READY FROM THE START

Identifying and Supporting At-Risk Ninth Graders from Their Earliest Days in High School

July 2018

Starting Strong: A Research Series on the Transition to High School

AUSTIN SLAUGHTER
RUTH CURRAN NEILD
MOLLY CROFTON

Philadelphia Education Research Consortium

To learn more about PERC, visit ***www.phledresearch.org***.

Acknowledgements

The authors gratefully acknowledge the intellectual contributions of Theodore Wills, Ji Eun Park, Joy Lesnick, and Tonya Wolford from the School District of Philadelphia's Office of Research and Evaluation.

At Research for Action, Kathryn Carter, Dae Kim, and Kate Shaw provided helpful feedback on drafts. Megan Morris created the report design and graphics.

This work was made possible through the support of the Neubauer Family Foundation and the William Penn Foundation. Neither foundation exercised editorial control over this report, and the contents of the report do not necessarily reflect their views.

About PERC

The mission of the Philadelphia Education Research Consortium is to provide timely, actionable, rigorous, and non-partisan research on the most pressing issues facing Philadelphia public education. To do this, PERC seeks to engage the region's colleges and universities, nonprofits, and the Philadelphia public education sector in respectful, mutually beneficial research-practice partnerships. By providing Philadelphia's leaders and citizenry with high-quality information about progress, challenges, and effective strategies in education, PERC aims to increase education opportunities and achievement for all Philadelphia students.

Suggested Citation

APA STYLE:

Slaughter, A., Neild, R.C., & Crofton, M. (2018). Ready from the start: Identifying and supporting at-risk ninth graders from their earliest days in high school. Philadelphia: The Philadelphia Education Research Consortium.

CHICAGO STYLE:

Slaughter, Austin, Neild, Ruth Curran, and Molly Crofton. (2018). *Ready from the Start: Identifying and Supporting At-risk Ninth Graders from their Earliest Days in High School.* Philadelphia: The Philadelphia Education Research Consortium.

Ready from the Start:

Identifying and Supporting At-risk Ninth Graders from their Earliest Days in High School

Austin Slaughter, Ruth Curran Neild, Molly Crofton • June 2018

Summary

Ninth grade is a critical juncture for students—and can be a jarring transition. Even students a strong track record in the middle grades can experience academic difficulty, and those who enter high school with poor course grades, weak attendance, or behavior problems are especially at risk. An early misstep can have lasting implications: students who fall off track at the beginning of the school year may find it difficult to recover, and ninth graders who fail to earn the required number of academic credits are at elevated risk of dropping out.

To support their most vulnerable students, high schools first need to identify them. This report uses eighth-grade student record data from two cohorts of first-time ninth graders (2015-16 and 2016-17) in the School District of Philadelphia (SDP) to examine which student characteristics are most predictive of falling off track in ninth grade. With this information, schools can use middle grades data to identify their most at-risk ninth graders—and intervene to help them start strong in high school.

KEY FINDINGS

- **Ninth-grade on-track rates varied by eighth-grade GPA, attendance, suspensions, and demographic characteristics.** More than 90 percent of students who earned an A in any eighth grade core subject were on track at the end of ninth grade. Although earning a D or an F in a core subject was relatively uncommon, students who earned these grades were more likely to be off track than on track. Less than one-third of students with the weakest eighth grade attendance – those who attended less than 80 percent of the time, or missed at least seven weeks of school – were on track at the end of ninth grade. Few students (14.1 percent) received an 8th grade out-of-school suspension, but of those who did, fewer than 50 percent were on track at the end of ninth grade. None of the demographic characteristics predicted on-track rates as well as course grades, attendance, or suspensions.

- **Of the available student records information, eighth-grade core-subject GPA was the best predictor of ninth grade on-track status. This was followed by attendance and the number of out-of-school suspensions.** However, knowing an eighth grade student's attendance and number of suspensions provided only a small amount of additional information when predicting ninth grade performance.

- **A set of four eighth-grade characteristics can identify about 30 percent of students who fall off track in ninth grade.** These characteristics – what we are calling the Eighth Grade Predictors (8GPs) – were: (1) earning final course grades of D or F in all eighth grade courses; (2) failing a core subject; (3) attending school less than 80 percent of the time; and

(4) receiving two or more out-of-school suspensions in eighth grade. Sixty-eight percent of students with at least one 8GP fell off track in ninth grade.

- **In all key student subgroups, at least 60 percent of students with at least one 8GP were off track at the end of ninth grade.** For example, 70 percent of Black students and 68.3 percent of White students with an 8GP were off track, but a smaller percentage of Asian students (60.9 percent) and Hispanic/Latinx students (64.2 percent) were off track. Likewise, 8GPs were less accurate for females than males: 61.9 percent of females with at least one 8GP were off track, compared to 72.8 percent of males.

- **8GPs were more accurate for ninth grade students in some high schools than others but, in general, were more accurate for schools with higher percentages of off track students.** At some schools the percentage of students with an 8GP who were off track was lower than 60 percent, while at other schools, 80 percent or more of those with an 8GP were off track.

- **High schools vary widely in the number of ninth graders with 8GPs.** At 23 schools, less than 10 percent of the first-time ninth graders had any 8GP; at 22 schools, the figure was between 10 and 29 percent; and at 9 schools, the percentage was 30 or more. Schools with lowest percentages of ninth graders with an 8GP also tended to have the lowest percentages of ninth graders who fell off track to graduation.

IMPLICATIONS FOR POLICY AND PRACTICE

- **Because high schools face different percentages of students with 8GPs, they likely require different resources and strategies to help these students stay on track from the earliest days of high school.** Schools with just one student entering with an 8GP may assign a guidance counselor or team of teachers to monitor that student's attendance, behavior, and class performance. Other schools may need extra staffing resources (counselors, tutors, or social service providers) to help students improve their behavior, attendance, and homework habits, and to provide additional academic support.

