

**Destination Graduation: Sixth Grade  
Early Warning Indicators for  
Baltimore City Schools**

**Their Prevalence and Impact**



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**Destination Graduation: Sixth Grade Early Warning Indicators for Baltimore City Schools – Their Prevalence and Impact**

**Executive Summary**

Even with the declining number of dropouts in Baltimore City, a focus on dropout prevention is essential. Recent research has emphasized the utility of an early warning system to inform prevention efforts. With this in mind, the Baltimore Education Research Consortium examined the 2000-01 cohort of sixth grade students (Class of 2007) from the Baltimore City Schools to ascertain whether there were indicators that predicted eventual dropout with a reasonable level of certainty, and identified enough students to justify intervention efforts. This *high yield* requirement ensured that the findings could be used by school staff to have an impact on students who were at risk for dropping out. As a final step, we examined a recent cohort of sixth graders from 2008-09 (Class of 2015) to determine if the prevalence of early warning indicators has changed.

We identified the following early warning indicators of non-graduation for sixth graders:

- Chronic absence (defined as missing 20 or more days of school),
- Failing English, or math, or both and/or a failing average for English, math, science, and social studies,
- Being at least one year overage (suggesting an earlier retention), and
- Being suspended for three or more days.

Table 1  
Number and Percent of Baltimore City School Students with Early Warning Indicators in Grade 6 for the Classes of 2007 and 2015

Early Warning Indicators	Class of 2007		Class of 2015	
	N	%	N	%
Chronic Absence	2,693	34.2	1,084	18.6
Failing Courses	1,658	21.0	556	9.6
Overage for Grade	1,300	16.5	1,836	31.6
Suspended 3 or more days	1,481	18.8	386	6.6

Note: There were 7,887 sixth graders in 2000-01. Course-taking data was missing for 1,538 and overage status was missing for 301 students. For the Class of 2015, there were 5,816 sixth graders in 2008-09. Course-taking data was missing for 1,075 and overage was missing for 736 students. When missing data, risk indicator was assigned a 0. Thus, prevalence of indicators may be conservative. The definition of overage is the same for both the Class of 2007 and the Class of 2015. MSDE policy in place for both cohorts would have allowed students who would not be 5 until December 31 to enroll in Kindergarten. Thus, the reported percent overage for each cohort likely underestimate the number of students actually retained.

These four indicators identify most future non-graduates. The good news for City Schools is that the prevalence of indicators has declined. When we compared all sixth graders in

2000-01 (the Class of 2007) with those in sixth grade 2008-09 (the Class of 2015), we found that chronic absence, failing courses, and being suspended three or more days had substantially declined (Table 1). In contrast, the number of sixth graders overage for grade has nearly doubled.

While the percent of sixth graders overage for grade nearly doubled from the Class of 2007 to the Class of 2015, the percent of students overage for grade appears to have declined more recently. The percentage of students currently being retained in grade in City Schools is lower than it was for 2002-03, which will probably lead to a lower percentage of overage for grade sixth graders within several years. Given the impact of retention on graduation outcomes, **City Schools may want to continue to monitor retention policies and practices.**

Overall, of students with early warning indicators in the sixth grade, approximately a third (36.4 percent) went on to graduate within one year of expected graduation, i.e., by June 2008.<sup>1</sup> In contrast, students with no warning indicators graduated at almost double the rate (70.5 percent). This finding signals that school staff can identify specific students in need of intervention as early as sixth grade. It emphasizes the importance of **schools providing supports to help students attend school regularly and pass their courses in the middle grades.**

### **Policy Implications**

Reduction in sixth grade early warning indicators of non-graduation is a positive sign for the district. Overall, sixth graders are much more likely to be on-track to graduation than they have been in the past.

At the same time it is important to keep in mind that students who are on-track in sixth grade can fall off at a later point in time. Rates of chronic absence tend to increase through the middle grades and especially from eighth grade to ninth grade. It is crucial for City Schools to continue to help schools maintain high levels of attendance for students in seventh and eighth grades.

