# Developing Equity Indicators for On-Time Graduation

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Graduating from high school remains one of the most critical educational milestones. Students who graduate from high school are more likely to attend college, receive higher lifetime earnings, have better health, and enjoy overall better well-being as adults compared to students who fail to graduate (Belfield & Levin, 2007; Oreopoulos & Salvanes, 2011; Rumberger, 2011). Despite these well-documented benefits, Census data reveal that more than half a million 15- to 24-year-old students dropped out of high school between October 2012 and October 2013 (Snyder, de Brey, & Dillow, 2016, Table 219.57).

As with other aspects of educational achievement, there are widespread disparities in dropout and graduation rates among subgroups of students. For example, in 2015-16 the 9th grade cohort graduation rate was 88.3 percent for White students, 79.3 percent for Hispanic students, and 76.4 percent for Black students (NCES, 2018, Table 1).[1] Disparities are even more pronounced among other subgroups: the 2015-16 graduation rate was 77.6 percent for economically disadvantaged students, 66.9 percent for Limited English proficient students, and 65.5 percent for students with disabilities (Ibid.). Current disparities, while smaller than in the past,[2] remain sizeable and warrant attempts both to understand their origins and to support interventions that reduce or eliminate them.

This paper examines disparities in dropout and graduation rates among various subgroups of students. First, we review the various ways dropout and graduation rates are measured. Next, we briefly review the research literature on predictors of high school graduation and identify four key factors that are most strongly associated with subgroup differences in graduation. Finally, we describe four policy indicators that can be used to monitor those factors and provide timely information to guide interventions aimed at reducing or eliminating group disparities in graduation rates.

**Measuring High School Graduation Rates**

A number of indicators have been used by government agencies and researchers to measure dropout and graduation rates. The rates reveal different aspects about dropping out or graduating from high school. The indicators also differ with respect to: 1) the definition of dropout

[1] We use the terms "Black" and "Hispanic" to conform with those used by federal agencies, such as the National Center for Education Statistics

[2] In the past four years, for example, race-ethnicity disparities have been reduced significantly. In 2012-13, the 9th grade cohort graduation was 87 percent for white students, 75 percent for Hispanic students, and 71 percent for black students, resulting in double-digit gaps between white and Hispanic and between white and black students (Ibid., Table 19.46).

or graduation that is used, including the credential being measured and the time period; 2) the population being measured; and 3) the source of data.

The federal government currently reports three different dropout indicators and three different graduation indicators (Table 1). We focus on indicators based on earning a regular high school diploma rather than a high school credential such as that earned by passing the General Education Development (GED) exam since research finds that students who earn a GED-based credential do not enjoy the same benefits as students who earn a regular diploma (Heckman, Humphries, & Mader, 2011).

This leaves the fifth and sixth indicators on the list, the Averaged Freshman Graduation Rate (AFGR) and the Adjusted Cohort Graduation Rate (ACGR). Both of these indicators only measure graduation rates for public schools, thus ignoring the approximate 10 percent of high school students who graduate from private schools (Snyder et al., 2016, Table 291.10). The AFGR estimates the graduation rate for an entering cohort of 9th grade students by dividing the number of public high school diplomas awarded in one year with the estimated number of 9th grade students four years earlier (an average of the number of 8th graders five years earlier, the number of 9th graders four years earlier, and the number of 10th graders three years earlier). The AFGR is based on aggregated administrative data on cross-sectional counts of students reported by states to the federal government and therefore is not a true cohort rate. In contrast, the ACGR is a true cohort rate based on individual-level, longitudinal student records compiled by state education agencies and reported to the federal government. The official ACGR, as defined by the federal government in 2009, represents a four-year or "on-time" graduation rate based on the number of entering 9th grade students who earn a regular diploma within four years. This rate, therefore, does not reveal how many entering 9th grade students eventually earn a diploma. Some states do compute and report 5-year and 6-year graduation rates that typically show rates two to five percentage points high than their 4-year rates.[3]

Although the on-time cohort graduation rate is the most appropriate indicator of high school completion, it suffers from a number of limitations that make it a blunt instrument for measuring high school performance and the preparation it provides for college and career success. First, despite the common definition that states use to compute it, the actual requirements for a diploma vary widely among states and individual school districts. These include the number and

[3] In Nevada, the 5-year rate was two percentage points higher in 2025-16 than the 4-year rate in 2014-15 (73.51 percent vs. 71.33 percent). See: http://nevadareportcard.com/DI/Content/pdf/cohort.pdf.

types of courses that students must pass and whether the state requires an exit exam.[4] Moreover, these requirements can vary over time. For example, West Virginia is planning to reduce the number of credits to receive a high school diploma from 24 to 21 next year.[5] Other states provide alternative pathways to earn a diploma. In Pennsylvania, for instance, students concentrating on career and technical education in high school can skip the state's exit exam.[6] This variation means that a high school diploma can represent vast differences in the learning and preparation it provides, ranging from a "thin" diploma that provides little preparation for future schooling and work to a "thick" diploma that provides sufficient preparation for success in college and/or a career. A recent report by The Alliance for Excellent Education of nine states found that the percentage of high school graduates who earned a "college and career-ready (CCR)" diploma was substantially lower than the published ACGR (Almond & Harper, 2017).[7] For example, the authors found that the official ACGR in Nevada was 70 percent in 2014 while the CCR rate was 30 percent (Ibid, p. 5, see Table 2). Moreover, traditionally disadvantaged students were less likely to earn a CCR diploma than more advantaged students. In California, for instance, the gap in the ACGR between White and Hispanic students was 11 percentage points (88 vs. 77 percent) in 2014, whereas the gap in the CCR was 17 percentage points (49 vs. 32 percent) (Ibid, p. 15).