Table of Contents

Why this study

Ninth grade marks a critical juncture in students' education careers. When students transition to high school, they encounter more choices, expanded social opportunities, and increased academic challenges. While some students thrive in this new environment, others experience a degree of academic difficulty that places them off track to graduation by the end of ninth grade. Off-track students have not earned the expected number or type of course credits toward graduation, typically because they have enrolled in but not earned a passing grade in a required core subject course. Among two recent ninth-grade cohorts in the School District of Philadelphia (SDP), approximately one-third of the students were off track at the end of their first year in high school.[1]

The transition to high school can be so jarring that even students who earned good grades and had good attendance in eighth grade fall off track to graduation. Research in Chicago and Philadelphia has found that, on average, ninth-grade outcomes do not just reflect how students did in school during their elementary and middle years. Stronger ninth-grade outcomes are associated with better odds of graduating from high school, independent of students' performance in the middle grades.[2]

However, it is also true that when some ninth graders enter high school, they already have a track record of poor course grades, weak attendance, and/or school behavior problems during the middle grades. These students are especially vulnerable to the challenges associated with the transition to high school. Without special attention from their new schools at the very start of ninth grade, students may fall off track early in the school year, setting a pattern from which it can be difficult to recover.

To support these most vulnerable students as they start ninth grade, high schools first need a way to identify them. This involves two things: first, having access to students' school record data from the middle grades and, second, knowing which student characteristics are most predictive of falling off track in ninth grade. Increasingly, high schools have ready access to data systems and dashboards that enable them to look at the prior school performance of new students. Less available are empirical analyses that pinpoint which aspects of students' prior performance are the best clues that they will struggle in ninth grade.[3]

---

[1] According to the SDP's 2018 Ninth Grade On-Track Definition, students who are on track at the end of ninth grade have earned at least (1) one course credit in each of the four core subjects (English, mathematics, social studies, and science), and (2) one additional credit from any source. More detail about the 2018 Ninth Grade On-Track Definition and its association with graduation rates is available in the following report: Theodore Wills, *Defining 9th Grade Success: A New 9th Grade On Track Definition* (Philadelphia: The School District of Philadelphia, 2018). Also see Molly Crofton and Ruth Curran Neild, *Getting On Track to Graduation: Ninth Graders' Credit Accumulation in the School District of Philadelphia, 2014-2016* (Philadelphia: The Philadelphia Education Research Consortium, 2018).

[2] Elaine M. Allensworth and John Q. Easton, *The On-Track Indicator as a Predictor of High School Graduation* (Chicago: Consortium on Chicago School Research, 2005); Ruth Curran Neild, Scott Stoner-Eby, and Frank Furstenberg, "Connecting Entrance and Departure The Transition to Ninth Grade and High School Dropout," *Education and Urban Society* 40 no. 5 (2008), 543-569.

[3] Much of the research on early warning indicators has examined predictors of graduating or dropping out, rather than falling off track in ninth grade. For example, research on the middle grades predictors has examined the association between these characteristics and dropping out (Robert Balfanz, Liza Herzog, and Douglas MacIver, "Preventing Student Disengagement and Keeping Students on the Graduation Path in Urban Middle-Grades Schools: Early Identification and Effective Interventions," *Educational Psychologist* 42 no. 4 (2007), 223-235; Arthur Burke, *Early identification of high school graduation outcomes in Oregon Leadership Network schools* ((REL 2015–079). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Northwest, 2015). However, we did identify two studies that examine the middle grades predictors of being on track in ninth grade: (1) Elaine M. Allensworth, Julia A. Gwynne, Paul Moore, and Marisa de la Torre, *Middle*

This study examined the student characteristics that are most predictive of falling off track during the first year of high school, using eighth grade data from two cohorts of ninth graders in the SDP. The study also shows how SDP high schools vary in the number of entering ninth graders at highest risk of falling off track and suggests different data-informed strategies that high schools could use to target available resources to the highest-risk ninth graders.

What the study examined

This study examines what can be known about entering ninth graders, based on their eighth grade school records, that can inform high schools about students' likelihood of being on track at the end of their first year. Specifically, the study uses de-identified student record data for two cohorts of SDP ninth graders to identify the strongest predictors of being on track to graduation at the end of ninth grade.

The research questions are:

- What are the associations between key eighth grade student characteristics and being on track at the end of ninth grade?
- Which eighth grade student characteristics, or combinations of characteristics, are most predictive of being on track at the end of ninth grade?
- How do high schools differ in the percentage of students whose eighth grade records indicate that they are at highest risk for falling off track?

To conduct these analyses, we examined eighth and ninth-grade data from SDP students who were first-time ninth graders in 2015-16 (the Class of 2019) or 2016-17 (the Class of 2020). Students in the analysis were enrolled in the SDP in both eighth and ninth grade and had eighth-grade attendance, suspension, test score, and course grade data, as well as data on ninth-grade credit accumulation. The sample includes 5,473 students from the Class of 2019 and 5,092 students from the Class of 2020, for a total of 10,565 students across both cohorts.[4] The study does not include information for students in Philadelphia's charter high schools, which serve approximately 30 percent of the students in grades 9-12 attending the city's publicly-funded high schools.

> *"To support these most vulnerable students as they start ninth grade, high schools first need a way to identify them."*

Grade Indicators of Readiness in Chicago Public Schools (Chicago: Consortium on Chicago School Research, 2014) and (2) Michael J. Kieffer, William H. Marinell, and Nicky S. Stephenson, *The Middle Grades Student Transitions Study Navigating the Middle Grades and Preparing Students for High School Graduation* (New York: Research Alliance for New York City Schools, 2011).