First-time ninth graders have high chronic absence rates and course failure rates as documented in the recent BERC report *Keeping On Track in Ninth Grade and Beyond*. Given the strong relationship between ninth grade attendance and course passing with graduation (outlined in BERC's upcoming policy brief *Moving Forward to Increase Graduation Rates in Baltimore City*), efforts to address both attendance and course passing in ninth grade are crucial.

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<sup>1</sup> Students who transferred out of the district were excluded from analysis of graduation rates.

## **Destination Graduation?**

### **Sixth Grade Early Warning Indicators for Baltimore City Schools: Their Prevalence and Impact**

#### **Background**

Current educational policy debates are balancing two seemingly contrary objectives:

- Increase the rigor of graduation requirements so all students are college and career ready, and
- Reduce an unacceptably high dropout rate-- the brunt of which is born by the country's minority and poor families and communities (Bridgeland, Dilulio, and Morison 2006, Orfield 2004).

Central to achieving this dual policy agenda is effective secondary school reform. To be successful, reform efforts in middle and high schools must reflect awareness of student needs and how at-risk students are distributed across schools. In particular, there is a need for early warning systems that identify students who may be taking the first steps off the path toward graduation (Allensworth and Easton, 2007, Balfanz and Boccanfuso, 2007). These early alerts can assist schools in assuring that effective interventions can be directed toward the students who need them the most, when they most need them.

This report examines data from the Baltimore City Public Schools (City Schools) to identify statistically significant, highly predictive Early Warning Indicators of non-graduation outcomes, i.e., dropout. The report also considers the impact of single versus multiple indicators, and the number of students identified as at-risk of being off-track to eventual graduation. Then, the concentration of Early Warning Indicators is presented for a recent cohort of Baltimore sixth graders to describe the current level of need in City Schools. Policy makers and practitioners can use this report to determine whether Early Warning Indicators might be used for targeted interventions and educational supports.

Determination of predictive and high-yield Early Warning Indicators were guided by the following two principles:

1. A high proportion of students with the indicator did not graduate (i.e., around 70 percent), and
2. A substantial number of those who eventually dropped out (i.e., more than 20 percent) displayed the indicator.

In this way, only indicators that were highly predictive and practically meaningful were identified.

## Findings

A logistic regression analysis identified the following four predictive sixth grade early warning indicators of non-graduation:

- Chronic absence (defined as missing 20 or more days of school),
- Failing English, or math, or both and/or a failing average of English, math, science, and social studies,
- Being at least one year overage (suggesting an earlier retention), and
- Being suspended for three or more days.

It is important to note that students missing birthdate/age or course grade data were assigned to a *no risk* category for that indicator, respectively. The same is true with suspension data. Students not found in the suspension file are assumed to have had no suspensions. This assumption is more likely to be true than the assumption that students missing birthdate or course grade data had no risk indicators. [The following tables are different from Table 1 because subsequent out-of-district transfer students were excluded from analyses.]

**Chronic absence** was the Early Warning Indicator that was the most common for sixth graders. For the purposes of this study, chronic absence was defined as missing 20 or more days of school in a given school year, or for students enrolled for part of the year, an attendance rate below 89 percent, whether excused or not. One-third (33.3 percent) of the Class of 2007 students were chronically absent in sixth grade.

Table 2  
Number and Percent of Sixth Grade Students in the Class of 2007 by Absence Indicator and Graduation Rate Within One Year of Expected Year

6 <sup>th</sup> Grade Absences	N	Percent	Grad within 1 Yr of Expected
<b>Chronically Absent Students</b>			
Missing 20-39 days	2,058	33.3	28.6%
Missing 40+ days	1,370	22.2	36.3%
<hr/>			
<b>Other Absences</b>			
Missing 0-10 Days	688	11.1	13.2%
More than 10, fewer than 20 Days	2,859	46.3	70.0%
	1,258	20.4	51.4%

Note: This table excludes students who permanently transferred out of the district over the seven year period, for a final count of 6,175.

