IES Institute of Education Sciences

APPENDIXES
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Regional Educational Laboratory Northwest
At Education Northwest

First-Year Effects of Early Indicator and Intervention Systems in Oregon

See https://go.usa.gov/xFyhy for the full report.

Appendix A. About the study

This appendix provides an overview of the literature on early indicator and intervention systems (EIISs), including key indicators of high school dropout and graduation; which grade levels to focus on, as identified in the research for preventing high school dropout; and the evidence on EIISs that was available before this study. It then summarizes the history of Oregon Ballot Measure 98 and the High School Success Initiative during its first two years to provide additional context. Finally, it offers a more detailed description of each component of an EIIS.

Review of the literature

EIISs, also called early warning systems or early warning intervention monitoring systems, are a popular tool used by schools and school districts and supported by state education agencies across the country to identify students who do not meet on-track thresholds on indicators associated with high school graduation (Allensworth & Easton, 2007; George Washington University, 2012; Stuit et al., 2016; Therriault et al., 2010; Therriault et al., 2013). Students identified as not on track are then assigned to individualized interventions.

Summary of research on indicators. The most popular early warning indicators (attendance, behavior, and course performance) have been thoroughly researched over the past 15 years, resulting in the creation of many related data systems and the identification of promising practices for the use of these indicators (Allensworth & Easton, 2007; Balfanz et al., 2007; Bowers et al., 2013; Bruce et al., 2011; Roderick et al., 2014; Therriault et al., 2013; Uekawa et al., 2010). The following discussion reviews some of the key findings around these indicators. In short, the evidence on using attendance and course performance data as predictors of dropout and high school graduation is strong. The evidence for using behavior indicators as predictors is mixed (Allensworth et al., 2018).

The Consortium on Chicago School Research at the University of Chicago has been at the forefront of research on early warning indicators for many years. One of its early studies identified a key indicator of on-time graduation as the combination of accumulating five credits and receiving no more than one failing semester grade in a core course (math, English, history, or science) during grade 9. This measure correctly identified students who would graduate within four years 80 percent of the time. The study authors also identified grade point average in core courses and attendance as effective indicators of graduation, offering further information and additional opportunities for identification during grade 9 (Allensworth & Easton, 2007). A recent study by the consortium found that similar measures for grade 10 students are also highly predictive of four-year graduation (Seeskin et al., 2020). The indicator for on-track graduation at the end of grade 10 is measured as accumulating 13 credits

and failing no more than one semester course during grade 10. The consortium also found that attendance and grades are more predictive of high school graduation than standardized test scores (Allensworth et al., 2018).

A study of New York City Department of Education data found similar associations for grade 9 students. The study showed that earning 10 or more credits by the end of grade 9 offered a reliable prediction of graduation with a New York Regents diploma, which indicates college readiness (Kemple et al., 2013).[1] However, the study found that passing at least one Regents exam represents a substantial improvement in predicting graduation with a Regents diploma.[2] This combined on-track indicator was reliable and stable across seven cohorts of students. The analysis also showed that a substantial increase in grade 9 on-track graduation rates foreshadowed increases in Regents diploma graduation rates in New York City. The differences and similarities between the indicators in Chicago and New York highlight how local policies can affect indicator choices.

A study of predictors of dropping out in Delaware found that the strongest indicators in grades 9–12 were attendance rates, grade repetition, and math and English language arts course grades (Uekawa et al., 2010). The study also found a statistically significant relationship between number of suspensions in grades 9, 10, and 11 and dropping out, but the number of suspensions indicator did not demonstrate a statistically significant explanatory power when combined with the other indicators.

A review of 36 studies and 110 possible early warning indicators looked at both the precision (ability to identify dropouts) and accuracy (ability to identify nondropouts) of the indicators used (Bowers et al., 2013). The review found that longitudinal growth models (looking at indicators such as math achievement trajectories from grades 7 through 12) were the most precise and accurate, but it acknowledged that these models did not allow for easily calculated flags using data readily available at schools. The strongest cross-sectional indicators for which data are more likely to be readily available include the freshman on-track indicator created by the Consortium on Chicago School Research, mentioned above, along with other course performance measures of cumulative grade point average and number of first semester failures. Disciplinary infractions were not found among the strongest indicators in this review of the research.

The Everyone Graduates Center at Johns Hopkins University has worked extensively over the years to help districts identify the best indicators of high school dropout and graduation and to support the creation of EIISs. A study using longitudinal data demonstrated how predictive indicators reflecting poor attendance, misbehavior, and course failures in grade 6 can be used to identify 60 percent of the students who will not graduate from high school (Balfanz et al., 2007). Another study found that the number of suspensions in grade 9 was closely linked to dropout and high school graduation and that the relationship was statistically significant even after the model controlled for student demographic characteristics, attendance, and course performance. The study also found evidence that disciplinary infractions can be an early indicator of a downward academic spiral for some students and that these behavior issues may appear earlier than attendance and course performance issues (Balfanz et al., 2014). Still, the use of disciplinary infractions in EIISs should be approached with caution since the research findings on these measures are mixed, definitions of disciplinary measures differ across states and districts, and male students and students of color tend to have disproportionate suspension rates compared with other students who exhibit similar behavior (Allensworth et al., 2018). If these disproportionate rates of disciplinary infractions for some groups of students are not proportional to actual student behavior, this would be particularly problematic for an EIIS because certain student groups would be identified as at risk and assigned to services at higher rates than other groups, regardless of their actual behaviors.

Focus on grade 9 and 10. The Consortium of Chicago School Research focused on grade 9 course performance because many students fall off track during the transition from grade 8 to grade 9. The consortium found that a

[1] Credits are counted by semester in New York and by year in Chicago.

[2] Regents exams in several subject areas were required for graduation with a Regents diploma across the state of New York.

quarter of students with very high grade 8 standardized test scores were off track (using the on-track for graduation in grade 9 measure discussed above) at the end of grade 9, and 40 percent of students with very low grade 8 test scores were on track at the end of grade 9 (Allensworth & Easton, 2005). A more recent study found that the percentage of students on track at the end of grade 9 improved most when schools acted on real time data on absences and course performance and that this improvement led to higher high school graduation rates (Roderick et al., 2014). A recent study confirmed that grade 9 is still the most critical year in high school student trajectories and that the grade 9 on-track indicator is still highly predictive of graduation. Based on the indicator discussed above, nearly 50 percent of the nongraduates studied were off track, and another 20 percent had a course failure or low attendance during grade 9. Although the grade 9 indicators were highly predictive of high school graduation, the study found that an additional 8 percent of students who were on track in grade 9 moved off track in grade 10 and that students' grades and attendance generally decreased in grade 10 (Seeskin et al., 2020).

Summary of evidence for early indicator and intervention systems. The What Works Clearinghouse's *Preventing Dropout in Secondary Schools* updated practice guide recommends monitoring all students' progress and intervening when students show early signs of attendance, behavior, or academic problems, all the while noting that there is minimal evidence for this strategy (Rumberger et al., 2017). There are at least two rigorous studies of the implementation and effectiveness of EIISs.

The most important research on the impact of early warning systems comes from a randomized controlled trial of the impacts of the Early Warning Intervention and Monitoring System implemented in the Regional Educational Laboratory Midwest region (Faria et al., 2017). The study findings suggest that the system reduced chronic absenteeism and course failure, even after its first year and with relatively modest implementation. The study did not find a reduction in suspensions or an effect on credit accumulation. A rigorous evaluation of Diplomas Now, a full-school reform model that includes an EIIS, did not find impacts on the attendance, behavior, or course performance indicators when looked at separately, but did find an impact on a composite indicator of all three combined (Corrin et al., 2016).

The study of the Early Warning Intervention and Monitoring System compared schools implementing the system with schools that continued with their normal practices, and the Diplomas Now study compared schools implementing Diplomas Now with schools that were either maintaining their normal practices or pursuing other types of school reform. The current study of EIISs differed in that it compared districts that adopted EIIS using the additional High School Success Initiative funding with districts that might have used the additional funding to implement other activities focused on dropout prevention or college or career readiness.