[4] This study involves fewer students (n=10,565) than another PERC study on the percentage of ninth graders in the same two cohorts who were on track to graduation. That study, by Crofton and Neild (2018), had a sample size of 16,902. The present study includes only students who had eighth and ninth grade data from the two cohorts. Students who left the SDP after eighth grade or who entered the SDP in ninth grade are not included in this study.

To determine whether students were on track to graduate at the end of ninth grade, the study used the Ninth Grade On-Track Definition developed by the SDP in 2018. To make the analysis more relevant to current school improvement efforts, the analysis applies this definition retrospectively to the 2015-16 and 2016-17 cohorts, even though the definition was not developed until after these students had completed their first year in high school. According to this definition, students who are on track at the end of ninth grade have earned at least:

- One course credit in each of the four core subjects (English, mathematics, social studies, and science), and
- One additional credit from any source.

More detail about the 2018 Ninth Grade On-Track Definition and its association with graduation rates is available in a report published by the SDP.[5]

[5] The 2018 On-Track Definition is different from the indicator displayed in the SDP's School Progress Reports from 2017 and earlier. The previous on-track indicator required that students earn five credits during ninth grade without consideration of the subject area in which the credits were earned. Since high school students are required to obtain a certain number of credits in each subject in addition to the total credit accumulation, the indicator studied in this report provides a more complete picture of students' progress towards graduation. For more information on the On-Track Definition, see Theodore Wills, *Defining 9th Grade Success: A New 9th Grade On Track Definition* (Philadelphia: The School District of Philadelphia, 2018).

Box 1

How this study is similar to, and different from, research on early warning indicators of dropout

The past 10 years have seen a rapid increase in the number of studies using student record data to identify "early warning indicators" of not completing high school. Researchers have identified early warning indicators for ninth graders and even for middle grades students. Typically, these predictors are combinations of attendance, behavior, and course grades.

These studies examine factors associated with dropping out of high school, while this study explores factors associated with a different, but related outcome: falling off track in ninth grade. These studies are complementary but serve a different purpose. Studies of ninth grade predictors of dropout seek to raise awareness of how the transition to high school affects the likelihood that students will earn a diploma – including changing the education prospects of students who appeared to be doing well before they entered high school. In contrast, this study seeks to identify students whose school performance in the middle grades signals that they are at high risk of falling off track in ninth grade – which, in turn, is linked to dropping out of high school. There is no need for school staff to wait and see how these students will do in high school: without intervention from the beginning of the school year, they are very likely to fall off track.

Resources on early warning indicators of high school dropout include:

- Robert Balfanz, Liza Herzog, and Douglas MacIver, "Preventing Student Disengagement and Keeping Students on the Graduation Path in Urban Middle-Grades Schools: Early Identification and Effective Interventions," *Educational Psychologist* 42 no. 4 (2007), 223-235.
- Elaine M. Allensworth and John Q. Easton, *The On-Track Indicator as a Predictor of High School Graduation* (Chicago: Consortium on Chicago School Research, 2005.
- Sarah Frazelle and Aisling Nagel, *A Practitioner's Guide to Implementing Early Warning Systems (REL 2015–056).* (Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Northwest, 2015).

Box 2

Data and Variables

This study used student-level data for first-time ninth graders in the SDP's Classes of 2019 and 2020. The data include no personally identifying information, and no individual student can be identified.

The study sample was limited to first-time ninth graders in 2015 or 2016 who were enrolled in at least one credit-bearing course in ninth grade. We further limited the sample to students who were enrolled in eighth grade in SDP and who had valid data on eighth-grade course grades, attendance, suspensions, and standardized test scores. Our initial data set included 16,916 ninth graders across the two cohorts. Of these, 4,480 were not enrolled in the district during the previous year. An additional 1,871 students were enrolled in the district but were missing state standardized test scores and/or course grades. We did not impute missing data for these 1,871 students because we had no evidence that the data were Missing at Random, an assumption of imputation methods. The final data set included 10,565 students.

Key variables are:

***On track status*:** The student would have been considered on track at the end of ninth grade, according to the SDP's 2018 Ninth Grade On Track Definition.

***Core subjects GPA*:** An average of the student's final grades in the four core subjects (eighth-grade English, mathematics, science, and social studies).

***Average Daily Attendance (ADA)*:** The proportion of enrolled days in which the student attended school.

Suspensions: The number of out-of-school suspensions in eighth grade.

Test scores: Scores earned in eighth grade on the state-mandated English, mathematics, and science standardized assessments (the Pennsylvania State System of Assessment, or PSSA).

Overage for grade: Students who were 15 years or older on September 1st of ninth grade.

English learner status: The SDP data included an indicator of whether a student was classified as an English learner and receiving linguistic support.

Low-income status: Whether a student's family received public assistance through Temporary Assistance for Needy Families (TANF) and/or Supplemental Nutrition Assistance Program (SNAP).

Special education status: The data included an indicator of whether students were receiving special education services other than gifted and talented services.

High school attended: The SDP data indicate the school each student attended for ninth grade. For students who attended more than one school, we used the last school attended.

What the study found

Eighth graders who earned higher final course grades in core subjects were more likely to be on track to graduation at the end of ninth grade.

A student who is on track at the end of ninth grade, according to the SDP's Ninth Grade On-Track Definition, has earned passing grades in at least five courses, including the four core subjects (English, mathematics, science, and social studies). It makes sense, then, that students with higher grades in core subjects in eighth grade were more likely to have earned passing grades in their ninth-grade courses and be on track (Table 1).

