Just the Right Mix:
Identifying Potential Dropouts in Montgomery County Public Schools Using an Early Warning Indicators Approach

Office of Shared Accountability

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MONTGOMERY COUNTY PUBLIC SCHOOLS

Montgomery County Public Schools

OFFICE OF SHARED ACCOUNTABILITY

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Executive Summary

Each school year, roughly a thousand students drop out of Montgomery County Public Schools (MCPS). However, unlike other large, urban school districts where students who drop out skip school and are suspended often (Balfanz & Byrnes, 2010), students who drop out of MCPS are present in school; they just are not doing well academically. According to the end-of-year MCPS attendance files provided to the Maryland State Department of Education (MSDE) each year, students who drop out of MCPS are generally coded as dropping out of school due to: 1) a lack of personal motivation or interest to continue their education, or to 2) a lack of academic success including low grades and/or retention. These are both signs of a lack of student engagement (i.e., investment and motivation towards school). Fortunately, students who drop out of school exhibit a pattern of behaviors that are generally identifiable in advance of them dropping out of school completely. These behaviors are referred to as Early Warning Indicators (EWIs)

EWIs use student-level data including attendance, behavior, and course failures (the ABCs) to identify cut-points that are related to an increased likelihood of students dropping out from school. With longitudinal data systems, these patterns have generally been identified by grade 6 (Balfanz & Byrnes, 2010) but can be identified as early as third grade (Rethinam & West 2012). By applying the EWIs approach to MCPS student data, this report identifies the attendance, behavior, and coursework indicators of MCPS dropouts for the first marking periods of Grades 3, 6, and 9. Additionally, for the first time in EWI research, this report identifies EWIs for Grade 1. The following research questions are addressed in this study:

1. What are the attendance, behavior, and coursework patterns at the end of marking period three for Grade 1 students, and at the end of marking period one for Grades 3, 6, and 9 students who eventually drop out of high school?
2. For each of the time points, what is the likelihood of students dropping out by each EWI?
3. Are the EWIs for identifying the MCPS high school Class of 2011 dropouts reliable at identifying the Class of 2012 dropouts?

To analyze these questions, a series of cross tabulations and logistic regressions are examined to analyze the relationship between various attendance, behavior, and coursework cut-points and dropout status.

Summary of Key Findings

MCPS EWIs

Table I shows the attendance, behavior, and coursework EWIs that were identified from analyzing data for the Class of 2011 and 2012. Across all four time points, being absent for three or more times (per marking period), being suspended (in- or out-of-school) one or more times, having difficulty in reading and/or mathematics, and/or having a cumulative GPA equivalent to a 'C' or below were found to be signs of students disengaging from school (see Table I).

Table I. Early Warning Indicators (EWIs) by Grade, Marking Period, and Dropout Status

Grade and Marking Period	Early Warning Indicator (EWI)		
	Attendance	Behavior	Coursework
Grade 1 Marking Period 3	Absent from *school* nine or more times	Suspended (in- or out-of-school) one or more times	(1) Below grade level in reading and/or mathematics; (2) Having a calculated third marking period grade point average (GPA) below a 1.20
Grade 3 Marking Period 1	Absent from *school* three or more times	(1) Suspended (in- or out-of-school) one or more times; (2) Receiving a 'Needs Improvement' on completing homework on-time	(1) Below grade level in reading and/or mathematics; (2) Having a calculated first marking period grade point average (GPA) below a 3.00
Grade 6 Marking Period 1	Absent from *a class* three or more times	Suspended (in- or out-of-school) one or more times	(1) Receiving a grade of 'D' or below in mathematics and/or English; (2) Having a first marking period grade point average (GPA) below a 3.00
Grade 9 Marking Period 1	Absent from *a class* three or more times	Suspended (in- or out-of-school) one or more times	(1) Receiving a grade of 'D' or below in mathematics and/or English; (2) Having a first marking period grade point average (GPA) below a 3.00

MCPS EWIs and the Likelihood of Dropping Out of High School

Table II summarizes the results from a series of logistic regressions using data from the Classes of 2011 and 2012 (see Tables 2 and A5). The analyses were performed by regressing the likelihood of dropping out of high school on each of the EWIs by grade and marking period. Students with an attendance EWI were found to be twice as likely to drop out of high school than their peers without an attendance EWI. The suspension behavior EWI, at the minimum, doubled the odds of a student dropping out of high school compared to students who were not suspended. In regards to the reading and mathematics coursework EWI, being below grade level in reading and/or mathematics (or receiving a 'D' or below) at least doubled the odds of a student dropping out compared to higher performing peers. Lastly, below average GPA of 1.20 in first grade and 3.0 in third, sixth, and ninth grade EWI, was found to double the odds of dropping out if it was present in elementary school (Grades 1 and 3) and was related to an odds increase of five times in middle and high school (Grades 6 and 9).

Table II. Likelihood of Dropping Out of HS by Early Warning Indicators (EWIs), Grade, and Marking Period

Grade and Marking Period	Early Warning Indicator (EWI)		
	Attendance	Behavior	Coursework
Grade 1 Marking Period 3	Students absent from *school* nine or more times are **twice** as likely to drop out of high school	Students suspended (in- or out-of-school) one or more times can be up to **five** times as likely to drop out of high school	(1) Students below grade level in reading and/or mathematics are **twice** as likely to drop out of high school; (2) Students having a calculated third marking period grade point average (GPA) below a 1.20 are **twice** times as likely to drop out of high school
Grade 3 Marking Period 1	Students absent from *school* three or more times are **twice** as likely to drop out of high school	(1) Students suspended (in- or out-of-school) one or more times can be up to **nine** times as likely to drop out of high school; (2) Students receiving a 'Needs Improvement' on completing homework on-time are **twice** as likely to drop out of high school	(1) Students below grade level in reading and/or mathematics are **twice** as likely to drop out of high school; (2) Students having a calculated first marking period grade point average (GPA) below a 3.00 are **twice** as likely to drop out of high school
Grade 6 Marking Period 1	Students absent from *a class* three or more times are **twice** as likely to drop out of high school	Students suspended (in- or out-of-school) one or more times are **three** times as likely to drop out of high school	(1) Students receiving a grade of 'D' or below in mathematics and/or English are **one and a half** times more likely to drop out of high school; (2) Students having a first marking period grade point average (GPA) below a 3.00 are at least **five** times as likely to drop out of high school
Grade 9 Marking Period 1	Students absent from *a class* three or more times are **three** times as likely to drop out high school	Students suspended (in- or out-of-school) one or more times are **twice** as likely to drop out of high school	(1) Students receiving a grade of 'D' or below in mathematics and/or English are at least **three** times as likely to drop out of high school; (2) Students having a first marking period grade point average (GPA) below a 3.00 are at least **five** times as likely to drop out of high school

Recommendations

1. An EWIs monitoring tool should be created based on the research and cut points determined by the Office of Shared Accountability (OSA) for all elementary, middle, and high school grades.
2. Once an EWI monitoring tool is ready, OSA staff should train school staff on how to use and interpret data from the tool.
3. The current OSA Grade 8 and Grade 9 tools should be discontinued.
4. EWI monitoring should be incorporated into teacher and administrator PLCs across all grades.
5. School staff, officials, counselors, and parents should work together to develop intervention strategies specific to individual students' needs.