Summary of Ballot Measure 98 and the High School Success Initiative

In November 2016 Oregon voters approved Ballot Measure 98 to provide additional funding to school districts for high school dropout prevention and college and career readiness initiatives. The measure created the High School Success Initiative, which provides direct funding to school districts and charter schools serving high school students (grades 9–12) with the goals of improving students' progress toward graduation starting in grade 9, increasing high school graduation rates, and improving the college and career readiness of high school graduates. The measure allocated $170 million for the 2017–19 period to be dispersed among districts that serve high school students. Funds were granted to districts in three areas: establishing or expanding career and technical education programs in high schools, college-level education opportunities for students in high schools, and dropout prevention strategies in high schools. More than 250 school districts and charter schools throughout Oregon received funding during this first phase of the initiative, including almost all the EIIS and comparison districts in this study (Oregon Department of Education, 2020a). Equity is a central tenet of the legislation, which specifies that traditionally underserved student groups should be targeted for services to ensure that their needs are met and that they are able to fully benefit from the initiative (Oregon Department of Education, 2020b).

All districts were required to use the funds in at least one of the areas listed above, and some districts, depending on the size of the grant, were required to use funds in all three areas. Districts that received less than $100,000 a year needed to address at least one of the areas, districts that received $100,000–$350,000 were required to address at least two areas, and districts that received $350,000 or more were required to address all three areas (Oregon Department of Education, 2020b). All eligible districts received funding in the first year. Prior to the second year, eligible districts were required to submit a High School Success Initiative plan describing how they intended to use the funding to address any or all of the three areas. All but one of the EIIS districts submitted a plan, and all but two comparison districts in the study submitted plans. All district plans were reviewed by the study team. Districts with plans that included an EIIS or activities similar to an EIIS were removed from the comparison pool.

The initiative specifies the following uses for funding under each of the three areas. For the establishment or expansion of career and technical education, funds could be used for the purchase of equipment; the construction of facilities; and the recruitment, licensing, employment, and training of personnel to provide career and technical education. For the establishment or expansion of college-level opportunities, the funds could be used for Advanced Placement, International Baccalaureate, or comparable college-level courses; dual credit and other accelerated college credit programs offered in conjunction with a postsecondary education institution; direct assistance to students with the selection and completion of any of these college-level opportunities; and the recruitment, licensing, employment, and training of personnel to provide college-level education opportunities in high school. For the establishment or expansion of dropout prevention initiatives, funds could be used to implement activities designed to reduce chronic absenteeism; establish and maintain data management systems that provide timely reports on students' attendance, disciplinary infractions, and course performance; provide academic and social supports for students at risk of not graduating, including summer programs, additional instructional time before or after school, tutoring or small group instruction during school, or counseling service; and provide coaching and counseling on postsecondary education and employment opportunities. The law was amended in 2017 to allow some funding (up to 15 percent) to support grade 8 students (Oregon Department of Education, 2020b).

Description of early indicator and intervention systems

The study team was unable to conduct research on EIIS implementation for this study, but generally in the EIIS approach, districts use data systematically to identify students who are not meeting attendance, behavior, or course performance goals; assign those students to interventions; and monitor their response to those interventions. There are four core elements of EIISs.

First, the EIIS design calls for a frequently refreshed data system that provides timely information on student indicators, often including attendance, behavior, and course performance (Frazelle & Nagel, 2015). Each district determines and sets thresholds for each indicator. Guidance on the best indicators suggests that they should be predictive of graduation, usable and clear, available in real-time or at the right time, have direct causal linkage to graduation or educational attainment, and be malleable enough that support services provided by the schools can have an effect (Allensworth et al., 2018). Districts often use indicators that have been shown to be associated with the risk of not graduating high school on time (Bowers et al., 2013; Uekawa et al., 2010). Districts can also validate their own thresholds using longitudinal local data that measure students' outcomes across high school, including high school graduation (Therriault et al., 2013). A district might set the threshold for attendance so that the system identifies any student missing more than 10 percent of school days. A threshold for behavior might be having one or more disciplinary infractions. A course performance threshold might be receiving a D or F in one or more courses. The data system is refreshed nightly and is available through a web-based dashboard, so district and school staff members regularly have access to up-to-date information (Willamette Education Service District, n.d.).

Second, the EIIS design offers a menu of interventions available at each school or district to address problems related to each indicator. For example, an afterschool tutoring program might be identified as a possible intervention for students not meeting course performance goals (Frazelle & Nagel, 2015). The menu is created by district or school staff and helps organize the individualized support services available for students. Usually, these menus are created in a spreadsheet program that lists interventions as rows and indicators as columns. Some interventions can support more than one indicator. For instance, individual coaching can support students struggling with attendance, behavior, course performance, or a combination of these issues. Interventions that can support more than one indicator can be noted by marking multiple indicator columns in the spreadsheet program (Frazelle & Nagel, 2015).

Third, a school implementing an EIIS creates a response team of teachers and other school staff members who meet frequently to discuss data reports from an EIIS and decide which interventions from the menu are best suited to each student's needs. For example, a student not meeting the attendance threshold could be assigned to a daily, first-period check-in with a school staff member. Students with disciplinary incidents could be assigned to a mediation group where other students trained in conflict resolution help their peers solve disputes. A student who falls below the threshold on more than one indicator could be assigned to individual coaching (Frazelle & Nagel, 2015).

Fourth, the response team monitors and updates the support as needed. After assigning a student to a specific intervention or set of interventions, the response team monitors the student's participation and progress to determine when changes should be made to the type or strength of the support the student receives (Frazelle & Nagel, 2015).

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Appendix B. Methods

This appendix discusses the study's data sources, outcome measures, study sample, and analytic methods and provides supplemental information for systematic reviews.

Data sources and outcome measures

The main data for this study are student-level records from the Oregon Department of Education for all Oregon high school students from 2013/14 to 2018/19. The records data contain information on student attendance, disciplinary infractions, course credit accumulation, performances on state standardized tests, and demographic characteristics. The study team used these data to assess whether early indicator and intervention systems (EIISs) had any first-year effects on chronic absenteeism, disciplinary infractions, course progression, or academic performance. The study team examined the outcome measures listed in table B1 in the grade levels identified.

Table B1. Description of outcome measures

Outcome measure	Description	Grades
Chronic absenteeism		
Chronic absenteeism: percentage of students who were absent for more than 10 percent of enrolled days	The value is 1 if the student was absent for 10 percent or more of enrolled days, and 0 otherwise	All grades (primary analysis); by grades 9–12 (exploratory analysis)
Severe chronic absenteeism: percentage of students who were absent for more than 15 percent of enrolled days	The value is 1 if the student was absent for 15 percent or more of enrolled days, and 0 otherwise	All grades (primary analysis); by grades 9–12 (exploratory analysis)
Disciplinary infractions		
Percentage of students who were ever suspended or expelled during the school year	The value is 1 if the student was ever suspended or expelled during the school year, and 0 otherwise	All grades (primary analysis); by grades 9–12 (exploratory analysis)
Course progression		
Percentage of students who met the course-progression goals needed to be considered on track to graduate in grade 9[a]	The value is 1 if the student obtained at least 25 percent of the credits required for graduation, and 0 otherwise	Grade 9 (primary analysis)
Academic performance		
Percentage of students who performed at or above the proficiency level in math[b]	The value is 1 if the student's score on the state standardized math test was at or above the proficiency level, and 0 otherwise	Grade 11 (primary analysis)
Percentage of students who performed at or above the proficiency level in English language arts[b]	The value is 1 if the student's score on the state standardized English language arts test was at or above the proficiency level, and 0 otherwise	Grade 11 (primary analysis)

a. This measure is available only for students in grade 9.
b. This measure is available only for students in grade 11.
Source: Authors' summary.

There were two measures of chronic absenteeism in this study: chronically absent and severely chronically absent. Chronically absent refers to the percentage of students who were absent for more than 10 percent of enrolled days. This threshold is suggested by the National High School Center as an early warning indicator for chronic absenteeism (Therriault et al., 2013) and is often used by state education agencies (Chang et al., 2019). Severely chronically absent refers to the percentage of students who were absent for more than 15 percent of enrolled days. This measure is used in this study to capture students with more serious attendance issues (Corrin et al.,

2016). With this measure the study captures whether EIIS adoption might have led to fewer students being severely chronically absent.