Table 1. Ninth grade on-track rates by eighth grade final grades in core subjects

	Percentage of students with this grade who were on track in ninth grade	Number of students earning this grade	Percentage of students earning this grade
Mathematics final grade (eighth grade)			
A	92.6%	2,575	24.4%
B	79.6	3,231	30.6
C	59.0	3,271	31.0
D	38.5	1,355	12.8
F	21.1	133	1.3
English final grade (eighth grade)			
A	92.5%	2,444	23.1%
B	79.5	3,604	34.1
C	56.9	3,251	30.8
D	39.0	1,074	10.2
F	21.4	192	1.8
Science final grade (eighth grade)			
A	91.9%	2,672	25.3%
B	79.0	3,440	32.6
C	56.5	3,155	29.9
D	38.3	1,141	10.8
F	27.4	157	1.5
Social studies final grade (eighth grade)			
A	91.7%	2,992	28.3%
B	76.0	3,509	33.2
C	55.9	2,868	27.1
D	37.9	1,024	9.7
F	19.2	172	1.6

Notes: n=10,565
Source: Authors' calculations based on student data provided by the School District of Philadelphia (2015-16, 2016-17, and 2017-18).

Within each core subject, more than 90 percent of students who earned an A in eighth grade were on track at the end of ninth grade. For example, among students who earned an A in mathematics, 92.6 percent were on track. At the other end of the grading scale, between 20 percent and 27 percent of students who failed a core subject were on track. Although earning a D or an F in a core subject was relatively uncommon (ranging from 11 percent for social studies to 14 percent for mathematics), students with a grade in this range were more likely to be off track than on track at the end of ninth grade.

Eighth graders with better attendance and fewer suspensions were more likely to be on track to graduation at the end of ninth grade.

Among students who attended school at least 95 percent of the time in eighth grade (that is, those who missed no more than nine days of school), 80.9 percent were on track at the end of ninth grade (Table 2). For students with the weakest eighth grade attendance – those who attended less than 80 percent of the time, missing at least seven weeks of school – less than one-third were on track.

A minority of students (14.1 percent) had received an out-of-school suspension in eighth grade, but of those who did, fewer than 50 percent were on track at the end of ninth grade. For the small group of students receiving three or more suspensions, fewer than 30 percent were on track.

These relationships are consistent with previous research in Philadelphia and elsewhere that demonstrates the association between attendance, behavior problems, and high school on-track rates.[6]

Table 2. Ninth grade on-track rates by eighth grade attendance and suspensions

	Percentage of students with this characteristic who were on track in ninth grade	Number of students with this characteristic	Percentage of students with this characteristic
Proportion of days attended (eighth grade)			
.95 or higher	80.9%	5,188	49.1%
.90 - .94	70.0	3,239	30.7
.85 - .89	53.5	1,143	10.8
.80 - .84	41.2	527	5.0
Below .80	30.8	468	4.4
Number of out-of-school suspensions (eighth grade)			
0	75.1%	9,077	85.9%
1	48.0	902	8.5
2	33.9	333	3.2
3 or more	28.1	253	2.4

Notes: n=10,565
Source: Authors' calculations based on student data provided by the School District of Philadelphia (2015-16, 2016-17, and 2017-18).

[6] Elaine M. Allensworth and John Q. Easton, *The On-Track Indicator as a Predictor of High School Graduation* (Chicago: Consortium on Chicago School Research, 2005); Ruth Curran Neild and Robert Balfanz, *Unfulfilled Promise: The Dimensions and Characteristics of Philadelphia's Dropout Crisis, 2000–2005* (Philadelphia: Philadelphia Youth Network, 2006).

Students with higher eighth grade state standardized test scores were more likely to be on track at the end of ninth grade, but more than half of the students at each proficiency level were on track.

Among students who scored at the highest level (Advanced) on the eighth-grade mathematics, English, or science state standardized tests, between 89.2 percent and 94.3 percent were on track at the end of ninth grade (Table 3). However, students scoring at the lowest level (Below Basic) on any of the tests still had a better-than-even chance of being on track. Compared to the stark differences in on-track rates by course grades (Table 1) or attendance or suspensions (Table 2), the differences by PSSA proficiency levels are smaller. These descriptive results hint that, among the possible predictors of being on track in ninth grade, eighth grade test scores may not be the strongest indicators of whether a student will be on track.

Table 3. Ninth grade on-track rates by eighth grade state standardized test scores

	Percentage of students at this PSSA proficiency level who were on track in ninth grade	Number of students at this proficiency level	Percentage of students at this proficiency level
Mathematics PSSA (eighth grade)			
Advanced	94.3%	614	5.8%
Proficient	84.3	1,232	11.7
Basic	77.3	2,400	22.7
Below Basic	62.7	6,319	59.8
English PSSA (eighth grade)			
Advanced	89.2%	931	8.8%
Proficient	79.1	3,156	29.9
Basic	67.3	4,071	38.5
Below Basic	56.8	2,407	22.8
Science PSSA (eighth grade)			
Advanced	89.5%	1,119	10.6%
Proficient	79.0	2,157	20.4
Basic	73.7	1,918	18.2
Below Basic	61.8	5,371	50.8

Notes: n=10,565
Source: Authors' calculations based on student data provided by the School District of Philadelphia (2015-16, 2016-17, and 2017-18).

On-track rates differed by eighth-grade family income, race or ethnicity, gender, age, special education status, and English learner status.

Lower percentages of male students, students receiving special education or English learner services, students who were overage for their grade, and students whose families received SNAP or TANF were on track at the end of ninth grade (Table 4). About 90 percent of Asian students were on track, compared to about 80 percent of White students and two-thirds of Black and Hispanic/Latinx students. However, in each of the groupings in Table 4, 50 percent or more of the students were on track to graduate. The differences in on-track rates were not as large for these characteristics as the differences associated with course grades, attendance, or suspensions. For example, the difference by English learner status was about one percentage point, while differences by special education status, gender, and family low-income status were about 10 percentage points.