As Table 2 indicates, the probability of graduation drops from 70.0 percent for students with ten or fewer days absent in sixth grade to 28.6 percent for students who were chronically absent in sixth grade. In other words, the probability of graduation is nearly two and a half times better for a student with ten or fewer absences compared to a chronically absent student. As



attendance rates fell, on-time graduation rates dropped as well, down to 13.2 percent for students missing 40 or more days.

**Course failure** was examined in a number of different ways. We first looked at failing English and/or math, and then having a course average below 60, averaged across all four content courses. As seen in Table 3, over one in six students failed English in sixth grade (17.2 percent), while 11.6 percent of the cohort failed math. Some of these students – 7.6 percent of the cohort – failed both English and math in sixth grade. The percentage having an average below 60 across all core content courses was 12.3. Many of these latter students also failed English or math.

Table 3  
Number and Percent of Students in Class of 2007 Who Failed a Course in Sixth Grade and Later Graduation Rate within One year of Expected

Course Failure	N	Percent	Grad within 1 Yr of Expected
Failed English/Reading	1,065	17.2	30.9%
Failed Math	717	11.6	23.0%
Failed English and Math	471	7.6	18.9%
Average below 60 for core courses	761	12.3	21.7%

Note: This table excludes students who permanently transferred out of the district over the seven-year period, for a final count of 6,175.

As seen in Table 3, failing core courses in sixth grade was strongly associated with a lower probability of graduation. Less than a third of these students eventually graduated. Graduation was particularly unlikely for those who failed both English and math, as only 18.9 percent went on to graduate.

**Overage** status usually serves as a proxy for district decisions to retain students in earlier grades. For the Class of 2007, almost one in five students, 16.7 percent, were overage entering sixth grade (born before September 1, 1988). As seen in Table 4, of these 1,006 students, a small subset, 130 students, were two or more years overage. The MSDE policy in place for both cohorts would have allowed students who would not be 5 until December 31 to enroll in Kindergarten. Thus, the reported percentage overage for each cohort likely underestimates the number of students actually retained.

Being overage-for-grade meant a student was substantially less likely to graduate than students who were not overage. More than three-fourths of the 1,006 overage students did not graduate by the end of the 2007-08 school year, making this the single strongest predictor of non-graduation. Of the 130 students who were overage by two or more years, only 11 graduated. The graduation rate for students in the Class of 2007 who were overage and had no other Early Warning Indicators in sixth grade was 45.5 percent (not shown in tables). This finding is consistent with prior research suggesting that – even absent any immediate or persistent academic and behavioral problems for an overage student – the very fact of being old-for-grade remains a dire risk factor (Entwisle, Alexander, and Olson 2004, Plank, DeLuca, and Estacion 2008, Stearns et al. 2007). The graduation rate for on-age students with no sixth grade Early

Warning Indicators was 70.5 percent. Another way to think about the predictive power is to look at non-graduates. Exactly 26.0 percent of all eventual non-graduates were overage by at least one year entering the sixth grade.

Table 4  
Number and Percent of Overage Sixth Grade Students in the Class of 2007  
and Graduation Rate within One Year of Expected

Years Overage	N	Percent	Grad within 1 Yr of Expected
One or More Years Overage	1,006	16.3	24.0%
Two or More Years Overage	130	2.1	8.5%

Note: This table excludes students who permanently transferred out of the district over the seven-year period, for a final count of 6,175.

**Discipline**, being suspended for three or more days, was a strong indicator of eventual dropout. Interestingly, receiving any out-of-school suspension in sixth grade was not a strong enough predictor of eventual dropout to be classified as an Early Warning Indicator. However, using the number of days suspended in this measure allowed us to capture students who were either multiple time offenders, or committed a single, serious violation of school rules. We found that of the 18.8 percent of sixth graders suspended three or more days, just 29.4 percent graduated within one year of expected (June, 2008). By contrast, the graduation rate of those with no suspensions in sixth grade was 59.4 percent.