Just the Right Mix: Identifying Potential Dropouts in Montgomery County Public Schools Using an Early Warning Indicators Approach

Thomas C. West

Background

Identifying Potential Dropouts

While the majority of Montgomery County Public Schools' (MCPS) students graduate from high school within four years, just over 7% drop out (MSDE, 2013). Based on information reported to the Maryland State Department of Education (MSDE), the overwhelming majority of MCPS dropouts have withdrawal codes indicating that they dropped out due to: 1) a lack of personal motivation or interest to continue their education, or 2) a lack of academic success including low grades and/or retention. Both of these reasons for dropping out fall under the theoretical construct of student engagement. Student engagement is a combination of behavioral, cognitive, and emotional components which help to explain students' involvement with school (Finn, 1993); their psychological investment towards learning (Newmann, Wehlage, & Lamborn, 1992); and students' motivation to learn (Steinberg, 1996). Thus, if students who are becoming disengaged from school can be identified before they fully disengage by dropping out, we can reduce the number of dropouts from MCPS high schools.

Because student engagement is based on what students do, think, and feel, it is a stronger predictor of whether students will drop out than students' demographic characteristics (i.e., race, ethnicity, gender, and Free and Reduced-price Meals System status) (Gleason & Dynarski, 2002). Students who are in the process of disengaging from school are more likely to be absent from school, exhibit behavioral problems, fail to complete assignments, and fail to pass courses (Finn, 1989). These student behaviors can be thought of as Early Warning Indicators (EWIs) (Balfanz & Byrnes, 2010), as they occur in advance of students dropping out.

With the wide-scale implementation of student-level, longitudinal data systems, we now have the ability to identify potential dropouts with a fairly high of degree of accuracy by Grade 6 (Balfanz & Byrnes, 2010) and potentially as early as Grade 3 (Rethinam & West, 2012). This is accomplished through the examination of cohorts of students (e.g., the Class of 2011) and comparing the attendance, behavior, and course performance patterns of students who dropped out and students who did not drop out. Once the critical cutpoints (or EWIs) are identified for each of the data points, the EWIs can then be applied to current students to identify potential future dropouts. For example, if it is observed that students who were absent five or more times from class during the first semester of Grade 6 were more likely to drop out than those who were absent less than five times, current Grade 6 students who are absent five or more times from class are identified as potential future dropouts.

The purpose of this report is to develop EWIs for MCPS elementary, middle, and high school students. To do so, this report examines attendance, behavior (i.e., suspension), and coursework

patterns of dropouts and non-dropouts belonging to the MCPS high school Class of 2011. Specifically, this report identifies EWIs for the third marking period of first grade, and for marking period one of third, sixth, and ninth grade. The third marking period of first grade was chosen as the earliest time point because this is the first time in which MCPS students receive a report card mark that determines whether they are performing above, on, or below grade level in reading and mathematics. Third grade marking period one was chosen because of the documented importance of students' performance in third grade and later academic performance (Lesnick, et al., 2010). The first marking period of sixth grade was chosen because students who are demonstrating signs of disengaging from school as early as sixth grade can be identified for intervention and hopefully re-engaged with school before they reach high school. For high school, marking period one of ninth grade was chosen because of the documented strong relationship between performance in the ninth grade and graduating on-time (i.e., within four years) from high school in MCPS (Rethinam, 2011) and in other districts (Neild & Balfanz, 2006; Allensworth & Easton, 2007). To test the reliability of the EWIs, MCPS high school Class of 2012 dropouts are also examined.

Literature Review

Early Warning Indicators

Since the publication of *The On-Time Indicator as a Predictor of High School Graduation* (Allensworth & Easton, 2005) and *Unfulfilled Promise: The Dimensions and Characteristics of Philadelphia's Dropout Crisis* (Neild & Balfanz, 2006), researchers and nonprofit organizations have been working with states and school districts to develop Early Warning Indicators (EWIs) to identify potential dropouts. One of these institutions, Johns Hopkins University, has collaborated with school districts including The School District of Philadelphia (PA), Baltimore City Public Schools (MD), Boston Public Schools (MA), Denver Public Schools (CO), and states' education agencies including the Tennessee Department of Education and the West Virginia Department of Education. For each of these agencies, Johns Hopkins University researchers used student-level, longitudinal data files to follow the progress, or lack thereof, of cohorts of students from as early as Grade 6 until high school graduation to determine what factors (or indicators) predicted the likelihood of students dropping out.

From their work with various education agencies, Johns Hopkins University researchers conclude that Grade 6 EWIs typically include:

- Attendance below 90%
- One or more suspensions or serious disciplinary incidents
- Failing a mathematics and/or English course

Grade 9 EWIs typically include:

- Attendance below 85%
- Two or more suspensions or serious disciplinary incidents
- Failing a mathematics and/or English course (Balfanz & Byrnes, 2010)

Similar work has been done by MCPS researchers, but rather than focusing on identifying dropouts, MCPS researchers identified EWIs of on-time graduation and college readiness (Rethinam, 2011).

Following students who were enrolled in Grade 9 for the first time in 2004–2005, MCPS researchers concluded that on-time graduation was higher for Grade 9 students who were absent fewer than eight days during the school year (attendance above 95%), were never suspended, failed one or fewer courses, and had a Grade 9 grade point average (GPA) of 2.5 or higher (Rethinam, 2011). In regards to college readiness, Grade 9 students who were absent fewer than eight days (attendance above 95%), failed no courses, and had a Grade 9 GPA of 3.5 or higher, were more likely to succeed in college than their peers. For both on-time graduation and college readiness, the Grade 9 GPA was the strongest predictor of students succeeding.

Methods

Research Questions

1. What are the attendance, behavior, and coursework patterns at the end of marking period three for Grade 1 students, and at the end of marking period one for Grades 3, 6, and 9 students who eventually drop out of high school?
2. For each of the time points, what is the likelihood of students dropping out by each EWI?
3. Are the EWIs for identifying the MCPS high school Class of 2011 dropouts reliable at identifying the Class of 2012 dropouts?

Study Population

This study focuses on 11,241 students who were identified by the Maryland State Department of Education (MSDE) as members of MCPS' high school Class of 2011. For the EWI analyses, this study focuses specifically on the 6,785 members of the MCPS Class of 2011 who were enrolled in first grade during the 1999-2000 school year, the 7,513 members of the MCPS Class of 2011 who were enrolled in third grade during the 2001-2002 school year, the 8,249 members of the MCPS Class of 2011 who were enrolled in sixth grade during the 2004-2005 school year, and on the 9,583 members of the MCPS Class of 2011 who were enrolled in ninth grade during the 2007-2008 school year (see Table 1). Students who were eventually enrolled in one of MCPS' alternative education setting are not included in the analyses. Because these students were already identified by MCPS as needing educational supports above the needs of their peers, it is not necessary to identify them twice. As a subgroup of students, they accounted for 110 (13.2%) of the 833 MCPS Class of 2011 dropouts. The remaining 723 (86.8%) MCPS Class of 2011 dropouts attended one of MCPS' 25 comprehensive high schools. In order to test the reliability of the final EWIs, data from the MCPS Class of 2012 are also analyzed.