The disciplinary infractions measure refers to the percentage of students who were ever suspended or expelled during the year, as reported in the Oregon Department of Education data. Many EIISs and other early warning indicator systems track students' office disciplinary referrals as well as suspensions and expulsions, allowing a school's staff to identify students with behavioral issues early on. The state data used for this study do not include office referrals. Although the suspensions and expulsions outcome measure is the best measure of student behavior available and has been used in other evaluations of early warning indicator systems (Corrin et al., 2016; Faria et al., 2017), it is imperfect because it depends not only on students' actual behavior but also on choices districts and schools make about how to deal with that behavior. For example, in recent years many school districts across the country have moved toward using restorative practices, a popular school reform that promotes relationship building and mediation over suspension. A district could have fewer suspensions because it adopted these or similar practices and not because there were changes in student behavior. It is also possible that staff members in EIIS districts might give more disciplinary referrals than they would without an EIIS in order to ensure that students receive the EIIS services.

Academic performance refers to the percentages of grade 11 students who scored proficient or better on the Smarter Balanced assessments in math and English language arts. Often, EIIS data systems are set up to identify students who have received a D or an F in one or more courses or whose grade point average dips below a certain level (such as 2.0 or a C average). These students are then offered interventions such as tutoring, homework help, or supplemental course work to strengthen their understanding of the subject matter. This support is theorized to lead to stronger course performance and ultimately to better general academic performance. However, data were not available to measure students' course performance directly. The study therefore measured the medium-term outcome of student academic performance using grade 11 state standardized test scores in math and English language arts.

The study team also constructed student characteristic measures based on the records data for each baseline year and the program year. These measures cover students' gender, race/ethnicity, special education status, and English learner status. The Oregon Department of Education also provided school-level enrollment data for the 2013/14–2018/19 school years and high school graduation rate data for all baseline years (2013/14–2017/18).

In addition to student-level records data, the study team collected school-level information from the Common Core of Data database maintained by the National Center for Education Statistics (U.S. Department of Education, n.d.). These variables include the school's locality (urban, suburban, town, or rural), eligibility for the federal Title I program (which provides additional funds to schools with high percentages or high numbers of children from low-income families), and type (charter, magnet, virtual, or regular).

Data from the EIIS data system managed by the Willamette Education Service District (n.d.) were used to identify the program districts. These data were provided to the study team by Willamette Education Service District. No other data from the EIIS data system were available to the study team.

Missing data. The student-level data allowed the team to construct district-level outcome measures for all districts in the study sample. Therefore, there was no attrition of districts in any of the main analyses, and there were no missing data for any of the outcome measures. This fact, along with the fact that covariates were not used in the main analyses (see the analytic methods section below), resulted in there being no missing data in these analyses. The attrition of districts for the subgroup analyses is discussed in the study sample section below.

Study timeframe. One important limitation of this study is that, due to the project timeline, it could assess the effect of EIISs only on short-term and some medium-term outcomes for one year. The EIIS model is complex, and

it could take more than a year for districts to fully implement all the components effectively. Although the initiative would be expected to show some improvements in shorter-term outcomes such as the measures related to attendance, behavior, and course progression, it is less likely that the initiative would produce gains on medium-term goals such as academic performance (which is measured in this study) and persistence and progression through high school (which are not measured because more than one year of data are needed to properly measure them). Since it is likely to take more than one year for the initiative to produce an effect on the long-term goal of improving high school graduation rates, this study did not explore that outcome.

Study sample. The primary analysis sample of the study consisted of 65 EIIS districts in Oregon that adopted an EIIS in 2018/19 and 29 unique comparison districts that are similar to the EIIS districts across a variety of characteristics. This section describes the matching process that produced this sample of districts. The same process was used to identify the districts included in the subgroup analyses that focused on students not meeting attendance, behavior, or course-progression goals in the year prior to EIIS adoption. The matching process for the subgroups is described at the end of this section.

The early indicator and interventions systems districts. To be included as an EIIS district in the study, a district had to meet several criteria:

- Use the Oregon Data Suite (a popular EIIS data system) by logging in at least once during the 2018/19 school year.[1]
- Have at least one regular high school (districts that served specific populations or contained only virtual or alternative schools were excluded).
- Have data on all outcome measures for 2013/14–2018/19 in the district records data obtained from the Oregon Department of Education.

This process identified 65 school districts in the East, South, West, and Northwest regions of Oregon that met these criteria; there were no EIIS districts in the Central region. These districts represented 97 percent (65 of 67) of all districts that logged onto the Oregon Data Suite at least once that year. They are included in the study as the EIIS districts. All but one of these districts also reported plans to use the High School Success Initiative funds to adopt an EIIS during the 2018/19 school year. These EIIS districts differed from other school districts in Oregon in student composition and district structural characteristics. For example, compared with other eligible districts in Oregon, the EIIS districts on average had larger student enrollment, higher student–teacher ratios, and higher proportions of English learner students. The EIIS districts were similar to other eligible districts in the student outcomes that were of interest to this study, as measured in the 2017/18 school year, the year before the EIIS was rolled out (table B2).

[1] Although several different data systems are used in Oregon, this study focuses on districts using the Oregon Data Suite, a particularly well-developed system and the most popular.

Table B2. Outcome measures and student composition and district structural characteristics of early indicator and intervention systems (EIISs) districts in the study and all other eligible districts in Oregon in the last baseline year, 2017/18

Outcome measure	Oregon EIIS districts (*n* = 65)	Other eligible Oregon districts[a] (*n* = 101)
Percentage of students who were chronically absent, all grades	30.7	30.1
Percentage of students who were severely chronically absent, all grades	17.4	16.7
Percentage of students with disciplinary infractions, all grades	7.6	7.0
Percentage of students meeting course-progression goals, grade 9	80.3	81.5
Percentage of students proficient or above in math, grade 11	32.1	30.5
Percentage of students proficient or above in English language arts, grade 11	71.0	69.5
Student composition		
Percentage of White students	68.9	75.0
Percentage of male students	51.5	52.3
Percentage of English learner students	2.7***	1.2
Percentage of students with Individualized Education Programs	14.2	13.3
District structural characteristics		
Number of high schools in district	1.4	1.5
Percentage of high schools located in a city or suburb	22.3	13.1
Percentage of high schools eligible for Title I	10.7	15.1
Percentage of high schools serving only grades 9–12	70.1*	52.3
Percentage of high schools that are charter schools	14.6	19.2
Average high school enrollment in grades 9–12	687.8***	360.0
Average grade 9 enrollment	179.1***	91.9
Average grade 10 enrollment	171.9***	91.6
Average grade 11 enrollment	167.0***	88.0
Student–teacher ratio	18.9**	16.4
Average graduation rate (percent)	80.6	79.9

* Difference significant at $p < .05$; ** significant at $p < .01$; *** significant at $p < .001$.

Note: Values are observed means aggregated to the district level. A two-tailed *t*-test was applied to each estimated difference between the EIIS districts and other eligible Oregon districts. Rounding might cause slight discrepancies in calculating sums and differences.

a. Includes only districts that serve regular, nonalternative high schools.

Source: Authors' analysis based on student-level data from the Oregon Department of Education and school-level data from U.S. Department of Education (n.d.), for school years 2013/14–2017/18.

Selection of comparison districts. In a comparative interrupted time series design, the purpose of the comparison group is to capture the extent to which the outcomes in program group (EIIS districts) would have changed had the districts not adopted the program. The study team used a two-step procedure to maximize the likelihood that the difference between the comparison districts' actual outcomes in the program year and their projected outcomes for the program year provided the right counterfactual. First, the study team identified a pool of potential comparison districts within the same geographic areas as the EIIS districts. Second, the study team used

multiple matching methods to select comparison schools whose baseline characteristics and trends in outcome measures were as similar as possible to those of the EIIS districts.[2]

Identifying the comparison pool. The pool of potential comparison districts consisted of districts that did not plan to use their High School Success Initiative funding to adopt an EIIS during 2018/19, the study year. To be part of the comparison pool, districts had to meet the following criteria:

- Had not discussed adopting an early warning system or components of such a system in its 2018/19 High School Success Plan.[3]
- Was not located in the Central region of Oregon (because none of the EIIS districts were in the Central region).
- Had at least one regular high school and at least 20 enrolled high school students (districts that served specific populations or comprised only virtual or alternative schools were excluded).
- Had data on all the study outcome measures over 2013/14–2018/19 in the district data obtained from the Oregon Department of Education.