Table 4. Ninth grade on-track rates by demographics and eighth grade statuses

	Percentage of students with this characteristic who were on track in ninth grade	Number of students with this characteristic	Percentage of students with this characteristic
Special education services (eighth grade)			
Received services	61.1%	1,482	14.0%
Did not receive services	71.9	9,083	86.0
English learner services (eighth grade)			
Received services	69.4%	744	7.0%
Did not receive services	70.5	9,821	93.0
Gender			
Female	74.6%	5,220	49.4%
Male	66.2	5,345	50.6
Age			
Overage in eighth grade	50.2%	687	6.5%
Not overage	71.8	9,878	93.5
Race or ethnicity			
Asian	90.8%	1,279	12.1
Black	64.4	5,579	52.8%
Hispanic/Latinx	65.2	1,840	17.4
White	79.0	1,515	14.3
Other	80.4	352	3.3
Family low income status (eighth grade)			
Received SNAP or TANF	66.1%	6,609	62.6%
Did not receive SNAP or TANF	77.5	3,956	37.4

Note: Some percentages do not sum to 100 because of rounding. n=10,565
Source: Authors' calculations based on student data provided by the School District of Philadelphia (2015-16, 2016-17, and 2017-18).

Eighth grade GPA in core subjects was the best predictor of being on track.

To be most useful to schools, the set of eighth-grade on-track predictors needs to be reduced to a small number of the most powerful predictors that can be used to target resources to students with the greatest risk of falling off track. To develop this smaller set of predictors, we used logistic regression, an advanced statistical technique, to summarize the unique and combined effects of the various eighth-grade characteristics described in Tables 1-4. Because each of the characteristics is measured in different scales and units, we standardized each variable into standard deviations from the mean. For test scores and course grades, standardized scores were calculated for each subject and then averaged into an overall score.

Of all the student characteristics, eighth grade GPA in core subjects consistently had the largest association with being on track in ninth grade. When we looked at how well each characteristic, by itself, could explain being on track, we found that a key measure of association – the pseudo-R^2 – for GPA was .20 (Table 5). This means that eighth grade GPA explained 20 percent of the variation in being on track in ninth grade.[7] The characteristics with the next-highest pseudo-R^2 values were attendance (R^2=.07), standardized test scores (R^2=.06), and the number of suspensions (R^2=.05).[8]

Table 5. Summary of univariate logistic regressions of on-track status on eighth grade student characteristics, ordered by size of pseudo-R^2

	Pseudo-R^2
GPA in core subjects	0.20
Average daily attendance	0.07
State standardized test scores	0.06
Number of suspensions	0.05
Asian†	0.04
Black†	
Hispanic/Latinx†	
Other race or ethnicity†	
Overage for grade	0.01
Family received SNAP and/or TANF	0.01
Received special education services	0.01
Female◊	0.01
Received English learner services	0.001

Notes: Regressions control for cohort. †Reference group is White. ◊Reference group is male. *p<.001. n=10,565.
Source: Authors' calculations based on student data provided by the School District of Philadelphia (2015-16, 2016-17, and 2017-18).

There is no hard-and-fast definition about what constitutes a large, medium, or small R^2. However, generally speaking, in education research an R^2 under .10 is considered to be a weak predictor, between .11 and .30 is considered to be a moderately good predictor, and above .30 is a very good predictor. Therefore, although there clearly are relationships between these characteristics and being on track, as shown descriptively in Tables 1-4, all characteristics except for GPA are relatively weak predictors.

[7] R^2 values range from 0 to 1. An R^2 of 1 means that the characteristic (or set of characteristics) explains, or fully accounts for, or perfectly predicts all of the variation in the outcome. An R^2 of 0 means that the characteristic does no better than the mean as a predictor.
[8] See Table A-1 for complete output from the univariate regressions.

Including a range of eighth grade characteristics improved the predictive model over GPA alone but not by much.

We used multiple regression to understand whether the predictive power of GPA alone could be improved by adding other eighth grade characteristics available in student record data and examined descriptively above. Table 6 presents the results for the four characteristics with an R^2 of .05 or above in Table 5, although the full set of characteristics was included in the model.[9]

In this model, GPA, school attendance, and number of suspensions in eighth grade are statistically significant predictors of being on track. Standardized test scores is not a statistically significant predictor when these other characteristics are controlled (p=.101).

The R^2 is .22, which represents a small improvement over using GPA alone (R^2=.20) and is consistent with findings from previous research conducted in Chicago.[10] This moderate-size R^2 tells us that it should be possible to identify some students who will fall off track in ninth grade on the basis of their eighth grade performance. At the same time, there is a great deal of variation (almost 80 percent) in ninth-grade outcomes that is not explained or well-predicted by what we can know about students from their school records. In other words, while it is clear that we can predict being off-track for some students on the basis of eighth grade characteristics, it is also true that the ninth-grade transition can redirect students' education careers in ways that could not have been predicted from prior performance.

Table 6. Multivariate logistic regression of on-track status on eighth grade student characteristics

	Coefficient	Standard error
GPA in core subjects	1.17***	-0.12
Average daily attendance	0.26***	-0.03
Number of suspensions	-0.14***	-0.05
State standardized test scores	0.15	-0.09
Constant	1.33***	-0.21
n	10,565	
Pseudo-r^2	0.22	

Notes: ***p<.001. Regression controls for: Receipt of English learner services, receipt of special education services, overage for grade, race or ethnicity, gender, family low income status, and cohort. n=10,565.
Source: Authors' calculations based on student data provided by the School District of Philadelphia (2015-16, 2016-17, and 2017-18).

[9] See Table A-2 for a full set of logistic regression models.