Table 5  
Number and Percent of Students from the Class of 2007  
Who Were Suspended in Sixth Grade by Graduation Rate

Suspension Event (not mutually exclusive categories)	N	Percent	Grad within 1 Yr of Expected
No Suspensions	4,459	72.2	59.4%
One Suspension	902	14.6	43.8%
Multiple Suspensions	814	13.2	23.6%
Three or More Days Suspended	1,158	18.8	29.4%

Note: This table excludes students who permanently transferred out of the district over the seven-year period, for a final count of 6,175.

**Less Useful Predictors of Non-Graduation.** The following measures did not meet our criteria as highly predictive and high yield indicators of non-graduation. **Standardized test scores** (math and reading scores on the Comprehensive Tests of Basic Skills (CTBS), a standardized test

administered to all sixth grade students in 2000-01) were analyzed. However, scoring even at the very lowest scale scores or national percentile ranks for math and reading was not a useful predictor of non-graduation.

**Gender**, specifically, male status, is a demographic predictor rather than an off-track indicator of non-graduation status. Gender also would not have met our criterion of carrying at least a 70 percent probability of non-graduation. Nonetheless, it should be noted that the graduation rate for males was 42.6 percent, compared to 62.6 percent for females. Males were more likely than females to have each of the off-track indicators.

We also examined graduation outcomes for students who ever received **English for Speakers of Other Languages (ESOL) or Special Education services** over the eight-year span of the study. However, neither of these factors was as predictive of eventual dropout as the four Early Warning Indicators. Free or reduced-price meal eligibility was not included in analyses because more than three-fourths of the Class of 2007 qualified and a trait that characterizes most of the cohort is not especially useful as a predictor.

**Impact of Having Multiple Early Warning Indicators.** As seen in Table 6, having multiple indicators greatly reduced the probability of graduation. The percent of students who graduated decreased as the number of indicators grew. Of students with no indicators, 70.5 percent went on to graduate within one year of expected. Of students with a single indicator, 50.7 percent went on to graduate with one year of expected, for students with two indicators, 26.1 percent went on to graduate, 13.0 percent of students with three indicators graduated, and 7.9 percent of students with four indicators graduated. Among students with multiple indicators (two or more), 20.4 percent went on to graduate.

Table 6  
Number and Percent of Class of 2007 Students by Number of Sixth Grade Early Warning Indicator and Graduation Rates within One Year of Expected Graduation

Number of Indicators	N	Percent	Grad within 1 Yr of Expected
Zero	2,907	47.1	70.5%
One	1,720	27.9	50.7%
Two	927	15.0	26.1%
Three	494	8.0	13.0%
Four	127	2.1	7.9%
<b>Class of 2007</b>	<b>6,175</b>	<b>100.0</b>	<b>52.4%</b>
Having one or more	3,268	52.9	36.4%
Having two or more	1,548	25.1	20.4%

Note: This table excludes students who permanently transferred out of the district over the seven-year period, for a final count of 6,175.

**The Impact of Different Combinations of Early Warning Indicators.** The pairings of different indicators were also related to graduation. Students with certain combinations of Early Warning Indicators had graduation rates lower than their peers. As seen in Table 7, the combination of chronic absenteeism and being overage was the riskiest pairing, with a graduation rate of 11.6 percent. It also accounted for the most cases among these comparisons. Over one-third (36.7 percent) of students who were chronically absent also had a course failure indicator in sixth grade. These two Early Warning Indicators had by far the greatest amount of overlap.