The team identified 75 districts that met these criteria and that were considered potential comparison districts.

Selecting matched comparison districts. The comparison districts in the study were chosen by matching each of the 65 EIIS districts to the one or two districts in the comparison district pool that were the best match. A comparison district was considered a best match to an EIIS district if it was the most similar to the EIIS district in baseline trends in outcomes and outcome values and in student composition and district structural characteristics in the year before an EIIS was adopted.

Two matching metrics were used to gauge the similarity between an EIIS district and a potential comparison district: Euclidean distance and propensity score. The Euclidean distance captures the differences between two districts in multiple matching variables. The Euclidean distance across *M* matching variables is defined as:

$$D = \sqrt{\sum_{M} \left(\frac{P_m - C_m}{SD_m}\right)^2}$$

where P_m is the value of variable *m* for the EIIS district, C_m is the value of variable *m* for a potential comparison district, and SD_m is the standard deviation of variable *m* across all the EIIS districts and potential comparison districts. This distance metric was calculated for each possible pair of EIIS and comparison districts, and the one or two comparison districts that were the most similar to (or least distant from) a given EIIS district were identified as the matched comparison for that EIIS district.

The second metric used to measure the overall distance between districts was the propensity score. The propensity score is the predicted likelihood (or propensity) of a district being in the EIIS group. This score is calculated based on estimated coefficients from the following logistic regression:

$$\text{logit}\left(\text{Program}_\text{j}\right) = \alpha + \sum_{\text{m=1}}^{\text{m=M}} \delta_\text{m} \text{M}_\text{mj} + \varepsilon_\text{j}$$

where $Program_j$ is an indicator that equals 1 if district *j* is an EIIS district and 0 if not, and M_{mj} is the m^{th} matching variable for district *j*, α is a constant term, δ_m is the estimated coefficient for the m^{th} matching variable, and ε_j is the between-district random variation. Only EIIS districts and potential comparison districts with propensity scores

[2] The literature includes studies that used other methods to select comparison districts. One recent example is Athey et al. (2018).

[3] Districts had to submit these plans in the spring of 2018 to receive funding under the High School Success Initiative.

within the range of the common support were kept in the matching process and subsequent analysis, to ensure that districts with the same *M* values have a positive probability of being treated and not treated (Heckman et al., 1999).

The following variables were used to calculate Euclidean distances and propensity scores in this study:

- Outcomes for the last baseline year (2017/18) and estimated slopes of baseline trends for each outcome measure:
  - Percentage of students who were chronically absent (for all grades).
  - Percentage of students who were severely chronically absent (for all grades).
  - Percentage of students with disciplinary infractions (for all grades).
  - Percentage of students meeting the course-progression goals to be considered on track to graduate (grade 9 only).
  - Percentage of students proficient or above on the state math test (grade 11 only).
  - Percentage of students proficient or above on the state English language arts test (grade 11 only).
- Student composition in the last baseline year (2017/18):
  - Percentage of White students.
  - Percentage of male students.
  - Percentage of English learner students.
  - Percentage of students with Individualized Education Programs.
- District structural characteristics in the last baseline year (2017/18):
  - Number of high schools in the district.
  - Percentage of high schools located in a city or suburb.
  - Geographic region (East, South, West, or Northwest).
  - Percentage of high schools eligible for Title I.
  - Percentage of high schools serving only grades 9–12.
  - Percentage of high schools that were charter schools or regular schools.
  - Average high school enrollment in grades 9–12.
  - Student–teacher ratio.
  - Average graduation rate.

The study team calculated a series of Euclidean distances and propensity scores using different combinations of the matching variables (the complete list, outcome values for 2017/18 and their baseline trends, outcome values for 2017/18, and trends plus a few variables related to student composition and district structural characteristics)[4] and conducted one-to-one and one-to-two matching using these metrics. Because of the small size of the comparison pool, comparison districts were chosen with replacement. In other words, a district from the pool could be chosen as the comparison for more than one EIIS district. Though matching with replacement reduces

[4] The demographic variables used here were percentage of White students, percentage of students with individualized education programs, percentage of high schools eligible for Title I, percentage of high schools that were charter schools, and the student–teacher ratio.

the number of unique comparison districts in the study, it maximizes the similarity of the comparison districts and the EIIS districts with respect to the matching variables. This process resulted in a set of matched samples based on different combinations of the matching metric (Euclidean distance or propensity score), matching variables, and number of matched comparison districts per EIIS district.

The study team then checked the similarity between the EIIS district and the comparison district for each matched sample and identified four matched samples with high levels of baseline similarity between the EIIS district and the comparison district. For each of the four samples there was no more than one estimated difference that was statistically significant for any of the outcome measures or demographic and structural characteristics in the last baseline year, and none of the estimated differences in any variable exceeded 0.25 standard deviation in effect size.[5]

To further narrow the choices, the study team conducted a validation analysis for each of the four identified samples by looking at the estimated effect of an EIIS on the districts in the last baseline year. This effect should be zero, because the EIIS districts were not yet rolling out their EIISs. Therefore, this test provides a useful benchmark for validating the design and the selection of the comparison districts. This validation test was conducted by treating the last baseline year (2017/18) as though it were the program year. Comparison districts were then selected again using the shifted baseline period (2013/14–2016/17), and the effects of EIIS were re-estimated. Of the four approaches tested, one produced a statistically significant impact on an outcome measure and was dropped from the selection.

Among the remaining three options, the team selected the matched sample that included all EIIS districts and had the largest number of unique comparison districts. This approach matched each EIIS district with the most similar comparison district (one-to-one match) using the Euclidean distance across the complete set of matching variables listed above. This final matched sample consisted of 65 EIIS districts and 29 unique comparison districts.

There are no statistically significant differences in the outcome measures or in the student composition or district structural characteristics between the EIIS districts and their matched comparison districts in the last baseline year before the districtwide adoption of EIISs (table B3). Additionally, the magnitudes of the estimated differences are small compared with the conventional threshold of caution (0.25 standard deviation in effect size). An omnibus test also found no evidence of systematic difference between these two groups (*p*-value = .25).

[5] This is the criterion used by the What Works Clearinghouse (2020), which is the clearinghouse for education research hosted by the U.S. Department of Education's Institute of Education Sciences. Studies show that quasi-experimental designs are more likely to produce biased results when baseline differences exceed this threshold (Ho et al., 2007).

Table B3. Outcome measures and student composition and district structural characteristics of early indicator and intervention systems (EIISs) districts and comparison districts in the last baseline year, 2017/18

Baseline measure	EIIS districts[a] (n = 65)	Comparison districts[a] (n = 29)	Estimated difference	Effect size of estimated difference[b]	Standard error of estimated difference	p-value of estimated difference
Outcome measure						
Percentage of students who were chronically absent, all grades	30.7	29.9	0.8	0.02	1.64	.625
Percentage of students who were severely chronically absent, all grades	17.4	16.5	0.9	0.02	1.42	.522
Percentage of students with disciplinary infractions, all grades	7.6	8.2	–0.6	–0.02	0.85	.482
Percentage of students meeting course-progression goals, grade 9	80.3	80.8	–0.6	–0.01	1.85	.765
Percentage of students proficient or above in math, grade 11	32.1	32.9	–0.9	–0.02	2.58	.742
Percentage of students proficient or above in English language arts, grade 11	71.0	72.4	–1.4	–0.03	2.19	.518
Student composition						
Percentage of White students	68.9	72.5	–3.6	–0.07	3.10	.250
Percentage of male students	51.5	51.5	0.0	0.00	0.74	.991
Percentage of English learner students	2.7	1.6	1.0	0.05	0.56	.074
Percentage of students with Individualized Education Programs	14.2	13.3	0.9	0.03	0.68	.202
District structural characteristics						
Number of high schools in the district	1.4	1.3	0.1	0.14	0.18	.450
Percentage of high schools located in a city or suburb	22.3	16.9	5.4	0.12	8.11	.508
Percentage of high schools eligible for Title I	10.7	6.2	4.5	0.14	5.58	.418
Percentage of high schools serving only grades 9–12	70.1	71.0	–1.0	–0.02	9.14	.916
Percentage of high schools that are charter schools	14.6	13.3	1.3	0.03	6.52	.845
Average high school enrollment in grades 9–12	687.8	621.1	66.8	0.10	128.90	.606
Average grade 9 enrollment	179.1	159.5	19.6	0.11	33.94	.565
Average grade 10 enrollment	171.9	159.9	12.0	0.07	32.92	.716
Average grade 11 enrollment	167.0	149.3	17.6	0.10	30.88	.569
Student-to-teacher ratio	18.9	18.9	0.0	0.01	0.75	.975
Average graduation rate (percent)	80.6	82.5	–1.9	–0.13	1.95	.321

Note: No differences were significant at p = .05 or higher. All values are aggregated to the district level. Student-level standard deviations were used for outcome measures and student composition; school-level standard deviations were used for district structural characteristics except for number of high schools in district, for which district-level standard deviation was used. A two-tailed t-test was applied to each estimated difference between the EIIS districts and the comparison districts. An omnibus test for systematic difference between the EIIS and comparison districts yielded a p-value of .250. Rounding might cause slight discrepancies in calculating sums and differences.

a. The values are the weighted means across districts, where the weights account for the fact that some comparison districts are chosen as the match for more than one EIIS district.

b. Calculated as the proportion of the standard deviation for a given variable.