[10] See R^2 values presented on p. 31 of Elaine M. Allensworth, Julia A. Gwynne, Paul Moore, and Marisa de la Torre, *Middle Grade Indicators of Readiness in Chicago Public Schools* (Chicago: Consortium on Chicago School Research, 2014).

A set of four eighth grade characteristics can identify about 30 percent of students who fall off track in ninth grade.

Focusing on the eighth grade characteristics that explained the most variance and were statistically significant (Tables 5 and 6), we examined different combinations of course grades, attendance, and numbers of suspensions to identify a small set of predictors of being off track that maximized both *accuracy* and *yield.* If a high percentage of students with a given characteristic fall off track in ninth grade, that characteristic is said to have high accuracy. Characteristics that identify a substantial proportion of students who fall off track have high yield. Accuracy and yield can sometimes be in tension: narrowly-defined predictors, while more accurate, can produce a lower yield.

We identified four eighth grade characteristics that, individually and together, maximize accuracy and yield (Table 7).[11] Students with any one of these four characteristics had about a 70 percent chance of being off track in ninth grade. Twelve percent of all first-time ninth graders had at least one of these characteristics.

Table 7. Eighth grade predictors of falling off track in ninth grade

	ACCURACY (% of students with this characteristic who were off track)	YIELD (% of off-track students with this characteristic)	Number of ninth graders with this characteristic	Percentage of ninth graders with this characteristic
Earned all Ds or Fs	77.1%	7.6%	310	2.9%
Failed a core course	74.8	10.6	445	4.2
<80% attendance	69.2	10.4	468	4.4
2+ suspensions	68.6	12.8	586	5.5
Any of these four characteristics	68.7	28.7	1,305	12.4

Notes: n=10,565
Source: Authors' calculations based on student data provided by the School District of Philadelphia (2015-16, 2016-17, and 2017-18).

Not surprisingly, the two strongest predictors were related to course grades. The most accurate predictor was earning all Ds or Fs in eighth grade; 77.1 percent of the students who earned these grades were off track in ninth grade. Close behind in accuracy was failing an eighth grade core subject (English, mathematics, science, or social studies); about 75 percent of the students who failed one of these subjects were off track. Among students who had an eighth grade attendance rate of less than 80 percent or who had received two or more out-of-school suspensions, about 69 percent were off track.

While there is some overlap in these categories (for example, there were some students who earned all Ds or Fs and failed a core course), the categories are not mere proxies for one another. Students who have two or more of these characteristics have an even higher risk of falling off track, ranging from 77.3 to 84.4 percent (Table 8).

[11] See Table A-3 for the full set of combinations that we tested.

Together, these four Eighth Grade Predictors – or 8GPs - identified almost 3 out of every 10 off-track ninth graders. For individual characteristics, the yield – that is, the percentage of off-track students with that characteristic – ranged from 7.6 percent to 12.8 percent (Table 7). Importantly, these data tell us that high schools can identify, *even before the first day of high school*, about 30 percent of the students who will fall off track in ninth grade. Of course, identifying students at risk is not the same thing as developing an effective solution for each student's particular set of challenges. But it is one of the first steps toward putting in place strategies to help students get on track to graduation.

Table 8. Selected combinations of eighth grade predictors of falling off track in ninth grade

	ACCURACY (% of students with this characteristic who were off track)	YIELD (% of off-track students with this characteristic)	Number of ninth graders with this characteristic	Percentage of ninth graders with this characteristic
All Ds and Fs AND failed a core course in eighth grade	84.4%	4.3%	160	1.5%
Failed a core course AND 2+ suspensions in eighth grade	81.2	2.3	127	1.2
All Ds and Fs AND <80% attendance in eighth grade	78.1%	1.8	73	0.7
<80% attendance AND 2+ suspensions in eighth grade	77.3%	2.9	119	1.1

Notes: n=10,565
Source: Authors' calculations based on student data provided by the School District of Philadelphia (2015-16, 2016-17, and 2017-18).

In all key student subgroups, at least 60 percent of students with at least one 8GP were off track at the end of ninth grade.

We examined whether the accuracy and yield of the four 8GPs were similar for key subgroups of students (Table 9). This is an important analysis to ensure that the 8GPs do not perform so poorly for some groups of students that it would reduce the confidence with which schools could use 8GPs to identify students for support.

We found that while the 8GPs were more accurate for some subgroups than others, at least 60 percent of students in all subgroups with an 8GP were off track at the end of ninth grade. For example, 70 percent of Black students and 68.3 percent of White students with an 8GP were off track, but a smaller percentage of Asian students (60.9 percent) and Hispanic/Latinx students (64.2 percent) were off track. Likewise, 8GPs were less accurate for females (61.9 percent) than males (72.8 percent).

These differences may suggest that, for some groups of students, it is more difficult to identify who will fall off track on the basis of eighth grade characteristics. Alternatively, it may be the case that other sets of eighth-grade predictors would be more accurate for these students. The benefits of

greater accuracy for some student groups, however, would need to be weighed against the drawbacks of reducing the simplicity and ease of use of a single set of EPGs to use for all students.

Table 9. How the Eighth Grade Predictors (8GPs) perform for key subgroups

	ACCURACY (% of 8GP students who were off track)	YIELD (% of off-track students with an 8GP)
Special education services (eighth grade)		
Received services	70.5%	26.5%
Did not receive services	63.9	38.4
English learner services (eighth grade)		
Received services	58.8%	21.9%
Did not receive services	69.4	29.2
Race or ethnicity		
Asian	60.9%	11.9%
Black	70.0	32.3
Hispanic/Latinx	64.2	21.8
White	68.3	26.4
Other race/ethnicity	69.2	27.3
Gender		
Female	61.9%	22.8%
Male	72.8	33.0

Source: Authors' calculations based on student data provided by the School District of Philadelphia (2015-16, 2016-17, and 2017-18).