**Predictors of On-time Graduation Rates**

Scholars have proposed a number of theoretical models and conducted literally hundreds of studies to understand how and why students drop out or graduate from high school (e.g., Allensworth & Easton, 2007; Fall & Roberts, 2012; Rumberger, 2011). They have also employed a wide range of research methodologies, from in-depth case studies of students and schools to statistical analyses of large, national datasets. For the most part, existing studies are unable to establish definitively that any specific factor "causes" students to drop out. Even complex, statistical models with large numbers of variables are unable to control for other, unobservable factors that may influence a student's decision to drop out of school. Consequently, we refer to the various factors related to dropping out or graduating as "predictors" when they derive from statistical studies that control for other, possibly confounding factors. Factors identified from

[4] See Ed Week: https://www.edweek.org/ew/section/multimedia/what-tests-does-each-state-require.html
[5] See Ed Week: http://blogs.edweek.org/edweek/high_school_and_beyond/2017/11/graduating_high_school_west_virginia.html
[6] See Ed Week: http://blogs.edweek.org/edweek/high_school_and_beyond/2017/06/career_tech_ed_students_can_skip_exit_exams_in_pennsylvania.html
[7] The Alliance defines a college and career ready (CCR) diploma as a regular diploma that includes four years of grade level English and language arts and three years of math through Algebra II or integrated Math III (see, p. 4)

simple associations, such as those derived from a crosstabs table, we refer to as correlates or associations.

Research has identified a wide range of predictors. They fall into two broad categories: factors related to characteristics of individual students and factors related to the three contexts—families, schools, and communities—of students' lives. Individual predictors fall into four areas: (1) academic performance, (2) behaviors, (3) attitudes, and (4) background. Contextual predictors also fall into four areas: (1) structure, (2) composition, (3) resources, and (4) practices. Although research has identified significant predictors within each of these areas, some are more salient than others. Moreover, it is possible to predict high school graduation with relatively few indicators (Allensworth & Easton, 2007; Allensworth, Gwynne, Moore, & de la Torre, 2014). In general, the closer or more proximal predictors, such as those that occur in high school, have a stronger relationship to dropping out or graduating than earlier or more distal factors, such as those that occur in middle or elementary school. Consequently, factors related to students' high school performance are stronger predictors than factors related to students' backgrounds or contexts (Allensworth & Easton, 2005, p. 5).

To identify relevant predictors, we relied on several recent reviews of the research literature (Bowers, Sprott, & Taff, 2013; Rumberger, 2011; Rumberger & Lim, 2008). From the literature, we attempted to identify predictors that were both precise, meaning that a high proportion of students with the dropout predictor actually dropped out (i.e., had a low proportion of false-positive or a low Type I error) and sensitive, meaning that a high proportion of actual dropouts were correctly identified with the dropout predictor (i.e., had a low proportion of false-negatives or a low Type II error). Both of these measures are important in judging the accuracy because although a predictor may accurately predict whether a student drops out, the predictor may identify only a small proportion of all students who drop out (Bowers et al., 2013). Ideally, the best predictors would both correctly identify most students at risk of failure and not falsely identify students as at risk who go on to graduate.

From an initial review of more than 6,000 studies of dropouts published since 1979, Bowers, Sprott, and Taft (2012) identified 36 research studies that had sufficient student-level data to compute measures of precision and sensitivity for a total of 110 dropout flags. The flags covered a range of factors, including academic performance (grades and test scores), school behaviors (absences, discipline, retention, drug use, pregnancy, extracurricular activities), and demographic characteristics (gender, race, family structure). Among this set of predictors, the authors found few that were both highly precise and sensitive (with values above .6 on both), especially across

multiple studies. The indicators meeting the precision and sensitivity thresholds include: earning sufficient credits (and failing no more than one academic course) in ninth grade to get promoted to 10th grade, not passing algebra in ninth grade, growth in mathematics test scores from grades 7-12, having one or more flags in sixth grade (low attendance, unsatisfactory behavior, failing math or English), and being retained at least once between kindergarten and eighth grade.

Based on our review of the literature, we identified four key predictors that are associated with group differences in on-time graduation and are both precise and sensitive. Two of them are student-level factors: (1) academic performance and (2) school behaviors; the other two are school-level factors: (3) student composition and (4) school practices. In some cases, these predictors can be measured with a single indicator, such as absentee rate, while in other cases they can best be measured with composite indicators based on a number of specific indicators (e.g., 9th grade on-track indicator based on credits and failed courses). In addition, the predictors may be reported as continuous measures, such as absentee rate or number of days absent from school, or as threshold measures that signify a high-risk of dropping out, such as an on-track indicator.

**Academic Performance**. The most accurate predictor of on-time high school graduation is academic performance. Models of high school performance typically show academic performance as the most proximal factor that predicts successful and timely graduation from high school (Farrington et al., 2012, Figure 2.1; Rumberger, 2011, Figure 6.1). The aspect of academic performance that is most pertinent to on-time graduation is credit accumulation. To earn a diploma, students must earn credits in a specified set of courses determined by the state and district. And to get promoted to the next grade level, students have to earn roughly one quarter of those total credits each year. Existing research has used several different measures of academic performance, including number of credits earned, number of course failures, retention, grades, test scores as well as composite indicators that combine several individual metrics (Bowers et al., 2013; Rumberger, 2011; Rumberger & Lim, 2008). In particular, research has also demonstrated that successfully passing ninth grade is highly predictive of whether students graduate on-time (Allensworth & Easton, 2007; Easton, Johnson, & Sartain, 2017; Strategic Data Project, 2012).