Table 1
Number and Percentage of Class of 2011 Cohort Enrolled in MCPS by School Year and On-Time Grade-Level (N = 11,063)

School Year (On-Time Grade-Level)	Total Number of Class of 2011 Cohort Students Enrolled in MCPS	Total Number of Class of 2011 Cohort Dropouts Enrolled in MCPS	Percent of Class of 2011 Cohort Students Enrolled in MCPS (N = 11,063)	Percent of Class of 2011 Cohort Dropouts Enrolled in MCPS (N = 723)
1998–1999 (Kindergarten)	6,063	295	54.8	40.8
1999–2000 (Grade 1)	6,785	322	61.3	44.5
2000–2001 (Grade 2)	7,186	343	65.0	47.4
2001–2002 (Grade 3)	7,513	353	67.9	48.8
2002–2003 (Grade 4)	7,833	377	70.8	52.1
2003–2004 (Grade 5)	8,178	407	73.9	56.3
2004–2005 (Grade 6)	8,249	392	74.6	54.2
2005–2006 (Grade 7)	8,711	445	78.7	61.5
2006–2007 (Grade 8)	8,983	470	81.2	65.0
2007–2008 (Grade 9)	9,583	584	86.6	80.8
2008–2009 (Grade 10)	10,439	641	94.4	88.7
2009–2010 (Grade 11)	10,743	566	97.1	78.3
2010–2011 (Grade 12)	10,633	415	96.1	57.4
2011–2012 (Grade 12+1yr)	859	183	7.8	25.3

Note. Excludes alternative education setting students.

Measures

The variables used in this study were selected based on prior EWI research conducted in MCPS and in other educational agencies. They include number of times absent from school (for first and third grade), number of times absent from class (for sixth and ninth grade), number of times suspended, work study skills (for first and third grade), course failures, and marking period grade point averages. In terms of course failures, this study specifically looked at course failures in English and mathematics because of their prior documented relationship to student engagement (Balfanz & Byrnes, 2010; Rethinam, 2011). Because grade point averages are not included as part of the first and third grade report cards, it was necessary to calculate these values. To do so, the values 'O', 'S', and 'N' were recoded to two, one, and zero, respectively, for all subjects except music, art, physical education, and instrumental music. Once recoded, the values were summed across the subjects the students were enrolled in and then divided by the number of subjects the students were enrolled in. All data was gathered either from MCPS central student systems archived files or from official MSDE cohort files.

Outcome Measure

In order to study dropouts, it was necessary to identify whether students dropped out of MCPS. The variable *dropout* was used from the MSDE Class of 2010 and 2011 files to make this determination. MCPS received this information from MSDE in the form of a Microsoft Excel file with the variable coded 'Y' for dropout and 'N' for non-dropout. For all analyses, this variable was used as it was provided to MCPS.

Statistical Procedures

The analyses conducted for this report are based on frequency distributions, arithmetic mean comparisons, cross tabulations, and logistic regressions. To address question one, frequency distributions, arithmetic mean comparisons, and cross tabulations are used to determine the most efficient cut points for attendance (i.e., number of times absent from a class), behavior (i.e., number of suspensions), course grades, and GPA to separate dropouts from non-dropouts. For question two, logistic regressions are utilized to determine how each indicator relates to the odds of students dropping out. Lastly, research question three examines cross tabulations of the final EWIs from question one and Class of 2012 dropout status. All results are considered statistically significant if they meet a 95% confidence-level.

Results

In the following section, the findings are organized by research question.

Research Question 1

What are the attendance, behavior, and coursework patterns at the end of marking period three for Grade 1 students, and at the end of marking period one for Grades 3, 6, and 9 students who eventually drop out of high school?

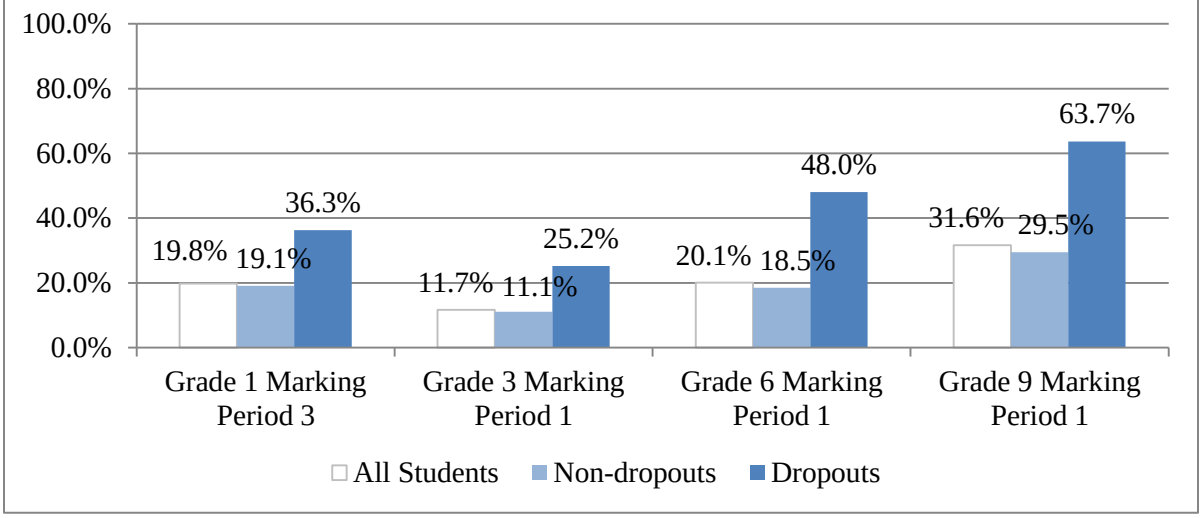
To answer research question one, cut points used in previous EWI research were applied to the MCPS high school Class of 2011 students who were enrolled in MCPS during the 1999-2000 school year as first-grade students, Class of 2011 students who were enrolled in MCPS during the 2001-2002 school year as third-grade students, Class of 2011 students who were enrolled in MCPS during the 2004-2005 school year as sixth-grade students, and Class of 2011 students who were enrolled in MCPS during the 2007-2008 school year as ninth-grade students. The cut points were: attending school less than 90% of the time, being suspended one or more times, and failing math and/or English.

Attendance. For MCPS, attending school less than 90% of the time for a given school year equates to being absent from school for nearly 20 days. This means for each marking period, being absent from school 5 or more days is equivalent to attending school less than 90% of the time. During the third marking period of the 1999-2000 school year, over 90% of the Class of 2011 students enrolled in MCPS were absent from school fewer than 15 days. For all Class of 2011 students enrolled at the time, the modal number of days absent was two days and the average number of days absent was six days. However, the average number of days absent for Class of 2011 dropouts was nine days, while the average for non-dropouts was five days. Thus, the attendance indicator for first grade marking period three will be set at missing school nine or more days. During the first marking period of the 2001-2002, 2004-2005, and 2007-2008 school years, again over 90% of the Class of 2011 students were absent from school fewer than 5 days. Class of 2011 dropouts missed on average one day more in 2001-2002 (1.9 compared to 0.9), nearly two days more in 2004-2005 (1.6 compared to 3.4), and five days more in 2007-2008 (2.2 compared to 7.2). Because non-dropouts on average did not miss three or more days during marking period one across the three time points, the attendance indicator for third, sixth, and ninth grade marking period one will be set at missing school three or more days. It is important to note that the sixth and ninth grade attendance EWI will be based on class absences instead of

school day absences. This enables us to measure if students are skipping class; a possibly more precise measure of student engagement.

