# Transitioning to College and Work
## Part 2: A Study of Potential Enrollment Indicators

RICE | HERC
Houston Education Research Consortium

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Part II of the Houston Longitudinal Study on the Transition to College and Work (HLS) examined potential indicators of college enrollment school and district staff might use to identify and support students at risk of not attending college. The study used administrative data from the Houston Independent School District (HISD) and tracked two cohorts of seventh-grade students in fall 2007 and fall 2008 for six years and into the first semester of college. Three potential indicators of college enrollment were examined:

- Chicago: Designed to predict high school graduation[1]; based on earning six course credits — the minimum to advance to the next grade in HISD — and having at most one semester F in a core subject (English, math, science, or social studies)
- Houston Education Research Consortium (HERC): Designed to predict college enrollment (see Appendix A for information on its origins); based on having an attendance rate of 90% or higher, having a B-average (80% or higher), and earning at least 0.5 advanced course credits
- State: Designed to predict college enrollment by the Texas Education Agency; based on meeting the benchmark on the English/language arts and mathematics tests

The study found the HERC indicator was more effective at predicting college enrollment in later grade levels than the Chicago and state indicators. In addition, a substantial share of students did not meet the Chicago and HERC indicators during the ninth-grade year. The state indicator showed different patterns, perhaps because test scores fluctuated little during middle and high school and might not reflect changes in student motivation or effort.

## Key Findings

- The Chicago indicator (Allensworth & Easton, 2005), designed to predict high school dropout[1], was less effective at predicting college enrollment than the HERC and state (Texas Education Agency, 2007) indicators, which were designed to predict college enrollment.
- The HERC indicator was more effective than the Chicago indicator at predicting non-college enrollment, particularly in ninth and 11th grade.
- The three potential indicators underestimated the college enrollment rates of white, Asian, and non-economically disadvantaged students, but were more accurate for black, Hispanic, and economically disadvantaged students.
- Students were most at risk of not meeting the Chicago and HERC indicators during the ninth grade.
- In contrast, the state indicator did not show the same ninth-grade pattern likely because it was based on test scores, which might vary little over time or neglect to capture changes in student motivation and effort.

[1] The Chicago indicator was tested to see whether a high school graduation indicator could also serve as a potential college enrollment indicator.

# Background

In the state of Texas, only 29 percent of eighth-grade students went on to complete a postsecondary credential, ranging from a certificate to a doctorate, within 12 years of high school graduation (Kinder Institute for Urban Research, 2018). In response to the low college completion rate, policymakers made higher education a priority by aiming to raise the share of young adults with a postsecondary education (Texas Higher Education Coordinating Board, 2015) and integrating measures of college readiness into the state accountability system (Texas Education Agency, 2018).

As policymakers set goals for postsecondary attainment, school and district practitioners might seek new strategies to ensure students are prepared to enroll in college. Although much is known about early warning indicators for both high school graduation and dropout (see Bowers, Sprott, & Taff, 2013 for a review)[2], college enrollment is a different concept. If schools and districts could identify an indicator that could both predict whether a student would enroll in college as well as when they might be at risk of not achieving that milestone, then practitioners might be able to use that information to provide additional support to students and get them back on-track to college.

In this study, three potential indicators of college enrollment that might be considered in an early warning system were examined (see Table 1 for details):

1. Chicago: Designed to predict high school graduation[3]; based on earning six course credits — the minimum to advance to the next grade in HISD — and having at most one semester F in a core subject (English, math, science, or social studies)
2. HERC: Designed to predict college enrollment (see Appendix A for information on its origins); based on having an attendance rate of 90% or higher, having a B-average (80% or higher), and earning at least 0.5 advanced course credits
3. State: Designed to predict college enrollment by the Texas Education Agency; based on meeting the benchmark on the English/language arts and mathematics tests

## Research Questions

1. How well did three potential early warning indicators of college enrollment predict college enrollment? Were there differences by gender, race/ethnicity, and socioeconomic status(SES)?
2. During which grade levels were students at risk of not achieving these potential indicators? Were there differences by gender, race/ethnicity, and SES?

[2] A prior HERC research brief entitled *Evaluating High School Dropout Indicators and Assessing Their Strength* examined predictors of high school dropout among students in HISD. The brief is available for download at https://kinder.rice.edu/research/evaluating-high-school-dropout-indicators-and-assessing-their-strength.
[3] The Chicago indicator was tested to see whether a high school graduation indicator could also serve as a potential college enrollment indicator.

## Research Question 1: How well did three potential early warning indicators of college enrollment predict college enrollment? Were there differences by gender, race/ethnicity, and socioeconomic status (SES)?

The following section assesses the predictive power of potential indicators of college enrollment. The goal was to identify measures that were:

- Associated with enrollment
- Available in administrative data
- Relatively easy for a school or district practitioner to calculate and assess

Each measure was examined for how accurately it predicted enrollment for all students and subgroups. For example, it might be possible a given measure was more accurate in predicting the outcomes of females than males. If so, practitioners ought to be aware of the measure's limitations if they decide to use it to identify students for intervention.

### Data

The study used data from HISD, made available through the Houston Education Research Consortium (HERC), from 2007-2014. The data contained information on students' demographic, socioeconomic, behavioral, and academic characteristics. They were also matched to records from the National Student Clearinghouse, which provided information on whether a student attended a college or university.

