	
Days Absent	0.02	1.02
ESE Status	0.70	2.00
Poverty Status	0.28	1.33

Predictor	Coefficient	Exp (coefficient)
Hispanic	0.67	1.96
	Grades 4-5	
Days Absent	0.02	1.02
Disciplinary Infractions Log-transformed	0.48	1.61

It can be observed that the role of the race/ethnicity as a predictor of the retention risk was inconsistent across grade levels. In grades K and 2, Hispanic students were more likely than their peers who had the same levels of academic achievement and other predictors in the model to be retained, whereas Black students in grade 1 were less likely to be retained than their peers similar in other respects.

There was one predictor (total number of days absent) whose influence was consistent across all grade levels and a few others that were consistent for many but not all grade levels. The exponential of the coefficient for the total number of days absent varied between 1.01 and 1.02 indicating that for each additional day absent, the odds of being retained increased by between 1% and 2% when all other predictors in the model were the same. Additional 10 days absent would correspond to the increased odds of retention by a factor between 1.01^{10} and 1.02^{10}, which is between 1.10 and 1.22 indicating that the corresponding increase in the odds of retention is between 10% and 22%.

Student discipline was a statistically significant factor increasing the risk of in-grade retention for the three of the grade groups. The values of the exponentials of the corresponding coefficients varied between 1.33 and 1.61. To interpret these values, we can consider a student with no recorded disciplinary infractions (89% of all cases), and then a student with one or two recorded disciplinary infractions having the same academic achievement and other characteristics as the first student. (These scenarios cover approximately 98% of all cases in the sample.)

By comparison with a student with no recorded disciplinary infractions, the odds of being retained for a student with one such infraction (all other things being equal) were greater by a factor between 2.5 and 3.1 or by between 150% and 210%. A student with two disciplinary infractions had the odds of being retained increased by a factor between 4.3 and 5.9 compared to a student with no recorded disciplinary infractions. It is likely that the lack of discipline among students negatively affected course completion results and teacher attitudes toward such students; these two factors, in turn, influenced the student in-grade retention risk.

It is noteworthy that ELL students had a lower risk of being retained in grades K-1 than their similar non-ELL counterparts. This is likely due to the District practice of not retaining ELL students in grades K-2 without the District's authorization. Students living in poverty had a higher risk of being retained (by between 33% and 48%) than their similar peers in two of the four groups. ESE students also had higher risk of being retained than their similar non-ESE peers in two grade groups.

Secondary Grades Results

Table 3 below presents the values of the statistically significant predictors in the model for grades 6-8 separately for each grade. Similar to the analysis results in other grades, the values of the control variables were statistically significant and consistently negative across all grade levels; their exponentiated values

varied between 0.43 to .65 for reading/ELA and between 0.49 and 0.65 for mathematics. These are not included in the table below.

Table 3

Values of Statistically Significant Predictors: Grades 6-8

Predictor	Coefficient	Exp (coefficient)
	Grade 6	
Days Absent	0.03	1.03
ELL Status	0.43	1.54
Disciplinary Infractions Log-transformed	0.30	1.35
	Grade 7	
Days Absent	0.05	1.05
	Grade 8	
Days Absent	0.05	1.05
Poverty Status	-0.35	0.70
Hispanic	-0.54	0.59

The only consistent statistically significant predictor of the grades 6-8 student retention risk, beyond student achievement, was the number of days absent. The exponential of the corresponding coefficient varied between 1.03 and 1.05 for students in grades 6-8 indicating that one extra day absent was associated with the 3-5% higher odds of being retained when all other predictors in the model were the same. An additional ten absences would increase the odds of being retained by 34-63%. These figures are substantially higher than the corresponding effects of absenteeism in elementary grades.

Summary and Discussion

The results of the data analysis showed that for all grade levels the odds of in-grade retention were negatively related to student overall achievement as measured by the combination of scores on reading/ELA and mathematics assessments. This finding was expected because higher student achievement should be associated with lower odds of students being retained in the same grade.

There was one factor that was a significant predictor of student retention in all grade levels – student attendance. Higher student absenteeism was associated with higher odds of student retention when all other student factors were the same. It is important to notice that the absenteeism predicted the odds of student retention above and beyond those predicted by student achievement. Therefore, it is likely that student absenteeism operated not through its negative affect on student test scores, but rather through its effect on course grades, as well as teacher expectations of and attitudes toward students.

In addition, student negative behavior, as measured by the number of disciplinary infractions, was predictive of the odds of retention above those predicted by student achievement, although not in all grade levels. That effect, rather large in magnitude, was evident for students in grades K-1 and 4-5. Again, it is likely that student misbehavior affected the odds of retention indirectly, through its effect on student course grades and teachers' perceptions and attitudes.

Finally, both the ESE status and status of students living in poverty were associated with increased odds of students being retained in grades 1-3.