As shown by Figure 1, just over a third of dropouts were absent from school for three or more days by third marking period of first grade during the 1999-2000 school year, while less than one-fifth of non-dropouts were absent three or more days by third marking period of first grade. For marking period one of third grade (2001-2002 school year), one-fourth of dropouts were absent 3 or more days, while only one-tenth of non-dropouts were absent three or more days. For grades six and nine marking period one, we see that nearly half of dropouts and nearly one-fifth of non-dropouts were absent from a class three or more times during grade six (2004-2005 school year), and nearly two-thirds of dropouts and less than one-third of non-dropouts were absent from a class three or more times during grade nine (2007-2008 school year). Behavior patterns of dropouts and non-dropouts measured by number of suspensions are explored next.

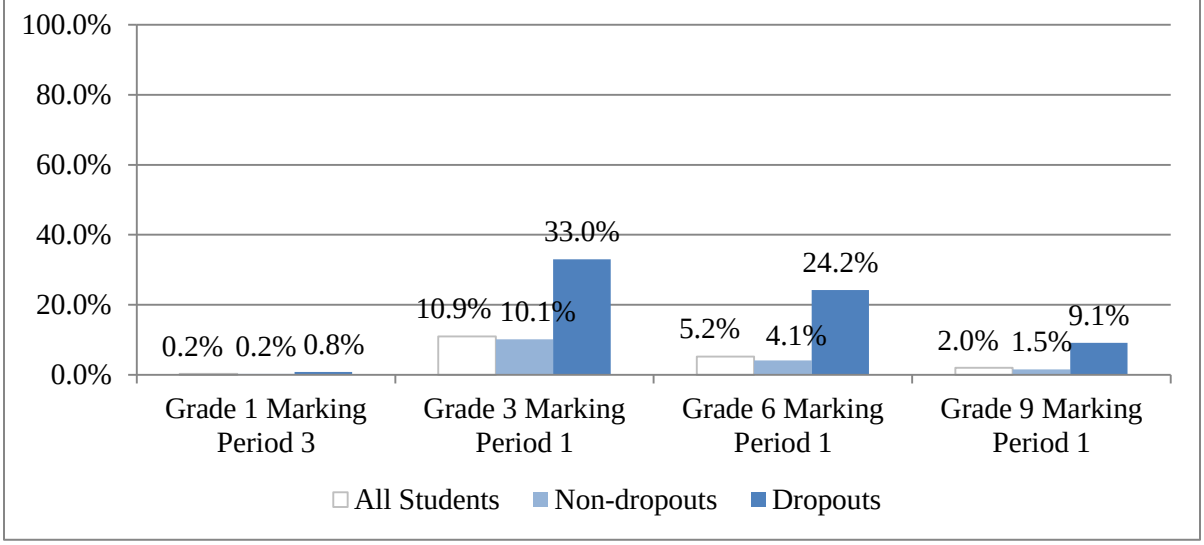
Figure 1. Percentage of Class of 2012 Students with an Attendance Indicator by Grade, Marking Period, and Actual Dropout Status



Behavior. In general, students in MCPS are suspended from school at a relatively low rate. During the third marking period of the 1999-2000 school year (grade 1), 99.8% of the Class of 2011 was not suspended either in- or -out of school (see Figure 2). For marking period one of grade three, two EWIs are used because of their later discussed relationship to the odds of eventually dropping out of high school: not completing homework on-time and suspensions. In 2001-2002 (grade 3), a third of Class of 2011 dropouts and a tenth of Class of 2011 nondropouts had at least one of these behavior EWIs. For grade six and nine only suspensions were used as the behavior EWI because MCPS middle and high schools do not provide marks for homework completion. For grade six, nearly a fourth of dropouts and less than a twentieth of nondropouts were suspended during marking period one of the 2004-2005 school year. For grade nine marking period one (2007-2008 school year), we see the portion of dropouts suspended decrease to under a tenth and the portion of non-dropouts decrease to just over a hundredth. Across the four time points, Figure 2 demonstrates that behavior (as measured by number of in- and out-of-

school suspensions) is not a prevalent characteristic of students who eventually drop out in MCPS. However, because suspensions are so rare in MCPS, being suspended one or more times will remain an MCPS EWI because of its relationship to the high probability of dropping out which will be discussed later in this report. Coursework EWIs will be examined next.

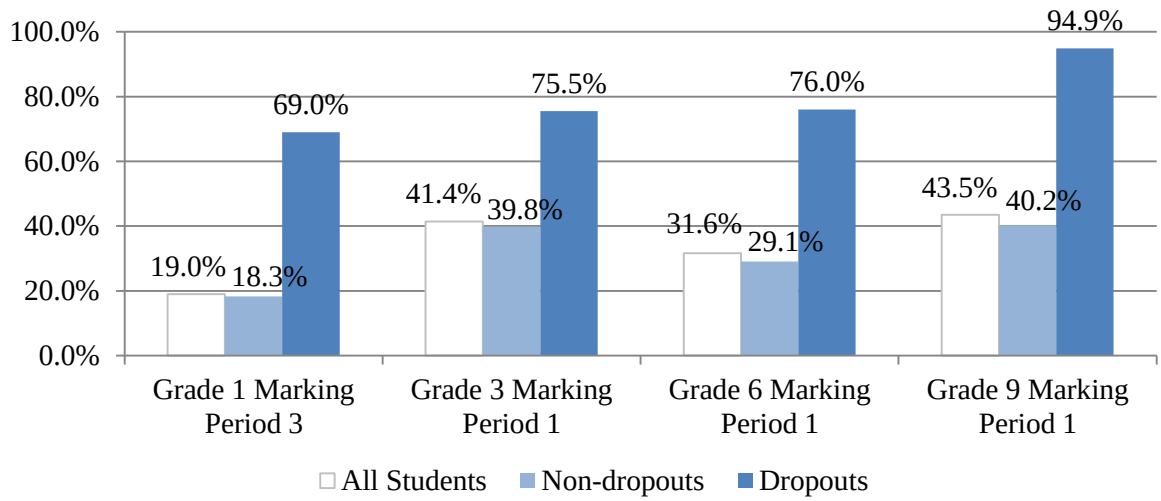
Figure 2. Percentage of Class of 2011 Students with a Behavior Indicator, by Grade, Marking Period, and Actual Dropout Status



Coursework. As done in prior EWI research, coursework will be confined to failing mathematics and/or English (e.g., Balfanz & Byrnes, 2010). For the purposes of identifying MCPS dropouts, failing mathematics and/or English will be defined for first grade as being below grade level for marking period three, for third grade as being below grade level for marking one, and for grades three, six, and nine as receiving a mark of 'D' or below for marking period one. Additionally, all time periods will also have a coursework EWI measured by students' marking period GPA. For grade one, the calculated GPA cut-off will be below a 1.20, and for grades three, six, and nine, the GPA cut-off will be below a 3.00.