At some high schools, no first-time ninth graders have any of the Eighth Grade Predictors (8GPs) of falling off track. At other schools, 30 percent or more have at least one predictor.

Just as high schools vary in the percentage of ninth graders who are on track, they also have different percentages of students with a record of low grades or course failure, poor attendance, or suspensions in eighth grade. At 23 schools, less than 10 percent of the first-time ninth graders had any 8GP; at 22 schools, the figure was between 10 and 29 percent; and at 9 schools, the percentage was 30 or more (Table 10). Schools with lowest percentages of ninth graders with an 8GP also tended to have the lowest percentages of ninth graders who fell off track to graduation.[12]

These percentages tell us that Philadelphia high schools face very different levels of challenge in planning interventions to keep students with known risk factors on track in ninth grade. The numbers of students with 8GPs, in addition to the percentages, make clear the different challenges that schools face in addressing student need from the very beginning of high school. For the group of 23 schools that had the lowest percentage of ninth graders with an 8GP, the median number of students with an 8GP was just two students. In contrast, for schools where more than 30 percent of the students had an 8GP, the median was 25 students.

[12] Molly Crofton and Ruth Curran Neild, *Getting On Track to Graduation: Ninth Graders' Credit Accumulation in the School District of Philadelphia, 2014-2016* (Philadelphia: The Philadelphia Education Research Consortium, 2018).

Table 10. Percentage of first-time ninth graders with an Eighth Grade Predictor (EPG), by high school

Less than 10%	10-19%	20-29%	30%+
Academy at Palumbo Arts Academy-Rush Bodine C.A.P.A. Central Constitution Engineering & Science Franklin Learning Ctr G.A.M.P. Girls HS of Future Hill-Freedman Lankenau Masterman Northeast Parkway CC Parkway NW Parkway West Phila Military Saul Sci. Lead. Academy SLA-Beeber Swenson	Furness Kensington CAPA Kensington Health Lincoln Mastbaum Motivation Penn Treaty Randolph Robeson The Linc Washington Workshop School	Building 21 Dobbins Edison Kensington Kensington Business King Roxborough South Phila The U School West Phila	Bartram Fels Frankford Franklin Kensington Ed. Overbrook Phila Virtual Sayre Strawberry Mansion
Annual number of entering ninth graders with any of the four predictors: Median and range			
2 students (0-44)	10 students (6-39)	17 students (5-38)	25 students (5-41)

Source: Authors' calculations based on student data provided by the School District of Philadelphia (2015-16, 2016-17, and 2017-18).

8GPs were more accurate for ninth graders attending some high schools than others but, in general, were more accurate for ninth graders attending schools with higher percentages of off-track students.

On average across the SDP, 68.7 percent of students with an 8GP were off track at the end of ninth grade. At some schools, however, the percentage of students with an 8GP who were off track was lower than 60 percent, while at other schools, 80 percent or more of those with an 8GP were off track (Table 11).

Generally speaking, the schools at which 8GPs were the least accurate (<60 percent) had lower percentages of ninth graders with an 8GP (compare Table 10) and fewer off-track students.[13] In other words, in the 8GPs were more accurate in schools with higher off track rates and more students who enter ninth grade with an 8GP. These are the schools where it is most important to have 8GPs perform best, since these are the schools that struggle most with keeping students on track.

[13] Molly Crofton and Ruth Curran Neild, *Getting On Track to Graduation: Ninth Graders' Credit Accumulation in the School District of Philadelphia, 2014-2016* (Philadelphia: The Philadelphia Education Research Consortium, 2018).

Table 11. Accuracy of the Eighth Grade Predictors (8GPs), by high school

Percentage of ninth graders with any 8GP who were off track			
At these schools, <60% of students with an 8GP were off track	**60-69%**	**70-79%**	**At these schools, 80%+ of students with an 8GP were off track**
Academy at Palumbo Arts Academy-Rush C.A.P.A. Central Dobbins Fels Franklin Learning Ctr G.A.M.P. HS of Future Hill-Freedman Lankenau Masterman Motivation Parkway NW Parkway West Penn Treaty Phila Military Phila Virtual Roxborough Sayre SLA-Beeber The Linc	Bodine Constitution Engineering & Science Frankford Kensington Kensington CAPA Kensington Ed. King Randolph Robeson Saul South Phila Strawberry Mansion Swenson	Bartram Edison Girls Kensington Business Mastbaum Overbrook Washington West Phila	Building 21 Franklin Furness Kensington Health Lincoln Northeast Parkway CC Sci. Lead. Academy The U School Workshop School

Source: Authors' calculations based on student data provided by the School District of Philadelphia (2015-16, 2016-17, and 2017-18).

Implications for policy and practice

Because high schools differ in the number and percentage of first-time ninth graders with an 8GP, they also differ in the resources and strategies needed to help these students stay on track from the earliest days of high school.

Knowing how schools differ in the percentages and numbers of students with an 8GP provides insight into the resources and strategies needed by different schools to support these vulnerable students. For schools with just one student entering with an 8GP, the intervention at the start of high school may be ongoing monitoring of attendance, behavior, and class performance by a guidance counselor or team of teachers. For schools with a moderate number of students with a 8GP (for example, 10-15 students), it might be possible to assign each student a teacher-advocate who is responsible for regular check-ins with the student and his or her teachers, counselor, and parent. Larger high schools, with more staff, might be able to take this approach even if they have more students. Schools of small or moderate size, however, will very likely need extra staffing resources (counselors, tutors, or social service providers) to help students improve their behavior, attendance, and homework habits, and to obtain any additional support needed to improve academic skills.

Schools serving middle grades students can use these indicators to identify students who need interventions before starting high school.