Source: Authors' analysis based on student-level data from the Oregon Department of Education and school-level data from U.S. Department of Education (n.d.), for school years 2013/14–2017/18.

Selection of the comparison districts for subgroups. A similar matching process was used to select comparison districts for subgroups of students: students who were severely chronically absent, who had disciplinary infractions, or who had not accumulated enough credits by the end of grade 9 to be considered on track to graduate. To explore whether the adoption of an EIIS benefited students in these subgroups, the study team constructed three subgroups for the year before EIIS adoption based on measures similar to EIIS indicators (see appendix C for more information about the subgroups). Once each subgroup was identified, the team generated aggregated district-level outcome measures and student composition and district structural characteristic measures based on data only for the specific subgroup of students. The same matching approach as described above for the full sample was then used for each subgroup of students; the process resulted in the creation of different samples of EIIS districts and comparison districts for each subgroup.[6]

EIIS districts with small enrollment numbers or high mobility might have had no students that met the subgroup criteria in a given year. When that was the case for either the last baseline year or the program year, the district was dropped from the subgroup analysis because no outcome data were available for the matching or for the impact analysis. As a result, each subgroup sample included a different number of EIIS districts: there were 46 EIIS districts in the subgroup of severely chronically absent students, 50 in the subgroup of students with disciplinary infractions, and 60 in the subgroup of grade 10 students who, by the end of grade 9, had not attained the credits needed to be considered on track to graduate. Districts with no students meeting the subgroup criteria in 2017/18 or 2018/19 were excluded from the comparison pool for the same reason.

This matching process also led to a separate set of comparison districts for each subgroup. The selected comparison districts offered the best match to the EIIS districts in terms of outcome measures and student composition and district structural characteristics in the last baseline year (2017/18), and the maximum number of unique districts were included in the sample. Even more important, for each of the three subgroups there were no statistically significant differences between EIIS and comparison districts in outcome measures, student composition, and district structural characteristics during the last baseline year (tables B4–B6). Outcome measures and student composition and district structural characteristics were measured for the groups of students meeting the definition for each of the three subgroups based on their performance during the previous year (2016/17).

Analytic methods

Comparative interrupted time series. This study evaluated the early effects of EIISs on student outcomes using a comparative interrupted time series (CITS) design, a quasi-experimental design that lends itself well to exploring the effect of systemwide interventions. In education, CITS designs have been used to evaluate federal policies such as No Child Left Behind and the effect of whole-school reform models (Dee & Jacob, 2011; Kemple et al., 2005; Somers & Garcia, 2016; Somers & Haider, 2017; Wong et al., 2009). Studies have shown that a well-implemented CITS design can, in some circumstances, reproduce the results of a randomized experiment (Fretheim et al., 2013; Somers et al., 2013; St. Clair et al., 2014).

[6] The matching variables used for selecting comparison districts for the subgroup analysis were the same as those used for the full-sample matching except that for the grade 10 subgroup of students not obtaining the credits needed to be considered on track in grade 9, outcomes based on information from other grade levels were not used as matching variables, and student-composition variables were calculated using grade 10 information only.

Table B4. Outcome measures, student composition, and district structural characteristics of early indicator and intervention systems (EIISs) districts and comparison districts in the last baseline year (2017/18) for students identified as severely chronically absent in the previous year (2016/17)

Baseline measure	EIIS districts[a] (n = 46)	Comparison districts[a] (n = 23)	Estimated difference	Effect size of estimated difference[b]	Standard error of estimated difference	p-value of estimated difference
Outcome measure						
Percentage of students who were chronically absent, all grades	84.5	84.8	–0.4	–0.01	2.19	.867
Percentage of students who were severely chronically absent, all grades	67.8	70.1	–2.3	–0.06	2.93	.443
Percentage of students with disciplinary infractions, all grades	15.0	14.6	0.4	0.01	1.99	.852
Percentage of students meeting course-progression goals, grade 9	42.1	42.9	–0.8	–0.02	5.41	.885
Percentage of students proficient or above in math, grade 11	9.7	11.1	–1.4	–0.03	2.78	.612
Percentage of students proficient or above in English language arts, grade 11	52.5	50.0	2.6	0.06	5.71	.655
Student composition						
Percentage of White students	68.7	71.3	–2.6	–0.05	3.66	.476
Percentage of male students	47.2	49.8	–2.6	–0.05	1.90	.173
Percentage of English learner students	2.6	2.3	0.3	0.02	0.83	.726
Percentage of students with Individualized Education Programs	21.4	20.2	1.1	0.03	2.40	.641
District structural characteristics						
Number of high schools in the district	1.5	1.5	0.0	0.02	0.28	.938
Percentage of high schools located in a city or suburb	20.7	19.6	1.1	0.02	9.71	.911
Percentage of high schools eligible for Title I	6.4	9.0	–2.6	–0.08	6.11	.673
Percentage of high schools serving only grades 9–12	73.4	66.4	7.1	0.15	10.29	.493
Percentage of high schools that are charter schools	12.0	15.4	–3.5	–0.09	6.75	.609
Average high school enrollment in grades 9–12	702.3	715.2	–12.9	–0.02	139.01	.926
Average grade 9 enrollment	180.0	183.6	–3.6	–0.02	36.05	.921
Average grade 10 enrollment	176.3	184.9	–8.5	–0.05	35.82	.812
Average grade 11 enrollment	172.1	169.8	2.3	0.01	33.33	.944
Student–teacher ratio	19.6	19.2	0.4	0.10	0.82	.603
Average graduation rate (percent)	80.0	80.7	–0.8	–0.05	2.46	.753

Note: No differences were significant at p = .05 or higher. All values are aggregated to the district level. Outcome measures and student composition values were measured for the subgroup of students who were severely chronically absent (absent for more than 15 percent of school days) in the previous school year (2016/17). Only districts with at least one student identified for this subgroup in the program year (2018/19) and the last baseline year (2017/18) were included in the analysis. Student-level standard deviations were used for outcome measures and student composition; school-level standard deviations were used for district structural characteristics except for number of high schools in district, for which district-level standard deviation was used. A two-tailed t-test was applied to each estimated difference between the EIIS districts and the comparison districts. An omnibus test for systematic difference between the EIIS and comparison districts yielded a p-value of .783. Rounding might cause slight discrepancies in calculating sums and differences.

a. The values are the weighted means across districts, where the weights account for the fact that some comparison districts are chosen as the match for more than one EIIS district.

b. Calculated as the proportion of the standard deviation for a given variable.

Source: Authors' analysis based on student-level data from the Oregon Department of Education and school-level data from U.S. Department of Education (n.d.), for school years 2013/14–2017/18.