The importance of passing ninth grade as a predictor of high school graduation is best demonstrated by a breakthrough study of students in the Chicago Public Schools by Elaine Allensworth and John Easton (2005). They constructed an "on-track" indicator to identify students who earned enough credits in ninth grade to be promoted to tenth grade, and who failed no more than one semester of a core academic course (English, math, science, or social science). Among students who entered the ninth grade for the first time in 1999, 59 percent were on-track and 81

percent of them graduated four years later, whereas only 22 percent of the off-track students graduated four years later. In other words, on-track students were three-and-a-half times more likely to graduate in four years than off-track students.[8] The study further found that the on-track indicator was a better predictor of high school graduation than students' test scores in eighth grade or their background characteristics, including gender, race, and SES (Ibid., p. 5). A follow-up study compared sensitivity (predicting non-graduates) and specificity (predicting graduates) of the on-track indicator with three other measures of ninth-grade course performance: overall GPA, semester course failures, and course absences (Allensworth & Easton, 2007, p. 6). The on-track indicator, GPA, and semester course failures all had similar overall accuracy and were more accurate than absences. Studies in several other school districts have found ninth grade academic performance, particularly passing core academic subjects (English, math, science, and social science) and earning enough credits for promotion to tenth grade, also predict whether students graduate on time (Silver, Saunders, & Zarate, 2008; Strategic Data Project, 2012).

Although ninth-grade academic performance is a better predictor of on-time graduation than student background characteristics, there are still differences in ninth grade performance by student background characteristics. Asian and white students are more likely to be on-track in ninth grade than Black and Hispanic students; and females are more likely to be on track than males (see Table 3). Racial and gender differences in other aspects of ninth-grade academic performance (GPA, course failures, and course absences) remain even after controlling for other background characteristics: socioeconomic status, school mobility, overage, and middle school test scores (Allensworth & Easton, 2007).

Academic performance in middle school is predictive of academic performance in high school. Further research in Chicago found that middle school attendance and grades can accurately predict course failures in ninth grade and being off-track, although not with complete accuracy (Allensworth et al., 2014). Middle school GPA also predicts high school GPA which, in turn, predicts success in college. The study found that success in college required at least a 3.0 high school GPA which, in turn, required a middle school GPA of 3.0.

Other district-level studies have found course failures in middle school directly predict high school graduation. In a study of the Los Angeles Unified School District, half the students failed at least one course in middle school and each course failure reduced the likelihood of graduating by 20 percentage points, or double the 10-percentage point impact of failing courses in high school

[8] Bowers, et al. estimated that the on-track indicator had both high precision (.780) and high sensitivity (.751), one of highest rated predictors of the 110 examined in their study.

(Silver et al., 2008). Another study of district graduation rates in three California school districts—Fresno Unified, Long Beach Unified, and San Francisco Unified—found that failing classes in seventh grade (2000-01) was highly predictive of whether students graduated five years later (2005-06) (Kurlaender, Reardon, & Jackson, 2008). In Long Beach, for example, nearly one-third of all students failed two or more classes and among those, only 37 percent graduated; whereas, 75 percent of students with no failed classes graduated. Studies in Philadelphia and Baltimore also found that students who failed courses in sixth grade were much less likely to graduate with high precision, but poor sensitivity (Balfanz, Herzog, & Mac Iver, 2007; Baltimore Education Research Consortium, 2011). However, both studies did find that an indicator with one or more flags for poor attendance, unsatisfactory behavior, or course failures in math or English had both high precision and high sensitivity (Bowers et al., 2013).

**Attendance**. While academic performance is the most proximal predictor of on-time graduation, performance is influenced by student behavior. To understand this connection, it is necessary to consider behavior as a measure of student engagement in school, which is a common thread across numerous theories explaining high school dropout (Alexander, Entwisle, & Kabbini, 2001; Finn, 1989; Rumberger & Rotermund, 2012; Wehlage, Rutter, Smith, Lesko, & Fernandez, 1989). Using these theories as frameworks, higher engagement is linked to better outcomes in achievement, reduced chances of teenage pregnancy, and lower dropout rates (Appleton, Christenson, & Furlong, 2008; Archambault, Janosz, Morizot, & Pagani, 2009; Ekstrom, Goertz, Pollack, & Rock, 1986; Manlove, 1998; Marks, 2000; Wang & Fredricks, 2014).

One behavioral factor in particular that has been linked with high school completion is school attendance (Rumberger & Lim, 2008). Recent work focusing on indicators identifying on-track to graduation status has increasingly included measures of attendance in their calculations (Allensworth, Gwynne, Moore, & de la Torre, 2014; Baltimore Education Research Consortium, 2011; Neild, Balfanz, & Herzog, 2007; Silver, Saunders, & Zarate, 2008; Stuit et al., 2016; Sun & Spinney, 2017; Utah Education Policy Center, 2012). In one particular report, it was estimated that students who are chronically absent, defined as missing 10 percent or more of the expected days of attendance, have 7.4 times greater odds of dropping out of high school (Utah Education Policy Center, 2012). This is an especially troublesome finding considering nearly 20 percent of students in high school around the country are chronically absent (U.S. Department of Education, 2016). Based on this issue, numerous states have included a measure of attendance, most often the traditional 10 percent chronic absence rate, in their state Every Student Succeeds Act (ESSA) plans as one of the indicators of success (Jordan & Miller, 2017).