To answer the first research question, two cohorts of seventh-grade students during fall 2007 and fall 2008 were tracked for six school years and into the first semester of college. Since the goal of the analysis was to determine how early warning indicators predicted college enrollment, the sample was limited to students who had no missing data on enrollment or the potential indicators tested. Native American students were excluded due to small sample size.[4] The final sample size consisted of 12,001 students.

[4] Limiting the sample to students who had data available to generate the three potential indicators in three grades (i.e., not missing data from the course grades, attendance, or TAKS files) might bias estimates of college enrollment and the potential indicator tests. However, these limitations were considered acceptable since college enrollment data were only available for high school graduates. Additionally, nearly all missing data were due to students in the PEIMS files not matching to the course grades, attendance, and TAKS files. This was likely due to student mobility. A missing data analysis is available from the authors upon request.

Three potential indicators were calculated and analyzed at three grade levels: seventh, ninth, and 11th. These grade levels were the focus of the study because:

- Seventh grade was often the grade level before schools sorted students by measured and perceived ability into different core content courses (e.g., eighth-grade algebra versus pre-algebra).
- Ninth grade was the first year of high school.
- Eleventh grade was the grade level before students began applying to college and typically when they first took college entrance exams like the SAT. During the years analyzed, it was also the final grade of state accountability testing.

## Measures

The outcome measured whether a student enrolled in a college or university the fall following high school graduation[5] — fall 2013 for the 2007-2008 seventh-grade cohort and fall 2014 for the 2008-2009 seventh-grade cohort — using three potential indicators of college enrollment (Chicago, HERC, state) at three grade levels (seventh, ninth, 11th). Although college readiness is multidimensional (Conley, 2010), the researchers developed potential indicators of enrollment that were based on measures readily available in administrative datasets and might be relatively easy for a practitioner to understand and generate on their own (See Table 1). The Chicago indicator was designed to predict high school graduation, but it was tested here to determine whether a high school graduation indicator could also serve as a potential college enrollment indicator. The indicator was based on whether a student earned enough course credits to advance to the next grade level and had no more than one semester grade of F in a core subject. The HERC indicator was designed to predict college enrollment (see Appendix A for information on its origins) and was based on attendance, average course grades, and advanced course credits earned. The state indicator was designed to predict college enrollment and was based on the College-Ready Graduates measure in the Texas Education Agency's accountability system, which was based on test scores.

## Methods

Logistic regression models predicted college enrollment using the Chicago, HERC, and state indicators at grades seven, nine, and 11. Subsequent models accounted for basic student background characteristics (age, gender, race/ethnicity, English learner, special education, economic disadvantage; details on these variables are available in Appendix B), as well as cohort and school fixed-effects (dummy variables for each cohort, dummy variables for each school attended in seventh, ninth, or 11th grade). After estimating the models, predicted probabilities were calculated. These probabilities were used to determine whether the model accurately predicted a student's college enrollment.

[5] The analyses did not distinguish between less-than-two-year, two-year, and four-year college enrollment. Since the academic requirements of these types of colleges might differ, distinct indicators might need to be developed to correctly predict these specific types of enrollment. Please contact the authors for additional information.

**Table 1. Potential College Enrollment Indicators Used in the Analyses**

| Potential Indicator | Developer | Origin | Definition Used in Study |
|---|---|---|---|
| Chicago | University of Chicago Consortium on School Research | The indicator was developed to predict high school graduation (Allensworth & Easton, 2005).[6] At the end of ninth grade, students were classified as "on-track" if they earned five course credits — the minimum number to advance to 10th grade in Chicago Public Schools — and had at most one semester grade of F in a core subject (English, math, science, or social studies). Despite its simplicity, the indicator was considered an accurate predictor of high school graduation (Bowers, Sprott, & Taff, 2013). | Earned six course credits — the minimum to advance a grade in HISD — and had at most one semester grade of F in a core subject (English, math, science, or social studies)[7] |
| HERC | Rice University Houston Education Research Consortium | By reviewing relevant literature and analyzing HERC data, the goal was to develop an indicator that was relatively easy for a school or district practitioner to calculate and assess (like Chicago's) and was more tied to college enrollment; additional details are available in Appendix A. Three components were considered — attendance rates, grades earned in courses taken, and credits earned in advanced courses. Advanced courses referred to pre-Advanced Placement (AP), pre-International Baccalaureate (IB), AP, IB, or academic dual credit[8] courses. | Had an attendance rate of 90% or higher, had a B-average (80% or higher), and earned any advanced course credits |
| State | Texas Education Agency Academic Excellence Indicator System | During the 2006-2007 school year, the state of Texas incorporated a measure called *College-Ready Graduates* into its annual school performance reports. The measure identified students who met benchmarks on the state English/language arts test, state mathematics test, SAT test, or ACT test. | Met the benchmark on the English/language arts and mathematics tests[9,10] |

[6] The Chicago indicator was tested to see whether a high school graduation indicator could also serve as a potential college enrollment indicator.

[7] Each half-credit was defined as passing a semester-long course (grade of 69.5% or above). Therefore, six course credits corresponded to passing 12 semester-long courses. A semester-long course with a grade below 69.5 percent counted as a semester grade of F.

[8] Academic dual credit courses were dual credit courses that were not Career & Technical Education.

[9] Although the College-Ready Graduates measure incorporated multiple tests, the study focused on the state English/language arts and mathematics tests since the goal was to generate annual measures. Students typically did not take the SAT or ACT annually.