Table B5. Outcome measures, student composition, and district structural characteristics of early indicator and intervention systems (EIISs) districts and comparison districts in the last baseline year (2017/18) for students with disciplinary infractions in the previous year (2016/17)

Baseline measure	EIIS districts[a] (n = 50)	Comparison districts[a] (n = 26)	Estimated difference	Effect size of estimated difference[b]	Standard error of estimated difference	p-value of estimated difference
Outcome measure						
Percentage of students who were chronically absent, all grades	49.8	53.4	–3.6	–0.08	3.00	.236
Percentage of students who were severely chronically absent, all grades	35.7	36.7	–1.1	–0.03	3.13	.729
Percentage of students with disciplinary infractions, all grades	32.5	35.7	–3.2	–0.12	2.82	.265
Percentage of students meeting course-progression goals, grade 9	53.7	54.2	–0.5	–0.01	4.00	.892
Percentage of students proficient or above in math, grade 11	9.6	8.2	1.4	0.03	2.55	.587
Percentage of students proficient or above in English language arts, grade 11	44.2	39.9	4.3	0.10	4.70	.365
Student composition						
Percentage of White students	61.6	65.0	–3.4	–0.07	4.33	.432
Percentage of male students	69.8	71.1	–1.4	–0.03	1.89	.463
Percentage of English learner students	4.0	3.6	0.4	0.02	1.19	.726
Percentage of students with Individualized Education Programs	26.5	22.6	3.9	0.12	2.11	.068
District structural characteristics						
Number of high schools in the district	1.5	1.7	–0.1	–0.12	0.26	.641
Percentage of high schools located in a city or suburb	29.0	27.0	2.0	0.04	10.17	.845
Percentage of high schools eligible for Title I	5.9	0.3	5.6	0.17	3.41	.103
Percentage of high schools serving only grades 9–12	82.1	76.0	6.0	0.13	8.23	.467
Percentage of high schools that are charter schools	8.0	17.2	–9.2	–0.24	5.27	.085
Average high school enrollment in grades 9–12	862.2	789.9	72.3	0.10	142.36	.613
Average grade 9 enrollment	224.6	198.7	25.9	0.14	38.02	.498
Average grade 10 enrollment	215.9	197.7	18.3	0.10	36.16	.615
Average grade 11 enrollment	208.6	193.8	14.9	0.09	34.28	.665
Student–teacher ratio	20.4	20.2	0.1	0.03	0.69	.850
Average graduation rate (percent)	79.9	76.9	3.0	0.20	2.29	.195

Note: No differences were significant at p = .05 or higher. All values are aggregated to the district level. Outcome measures and student composition values were measured for the subgroup of students who had at least one disciplinary infraction in the previous school year (2016/17). Only districts with at least one student identified for this subgroup in the program year (2018/19) and the last baseline year (2017/18) were included in the analysis. Student-level standard deviations were used for outcome measures and student composition; school-level standard deviations were used for district structural characteristics except for number of high schools in district, for which district-level standard deviation was used. A two-tailed t-test was applied to each estimated difference between the EIIS districts and the comparison districts. An omnibus test for systematic difference between the EIIS and comparison districts yielded a p-value of .273. Rounding might cause slight discrepancies in calculating sums and differences.

a. The values are the weighted means across districts, where the weights account for the fact that some comparison districts are chosen as the match for more than one EIIS district.

b. Calculated as the proportion of the standard deviation for a given variable.

Source: Authors' analysis based on student-level data from the Oregon Department of Education and school-level data from U.S. Department of Education (n.d.), for school years 2013/14–2017/18.

Table B6. Outcome measures, student composition, and district structural characteristics of early indicator and intervention systems (EIISs) districts and comparison districts in the last baseline year (2017/18) for grade 10 students who had not in the previous year obtained 25 percent of the credits needed to graduate (2016/17)

Baseline measure	EIIS districts[a] (*n* = 60)	Comparison districts[a] (*n* = 34)	Estimated difference	Effect size of estimated difference[b]	Standard error of estimated difference	*p*-value of estimated difference
Outcome measure						
Percentage of students who were chronically absent, grade 10	56.6	56.4	0.2	0.00	3.74	.960
Percentage of students who were severely chronically absent, grade 10	41.8	40.6	1.3	0.03	3.71	.729
Percentage of students with disciplinary infractions, grade 10	19.8	19.9	0.0	0.00	2.78	.991
Student composition						
Percentage of White students	62.5	68.6	–6.1	–0.13	4.59	.188
Percentage of male students	60.6	59.7	0.9	0.02	2.75	.735
Percentage of English learner students	5.7	4.2	1.5	0.08	1.73	.391
Percentage of students with Individualized Education Programs	25.3	23.3	2.0	0.06	2.74	.471
District structural characteristics						
Number of high schools in the district	1.5	1.5	0.0	0.00	0.24	1.000
Percentage of high schools located in a city or suburb	24.2	22.5	1.7	0.04	8.71	.849
Percentage of high schools eligible for Title I	8.3	2.1	6.1	0.18	4.22	.151
Percentage of high schools serving only grades 9–12	74.2	78.4	–4.2	–0.09	8.27	.614
Percentage of high schools that are charter schools	14.2	12.0	2.2	0.06	6.02	.718
Average grade 10 enrollment	184.2	174.4	9.9	0.06	33.63	.770
Student–teacher ratio	19.4	19.1	0.3	0.08	0.67	.626
Average graduation rate (percent)	80.0	79.3	0.7	0.05	2.12	.727

Note: No differences were significant at $p = .05$ or higher. All values are aggregated to the district level. Outcome measures and student composition values were measured for the subgroup of grade 10 students who failed to obtain at least 25 percent of the credits required for high school graduation at the end of grade 9 in the previous year (2016/17). Only districts with at least one student identified for this subgroup in the program year (2018/19) and the last baseline year (2017/18) were included in the analysis. Student-level standard deviations were used for outcome measures and student composition; school-level standard deviations were used for district structural characteristics except for number of high schools in district, for which district-level standard deviation was used. A two-tailed *t*-test was applied to each estimated difference between the EIIS districts and the comparison districts. An omnibus test for systematic difference between the EIIS and comparison districts yielded a *p*-value of .898. Rounding might cause slight discrepancies in calculating sums and differences.

a. The values are the weighted means across districts, where the weights account for the fact that some comparison districts are chosen as the match for more than one EIIS district.

b. Calculated as the proportion of the standard deviation for a given variable.

Source: Authors' analysis based on student-level data from the Oregon Department of Education and school-level data from U.S. Department of Education (n.d.), for school years 2013/14–2017/18.

In a CITS design, program impacts are evaluated by looking at whether school districts that implemented a program (in this study, an EIIS) deviated from their baseline trends by a greater amount than a group of similar comparison districts. The following steps outline how the analysis was carried out in the current study:

1. *Calculating mean outcomes.* Student-level data were used to create a time series of an outcome measure by calculating the mean outcome for the EIIS districts and for the comparison districts in each year examined in the study. The school years before adoption of an EIIS (2013/14–2017/18) are referred to as the "baseline years," and the year in which an EIIS was adopted in the EIIS districts (2018/19) is the "program year."
2. *Estimating baseline trends.* The time series of each outcome measure was then used to estimate a trend in outcomes during the baseline years. Baseline trends were estimated separately for the EIIS districts and for the comparison districts. These trends were then projected into the program year, to determine what the outcome would have been if the baseline trends continued.
3. *Obtaining deviations from the baseline trend.* The actual program-year mean outcome was then compared with the outcome level projected by the baseline trend. The differences between the actual mean outcomes and the outcome levels predicted by the trends—the deviations from the baseline trend—were estimated separately for the EIIS districts and for the comparison districts.
4. *Estimating the effect of the EIIS***.** The effect of the EIIS was estimated as the difference between the average deviation from the trend for the EIIS districts and the average deviation from the trend for the comparison districts. If the EIIS model was more effective than the other programs or reforms available to districts (those used by the comparison districts), the EIIS districts should experience a deviation from their baseline trend that is larger than the deviation found for the comparison districts.

In this design the effect of the EIIS is not estimated by directly comparing the actual outcomes of the EIIS and the actual outcomes of the comparison districts but by comparing the amount by which the two groups deviated from their baseline trends. This feature illustrates an important assumption of the CITS design: the comparison districts' deviation from their baseline trend is considered as a valid counterfactual. In other words, the comparison districts' deviation from baseline trend represents the deviation from trend that the EIIS districts would have experienced had they not adopted the EIIS. To maximize the likelihood that this assumption holds, the study team matched the EIIS districts with comparison districts with the most similar outcomes, their corresponding trends, and characteristics in the baseline period. Matching on the outcomes and their baseline trends makes it more probable that the EIIS and comparison districts were motivated and affected by the same contextual factors.