There are also other measures of behavior at the high school level for which previous research has found a predictive relationship with high school completion. Research has pointed to school suspensions and other disciplinary problems – such as behavior referrals or disruptive actions –as key indicators predicting high school completion (Bornsheuer, Polonyi, Andrews, Fore, & Onwuegbuzie, 2011; Bowers, Sprott, & Taff, 2013; Dalton, Glennie, Ingels, & Wirt, 2009; DePaoli et al., 2015; Suh, Suh, & Houston, 2007). Additionally, a lot of work has been done to explore how deviant behavior—use of illegal substances, criminal activity, fraternization with antisocial peers—may be predictive of high school completion (Battin-Pearson et al., 2000; Ekstrom et al., 1986; Kupersmidt & Coie, 1990; Mensch & Kandel, 1988). These behaviors at the high school level have direct predictive relationships with an increased risk of high school dropout, and thereby not completing high school on-time.

As with academic performance, there also exists a body of research on behavioral risk factors at the middle school level as they relate to high school completion and high school behavior. As in high school, attendance at the middle school level has been shown to ultimately relate to high school completion as it is mediated by high school attendance (Balfanz, Herzog, & Mac Iver, 2007; Baltimore Education Research Consortium, 2011; Kupersmidt & Coie, 1990). Suspensions in middle school follow a similar pattern as attendance in that they are related both to high school suspensions as well as eventual high school completion (Balfanz et al., 2007; Baltimore Education Research Consortium, 2011; Suh & Suh, 2007). There also exists another behavioral indicator at the middle school level that is not as readily used at the high school level: aggression (French & Conrad, 2001; Kupersmidt & Coie, 1990; Mahoney, 2000; Mahoney & Cairns, 1997). Aggression refers to a student's propensity to get into fights, argue, or generally get into trouble in school, and research has shown a direct relationship between measures of aggression and decreased odds of eventually graduating from high school.

At all schooling levels, there are certain existing behavioral correlates that show differences across subpopulations. Regarding attendance, American Indian, Pacific Islander, Black, Hispanic, and multi-racial students experience chronic absenteeism at higher rates than do White or Asian students (Attendance Works, 2015; U.S. Department of Education, 2016).[9] Students with disabilities, English learners, and low-income students are also overrepresented as groups experiencing chronic absenteeism (Attendance Works, 2015; Balfanz & Byrnes, 2012; U.S. Department of Education, 2016; Utah Education Policy Center, 2012). Similar patterns exist for minority students and students with disabilities as they relate to other behavioral factors, including

[9] Disparities for California are shown in Table 3.

suspensions, arrests, and other in school disciplinary actions (DePaoli et al., 2015; U.S. Department of Education, 2014). Despite these identified differences across subgroups, little empirical research has looked to examine differential effects of absenteeism and other behavioral issues across these separate groups.

Regardless of school level or subgroup, one of the major issues with many of these individual indicators is their inability to correctly identify students who do not complete high school on-time. The individual behavior indicators mentioned above tend to lack in at least one of these areas. Attendance and suspension indicators tend to be precise in that the students with poor attendance and high suspension rates tend to be those who do not graduate on time. However, there remain a large number of students who do not necessarily exhibit poor attendance or high suspension rates who do not graduate on time. An ideal indicator should be both precise and sensitive (Bowers et al., 2013).

**School composition**. [JAK1]Although student-level factors are the strongest predictors of on-time high school graduation, school factors also contribute. Research shows that graduation rates vary widely among high schools even after controlling for differences in student background characteristics (Borman & Dowling, 2010; Rumberger & Palardy, 2005c; Rumberger & Thomas, 2000). Similarly, research finds widespread differences among schools in high school performance (on-track, absences) even after adjusting for student background characteristics (Allensworth & Easton, 2005, 2007),

One of the most important and widely studied school-level factors is student body composition. Ever since Coleman's 1966 landmark study found that a student's achievement was more highly related to the characteristics of other students in the school than to any other factors, research has largely confirmed this conclusion (Borman & Dowling, 2010; Coleman et al., 1966; Palardy, 2013; Palardy, Rumberger, & Butler, 2015; Rumberger & Palardy, 2005b, 2005c). Much of the earlier research focused on the racial composition of schools, but more recent literature finds socioeconomic composition to be equally, and sometimes more, important. In fact, some studies have found that the race/ethnicity and socioeconomic composition of a school's student body has a stronger effect on students' achievement than their own race/ethnicity and socioeconomic background (Borman & Dowling, 2010; Rumberger & Palardy, 2005a). However, the effects of school composition of dropout and graduation rates is inconsistent, with some studies finding significant impacts (Goldschmidt & Wang, 1999; Mayer, Jencks, & Peterson, 1991; Rumberger, 1995; Rumberger & Palardy, 2005c) and others revealing no significant impact (Bryk & Thum, 1989; Lee & Burkam, 2003; McNeal, 1997; Rumberger & Thomas, 2000). Yet when more

specifically examining school socioeconomic status as the school composition indicator, the results are more uniform in suggesting at minimum a correlation, and in many cases a significant predictive relationship, with high school graduation (Bryk & Thum, 1989; Christle, Jolivette, & Nelson, 2007; Gottfried & Plasman, 2018; McNeal, 1997; Rumberger, 1995). Additionally, this relationship tends to be even more adverse for black, Hispanic, and low-SES students (Palardy, Rumberger, & Butler, 2015).