[10] English/language arts and mathematics cutoffs were based on the 11th-grade tests — 2200 for English/language arts and 2200 for mathematics. The numerical cutoffs were identical for the two subjects and did not change over time. Cutoffs identified in the test score distribution were applied to tests in other grades. For example, the mathematics cutoff for the 11th-grade test in 2007-2008 corresponded to a standardized score of -0.24. In the same year, a standardized score of -0.24 corresponded to a raw score of 2175.68 on the seventh-grade mathematics test. This raw score was the cutoff used to determine whether a student met the mathematics standard in seventh grade. Please contact the authors for additional information.

## 1 The Chicago indicator was less effective at predicting college enrollment than the HERC and state indicators.

### Results

Table 2 presents the results from tests of the three potential indicators of college enrollment in grades seven, nine, and 11. In each panel, the first three rows show how well each potential indicator predicted college enrollment without accounting for background characteristics, cohort, or school effects. In seventh grade (Panel A), all three potential indicators were positively correlated with enrollment, although the HERC indicator showed the highest correlation (r = 0.45). The HERC and state indicators explained more of the variance in enrollment (Pseudo-$R^2$ = 0.06) than the Chicago indicator. The last three columns show the share of correct predictions. Overall, without background characteristics, cohort, or school effects, the three potential indicators correctly predicted nearly two-thirds of students' enrollment outcomes. However, the HERC and state indicators performed slightly better than the Chicago indicator. These findings made sense given the HERC and state indicators were developed with college in mind, whereas the Chicago indicator was designed for high school graduation.

The differences between the potential indicators in seventh grade became more pronounced when looking at the correct positive and negative predictions. The Chicago indicator was highly accurate in terms of predicting enrollment (92%), but much less accurate in predicting non-enrollment (21%); that is, it assumed 79 percent of non-enrollees went to college. Of course, some non-enrollees might have intended *not* to go to college. Nevertheless, as the state integrates measures of college readiness into its accountability system (Texas Education Agency, 2018), practitioners may want to target potential non-enrollees for intervention. If the potential indicators tell a practitioner a student will likely attend college when they actually will not, then there is a missed opportunity. The Chicago indicator might predict non-enrollment poorly because it was too lenient, the bar was set too low. While the HERC and state indicators' correct positive prediction rates (79% and 69%, respectively) were lower than the Chicago indicator's, their correct negative prediction rates were higher (49% and 60%, respectively).[11] What this meant was these potential indicators were able to identify correctly half or more non-enrollees, which might be information useful for intervention.

The next two sections of the seventh-grade panel add in background characteristics, then cohort and school effects. The addition of these measures increased the explained variation and the correct overall prediction rate. The most notable change occurred with the potential indicators' share of correct positive and negative predictions; they began to resemble one another.

[11] As a robustness check, potential indicators from eighth grade were tested and showed patterns similar to those from seventh grade. Specifically, the state indicator performed slightly better than the HERC indicator in terms of correct negative predictions. It was possible attendance, grades, and advanced course credits in middle school were less predictive than they were in high school. Therefore, practitioners might consider relying more on test score indicators in early grades and indicators like the HERC indicator in later grades.

2

## The HERC indicator was more effective than the Chicago indicator at predicting non-college enrollment, particularly in ninth and 11th grade.

In sum, while there were similarities between the three potential seventh-grade indicators in correct overall predictions, the Chicago indicator demonstrated slightly worse performance. Moreover, it was particularly inefficient at predicting non-enrollment on its own, and to achieve correct prediction rates similar to those of the HERC and state indicators, control variables for sociodemographic characteristics and/or cohort and school effects must be added. This suggests the Chicago indicator may not be effective as a potential indicator of college enrollment. In contrast, the state and, to a lesser extent, the HERC indicators had correct negative prediction rates that were substantially higher and less affected by additional variables. If a practitioner wants to identify a potential indicator that can help identify potential non-enrollees, the HERC and state indicators alone may perform fairly well, whereas the Chicago indicator may require a more sophisticated analysis to perform as well.

Panels B and C of Table 2 show the same statistics using the Chicago, HERC, and state indicators from the ninth and 11th grades. Correlations and explained variances between the potential indicators and college enrollment were slightly higher in these later grades. This may be tied to the fact that the potential indicators in grades nine and 11 were closer to the time of college enrollment. Patterns of correct overall predictions in grades nine and 11 were similar to those reported in seventh grade. However, one key change was that without control variables for sociodemographic characteristics, cohort, and school effects, the rate of correct negative predictions dropped for the state indicator and increased for the HERC indicator. In addition, the correct positive prediction rate increased for the state indicator and declined for the HERC indicator. Low test scores during high school might be less consequential to college enrollment than chronic absenteeism, low grades, and lack of advanced credits. These latter measures might capture unobservable factors like low motivation and effort, which might drive students away from college and might not be easily reflected on a standardized test. It appeared the HERC indicator’s ability to predict non-enrollment — a feature that might be useful to a practitioner — strengthened over time, while the state indicator’s ability to do so weakened.