Figure 3 shows that just over two-third of Class of 2011 dropouts and nearly one-fifth of Class of 2011 non-dropouts had a calculated GPA below a 1.20 at the end of the 1999-2000 third marking period. For grade three marking period one, three-fourths of Class of 2011 dropouts and over a third of Class of 2011 non-dropouts had a GPA below 3.00. During the first marking period of the 2004-2005 school year at grade six roughly three-fourths of Class of 2011 dropouts had a GPA below a 3.00, but the portion of Class of 2011 dropouts with a GPA below a 3.00 decreased to under a third. Grade nine marking period one (2007-2008) shows a dramatic increase in the portion of Class of 2011 dropouts with a GPA below a 3.00 (over nine-tenths) while the portion of Class of 2011 non-dropouts with a GPA below a 3.00 was similar to that of the 2001-2002 (third grade) school year.

Figure 3. Percentage of Class of 2011 Students with a Coursework Indicator, by Grade, Marking Period, and Actual Dropout Status



Research Question 2
For each of the time points, what is the likelihood of students dropping out by each EWI?

In order to answer research question two, dropout status for the Class of 2011 was regressed on the EWIs for each time point. This approach gives the ability to examine the odds of a student dropping out by each EWI while controlling for the effects of the other EWIs.

Attendance. Across the four time periods, the attendance EWI was found to be related to the odds of eventually dropping out of high school. For the Class of 2011, students who were absent from school nine or more times by marking period three of first grade were twice as likely to drop out of high school than students who missed fewer than nine days (see Table 2). At the end of marking period one third grade for the Class of 2011, students who were absent from school three or more times odds of dropping out were doubled compared to students who were absent less from school less than three times. Looking at class absences for marking period one of grades six and nine, being absent from class three or more times doubled the odds of dropping out for grade six and tripled the odds for grade nine. The behavior EWI is next examined.

Behavior. Behavior, as defined as having one or more in- or out-of-school suspensions, was shown to be related to the odds of students dropping out of high school for marking period one of grades six and nine, but not for marking period three of grade one nor marking period one of grade three (see Table 2). However, the behavior EWI for marking period one of grade three of 'Needs improvement completing homework on time' was found to be related to the odds of students dropping out. The marking period one grade three homework EWI was shown to more than double the odds of students dropping out. Students suspended during grade six marking period one had more than three times the odds of dropping out than students who were not suspended. For marking period one of grade nine, being suspended nearly doubled the odds of students dropping out compared to students who were not suspended. Next, the two coursework EWIs will be discussed.

Coursework. Dropout status was regressed on the coursework EWIs: below grade level in reading and/or mathematics (for marking period three of grade one and marking period one of grade three), receiving a grade of 'D' or below in mathematics and/or English (for marking period one of grades six and nine), overall grade point average (GPA) below 1.20 (for marking period three of first grade), and overall grade point average GPA below 3.00 (for marking period three of grades six and nine). Students who were below grade level in reading and/or mathematics more than doubled the odds of students dropping out for the grades one and three EWI (see Table 2). Receiving a 'D' or below in mathematics and/or English increased the odds of dropping out for grade six students by more than half and more than tripled the odds of dropping out for grade nine students. In regards to GPA, grade one students with a GPA below 1.20 were twice as likely to drop out of high school than students with a GPA of 1.20 or above. Having a first marking period GPA below a 3.00 doubled the odds of students dropping out at grade three and more than quadrupled the odds of dropping out at grades six and nine.

Table 2. Likelihood of Dropping Out of High School for the Class of 2011, by Grade, Marking Period, and EWI

Variable	Estimate	Standard Error	Odds Ratio	Z Value	Sig. Diff.
Grade 1 Marking Period 3[a]					
Intercept	-3.974	0.113	0.019	-35.035	*
Absent from school nine or more times	0.646	0.139	1.907	4.659	*
Suspended (in- our-of-school) one or more times	0.696	0.790	2.006	0.882	
Below grade level in reading and/or mathematics	0.850	0.153	2.340	5.561	*
Overall grade point average (GPA) below 1.20	0.713	0.157	2.040	4.552	*
Grade 3 Marking Period 1[b]					
Intercept	-4.057	0.110	0.017	-36.865	*
Absent from school three or more times	0.682	0.141	1.978	4.844	*
Suspended one or more times (in- our out-of-school)	1.046	0.130	2.845	0.925	
'Needs improvement' completing homework on time	0.824	0.138	2.279	5.968	*
Below grade level in reading and/or mathematics	0.867	0.141	2.379	6.170	*
First marking period grade point average (GPA) below 3.00	0.704	0.153	2.022	4.596	*
Grade 6 Marking Period 1[c]					
Intercept	-4.249	0.107	0.014	-39.630	*
Absent from a class three or more times	0.859	0.109	2.360	7.887	*
Suspended one or more times (in- our out-of-school)	1.261	0.137	3.528	9.200	*
Receiving a grade of 'D' or below in mathematics and/or English	0.454	0.122	1.575	3.726	*
First marking period grade point average (GPA) below 3.00	1.585	0.135	4.880	11.728	*
Grade 9 Marking Period 1[d]					
Intercept	-5.116	0.152	0.006	-33.657	*
Absent from a class three or more times	1.138	0.104	3.120	10.919	*
Suspended one or more times (in- our out-of-school)	0.629	0.182	1.876	3.458	*
Receiving a grade of 'D' or below in mathematics and/or English	1.317	0.123	3.732	10.690	*
First marking period grade point average (GPA) below 3.00	1.539	0.178	4.661	8.629	*

*$p < .05$

[a] $x^2 = 156.279$, df = 4, $p < 0.05$, n = 6,169

[b] $x^2 = 263.390$, df = 5, $p < 0.05$, n = 7,000

[c] $x^2 = 585.977$, df = 4, $p < 0.05$, n = 7,960

[d] $x^2 = 908.458$, df = 4, $p < 0.05$, n = 9,294

Research Question 3
Are the EWIs for identifying the MCPS high school Class of 2011 dropouts reliable at identifying the Class of 2012 dropouts?

To test the reliability of the EWIs developed and analyzed to answer research questions one and two, each EWI will be applied to the same corresponding grades and marking periods using data for the MCPS Class of 2012.

Attendance. In regards to the elementary grades, a larger portion of Class of 2012 dropouts and non-dropouts missed nine or more days by marking period three of grade one (42.4% compared to 36.4% for dropouts; 22.7% compared to 19.1% for non-dropouts) and missed three or more days by marking period one of grade three (33.3% compared to 25.2% for dropouts; 16.8% compared to 11.1% for non-dropouts) than Class of 2011 dropouts and non-dropouts (see Tables A1 and A2). For marking period one of grade six, a slightly smaller portion of Class of 2012 dropouts and non-dropouts missed three or more days than Class of 2011 dropouts and non-dropouts (45.8% compared to 48.0% for dropouts; 18.4% compared to 18.5% for non-dropouts). The difference between the two classes was even more pronounced for marking period one of grade nine (41.2% compared to 69.0% for dropouts; 10.5% compared to 30.2% for non-dropouts).

Behavior. As seen with the Class of 2011, very few of the Class of 2012 students enrolled in MCPS were suspended in- or out-of-school during the elementary school years. By the third marking period of grade one, 2.0% of Class of 2012 dropouts and 0.3% of Class of 2012 non-dropouts were suspended one or more times (see Table A2). For the first marking period of grade three, 1.6% of Class of 2012 dropouts and 0.1% of Class of 2012 non-dropouts had been suspended one or more times. While the Class of 2012 and Class of 2011 portions for these two time periods are slightly different, the rates are so low that they will be treated as relatively equal.