The focus on student composition is so salient because of the history of racial segregation in the U.S. Even after the 1954 Supreme Court decision overturning de jure segregation by race, de facto segregation has remained a prominent feature in American schools. In fact, racial segregation among whites and blacks has increased over the last 30 years (Whitehurst, 2017). A recent GAO report found that the percentage of all K-12 public schools that were high poverty (75-100 percent free or reduced lunch) and high minority (75-100 percent Black or Hispanic students) increased from 9 percent in 2000-01 to 16 percent in 2013-14 (U.S. Government Accountability Office, 2016, p. 10). And, not surprisingly, Black, Hispanic, and poor students are more likely to attend schools with high concentrations of Black, Hispanic, and poor students (Palardy et al., 2015).

One important issue surrounding student composition is what accounts for its effects. One explanation is that student composition is largely a proxy for other characteristics of schools that have a more direct impact on student outcomes. These characteristics include structural features (e.g., school size, school type [private, traditional public, charter]), school resources (e.g., money, teacher quality), and school practices (e.g., discipline policy, curriculum). For example, recent data from the US Office of Civil Rights show that schools with high concentrations of Black and Hispanic students are less likely to offer high-level math and science courses than schools with low concentrations of such students (U.S. Department of Education Office of Civil Rights, 2016).[10] A just-released report by the U.S. Commission on Civil Rights reviews research on other disparities in school funding and resources that are the hallmark of U.S. schools (U.S. Commission on Civil Rights, 2018). The other explanation is peer influences. Students benefit from attending schools with peers who have high achievement, high aspirations, and good behavior, an explanation that Coleman identified in his study and has been confirmed in a large body of research on peer effects (Coleman, 1990; Cook, Deng, & Morgano, 2007; Hanushek, Kain, Markman, & Rivkin, 2003; Hymel et al., 1996; Palardy et al., 2015).

[10] Only 33 percent of high schools with more than 75 percent Black and Hispanic enrollment offer calculus, compared to 56 percent of schools with less than 25 percent Black and Hispanic enrollment (p. 6).

Research confirms that both peer effects and school effects matter. The literature generally finds that although student composition is a significant predictor of high school graduation, the relationship becomes insignificant after controlling for school structure, school resources, and school practices. However, peer influences at the individual level, such as spending time with friends with friends, remain significant (Palardy et al., 2015).

**School practices**. [JAK2] While schools generally have little control over the characteristics of the students they serve, their size and location, and the resources they receive, they do have control over how they are managed, the teaching practices they use, and the climate they create to promote student engagement and learning. In particular, some scholars argue that the social relationships or ties among students, parents, teachers, and administrators—which have been characterized as *social resources* or *social capital*—are a key component of effective and improving schools (Ancess, 2003; Bryk & Schneider, 2002; Elmore, 2004; Hoy, Tarter, & Hoy, 2006).

Research has identified two types of school practices that are generally associated with graduation: those related to the academic climate of the school, such as schools where students take more advanced academic courses, do more homework, or report more supportive teachers (Bryk & Thum, 1989; Jia, Konold, & Cornell, 2016; Lee & Burkam, 2003; Rumberger & Palardy, 2005c), and those related to the disciplinary climate of the school, such as schools where students report more class disruptions, disciplinary problems, or feeling unsafe (Bryk & Thum, 1989; Kotok, Sakiko, & Bodovski, 2016; Rumberger, 1995; Rumberger & Palardy, 2005c). Other studies have found more general measures of school climate, such as those based on school attendance rates or items from student surveys, also predict whether students drop out (Rumberger & Thomas, 2000; Worrell & Hale, 2001). Studies have also found that positive relationships between students and teachers—an aspect of school social capital—reduced the risk of dropping out, especially among high-risk students (Croninger & Lee, 2001; Rumberger & Palardy, 2005c). Overall, the research evidence is generally consistent and compelling, although not all studies find significant effects from school climate measures (e.g., McNeal, 1997).

Existing research shows that there are profound differences in school climate associated with the racial/ethnic and socioeconomic composition of schools. The recent GAO study of school segregation found that, compared to all other and particularly low-poverty and low-minority schools, high-poverty schools and schools with mostly Black and Hispanic students were less likely to offer advanced math and science classes, AP classes, and more likely to have higher ninth grade retention rates, and enroll students with more than one out-of-school suspension (U.S. Government Accountability Office, 2016).

**Proposed Indicators**

Based on our review of the predictors we propose four indicators that could be used to provide timely and useful information on group differences in on-time high school graduation (a) ninth-grade GPA, (b) school-year attendance, (c) high school composition, and (d) high school academic climate. All the proposed indicators are based on a single metric that can reported as a continuous measure or as a threshold (dichotomous) measure.

**Ninth-grade GPA**. The research literature provides strong evidence that ninth-grade performance is a key predictor of on-time high school graduation. Three specific factors have been shown to be both precise and sensitive predictors: failed classes, GPA, and a composite, on-track indicator based on credits earned and number of failed classes (Bowers et al., 2013). A recent study in Chicago found that all three factors had high and almost identical specificity and sensitivity in predicting on-time high school graduation (Allensworth & Easton, 2007, p. 6). However, GPA has an advantage over the other two because a subsequent Chicago study found that it can also accurately predict later high school grades as well as college enrollment and college completion (Easton et al., 2017). These findings are consistent with other research showing high school grades are the best predictor of college success (National Academies of Sciences, 2017). The reason is that grades reflect both academic and intra-personal skills, such as conscientiousness, that contribute to college persistence and success (Ibid., p. 5).

Ninth-grade GPA varies among subgroups and thus could serve as a useful equity indicator. In the 2007 Chicago study, differences in ninth-grade GPA were also associated with student background characteristics, with girls having higher GPAs than boys; White and Asian students having higher GPAs than Black and Hispanic students; students from more-advantaged neighborhoods having higher GPAs than students from more disadvantaged neighborhoods, and students with higher incoming test scores having higher GPAs than students with lower test scores (Easton et al., 2017, pp. 14-15).