3

**The three potential indicators underestimated the college enrollment rates of white, Asian, and non-economically disadvantaged students, but were more accurate for black, Hispanic, and economically disadvantaged students.**

Practitioners may consider whether the potential indicators predict college enrollment equally well for different groups of students. In short, the answer was no. In additional analyses, the correct overall prediction rates for female, white, Asian, and non-economically disadvantaged students slightly exceeded the rates for male, black, Hispanic, and economically disadvantaged students. However, despite the higher correct overall prediction rates, female, white, Asian, and non-economically disadvantaged students showed low correct negative prediction rates. For these groups of students, the models did not capture non-enrollment accurately. Students from more advantaged groups who did not meet a given potential indicator were more likely to enroll in college than students from less advantaged groups who also did not meet a potential indicator. There might be external factors (e.g., parental education, social capital) driving the enrollment of students from more advantaged groups the models were unable to capture. These factors might push advantaged students into college even if they did not meet the potential indicators. Had the models controlled for external factors, predictors of non-enrollment for more advantaged groups might have been more accurate. If practitioners wish to use the potential indicators for intervention, they ought to be aware of this limitation and gather additional information from students before targeting them for resources. Graphs illustrating the correct overall, positive, and negative predictions by subgroup are available in Appendix D. Additional details are available from the authors upon request.

For more analyses of the potential indicators, please see Appendices E and F.

**Table 2. Predictive Power of Potential College Enrollment Indicators, by Grade**

| Potential Indicator | Polychoric Correlation | Pseudo-$R^2$ | Correct Overall Prediction | Correct Positive Prediction | Correct Negative Prediction |
|---|---|---|---|---|---|
| **Panel A. Potential Seventh-Grade Indicators** | | | | | |
| Chicago | 0.37 | 0.03 | 62% | 92% | 21% |
| HERC | 0.45 | 0.06 | 66% | 79% | 49% |
| State | 0.44 | 0.06 | 65% | 69% | 60% |
| Control for Sociodemographic Characteristics | | | | | |
| Chicago | | 0.11 | 66% | 78% | 51% |
| HERC | | 0.12 | 67% | 80% | 51% |
| State | | 0.12 | 68% | 76% | 56% |
| Add Cohort and School Fixed-Effects | | | | | |
| Chicago | | 0.13 | 69% | 80% | 54% |
| HERC | | 0.14 | 69% | 78% | 56% |
| State | | 0.14 | 68% | 77% | 56% |
| **Panel B. Potential Ninth-Grade Indicators** | | | | | |
| Potential Indicator | Polychoric Correlation | Pseudo-$R^2$ | Correct Overall Prediction | Correct Positive Prediction | Correct Negative Prediction |
| Chicago | 0.38 | 0.03 | 63% | 90% | 26% |
| HERC | 0.51 | 0.08 | 66% | 61% | 73% |
| State | 0.43 | 0.05 | 65% | 81% | 44% |
| Control for Sociodemographic Characteristics | | | | | |
| Chicago | | 0.11 | 67% | 82% | 46% |
| HERC | | 0.14 | 69% | 73% | 63% |
| State | | 0.12 | 67% | 81% | 50% |
| Add Cohort and School Fixed-Effects | | | | | |
| Chicago | | 0.15 | 69% | 77% | 57% |
| HERC | | 0.17 | 71% | 77% | 62% |
| State | | 0.15 | 69% | 78% | 56% |
| **Panel C. Potential 11th-Grade Indicators** | | | | | |
| Potential Indicator | Polychoric Correlation | Pseudo-$R^2$ | Correct Overall Prediction | Correct Positive Prediction | Correct Negative Prediction |
| Chicago | 0.51 | 0.07 | 67% | 90% | 35% |
| HERC | 0.56 | 0.11 | 68% | 64% | 74% |
| State | 0.47 | 0.07 | 67% | 79% | 50% |
| Control for Sociodemographic Characteristics | | | | | |
| Chicago | | 0.14 | 69% | 84% | 49% |
| HERC | | 0.16 | 70% | 75% | 64% |
| State | | 0.13 | 68% | 80% | 53% |
| Add Cohort and School Fixed-Effects | | | | | |
| Chicago | | 0.17 | 71% | 81% | 58% |
| HERC | | 0.19 | 72% | 78% | 65% |
| State | | 0.16 | 70% | 79% | 58% |

Source: HERC multi-year data.

Note: Sample was limited to non-Native American students who were not missing data. Results came from logistic regression models that predicted college enrollment; controlled for the Chicago, HERC, or state indicator in grade seven, nine, or 11; controlled for student background characteristics (age, gender, race/ethnicity, English learner, special education, economic disadvantage); and controlled for cohort and school fixed-effects (dummy variables for each cohort, dummy variables for each school attended in seventh, ninth, or 11th grade).

## Research Question 2: During which grade levels were students at risk of not achieving these potential indicators? Were there differences by gender, race/ethnicity, and SES?

In the first section of this report, three potential indicators were tested for how well they predicted college enrollment. In terms of correct overall predictions, findings showed the HERC and state indicators performed as well as or slightly better than the Chicago indicator. Differences were more pronounced when considering correct positive and negative predictions. While the Chicago indicator was good at predicting enrollment for enrollees, it was less adept at predicting non-enrollment for non-enrollees. This might be expected since the Chicago indicator was designed to predict high school graduation, not college enrollment. Regardless of the potential indicator a school or district decides to use in an early warning system, practitioners may wish to know when a student may be most at risk of falling off-track from college, as well as the most appropriate time to intervene.