Table 7  
Graduation Rates for the Class of 2007 with Multiple Risk Indicators, by Indicator Pairings

Indicator 1	Indicator 2	N	Percent	Grad within 1 Yr of Expected
Chronic Absence	Failed Courses	755	12.2	17.9
Chronic Absence	Discipline	713	11.6	16.4
Chronic Absence	Overage	576	9.3	11.6
Failed Courses	Discipline	443	7.2	18.3
Failed Courses	Overage	355	5.7	13.5
Discipline	Overage	329	5.3	14.0

Note: This table excludes students who permanently transferred out of the district over the seven year period, for a final count of 6,175.

**Prevalence of Early Warning Indicators for the Classes of 2007 and 2015** As a final step, we looked at all of the sixth graders for the Class of 2007 (including students who would later transfer out and have no impact on graduation rate) and the Class of 2015 to determine if there has been a reduced prevalence of indicators. As can be seen in Table 8, chronic absence is almost half of what it was in the earlier cohort, down to 18.6 percent from 34.2. The percent of students failing courses decreased by over half, from 21.0 to 9.6 percent.

Table 8  
Number and Percent of Baltimore City School Students with Early Warning Indicators in Grade 6 for the Classes of 2007 and 2015

Early Warning Indicators	Class of 2007		Class of 2015	
	N	%	N	%
Chronic Absence	2,693	34.2	1,084	18.6
Failing Courses	1,658	21.0	556	9.6
Overage for Grade	1,300	16.5	1,836	31.6
Suspended 3 or more days	1,481	18.8	386	6.6

Note: There were 7,887 sixth graders in 2000-01. Course-taking data was missing for 1,538 and overage status was missing for 301 students. For the Class of 2015, there were 5,816 sixth graders in 2008-09. Course-taking data was missing for 1,075 and overage was missing for 736 students. When missing data, risk indicator was assigned a 0. Thus, prevalence of indicators may be conservative.

Having multiple indicators shows a similar trend. The percent of students with all four declined from 2.0 to 0.3 percent. Moreover, the percent with none increased slightly from 46.4 to 48.3 percent, and the percent with just one showed the largest change increasing from 28.3 to 39.9 percent.

Table 9  
Number and Percent of Students in Grade 6 by Number of Early Warning Indicators for the Classes of 2007 and 2015

Number of Indicators	Class of 2007		Class of 2015	
	N	Percent	N	Percent
Zero	3,659	46.4	2810	48.3
One	2,232	28.3	2322	39.9
Two	1,205	15.3	528	9.1
Three	635	8.1	140	2.4
Four	156	2.0	16	0.3
<b>Total</b>	<b>7,887</b>	<b>100.0</b>	<b>5,816</b>	<b>100.0</b>

Note: There were 7,887 sixth graders in 2000-01. Course-taking data was missing for 1,538 and overage status was missing for 301 students. For the Class of 2015, there were 5,816 sixth graders in 2008-09. Course-taking data was missing for 1,075 and overage was missing for 736 students. When missing data, risk indicator was assigned a 0. Thus, prevalence of indicators may be conservative.

### A Picture of Future Non-Graduates as Sixth Graders

Next we looked at the group of students who did not graduate within one year of the expected date (i.e., by June 2008) by indicators (see Table 10). These students would have had eight years to complete the middle grades, enter high school and earn enough credits to graduate. The Class of 2007 did not need to meet the High School Assessment (HSA) graduation requirement.

Nearly three in ten (29.2 percent) of non-graduates had no indicators in sixth grade while the vast majority (70.8 percent) were already off-track to graduation. The most prevalent indicator was chronic absence, manifested in sixth grade by more than 35 percent of non-graduates. Subsequent analyses indicated that most of these students with no indicator in grade 6 had developed them by ninth grade. The majority (70.8 percent) of non-graduates were already showing signs of disengagement in sixth grade. This finding emphasizes the need to monitor early warning indicators throughout the middle grades and the first high school year.