Analytically, the following two-level model was used to estimate the effect of the EIIS in the program year. For the analysis all student-level data were aggregated to the district level by year. A multilevel model with district-by-year observations clustered within districts was used to account for the clustering of time within districts.

Level 1. District-years within districts

$$Y_{jt} = \alpha_{0j} + \beta_0 PROGRAM_j + \phi_{0j} RELYR_t + \lambda_0 RELYR_t * PROGRAM_j + \alpha_1 POST_t + \beta_1 PROGRAM_j * POST_t + \varepsilon_{jt}$$

Level 2. Districts

$$\alpha_{0j} = \alpha_0 + \mu_j$$
$$\phi_{0j} = \phi_0 + \sigma_j$$

where *j* denotes districts and *t* is the time index, which is equal to 1 for the first program year (the 2018/19 school year) and to 0 or negative for the five baseline years (0 = the 2017/18 school year, –1 = the 2016/17 school year, and so on).

The variables in the model are defined as follows:

Y_{jt} = Outcome for district *j* and year *t*.

$RELYR_t$ = Continuous variable for time centered at the last baseline (pre-intervention) year, such that *RELYR* = 0 for the 2017/18 school year (the year before EIIS adoption).

$PROGRAM_j$ = Dichotomous indicator for whether district *j* is an EIIS district and is equal to 1 if an EIIS districts or to 0 if a comparison district.

$POST_t$ = Dichotomous indicator for the program year and is equal to 1 if the 2018/19 school year or to 0 if a baseline year.

ε_{jt} = Random variation in outcome across year *t* within district *j*.

μ_j = Between-district random variation in baseline intercept.

σ_j = Between-district random variation in baseline slope.

From the model the following quantities of interest can be obtained:

α_0 = Baseline mean (intercept) for the comparison districts in the last baseline year.

$\alpha_0 + \beta_0$ = Baseline mean (intercept) for the EIIS districts in the last baseline year.

ϕ_0 = Baseline slope for the comparison districts.

$\phi_0 + \lambda_0$ = Baseline slope for the EIIS districts.

α_1 = Deviation from baseline trend for the comparison districts in the program year.

$\alpha_1 + \beta_1$ = Deviation from baseline trend for the EIIS districts in the program year.

β_1 = Estimated effect of the EIIS on Y in the program year.

In this model, β_1 represents the estimated effect of the EIIS—that is, the deviation from baseline trend for the EIIS districts minus the deviation from trend for the comparison districts. The analysis is weighted to account for the fact that some comparison districts are chosen as the match for more than one EIIS district.[7]

The What Works Clearinghouse (2020) standards (version 4.1) also call for statistical adjustments for any characteristics with baseline differences that are larger than 0.05 standard deviation in effect size. Table B3 shows that no such student-level characteristics were found for the current sample. Therefore, no statistical adjustment was included in the primary impact estimation model. The study team conducted a sensitivity test that included adjustments for all characteristics with baseline differences larger than 0.05 standard deviation in effect size. Results for that test were not substantively different from those based on the primary estimation model. Those results are presented in table B7 (column 3) and discussed in the section below on sensitivity tests.

[7] The weights are normalized so that their sum equals the number of districts in the analysis.

The same analytic approach was used to assess the effects of EIIS adoption for students across all high school grades, as well as to explore such effects by grade levels whenever possible.

Sensitivity tests. The study team conducted a series of sensitivity tests to check the validity and credibility of the design and of the comparison group (see table B7). The impact estimates discussed in the main report are presented in the first column of table B7 for reference purposes.

The study team conducted a design validation test by estimating the "effects" of the EIIS for the last baseline year before it was adopted. Since the effects of the program are expected to be zero in the last baseline year, this test provides a useful benchmark against which to check the choice of comparison districts. In other words, if the estimated effects of the EIIS in the last baseline year are not zero, it would cast doubt on the credibility of the selected comparison districts and of the findings. The findings from the design validation analysis are presented in the second column of table B7. As expected, they are not different from zero to a statistically significant degree.

Another threat to the credibility of the impact findings is that if the EIIS districts and the comparison districts experienced different demographic changes in the program year, the comparison districts might not serve as valid counterfactuals for the EIIS districts. To assess this possibility, the study team re-estimated the effects of EIISs, controlling for student composition and district structural characteristics in the regression model. In general, adjusting for student composition and district structural characteristics does not change the size or the statistical significance of the estimated effects of EIISs on any of the outcomes (see column 3 in table B7). This result indicates that the findings presented in the report are not likely to be confounded with differential shifts in the student composition or district structural characteristics in either the EIIS or the comparison districts.

The study team also re-estimated the effects of EIISs using a set of comparison districts selected through an alternative matching metric. In place of Euclidean distance, comparison schools were selected using propensity score matching (see the study sample section for a description of this metric) based on outcomes and trends plus a few demographic variables, as described earlier, and using one-to-two matching with replacement. To ensure that the remaining districts were comparable, this alternative matching approach excluded EIIS districts or comparison districts with estimated propensity scores that were outside the range of propensity score values shared by these two groups of districts (Caliendo & Kopeinig, 2005). This approach was chosen from all propensity score matching approaches because it produced a set of comparison districts that were the most like the EIIS districts on average. However, this approach was only able to find suitable matches for 51 of the 65 EIIS districts, so the findings might not be directly comparable to the findings from the full sample. In addition, the smaller sample size makes it harder to detect statistically significant effects. These two factors might explain why some of the findings reported in the last column of table B7 are different from the findings in the main report.

Table B7. Sensitivity tests for the estimated effects of early indicator and intervention systems (EIISs) on chronic absenteeism, disciplinary infractions, course progression, and academic achievement in 2018/19

Outcome	Impact findings presented in main report	Design validation[a]	Alternative model specification[b]	Alternative matching approach[c]
Percentage of students who were chronically absent, all grades	–3.9*	–0.9	–3.9*	–1.3
Percentage of students who were severely chronically absent, all grades	–3.3**	–0.8	–3.4**	–0.6
Percentage of students with disciplinary infractions, all grades	0.3	–0.7	0.4	1.8*
Percentage of students meeting course-progression goals, grade 9	2.4	2.6	2.8	1.8
Percentage of students proficient or above in math, grade 11	4.9	3.4	5.6	4.0
Percentage of students proficient or above in English language arts, grade 11	–0.2	–0.1	0.4	0.1
Number of EIIS districts	65	65	65	51
Number of unique comparison districts	29	33	29	39

* Significant at $p < .05$; ** significant at $p < .01$.

Note: All values are aggregated to the district level. The values in this table are the estimated effects of EIIS, calculated as the differences between the EIIS districts and the comparison districts with respect to the deviations from their baseline trends. A two-tailed *t*-test was applied to each estimated difference.

a. The validity of the study design was tested by estimating the "effects" of EIIS in the last baseline year before the adoption of EIIS, using the same process for comparison district selection as the one used for the main study sample. If the study design and the comparison district selection approach are sound, then the "effects" of EIIS in the year before it launched should all be zero by definition.

b. This specification controlled for certain student composition and district structural characteristics: percentage of White students, the percentage of male students, percentage of English learner students, percentage of students with Individualized Education Programs, percentage of schools eligible for Title I, average school enrollment, and average student–teacher ratio.

c. This validation test used propensity scores rather than Euclidean distances to select comparison districts. For each EIIS district the two comparison districts with the closest propensity scores were selected and included in the analysis.

Source: Authors' analysis based on student-level data from the Oregon Department of Education and school-level data from U.S. Department of Education (n.d.), for school years 2013/14–2017/18.

Supplemental information for systematic reviews

Standard deviations for the outcomes, student composition, and district structural characteristics measured in the last baseline year are in table B8. The standard deviations for student outcomes and composition were calculated using individual student data and are thus student-level standard deviations. District structural characteristics were measured for each district based on school-level data, and their standard deviations are at the school level, with one exception. The number of high schools in a district measure was available only at the district level, and therefore the standard deviation for this variable was calculated at the district level. Standard deviations are shown for the EIIS districts and comparison districts separately and for both groups of districts pooled together.

In this study the minimum detectable effect is the smallest true program impact that can be detected with 80 percent power for a given level of statistical significance (in this case, 5 percent for a two-tailed *t*-test). Table B9 presents the realized minimum detectable effects for the study sample and the three subgroups. The minimum detectable effects were calculated by multiplying the standard error of each estimated impact by 2.8.