### Data

To determine the grade during which students fell off-track, HERC data from 2007-2014 were used. Like Research Question 1, the analyses focused on two cohorts of seventh-grade students in fall 2007 and fall 2008 and followed them for six years, through grade 12. The sample was limited to non-Native American students who were not missing data on the Chicago, HERC, and state indicators or on control variables used in the statistical models.[12] The final analytic sample consisted of 17,879 students.[13]

Separate data files were created for the Chicago, HERC, and state analyses, respectively. The files were restructured into a person-period format so that each observation represented a student-grade (e.g., student A in grade 7, student A in grade 8, student A in grade 9). This longitudinal format was required for the event history analysis, the method used to determine when students were at risk of falling off-track and when practitioners ought to intervene.[14]

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[12] Nearly all missing data were due to students in the PEIMS files not matching to the course grades, attendance, TAKS, and discipline files. This was likely due to student mobility. A missing data analysis is available from the authors upon request.

[13] In statistical models, there were actually more than 17,819 observations. The analytic strategy required creating a student-by-grade dataset in which there was one row for each student in each grade level. The number of student-by-grade observations reported in the tables in Appendix I varied because students exited the sample once they did not meet an indicator. Because more students did not meet the HERC indicator than the Chicago indicator, there were fewer student-by-grade observations in the HERC indicator analysis (46,228) than the Chicago indicator analysis (63,352). Although more students did not meet the HERC indicator than the state indicator, the state indicator analysis (41,936) included fewer student-by-grade observations than the HERC indicator analysis because fewer grade levels were included in the state indicator analysis; there was no 12th-grade test, so a state indicator could not be developed. Additional details on the data structure are available from the authors upon request.

[14] Because of this restructuring, the actual sample size for the regression models included 63,352 student-grades for the Chicago indicator analysis, 46,228 student-grades for the HERC indicator analysis and 41,936 student-grades for the state indicator analysis.

## Measures

The dependent variables were binary (0/1) and measured whether a student *did not* meet the Chicago, HERC, or state indicator in a given grade level. The key independent variable of interest was a categorical measure of the grade level during which a student first did not meet the potential indicator. The reference category was seventh grade and the measure determined the grade during which students were most at risk of falling off-track in terms of the Chicago, HERC, or state indicators. The coefficients on the grade dummies showed whether students were more or less likely to not meet a potential indicator in a given grade, as compared to seventh grade.

Aside from the grade level measure, the statistical models controlled for a variety of student background characteristics. Most notably, the models included lagged measures from the sixth grade to account for baseline achievement: the total number of credits earned, the number of core courses failed, the attendance rate, the average grade percentage, the number of advanced credits earned, English/language arts test scores, and mathematics test scores. In addition, the models controlled for age, gender, race/ethnicity, English learner, special education, and economic disadvantage from the seventh-grade data file. The models also included the number of in-school and out-of-school suspensions since it might be possible student behaviors in middle and high school correlated with whether a student was on-track to college. These two count variables were allowed to vary over time. Finally, the models accounted for differences between the two cohorts as well as differences between schools.[15]

## Methods

Using the student-by-grade data files, event history models that predicted when a student first did not meet the potential indicator of college enrollment were estimated. Separate models were estimated for the Chicago, HERC, and state indicators. All models controlled for grade, student background characteristics, cohort effects, and seventh-grade school effects. Additional details on the statistical models are available in Appendix G.

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### Students were most at risk of not meeting the Chicago and HERC indicators during the ninth grade.

## Results

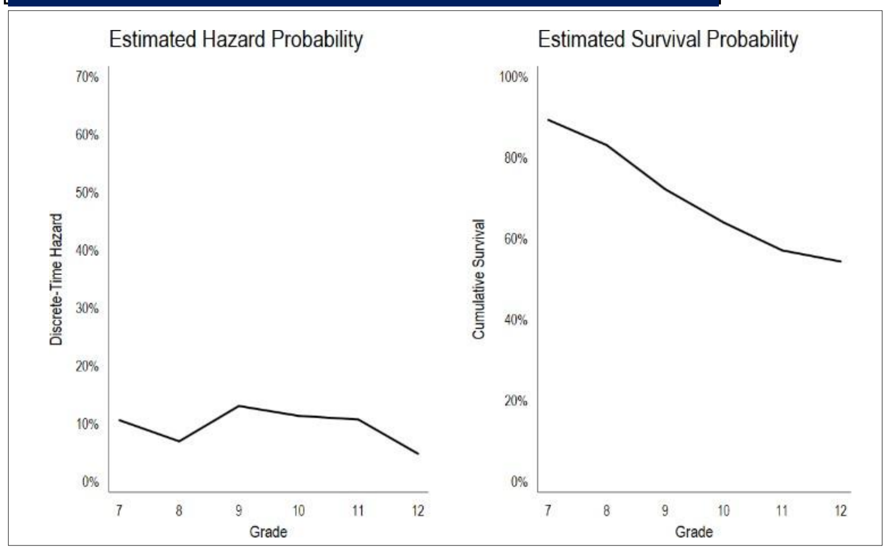
Figures 1-3 show the main results from the analyses with all control variables and fixed-effects; full regression tables are available in Appendix I. For each potential indicator, two plots are produced. The first plots the hazard curve, which shows the share of students who fell off-track (i.e., did not meet the Chicago, HERC, or state indicator) in each grade. If the hazard curve for a given grade is higher, then that

[15] In robustness checks, time-varying school characteristics (percent of economically disadvantaged students, number of advanced courses offered, student-teacher ratio, average years of teacher experience) were included. Results were similar to those reported and are available from the authors upon request.

meant more students fell off-track during that grade and that might be when a practitioner ought to intervene. The second plot shows the survival curve, which is the share of students still on-track by the end of each grade. This is a cumulative measure. If, for example, the survival curve shows a value of 20 percent in 12th grade, then that meant only 20 percent of the sample met the potential indicator during *all* six grade levels, seventh through 12th.