In regards to the second marking period one of grade three behavior EWI (i.e., 'Needs improvement' completing homework on time) slightly less of the Class of 2012 dropouts and non-dropouts received this mark than Class of 2011 dropouts and non-dropouts (28.1% compared to 31.8% for dropouts; 8.8% compared to 9.9% for non-dropouts). Marking period one of grade six shows similar patterns for the Class of 2012 dropouts and non-dropouts as was seen for the Class of 2011. Twenty-six percent of Class of 2012 dropouts and 4.3% of Class of 2012 non-dropouts were suspended one or more times. These rates are comparable to the 24.2% of Class of 2011 dropouts and 4.1% of Class of 2011 non-dropouts who were suspended during the same grade and marking period (see Tables A1 and A2). For the first marking period of grade nine, a smaller portion of Class of 2012 dropouts and non-dropouts were suspended one or more times compared to Class of 2011 dropouts and non-dropouts (5.5% compared to 9.1% for dropouts; 0.7% compared to 1.5% for non-dropouts).

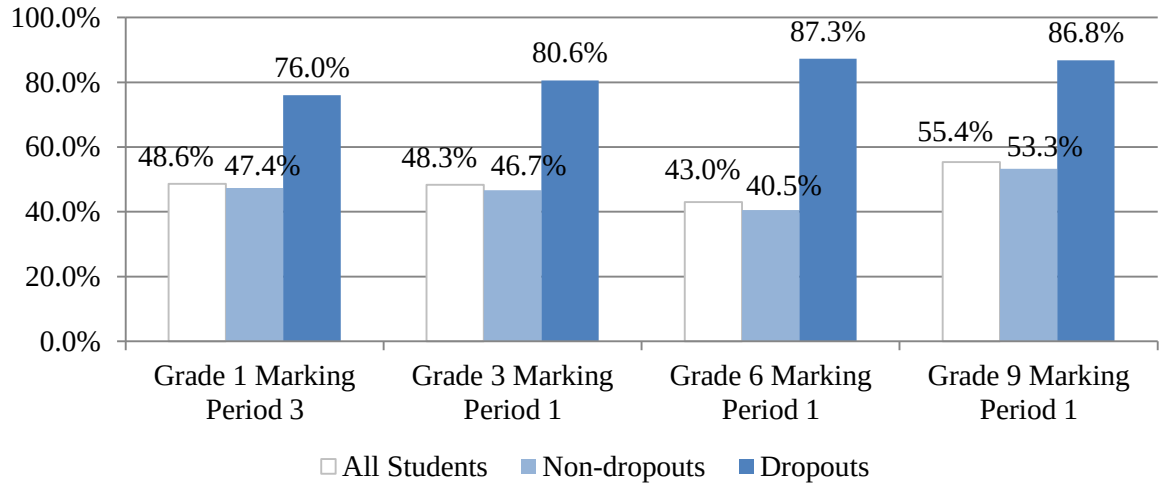
Coursework. Across the coursework EWIs, the portion of Class of 2012 dropouts and non-dropouts with a coursework EWI by grade and marking period varied slightly across the four time points compared to the portion of Class of 2011 dropouts and non-dropouts with a coursework EWI. For the two marking period three of grade one coursework EWIs (i.e., being

below grade level in reading and/or mathematics; overall grade point average (GPA) below 1.20), a smaller portion of Class of 2012 dropouts and non-dropouts were below grade level in reading and/or mathematics than the Class of 2011 dropouts and non-dropouts (45.9% compared to 51.0% for dropouts; 19.2% compared to 21.6% for non-dropouts) and a larger portion of Class of 2012 dropout and non-dropouts had a GPA below 1.20 than the Class of 2011 dropouts and non-dropouts (70.6% compared to 62.2% for dropouts; 40.4% compared to 33.4% for non-dropouts) (see Tables A1 and A2). At the conclusion of the first marking period of grade three, the Class of 2012 had generally the same portion of dropouts and non-dropouts with a coursework EWI as the Class of 2011. For marking period one of grade six, the Class of 2012 had higher portions of students receiving a 'D' or below in mathematics and/or English than the Class of 2011 (52.9% compared to 42.5% for dropouts; 16.5% compared to 12.0% for non-dropouts) and higher portions of students with a GPA below a 3.00 (82.0% compared to 76.0% for dropouts; 30.4% compared to 28.5% for non-dropouts). Lastly, smaller portions of the Class of 2012 dropouts and non-dropouts received a 'D' or below in mathematics and/or English than the Class of 2011 (66.4% compared to 74.8% for dropouts; 19.5% compared to 21.2% for non-dropouts) and similar portions of the Class of 2012 dropouts and non-dropouts had a GPA below 3.00 compared to the Class of 2011.

Conclusions

The EWIs developed in this report can help MCPS potentially identify as early as first and third grade nearly 8 out of 10 students who will eventually drop out of high school and by sixth and ninth grade nearly 9 out of 10 students who will eventually drop out (see Figure 4). Because EWIs are signs of students disengaging from school, they provide MCPS with the opportunity to not only intervene with potential dropouts, but to also provide supports to students who are struggling with school that may not eventually drop out. As shown by Figure 4, this accounts for roughly 5 out of 10 students who did not eventually drop of out of high school across the four time points.

Figure 4. Percentage of Class of 2011 Students Identified as Dropouts by Grade, Marking Period, and Actual Dropout Status



It is also important to point out that while students who dropout from MCPS tend to have a higher number of EWIs than students who do not dropout (i.e., non-dropouts), the number EWIs a student has does not necessarily mean they are more or less likely to dropout. Instead, the EWIs give school staff and officials an idea of what needs to be addressed (see Appendix Tables A1-A2 for information on the number and percentage of students by number of indicators for both the Class of 2011 and 2012). For example, one student may have two Grade 6 Semester 1 indicators: 1) absent from class five or more times and 2) receiving an average grade of 'C' or below in math and/or English. To intervene with this student, it will be necessary for school staff and officials to find out why the student was absent from class and to look at the student's course grades. Upon investigation, it may become clear to school staff and officials that the student has difficulty getting to school on-time due to a parent's work schedule and that they received a 'C' in English but received 'A's' and 'B's' in their other courses. To address the student's tardiness, it may be possible to contact the student's parent and work out an alternative means to get the student to school on-time. In regards to the 'C' in English, by bringing together all of the student's teachers, there may be something unique about the student's experience in English class that can be addressed from what is working for the student in their other courses. EWIs are helpful in that they can be used to monitor all students. But, the key to keeping students from dropping out of school lies in what school staff, officials, and parents do to help students once they are identified (Balfanz & Byrnes, 2010).

Professional Learning Communities (PLCs) and cross-discipline teacher teams are the ideal situations for having EWIs related discussions (Herzog, Davis, & Legters, 2012). Both of these situations create the opportunity to bring together all adults who have contact with a student and to discuss the student's needs. Additionally, PLCs and cross-discipline teacher teams create an environment in which teachers can pool their experience and resources to come up with effective and doable solutions for a given student (Herzong, Davis, & Legters, 2012). An intervention crafted specifically to a student's individual needs will have the greatest chance of working if all adults the student comes in contact with at school enact consistent supports. If possible, these teams should also include school counselors and, where appropriate, pupil personnel workers. For more information on how to create and implement such a team, see Learning What it Takes: An Initial Look at How Schools are Using Early Warning Indicator Data and Collaborative Response Teams to Keep All Students on Track to Success (Herzog, Davis, & Legters, 2012).