Computing and using ninth-grade GPA as an indicator of on-time high school graduation raises a couple of issues. First, it would require access to student course titles and grades, which may or may not be possible through existing state data systems. According to the most recent report by the Data Quality Campaign, 41 states currently collect and report student transcript data, including data on courses completed and grades.[11] Second, it would require a standard definition of grades and what courses would be used to compute the ninth-grade GPA—all courses or only

[11] See: https://dataqualitycampaign.org/why-education-data/state-progress/

academic (English language arts, math, science, and history/social science). Finally, it may require some additional analysis to address the fact that grades can be somewhat subjective because of differences in grading practices among teachers and among schools

**Annual attendance**. Attendance has been shown to be an accurate predictor of school performance and on-time high school graduation. The most common measures of attendance are the number of days absent or a flag that indicates "chronic" absenteeism. One limitation of both indicators is that they fail to account for absences accrued during periods when a student is not enrolled in school, such as when students transfer schools during the school year leading to "gaps" in their school enrollment. Additionally, absence measures do not typically differentiate between reasons for missing school. While any missed school can prove detrimental to outcomes, there may be measurable differences between days missed due to illness, and days missed for unexcused reasons (Rumberger & Gottfried, 2016). Consequently, interventions for these two different types of absences would be very different.

An indicator of "chronic" absenteeism requires defining how many absences should be considered as chronic. The U.S. Office of Civil Rights defines chronic absence as 15 days per year (U.S. Department of Education Office of Civil Rights, 2016), whereas much of the research literature and some advocacy groups generally define chronically absent as 10% of days enrolled or 18 days over a typical school year (Attendance Works and Everyone Graduates Center, 2016). While this indicator may achieve high precision by flagging a high percentage of students who go on to drop out, it is not sensitive enough in that it fails to flag many of the students who eventually drop out (Allensworth et al., 2014). Allensworth and Easton (2007) found that missing only 10 days across a school year or five days in a semester can drastically increase the chances of dropping out of school. Finally, students are typically only counted as absent if they miss a full day of school. However, partial day, or course specific, absences can also help to identify behavioral patterns that apply only to a single class. Allensworth and Easton (2007) use a measure such that each class absence is counted as a fraction of a full day. This begins to account for the act of missing only a portion of a school day.

Considering the importance of attendance to various learning outcomes, including high school completion, and the growing prevalence of chronic absenteeism as a key measure of school success, a common and all-encompassing attendance indicator is necessary for recognizing students at-risk of not completing high school due to missing school. There are four key components to consider in this single attendance indicator. First, considering the number of students who miss days while not enrolled, schools should account for these non-attendance

absences. Second, the type of absence needs to be considered. Measures to identify excused or unexcused absences should be included in order to identify appropriate interventions. Third, 10 missed days of school appears to be a meaningful threshold at which point odds of on-time graduation begin to drastically drop. Flagging students for intervention when they approach this threshold could help stem future absences. Finally, an ideal attendance indicator would also include class by class absences to identify specific patterns of attendance. This multi-faceted attendance indicator would be able to account for academic behavior issues by identifying days missed due to suspension, social behavior issues by identifying students skipping classes using the period by period attendance measure, while also accounting for overall attendance during periods of enrollment and non-enrollment.

Beginning with the 2016-17 school year, California began collecting attendance data for all schools. There are a number of key variables included in this data collection effort (California Department of Education, 2017). First, schools are asked to distinguish between absences based on excused, unexcused, in-school suspension, and out-of-school suspension. Schools are also asked to identify the number of days a student was expected to be in school and the number of days a student was actually in attendance at school. These are important attendance measure to collect, but there remain several missing elements to fully capture the impact of attendance. By collecting only "expected days of attendance," the measure misses any days during which a student was not enrolled in school. Additionally, there is no breakdown on a class to class basis.

Given the current state of data collection requirements, it is difficult to create an indicator with all the ideal components. Therefore, potential alternate indicators of attendance that are more readily available include traditional chronic absence as defined by the Office of Civil Rights or days absent as reported in state longitudinal datasets. Either indicator would allow schools to identify students meeting or approaching predetermined attendance thresholds. According to the Data Quality Campaign, 28 states currently collect and report student absence data, while 36 states will be reporting chronic absence data as identified in their ESSA plans.[12]

**School composition**. Research clearly demonstrates that schools influence student outcomes, including on-time high school graduation rates. Even after controlling for differences in the background characteristics entering high school, there remain large differences in high school graduation rates (Rumberger & Thomas, 2000). Similarly, there remain large differences in predictors of high school graduation, such as the on-track indicator used in the Chicago schools,

[12] Based on data file shown on: https://dataqualitycampaign.org/why-education-data/state-progress/ and https://www.future-ed.org/wp-content/uploads/2017/10/TABLE_Chronic_Absenteeism_v2.pdf

after controlling for the background characteristics of students (Allensworth & Easton, 2005, Figure 1). Given the importance of school effects and the large differences in the schools that students from various subgroups attend, it is important to use school indicators along with student indicators to monitor equity.

One school indicator that represents both a direct, peer effect on school outcomes and serves as a proxy for other school factors, such as school resources, teacher quality, and school climate, is composition of the student body. Several school composition indicators have been shown to predict high school graduation—racial/ethnic composition, mean SES, and proportion of poor (i.e., eligible for free or reduced school lunch) students (Rumberger & Lim, 2008). These indicators are highly correlated because Black and Hispanic students have much higher poverty rates and lower socioeconomic status than White and Asian students (Musu-Gillette, 2017, p. 20) and therefore schools with high concentrations of Black and Hispanic students are more likely to have high concentrations of poor students (Palardy et al., 2015, Table 1).