In terms of the Chicago indicator (Figure 1), ninth grade was the year during which a slightly higher percentage of students did not meet the potential indicator (13%). Eleven percent of students did not meet the potential indicator in grades seven, 10, and 11. This finding was in line with prior work demonstrating the ninth-grade year was important for high school graduation (Allensworth & Easton, 2005). Turning to the survival curve, by the end of high school, approximately 46 percent of students did not meet the Chicago indicator at least once and 54 percent met it all six years.

**Figure 1. Falling Off-Track Based on the Chicago Indicator**



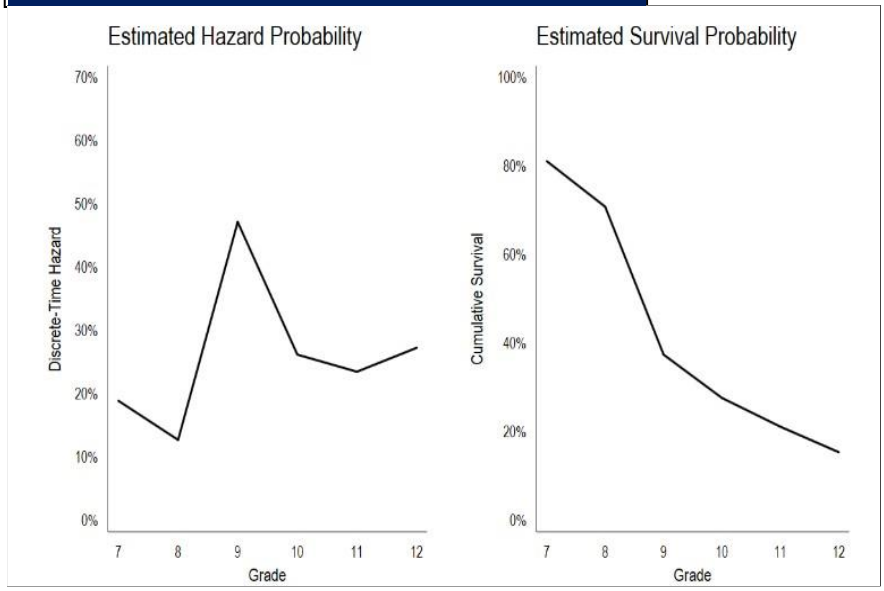

Note: Sample was limited to 17,879 non-Native American students with non-missing data. Results came from discrete-time hazard models with control variables, cohort fixed-effects, and seventh-grade school fixed-effects.

Source: HERC multi-year data.

Figure 2 shows hazard and survival plots for the HERC indicator. Results clearly showed ninth grade was when a substantial share of students fell off-track; approximately 47 percent did not meet the potential indicator during this school year. The survival curve showed a steep drop between grades eight and nine; what this meant was a substantial share of students did meet the indicator during the ninth grade. At the end of eighth grade, 71 percent of students were still on-track (i.e., met the HERC indicator in both grades seven and eight), but by the end of ninth grade, only 37 percent of students were still on-track (i.e., met the HERC indicator in grades seven through nine). By the end of high school, only 15 percent of students in the sample met the potential indicator all six years; the wide majority did not meet it at least once.

Finally, Figure 3 shows results for the state indicator. Please note the event history analysis for the state indicator excluded grade 12 since state tests were not administered that year. According to the hazard curve, seventh grade was the school year during which a higher share of students did not meet the potential indicator (24%). The hazard curve flattened out after that point. By the end of 11th grade (the last testing year), 45 percent of students had not met the state indicator one or more times, while 55 percent met it every single year.

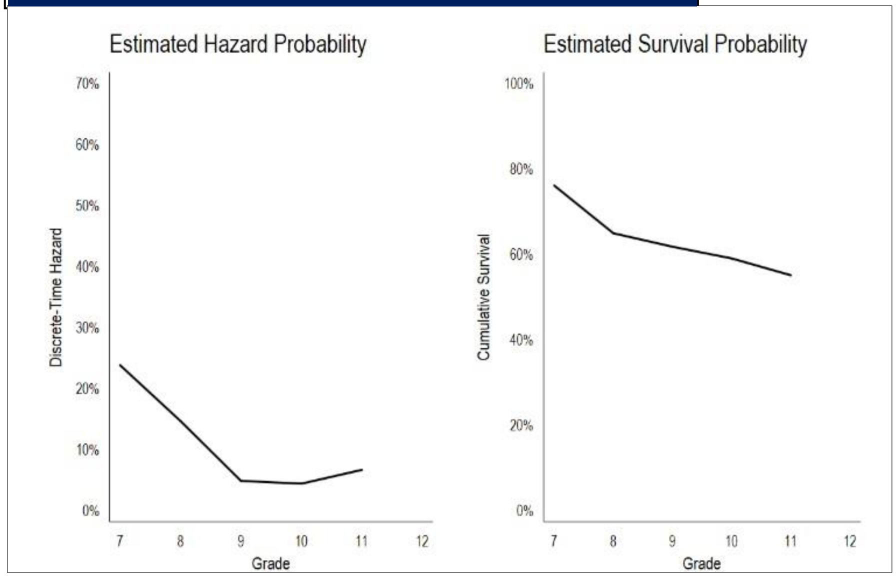
Figure 2. Falling Off-Track Based on HERC Indicator




Note: Sample was limited to 17,879 non-Native American students with non-missing data. Results came from discrete-time hazard models with control variables, cohort fixed-effects, and seventh-grade school fixed-effects.