From this information, we can conclude that once the elementary, middle, and high school EWIs are developed, it will be important to apply them at least once a year to all grades. This will expand MCPS' ability to assess the dropout potential of any students who transfer into MCPS, which will increase the likelihood of identifying and intervening with all possible dropouts.

Recommendations

1. An EWIs monitoring tool should be created based on the research and cut points determined by the Office of Shared Accountability (OSA) for all elementary, middle, and high school grades.
2. Once an EWI monitoring tool is ready, OSA staff should train school staff on how to use and interpret data from the tool.
3. The current OSA Grade 8 and Grade 9 tools should be discontinued.
4. EWI monitoring should be incorporated into teacher and administrator PLCs.
5. School staff, officials, counselors, and parents should work together to develop intervention strategies specific to individual students' needs.

Limitations

This study is based on two cohorts of students: the Classes of 2011 and 2012. The indicators developed from analyzing the attendance, behavior, and coursework of the two cohorts will need to be checked against future cohorts to ensure that they remain reliable. If warranted, the indicators should be adjusted if at any point in time they lose the ability to correctly identify potential dropouts. With the implementation of Curriculum 2.0 and new report cards for elementary school students, it will be necessary to look for new indicators if the current elementary EWIs become no longer available from the student report cards. It is important to note that just because a student has one of the EWIs does not mean they will drop out of high school. For example, in this study, a student who is absent from school due to sickness is treated the same as a student who is absent from school because they skipped school. It is the role of school staff to provide context to the EWIs. With context, school staff can judge whether an intervention is necessary or not.

References

Allensworth, E. & Easton, J. (2005). The on-track indicator as a predictor of high school graduation. Chicago, IL: Consortium on Chicago School Research.

Allensworth, E. & Easton, J. (2007). What matters for staying on-track and graduating in Chicago Public *Schools*. Chicago, IL: Consortium on Chicago School Research.

Balfanz, R. & Byrnes, V. (2010). Dropout prevention through Early Warning Indicators: A current distribution in West Virginia schools. Baltimore, MD: Johns Hopkins University.

Finn, J.D. (1989). Withdrawing from school. *Review of Educational Research*, 59, pp. 117–142.

Finn, J.D. (1993). *School engagement and students at risk*. Washington, DC: National Center for Education Statistics.

Gleason, P. & Dynarski, M. (2002). Do we know whom to serve? Issues in using risk factors to identify dropouts. *Journal of Education for Students Placed at Risk*, 7, pp. 25–41.

Herzog, L., Davis, M., & Legters, N. (2012). Learning what it takes: An initial look at how schools are using early warning indicator data and collaborative response teams to keep all students on track to success. Baltimore, MD: Johns Hopkins University.

Lesnick, J., Goerge, R.M., Smithgall, C., & Gwynne, J. (2010). *Reading on grade level in third grade: How it is related to high school performance and college enrollment?* Chicago: Chapin Hall at the University of Chicago.

Maryland State Department of Education (MSDE). "4-Year Adjusted Cohort Dropout Rate: Montgomery County: 2012 Maryland Report Card. Last modified February 1, 2013. http://www.mdreportcard.org.

Neild, R. & Balfanz, R. (2006). Unfilled promise: The dimensions and characteristics of Philadelphia's dropout crisis, 2000-2005. Philadelphia, PA: Philadelphia Youth Transitions Collaborative.

Newmann, F.M., Wehlage, G.G., & Lamborn, S. (1992). The significance and sources of student engagement. In F. Newmann (Ed.), *Student engagement and achievement in American secondary schools* (pp. 11–39). New York: Teachers College Press.

Rethinam, V. (2011). Grade 9 indicators influencing high school graduation and college readiness in Montgomery County public high schools. Rockville, MD: Montgomery County Public Schools.

Rethinam, V. & West, T.C. (2012). Predicting grade 6 marking period one performance using grade 3 semester one indicators. Rockville, MD: Montgomery County Public Schools.

Steinberg, L. (1996). Beyond the classroom: Why school reform has failed and what parents need to do. New York: Simon and Schuster.

Appendix

Table A1. Class of 2011 Early Warning Indicators, by Grade, Marking Period, and Dropout Status

Dropout Status	Early Warning Indicator										Total	
	Attendance		Behavior (1)		Behavior (2)		Coursework (1)		Coursework (2)			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Grade 1 Marking Period 3												
Non-dropouts	1,171	19.1%	13	0.2%	–	–	1,277	20.8%	2,049	33.4%	6,140	100.0%
Dropouts	95	36.3%	2	0.8%	–	–	129	49.2%	163	62.2%	262	100.0%
Total	1,266	19.8%	15	0.2%	–	–	1,406	22.0%	2,212	34.6%	6,402	100.0%
Grade 3 Marking Period 1												
Non-dropouts	764	11.1%	5	0.1%	681	9.9%	1,626	23.5%	2,432	35.2%	6,913	100.0%
Dropouts	83	25.2%	1	0.3%	105	31.8%	189	57.3%	224	67.9%	330	100.0%
Total	847	11.7%	6	0.1%	786	10.9%	1,815	25.1%	2,656	37.5%	7,243	100.0%
Grade 6 Marking Period 1												
Non-dropouts	1,421	18.5%	312	4.1%	–	–	919	12.0%	2,183	28.5%	7,668	100.0%
Dropouts	212	48.0%	107	24.2%	–	–	188	42.5%	336	76.0%	442	100.0%
Total	1,633	20.1%	419	5.2%	–	–	1,107	13.6%	2,519	31.1%	8,110	100.0%
Grade 9 Marking Period 1												
Non-dropouts	2,656	29.5%	137	1.5%	–	–	1,859	20.7%	3,518	39.1%	8,999	100.0%
Dropouts	372	63.7%	53	9.1%	–	–	394	67.5%	486	83.2%	584	100.0%
Total	3,028	31.6%	190	2.0%	–	–	2,253	23.5%	4,004	41.8%	9,583	100.0%

Table A2. Class of 2012 Early Warning Indicators, by Grade, Marking Period, and Dropout Status

Dropout Status	Early Warning Indicator										Total	
	Attendance		Behavior (1)		Behavior (2)		Coursework (1)		Coursework (2)			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Grade 1 Marking Period 3												
Non-dropouts	1,429	22.7%	16	0.3%	–	–	1,207	19.2%	2,542	40.4%	6,299	100.0%
Dropouts	108	42.4%	5	2.0%	–	–	117	45.9%	180	70.6%	255	100.0%
Total	1,537	23.5%	21	0.3%	–	–	1,324	20.2%	2,722	41.5%	6,554	100.0%
Grade 3 Marking Period 1												
Non-dropouts	1,177	16.8%	8	0.1%	616	8.8%	1,624	23.1%	2,480	35.3%	7,023	100.0%
Dropouts	102	33.3%	5	1.6%	86	28.1%	174	56.9%	220	71.9%	306	100.0%
Total	1,308	17.6%	13	0.2%	702	9.6%	1,798	24.5%	2,700	36.8%	7,329	100.0%
Grade 6 Marking Period 1												
Non-dropouts	1,456	18.4%	338	4.3%	–	–	1,307	16.5%	2,407	30.4%	7,906	100.0%
Dropouts	176	45.8%	100	26.0%	–	–	203	52.9%	315	82.0%	384	100.0%
Total	1,632	19.7%	438	5.3%	–	–	1,510	18.2%	2,722	32.8%	8,290	100.0%
Grade 9 Marking Period 1												
Non-dropouts	978	10.5%	68	0.7%	–	–	1,812	19.5%	3,568	38.4%	9,293	100.0%
Dropouts	218	41.2%	29	5.5%	–	–	351	66.4%	469	88.7%	529	100.0%
Total	1,196	12.2%	97	1.0%	–	–	2,163	22.0%	4,037	41.1%	9,822	100.0%