Table 10  
 Number and Percent of Non-graduates for the Class of 2007 by Early Warning Indicator

Indicator	N	Percent of all non-graduates
No Indicators	2,907	29.2
Only overage	288	5.3
Only chronic absence	738	13.2
Only course failure	410	6.4
Only discipline	284	3.9
Overage and chronic absence	185	5.3
Overage and course failure	67	1.5
Overage and discipline	51	1.2
Chronic absence and course failure	285	6.9
Chronic absence and discipline	253	6.7
Course failure and discipline	86	1.7
Three indicators	494	14.6
Four indicators	127	4.0

**Conclusions and Policy Implications**

The reduction in sixth grade early warning indicators in City Schools is a positive sign for the district. Overall, sixth graders are much more likely to be on-track to graduation than they have been in the past. Numerous interventions on attendance and suspensions as well as attention to instruction and support for teachers have likely led to this improved outcome for sixth graders, and will continue to improve academic achievement as these students continue on towards graduation.

At the same time, there is room to improve. Chronic absence increases through the middle grades and especially from eighth grade to ninth grade. City Schools must continue to help schools maintain high levels of attendance for students in seventh and eighth grades to ensure students arrive at high school with good attendance habits and the academic skills to master high school content.

First-time ninth graders continue to struggle with high chronic absence rates and course failure rates, as the recent BERC report *Keeping On Track in Ninth Grade and Beyond* has shown. Given the strong relationship between ninth grade attendance, course passing, and graduation (outlined in BERC’s recent policy brief *Moving Forward to Increase Graduation Rates in Baltimore City*), efforts to increase attendance and course passing in ninth grade are crucial.

## Appendix

### Data and Methods

Cohort Development. Using data provided by the City Schools for the 2000-01 school year, we defined our cohort of sixth grade students for the Class of 2007 and then used 2008-09 data to identify the sixth grade students in the future Class of 2015. The Class of 2007 consisted of all students enrolled in sixth grade in the 2000-01 school year (excluding those who had permanently transferred out of the district as of October 1, 2000). For analyses of graduation outcome we also excluded students for whom we had no graduation information, such as documented transfers out of the district (1,612 students), transfers to evening school (74), or students passed away (26).<sup>2</sup> We followed the Class of 2007 year by year until June 2008, to capture students who graduated one year later than their on-time graduation date.

Statistical methods. Logistic regression was used to determine which factors suggested by prior research and experience successfully predict whether a student will drop out. These variables were further narrowed down to find those with the highest yield. The criteria used are as follows:

- (a) Project with high probability (i.e., at least 70 percent) that a student with the indicator will not graduate and
- (b) A substantial number (i.e., more than 20%) of the students who eventually dropped out possessed the indicator.

In this way only indicators that are statistically significant, highly predictive, and practically meaningful were identified

Missing Data. As is generally true for any studies using school districts' administrative records, there were missing data for each cohort. Attendance data were consistently available for all enrolled students in both cohorts. For the 2000-01 cohort, birthdate data were not available for roughly 16.4 percent of students (overage status was inferred for 13.9% of the cohort by identifying a student's grade level five years earlier to determine if they were retained between first and sixth grade). For the 2008-09 cohort, approximately 17.2% were missing birthdate data (overage status was inferred for 4.5% of the cohort from prior years' grade level information).

In 2000-01, 16.4% of sixth grade students were entirely missing core course-taking data (missingness varied by subject). In 2008-09, 18.6% of sixth grade students were entirely missing course data. Students without course grades were classified as having passed, and those with missing overage status data were classified as not overage. City Schools provided suspension data, and any students not included in the file were assumed to have no suspensions. This assumption is more likely to be true than the assumption that students missing birthdate or course grade data had no risk indicators.

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<sup>2</sup> While it is common research practice to exclude transfer students from analyses, it should be noted that transfer students often have early warning indicators, and depending on the timing of transfer, often resemble non-graduates more than they resemble graduates in their behavioral characteristics. And students who transferred to "evening school" typically have a lower probability of graduation than regular transfer students. Balfanz, Herzog, and Mac Iver (2007) treated transfers as non-graduates in their analyses.



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