Source: HERC multi-year data.

Figure 3. Falling Off-Track Based on the State Indicator




Note: Sample was limited to 17,879 non-Native American students with non-missing data. Results came from discrete-time hazard models with control variables, cohort fixed-effects, and seventh-grade school fixed-effects.

Source: HERC multi-year data.

## 5 The state indicator did not show the same ninth-grade pattern.

The results indicated that according to the Chicago and HERC indicators of college enrollment, the school year during which more students fell off-track was ninth grade. Students were less likely to hit key benchmarks that year (e.g., earning high grades, completing advanced credits). If school and district practitioners wish to increase college enrollment and implement an intervention or provide targeted assistance to a specific grade level, then they may consider doing so for ninth-grade students. This pattern was not apparent with the state indicator. Seventh grade — the first grade level in the analysis — was when the highest share of students missed the state indicator. After that, the hazard curve was flat.

There might be two interpretations for these findings. First, test score indicators (and raw test scores) were quite correlated over time. Although there was an expectation potential indicators from neighboring grades would be correlated with one another (since academic performance might not change dramatically in a year, for example), the correlation between potential indicators from non-sequential grades might be more muted, as well; supplemental analyses confirmed this.[16] If test scores were less variable over time than the measures underlying the Chicago and HERC indicators (e.g., grades earned, credits completed), then that might explain why there was little change in the hazard curve.

Another explanation for why the state indicator might not follow the same pattern as the Chicago and HERC indicators was the Chicago and HERC indicators measured more than student ability. To be sure, to earn an A or B, a student must be skilled; however, they also must be motivated and put in a great deal of effort by paying attention in class, completing assignments, and studying for exams. Students might experience dramatic changes in their motivation and effort over time if, for example, they disliked their teachers, moved to a new school, or had trouble in their home lives. In contrast, standardized tests might be less subject to changes in student motivation and effort over time since they were snapshots of a student's academic ability (i.e., administered during a single week in the school year). It should be noted the increased share of students falling off-track in the ninth grade for the Chicago and HERC indicators likely might be tied to the transition from middle to high school. This transition would involve a structural move (i.e., moving to a new building), encountering new students and teachers, and facing higher expectations. These changes might have been challenging for students and disrupted their patterns of attendance, grades, and course-taking.

Aside from the ninth-grade findings, another key observation was the survival curve was steeper for the HERC indicator than it was for the Chicago indicator; what this meant was that more students did not meet the HERC indicator than the Chicago indicator over time. The Chicago indicator might be considered a lenient benchmark of college enrollment; as mentioned, it was designed to predict high school graduation. Moreover, while the ninth-grade transition might pose challenges to students in terms of passing classes, it might have been disruptive beyond the lowest-achieving students who were most likely

[16] These results are available from the authors upon request.

to drop out. Middle- and high-achieving students might also find the ninth grade challenging. Although they might not be at risk of failing a class or being retained, middle- and high-achieving students might struggle with their schoolwork, earn lower grades than they were used to, and choose to take easier courses. In effect, the HERC indicator represented a higher standard that not only affected the lowest-achieving students at risk of high school dropout, but *all* students who might find the changes and rigors of high school challenging.

In additional analyses, interaction terms were incorporated to test for differential effects by gender, race/ethnicity, and economic disadvantage. These models helped determined whether the grade during which students were at risk of falling off-track and not meeting the Chicago, HERC, and state indicators varied by student background (See Appendix J). Overall, patterns varied little among subgroups. Regardless of demographic background or socioeconomic status, ninth grade was a challenging transition in terms of the HERC indicator and, to a lesser extent, the Chicago indicator. Moreover, the state indicator showed seventh grade — the first year in the analyses — was when the plurality of students did not meet that measure.

While male, black, Hispanic, and economically disadvantaged students were less likely to meet the Chicago, HERC, or state measures, a more troubling finding was that the hazard curves, which traced when students were at greatest risk of not meeting a measure, were steeper. This meant male, black, Hispanic, and economically disadvantaged students were less likely to meet the Chicago, HERC, and state indicators than female, white, Asian, and non-economically disadvantaged students. For example, using the HERC indicator, the share of students not meeting the potential indicator in ninth grade was relatively low for white and Asian students, 15 and 12 percent, respectively. In contrast, the share of black and Hispanic students not meeting the HERC indicator in ninth grade was dramatically higher, 64 and 53 percent, respectively. There were also large differences by SES: while 23 percent of non-economically disadvantaged students did not meet the ninth-grade HERC indicator, 58 percent of economically disadvantaged students did not meet it. The ninth-grade transition was challenging for all students, but if the HERC indicator might be considered a reliable predictor of college enrollment, then that transition could have particularly harmful consequences for black, Hispanic, and economically disadvantaged students.