Table A3. Number and Percent of Class of 2011 Early Warning Indicators, by Grade, Marking Period, and Dropout Status

Dropout Status	Number of Early Warning Indicators (EWIs)										Total	
	No Indicators		One Indicator		Two Indicators		Three Indicators		Four Indicators			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Grade 1 Marking Period 3												
Non-dropouts	3,227	52.6%	1,628	26.5%	976	15.9%	306	5.0%	3	0.0%	6,140	100.0%
Dropouts	63	24.0%	57	21.8%	95	36.3%	46	17.6%	1	0.4%	262	100.0%
Total	3,290	51.4%	1,685	26.3%	1,071	16.7%	352	5.5%	4	0.1%	6,402	100.0%
Grade 3 Marking Period 1												
Non-dropouts	3,684	53.3%	1,576	22.7%	1,130	16.3%	447	6.5%	85	1.2%	6,913	100.0%
Dropouts	64	19.4%	53	16.1%	112	33.9%	79	23.9%	22	6.7%	330	100.0%
Total	3,748	51.7%	1,620	22.4%	1,242	17.1%	526	7.3%	107	1.5%	7,243	100.0%
Grade 6 Marking Period 1												
Non-dropouts	4,566	59.5%	1,813	23.6%	897	11.7%	340	4.4%	52	0.7%	7,668	100.0%
Dropouts	56	12.7%	103	23.3%	147	33.3%	98	22.2%	38	8.6%	442	100.0%
Total	4,622	57.0%	1,916	23.6%	1,044	12.9%	438	5.4%	90	1.1%	8,110	100.0%
Grade 9 Marking Period 1												
Non-dropouts	4,199	46.7%	2,359	26.2%	1,583	17.6%	787	8.7%	71	0.8%	8,999	100.0%
Dropouts	77	13.2%	67	11.5%	129	22.1%	264	45.2%	47	8.0%	584	100.0%
Total	4,276	44.6%	2,426	25.3%	1,712	17.9%	1,051	11.0%	118	1.2%	9,583	100.0%

Table A4. Number and Percent of Class of 2012 Early Warning Indicators, by Grade, Marking Period, and Dropout Status

Dropout Status	Number of Early Warning Indicators (EWIs)										Total	
	No Indicators		One Indicator		Two Indicators		Three Indicators		Four Indicators			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Grade 1 Marking Period 3												
Non-dropouts	2,883	45.8%	1,969	31.3%	1,121	17.8%	321	5.1%	5	0.1%	6,299	100.0%
Dropouts	42	16.5%	74	29.0%	82	32.2%	56	22.0%	1	0.4%	255	100.0%
Total	2,925	44.6%	2,043	31.2%	1,203	18.4%	377	5.8%	6	0.1%	6,554	100.0%
Grade 3 Marking Period 1												
Non-dropouts	3,615	51.5%	1,670	23.8%	1,114	15.9%	490	7.0%	133	1.9%	7,023	100.0%
Dropouts	45	14.7%	74	24.2%	77	24.2%	82	26.8%	27	8.8%	306	100.0%
Total	3,660	49.9%	1,744	23.8%	1,191	16.3%	572	7.8%	160	2.2%	7,329	100.0%
Grade 6 Marking Period 1												
Non-dropouts	4,567	57.8%	1,748	22.1%	1,077	13.6%	450	5.7%	64	0.8%	7,906	100.0%
Dropouts	45	11.7%	75	19.5%	113	29.4%	111	28.9%	40	10.4%	384	100.0%
Total	4,612	55.6%	1,823	22.0%	1,190	14.4%	561	6.8%	104	1.3%	8,290	100.0%
Grade 9 Marking Period 1												
Non-dropouts	5,230	56.3%	2,107	22.7%	1,572	16.9%	361	3.9%	23	0.2%	9,293	100.0%
Dropouts	49	9.3%	91	17.2%	207	39.1%	166	31.4%	16	3.0%	529	100.0%
Total	5,279	53.7%	2,198	22.4%	1,779	18.1%	527	5.4%	39	0.4%	9,822	100.0%

Table A5. Likelihood of Dropping Out of High School for the Class of 2012, by Grade, Marking Period, and EWI

Variable	Estimate	Standard Error	Odds Ratio	Z Value	Sig. Diff.
Grade 1 Marking Period 3[a]					
Intercept	-4.203	0.130	0.015	-32.285	*
Absent from school nine or more times	0.757	0.135	2.133	5.611	*
Suspended (in- our-of-school) one or more times	1.600	0.555	4.955	2.885	*
Below grade level in reading and/or mathematics	0.749	0.152	2.114	4.923	*
Overall grade point average (GPA) below 1.08	0.877	0.165	2.404	5.311	*
Grade 3 Marking Period 1[b]					
Intercept	-4.248	0.122	0.014	-34.949	*
Absent from school three or more times	0.487	0.124	1.627	3.934	*
Suspended one or more times (in- our out-of-school)	2.184	0.631	8.884	3.463	*
'Needs improvement' completing homework on time	0.625	0.146	1.868	4.271	*
Below grade level in reading and/or mathematics	0.739	0.143	2.093	5.179	*
First marking period grade point average (GPA) below 3.00	0.955	0.159	2.599	6.000	*
Grade 6 Marking Period 1[c]					
Intercept	-4.643	0.130	0.010	-35.734	*
Absent from a class three or more times	0.808	0.115	2.244	7.008	*
Suspended one or more times (in- our out-of-school)	1.176	0.140	3.241	8.381	*
Receiving a grade of 'D' or below in mathematics and/or English	0.425	0.128	1.529	3.316	*
First marking period grade point average (GPA) below 3.00	1.822	0.161	6.183	11.293	*
Grade 9 Marking Period 1[d]					
Intercept	-4.875	0.143	0.008	-34.206	*
Absent from a class three or more times	1.210	0.100	3.355	12.151	*
Suspended one or more times (in- our out-of-school)	0.804	0.232	2.234	3.467	*
Receiving a grade of 'D' or below in mathematics and/or English	1.082	0.112	2.951	9.637	*
First marking period grade point average (GPA) below 3.00	1.836	0.168	6.273	10.912	*

*$p < .05$
[a] $x^2 = 159.991$, df = 4, $p < 0.05$, n = 6,336
[b] $x^2 = 253.761$, df = 5, $p < 0.05$, n = 7,160
[c] $x^2 = 555.878$, df = 4, $p < 0.05$, n = 8,112
[d] $x^2 = 933.289$, df = 4, $p < 0.05$, n = 9,530