This report has showed how some students enter ninth grade with a track record of academic difficulty , behavioral challenges, or poor attendance. These problems carry over into ninth grade, placing students at heightened risk of dropping out of school. Schools serving these middle grades students may already have targeted many of these students for special intervention during eighth grade, but the findings in this report suggest a particular urgency for identifying and implementing the educational, social, and/or health services that will help these students get on a new path. Interventions do not need to wait until high school; the sooner steps are taken to address these students' problems, the more opportunities there are for a fresh start.

Appendix A: Additional tables

Table A-1. Univariate logistic regressions of on-track status on various eighth grade factors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Asian	0.961***									
	(0.252)									
Black	-0.731***									
	(0.228)									
Hispanic/ Latinx	-0.699***									
	(0.213)									
Other race or ethnicity	0.0794									
	(0.228)									
Overage		-0.924***								
		(0.130)								
Female			0.405***							
			(0.0975)							
English learner				-0.0560						
				(0.171)						
Special education					-0.485***					
					(0.152)					
Low-income						-0.570***				
						(0.110)				
Attendance							0.676***			
							(0.0646)			
Test Scores								0.687***		
								(0.113)		
Suspensions									-0.553***	
									(0.0819)	
Course grades										1.392***
										(0.143)
Class of 2020	0.178*	0.180*	0.185*	0.182*	0.180*	0.189*	0.140	0.192	0.185*	0.204
	(0.107)	(0.104)	(0.104)	(0.103)	(0.104)	(0.104)	(0.115)	(0.131)	(0.110)	(0.128)
Constant	1.241***	0.848***	0.586***	0.783***	0.853***	1.148***	0.847***	0.860***	0.791***	1.045***
	(0.260)	(0.167)	(0.161)	(0.171)	(0.173)	(0.200)	(0.154)	(0.160)	(0.155)	(0.148)
Obs	10,565	10,565	10,565	10,565	10,565	10,565	10,565	10,565	10,565	10,565
Pseudo R2	0.0407	0.0116	0.00835	0.00144	0.00665	0.0137	0.0742	0.0571	0.0459	0.195

Robust standard errors in parentheses | *** p<0.01, ** p<0.05, *p<0.1

Source: Authors' calculations based on student data provided by the School District of Philadelphia (2015-16, 2016-17, and 2017-18).

Table A-2. Multivariate logistic regressions of on-track status on various eighth grade factors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Academic	Behavior	Demographics	Eng learner + Spec Ed	Academic + Behavior	Academic + Demographics	Academic + Eng learner + Spec Ed	All
Low-income			-0.481***			-0.244***		-0.185***
			(0.0933)			(0.0701)		(0.0702)
Asian			1.006***			0.214		0.155
			(0.250)			(0.199)		(0.192)
Black			-0.655***			-0.242		-0.256*
			(0.206)			(0.156)		(0.155)
Hispanic/Latinx			-0.619***			-0.374**		-0.428***
			(0.188)			(0.147)		(0.152)
Other race or ethnicity			0.0875			0.0677		0.0549
			(0.218)			(0.204)		(0.194)
Female			0.435***			-0.0818		-0.0144
			(0.0954)			(0.0770)		(0.0832)
Overage			-0.752***			-0.318***		-0.306***
			(0.0995)			(0.0799)		(0.0850)
Course Grades	1.313***				1.164***	1.279***	1.351***	1.170***
	(0.126)				(0.122)	(0.118)	(0.130)	(0.120)
Test Scores	0.207**				0.168*	0.141	0.245***	0.146
	(0.0932)				(0.0914)	(0.0898)	(0.0937)	(0.0891)
Attendance		0.564***			0.263***			0.256***
		(0.0562)			(0.0327)			(0.0326)
Suspensions		-0.363***			-0.138**			-0.136***
		(0.0724)			(0.0537)			(0.0528)
English learner				-0.0297			0.242	0.159
				(0.162)			(0.158)	(0.174)
Special education				-0.484***			0.406***	0.453***
				(0.149)			(0.103)	(0.107)
Class of 2020	0.243*	0.147	0.188*	0.180*	0.215	0.229	0.250*	0.212
	(0.143)	(0.118)	(0.110)	(0.104)	(0.146)	(0.144)	(0.145)	(0.147)
Constant	1.044***	0.843***	1.338***	0.855***	1.041***	1.451***	0.973***	1.325***
	(0.145)	(0.150)	(0.274)	(0.180)	(0.144)	(0.213)	(0.147)	(0.208)
Observations	10,565	10,565	10,565	10,565	10,565	10,565	10,565	10,565
Pseudo R2	0.198	0.0902	0.0642	0.00666	0.211	0.204	0.201	0.220
Robust standard errors in parentheses								
*** p<0.01, ** p<0.05, * p<0.1								

Source: Authors' calculations based on student data provided by the School District of Philadelphia (2015-16, 2016-17, and 2017-18).

Table A-3. Accuracy of eighth grade predictors, individually and in combination

	ACCURACY Percentage of students with this characteristic who were off track	Number of students with this characteristic
Earned no As or Bs	59.9%	2352
Earned Ds or Fs only	77.1	310
Failed a core course	74.8	445
Attendance <90%	54.5	2138
Attendance <85%	63.7	995
Attendance <80%	69.2	468
Suspended 1+ times	58.5	1488
Suspended 2+ times	68.6	586
Suspended 3+ times	71.9	253
No As or Bs *and* attendance <90%	70.5	980
No As or Bs *and* suspended 1+ times	73.9	767
Attended <90% *and* suspended	69.1	740
No As or Bs *or* attendance <90%	53.6	3510
No As or Bs *or* suspended 1+ times	55.7	3073
Attended <90% *or* suspended	52.9	2886

Note: n=10,565
Source: Authors' calculations based on student data provided by the School District of Philadelphia (2015-16, 2016-17, and 2017-18).