We propose a simple indicator—the percentage of students eligible for free and reduced-price lunch. This is a widely used indicator reported by government agencies and used in research (Caldas & Bankston, 1997; Christle, Jolivette, & Nelson, 2007; Gottfried & Plasman, 2018; Rumberger, 1995). The indicator is easy to construct from existing federal (CCD) data. It also is a useful proxy for other characteristics of high schools, such as percentage of Black and Hispanic students. Further, the measures of school socioeconomic status have been shown to predict high school dropout and graduation even after controlling for student background characteristics and other school inputs, such as size and resources (Palardy et al., 2015; Rumberger, 1995; Rumberger & Palardy, 2005c). Finally, it helps differentiate the educational experiences of student subgroups. For example, according to the latest data reported by the National Center for Education Statistics, 29 percent of Black students and 32 percent of Hispanic students attended a high school with more than 75 percent of the students eligible for free or reduced-price lunch, compared to 4 percent of White students and 10 percent of Asian students (Snyder et al., 2016, Table 216.60)

**School Academic Climate**. While student composition can serve as a useful proxy for a variety of high school characteristics related on-time graduation, it would still be useful to create an indicator that more directly reflects school practices and/or school climate. The research literature finds that both the academic climate and disciplinary climate are associated with high school graduation (Rumberger & Lim, 2008).

We propose an indicator that reflects the academic climate of schools. Past studies have used a number of different indicators to measure a school's academic climate: school attendance

(Rumberger & Thomas, 2000); the mean number of advanced courses taken by students (Rumberger & Palardy, 2005c); the percentage of students in an advanced academic program (Bryk & Thum, 1989); whether the school offers calculus (Lee & Burkam, 2003); and good student-teacher relations (Croninger & Lee, 2001; Lee & Burkam, 2003; Rumberger & Palardy, 2005c).

One simple indicator is whether the school offers calculus. The recent GAO study found that only 29 percent of high-poverty and high concentration Black or Hispanic schools offered calculus compared to 71 percent low-poverty and low concentration Black or Hispanic schools (U.S. Government Accountability Office, 2016, Figure 5). Of course, this indicator does not reveal how many students actually take calculus and whether there are socioeconomic or racial/ethnic disparities in taking calculus and the grades that students earn. Therefore, a more refined indicator would be the proportion of students in the school that take calculus and received a grade of a C or better.[13]

Fortunately, the required data are collected and reported regularly by the U.S. Office of Civil Rights (OCR). The OCR reports whether schools offer advanced math and science classes, including calculus as well as AP and IB (International Baccalaureate) classes. It also reports the race/ethnicity, gender, and LEP/disability status of students enrolled in each type of class at the school, district, state, and national levels.[14]

**Conclusion**

Despite the various definitions of high school graduation, the receipt of a high school diploma continues to signify a major transition from adolescence into adulthood. However, certain groups of marginalized youth—in particular minority students, economically disadvantaged students, Limited English proficient students, and students with disabilities—tend to leave high school without a diploma at significantly higher rates than their more advantaged peers. While the body of literature seeking to understand high school completion and dropout is extensive, research has yet to identify a single explanation for why students choose not to finish high school.

In this report, we have identified four key indicators across both individual-level and school-level contexts that we deem to be the most efficient in highlighting inequities relating to on-time high school graduation. At the student level, we have identified ninth grade GPA as a key indicator within the realm of academic performance and days absent as a key indicator of behavior in school. At the school level, the percent of students eligible for free and reduced-price lunch serves as key indicator relating to school

[13] Research shows a high economic payoff to students who take calculus in high school (Rose & Betts, 2004).
[14] The most recent data are for 2013-14. See: https://ocrdata.ed.gov/Home

composition, while the percent of students completing calculus is an important indicator of school academic climate.

Each of these four indicators are related to the high school completion gap for marginalized students. Moreover, the indicators can be readily calculated from existing state and federal systems, although some data are more widely available than other data (see Table 4). There are also limitations in state systems on the availability of the data for subgroups. According to the latest report by the Data Quality Campaign, a number of states do not report data by gender (13), disability status (7), low-income status (7), ethnicity (6), and English learner status (6).

Ultimately, it is our hope that policymakers, administrators, and practitioners can use these indicators to help identify, early on in high school, those students who may be especially at-risk of leaving high school without a diploma. Additionally, schools and districts may be able to use these indicators as means of addressing inequities for specific populations of students.

Table 1. Dropout and Graduation Indicators

| Indicator Year | Rate | Definition | Population | Credentials | Data Source |
|---|---|---|---|---|---|
| CPS Event Dropout Rate 2013 | 4.7% | The percentage of 15- to 24-year-olds in grades 10 through 12 who left high school between the beginning of one school year and the beginning of the next (e.g., October 2012 to October 2013) without earning a high school diploma or an alternative credential. Dropouts=508,000 | Civilian, noninstitutionalized youth ages 15 to 24 who attended either public or private high schools in the United States. N=10.854M | Recipients of an alternative credential such as a GED are not counted as dropouts. | Current Population Survey (CPS) |
| CPS Status Dropout Rate 2013 | 6.8% | The percentage of all 16- to 24-year-olds who are not enrolled in school and do not have a high school credential. | Civilian, noninstitutionalized youth ages 16 to 24 residing in the United States, regardless of whether they attended public schools, private schools, or schools outside of the United States. | Recipients of an alternative credential such as a GED are not counted as dropouts. | Current Population Survey (CPS) |
| ACS Status Dropout Rate 2013 | 6.8% | The percentage of all 16- to 24-year-olds who are not enrolled in school and do not have a high school credential. | Youth ages 16 to 24 residing in the United States regardless of whether they | Recipients of an alternative credential such as a GED are not | American Community Survey (ACS) |