# Conclusion

The goal of this study was twofold: 1) to test different potential indicators of college enrollment and determine which ones might be useful to practitioners in identifying students for early intervention and 2) to examine the potential indicators in an effort to understand when students might be at risk of not meeting them and, implicitly, falling off the pathway to college.

Overall, the assessment of the potential indicators suggested the HERC indicator might be the best predictor of college enrollment. Not only did it show high rates of correct overall predictions, but it also correctly predicted outcomes for a majority of non-college enrollees, particularly in later grades. (In seventh grade, the state indicator correctly predicted non-college enrollment at a higher rate than both the HERC and Chicago indicators.) Correctly predicting non-enrollment for non-college enrollees is especially important for educational decision-makers. Practitioners may target non-enrollees for early intervention and help them plan and prepare for postsecondary education. Correctly predicting outcomes for enrollees is important, too — it can help education decision-makers understand where *not* to intervene.

School and district practitioners must exercise caution when using the potential indicators to predict outcomes for students of different backgrounds. The college enrollment rates of white, Asian, and non-economically disadvantaged students who did not meet the Chicago, HERC, and state indicators were underestimated. These students might have additional supports outside of school, which could not be captured in the analysis and might push them into college despite subpar academic performance.

In addition, the event history analyses suggested, in terms of the Chicago and HERC indicators, ninth grade was a challenging time for students. This was the year during which higher shares of students fell off-track. However, the findings did not show this pattern with the state indicator, which was based on test score cutoffs. Standardized tests, which are highly correlated year-to-year, may not capture motivation and effort in school and thereby be less subject to variation caused by external shocks like the structural move from middle to high school or changes in friend groups, teachers, and course rigor.

HISD has implemented a number of innovative programs aiming to improve college readiness among its students. For example, during the 2018-2019 school year, the district launched Project Explore, a college readiness initiative targeting high-achieving middle-school students. The students in our analyses did not have opportunities to participate in this program or HISD's recent college readiness efforts because they did not yet exist, so it is possible outcomes for future cohorts will be different.

It is beyond the scope of this report to suggest specific strategies to district practitioners, but, based on the findings, targeting the ninth-grade transition is key to ensuring students stay on-track to college. Additionally, the potential indicators tested may be part of those efforts if they can help teachers, counselors, and administrators identify students in need of additional resources and supports.

# References


Allensworth, E. M., & Easton, J. Q. (2005). *The On-Track Indicator as a Predictor of High School Graduation*. Chicago, IL: University of Chicago Consortium on School Research. Retrieved March 28, 2017, from https://consortium.uchicago.edu/publications/track-indicator-predictor-high-school-graduation

Allensworth, E. M., Gwynne, J. A., Moore, P., & de la Torre, M. de la. (2014). *Looking Forward to High School and College: Middle Grade Indicators of Readiness in Chicago Public Schools*. Chicago, IL: University of Chicago Consortium on School Research. Retrieved April 25, 2017, from http://ccsr.uchicago.edu/publications/looking-forward-high-school-and-college-middle-grade-indicators-readiness-chicago

Bowers, A. J., Sprott, R., & Taff, S. A. (2013). Do We Know Who Will Drop Out?: A Review of the Predictors of Dropping out of High School: Precision, Sensitivity, and Specificity. *The High School Journal, 96*(2), 77–100.

Conley, D. T. (2010). *College and Career Ready: Helping All Students Succeed Beyond High School*. San Francisco, CA: Jossey-Bass.

García, E., & Weiss, E. (2018). *Student absenteeism: Who misses school and how missing school matters for performance.* Washington, D.C. Retrieved May 1, 2019, from https://www.epi.org/publication/student-absenteeism-who-misses-school-and-how-missing-school-matters-for-performance/

Geiser, S., & Santelices, M. V. (2007). *Validity of High School Grades in Predicting Student Success Beyond the Freshman Year: High School Record vs. Standardized Tests as Indicators of Four-Year College Outcomes* (Research & Occasional Paper Series No. CSHE.6.07). Berkeley, CA: Center for Studies in Higher Education, University of California, Berkeley. Retrieved October 29, 2018, from https://cshe.berkeley.edu/publications/validity-high-school-grades-predicting-student-success-beyond-freshman-yearhigh-school

Kinder Institute for Urban Research. (2018). *Tracking Eighth-Graders' Postsecondary Outcomes in Harris County*. Houston, TX: Author. Retrieved April 30, 2019, from https://www.datahouston.org/story/8thgrade.html

Long, M. C., Conger, D., & Iatarola, P. (2012). Effects of High School Course-Taking on Secondary and Postsecondary Success. *American Educational Research Journal, 49*(2), 285–322.

Texas Education Agency. (2007). *Glossary for the Academic Excellence Indicator System: 2006-07 Report*. Austin, TX: Author. Retrieved April 24, 2019, from https://rptsvr1.tea.texas.gov/perfreport/aeis/2007/glossary.html

Texas Education Agency. (2018). *2018 Accountability Manual for Texas Public School Districts and Campuses*. Austin, TX: Author. Retrieved April 23, 2019, from https://tea.texas.gov/2018accountabilitymanual.aspx

Texas Higher Education Coordinating Board. (2015). *60x30TX: Texas Higher Education Strategic Plan: 2015-2030*. Austin, TX: Author. Retrieved August 29, 2016, from http://www.thecb.state.tx.us/reports/PDF/6862.PDF?CFID=46806174&CFTOKEN=16179922

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