| | | | | | |
|---|---|---|---|---|---|
| | | | attended public schools, private schools, or schools outside of the United States. Includes those in active duty military service and those living in institutional settings. | counted as dropouts. | |

| | | | | | |
|---|---|---|---|---|---|
| CPS Status Completion Rate 2013 | 92% | Among 18- to 24-year-olds who are not enrolled in high school or a lower education level, the percentage who hold a high school diploma or alternative credential. | Civilian, noninstitutionalized youth ages 18 to 24, including youth who attended public schools, private schools, or schools outside of the United States. | A high school diploma or an alternative credential, such as a GED. | Current Population Survey (CPS) |
| Averaged Freshman Graduation Rate 2012-13 | 82% | An estimate of the percentage of public high school students who graduate with a regular diploma 4 years after starting 9th grade. | The incoming class of public high school freshmen, estimated by summing the enrollment in 8th grade in year one, 9th grade for the next year, and 10th grade for the year after, and then dividing by three. | A regular high school diploma, or a diploma that recognizes some higher level of academic achievement. | Common Core of Data (CCD) |
| Adjusted Cohort Graduation Rate 2015-16 | 84.1% | The percentage of first-time 9th graders in public high schools who graduate with a regular diploma within 4 years. | Public high school students who form the adjusted cohort for the graduating class (the number of first-time 9th-graders plus students who subsequently transfer in minus students who subsequently transfer out, | The ACGR is calculated by state education agencies (SEAs) and submitted to the U.S. Department of Education through the ED*Facts* submission | State Longitudinal Data Systems |

| | | | | | |
|---|---|---|---|---|---|
| | | | emigrate, or die during 9th, 10th, 11th, or 12th grade). | system. | |

SOURCE: NCES, *Trends in School Dropout and Completion Rates in the United States*. Retrieved from: https://nces.ed.gov/programs/dropout/

Table 2. State ACGR and CCR Rates

| STATE | ACGR | CCR |
|---|---|---|
| Arkansas | 86.9% | 88.3% |
| California | 81.0% | 41.9% |
| Indiana | 87.9% | 85.3% |
| Maryland | 86.4% | 65.8% |
| Massachusetts | 86.1% | 72.4% |
| Nevada | 70.0% | 29.8% |
| New York | 77.8% | 40.8% |
| Texas | 88.3% | 85.5% |
| Virginia | 85.3% | 56.3% |

SOURCES: Alliance for Excellent Education (https://all4ed.org/wp-content/uploads/2017/10/Diploma_Paper-UPDATE-10-17.pdf); (Allensworth & Easton, 2005)

Table 3. Various High School Performance Indicators by Student Subgroups

| | Adjusted Cohort Graduation Rate 2014-15 US (Percent) | On-track 2012-13 Freshman Cohort Chicago (percent) | Chronic Absenteeism Grades 9-12 2016-17 California (percent) | Attending high-poverty secondary school Fall 2015 US (Percent) |
|---|---|---|---|---|
| Total | 83.2 | 57.9 | 15.4 | 15.2 |
| Race/ethnicity | | | | |
| --Native American/Alaska Native | 71.6 | | 26.5 | 24.6 |
| --Asian | 90.2 | | 5.0 | 10.2 |
| --Hispanic | 77.8 | | 17.3 | 32.1 |
| --Males | | 77.4 | | |
| --Females | | 85.6 | | |
| --Black | 74.6 | | 22.8 | 28.9 |
| --Males | | 71.4 | | |
| --Females | | 82.3 | | |
| --White | 87.6 | | 13.8 | 3.9 |
| --Males | | 87.2 | | |
| --Females | | 93.1 | | |
| Gender | | | | |
| --Female | | | 15.6 | |
| --Male | | | 15.2 | |
| SES | | | | |
| --Economically disadvantaged | 76.1 | | 13.3 | |
| EL Status | | | | |
| LEP | 65.1 | | 10.5 | |
| Disability | | | | |
| --Students with disabilities | 64.5 | | 17.7 | |

*Students in the lowest quartile.

SOURCES: NCES (https://nces.ed.gov/ccd/tables/ACGR_RE_and_characteristics_2014-15.asp); (Roderick, Kelly-Kemple, Johnson, & Beechum, 2014); Dataquest

(https://data1.cde.ca.gov/dataquest/DQCensus/AttChrAbsRate.aspx?agglevel=State&cds=00&year=2016-17);

(Snyder et al., 2016, Table 216.60)

Table 4. Proposed Indicators and Sources of Data

| Indicator | Definition | Source of data | Data Elements | Number of states and D.C. collecting data |
|---|---|---|---|---|
| Student ninth-grade GPA | The average unweighted grade point average for all courses students take in the ninth grade | State Longitudinal Data Systems | Courses<br>Credits<br>Grades | 41 |
| Student annual attendance | Number days absent | | Enrollment | 28 (Data Quality Campaign)<br>36 (ESSA Chronic Absence indicators) |
| School poverty | The percentage of high school students who are eligible for free or reduced-price lunch | Common Core Data | | all |
| School offers calculus | Flag indicating school offers calculus | U.S. Office of Civil Rights | | all |

SOURCES: Data Quality Campaign. Retrieved from https://dataqualitycampaign.org/why-education-data/state-progress/; (Snyder et al., 2016, Table 216.60).

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