Table B8. Standard deviations of student composition and district structural characteristics in the last baseline year (2017/18) for early indicator and intervention systems (EIISs) districts, comparison districts, and all districts

Baseline measure	EIIS districts (*n* = 65)	Comparison districts (*n* = 29)	All districts[a] (*n* = 94)
Outcome measure			
Percentage of students who were chronically absent, all grades	47.0	46.4	46.9
Percentage of students who were severely chronically absent, all grades	40.6	38.9	40.2
Percentage of students with disciplinary infractions, all grades	27.6	26.8	27.4
Percentage of students meeting course-progression goals, grade 9	38.6	39.9	38.9
Percentage of students proficient or above in math, grade 11	47.3	48.5	47.6
Percentage of students proficient or above in English language arts, grade 11	45.3	43.8	45.0
Student composition			
Percentage of White students	49.2	44.9	48.5
Percentage of male students	50.0	50.0	50.0
Percentage of English learner students	21.1	13.4	19.4
Percentage of students with Individualized Education Programs	33.7	33.0	33.5
District structural characteristics			
Number of high schools in the district	1.1	0.6	1.0
Percentage of high schools located in a city or suburb	45.1	44.2	44.7
Percentage of high schools eligible for Title I	36.0	27.0	33.6
Percentage of high schools serving only grades 9–12	46.6	49.8	47.6
Percentage of high schools that are charter schools	36.0	42.7	38.1
Average high school enrollment in grades 9–12	746.2	583.5	702.0
Average grade 9 enrollment	198.2	155.4	186.8
Average grade 10 enrollment	187.4	148.2	176.7
Average grade 11 enrollment	179.5	142.7	169.4
Student–teacher ratio	4.5	4.0	4.4
Average graduation rate (percent)	14.1	16.2	14.7

Note: Standard deviations for outcome measures and student composition variables were calculated at the student level. Standard deviations for number of high schools in the district were calculated at the district level. Standard deviations for the rest of the district structural characteristics variables are calculated at the school level.

a. These values were used for baseline-year calculations of effect sizes.

Source: Authors' analysis based on student-level data from the Oregon Department of Education and school-level data from U.S. Department of Education (n.d.), for school years 2013/14–2017/18.

Table B9. Minimum detectable effects of early indicator and intervention systems for full study sample and the three subgroup samples, by outcome measure and sample, 2018/19

Outcome measure	Full sample	Subgroup sample		
		Chronic absenteeism[a]	Disciplinary infractions[b]	Grade 9 on-track status[c]
Percentage of students who were chronically absent, all grades	4.4	10.5	9.7	14.9
Percentage of students who were severely chronically absent, all grades	3.1	12.1	9.4	14.1
Percentage of students with disciplinary infractions, all grades	1.8	6.2	7.8	7.3
Percentage of students meeting course-progression goals, grade 9	6.2	20.6	17.3	na
Percentage of students proficient or above in math, grade 11	11.9	13.0	12.2	na
Percentage of students proficient or above in English language arts, grade 11	7.9	22.8	18.9	na
Number of early indicator and intervention system districts	65	46	50	60
Number of unique comparison districts	29	23	26	34

na is not applicable because grade 9 on-track status does not pertain to other grades.
Note: All values are aggregated to the district level. Minimum detectable effects in this table were calculated by multiplying the standard error of the estimated effects by 2.8, assuming a statistical significance level of 5 percent.
a. This subgroup includes students who were absent for more than 15 percent of school days in the 2017/18 school year.
b. This subgroup includes students who were ever suspended or expelled during the 2017/18 school year.
c. This subgroup includes grade 10 students who failed to obtain at least 25 percent of the credits required for high school graduation by the end of grade 9.
Source: Authors' analysis based on student-level data from the Oregon Department of Education and school-level data from U.S. Department of Education (n.d.), for school years 2013/14–2017/18.

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Appendix C. Supporting analyses

This appendix supplements the findings on the effects of early indicator and intervention systems (EIISs) presented in the main report. It includes additional details on the full sample findings presented in the report, as well as findings for the student subgroup analyses.

Additional details on the primary findings in the report

Figure 2 and tables 1–4 in the main report present the findings on the first-year effects of EIISs on the percentages of students who were chronically absent, had disciplinary infractions, met the course-progression goals by the end of grade 9 needed to be considered on track to graduation, and achieved proficiency on state standardized math and English language arts tests in grade 11. The details of these impact estimates—effect sizes, standard errors, confidence intervals, and *p*-values associated with each estimate—are presented in table C1.

Table C1. Estimated effects of early indicator and intervention systems (EIISs) on chronic absenteeism, disciplinary infractions, course progression, and academic achievement for full sample and subsamples, 2018/19

Outcome	Difference between actual and projected outcomes (percentage points)		Estimated effect[b] (percentage points)	95% confidence interval (percentage points)		Effect size	Standard error	*p*-value for estimated effect
	EIIS districts[a] (*n* = 65)	Comparison districts (*n* = 29)		Lower bound	Upper bound			
All grades	–3.5**	0.3	–3.9*	–7.0	–0.8	–0.08	1.58	.014
Grade 9	–2.2	–1.9	–0.3	–4.2	3.6	–0.01	1.98	.869
Grade 10	–2.9	2.2	–5.1*	–9.3	–0.9	–0.11	2.14	.018
Grade 11	–5.2**	1.3	–6.4**	–10.9	–2.0	–0.14	2.25	.004
Grade 12	–3.3	1.1	–4.4	–10.1	1.3	–0.09	2.89	.128
Percentage of students who were severely chronically absent								
All grades	–2.5**	0.8	–3.3**	–5.5	–1.1	–0.09	1.12	.003
Grade 9	–1.5	–1.1	–0.4	–3.0	2.2	–0.01	1.31	.759
Grade 10	–1.9	3.2**	–5.2**	–8.3	–2.0	–0.14	1.61	.001
Grade 11	–3.8**	1.8	–5.6***	–8.9	–2.4	–0.14	1.66	.001
Grade 12	–2.2	–0.1	–2.1	–6.5	2.3	–0.05	2.23	.355
Percentage of students with disciplinary infractions								
All grades	0.3	0.0	0.3	–0.9	1.6	0.02	0.63	.591
Grade 9	0.6	–2.1*	2.8*	0.2	5.3	0.11	1.30	.032
Grade 10	1.2	1.2	0.0	–1.9	1.8	0.00	0.94	.991
Grade 11	–0.3	0.3	–0.6	–2.8	1.6	–0.03	1.12	.582
Grade 12	–0.2	0.3	–0.6	–2.4	1.3	–0.03	0.95	.552
Percentage of students meeting course-progression goals								
Grade 9	0.7	–1.7	2.4	–2.0	6.8	0.06	2.23	.286
Percentage of students proficient or above in math								
Grade 11	12.7***	7.8*	4.9	–3.5	13.3	0.10	4.26	.252
Percentage of students proficient or above in English language arts								
Grade 11	2.7	3.0	–0.2	–5.8	5.3	–0.01	2.81	.930

* Significant at $p < .05$; ** significant at $p < .01$; *** significant at $p < .001$.

Note: All values were aggregated to the district level. A two-tailed *t*-test was applied to each estimated difference between the EIIS districts and the comparison districts. Rounding might cause slight discrepancies in calculating the sums and differences.

a. Values are the estimated differences between actual and projected outcomes for districts that adopted an EIIS in 2018/19.

b. Values are the differences between the EIIS districts and the comparison districts in the differences between their actual and projected outcomes.

Source: Authors' analysis based on student-level data from the Oregon Department of Education and school-level data from U.S. Department of Education (n.d.), for school years 2013/14–2018/19.

Subgroup findings

Subgroup definitions. Ideally, the study team would be able to identify the subgroup of students who were targeted by an EIIS and explore the effects of an EIIS on these targeted students. However, such data were not available. Instead, the study team used available student-level records from the Oregon Department of Education

for the school year before EIIS adoption (2017/18) to identify three subsets of students who might have been identified for additional services if an EIIS had been adopted during that year:

- Students who were severely chronically absent: absent for more than 15 percent of school days in the 2017/18 school year.
- Students with disciplinary infractions: suspended or expelled at least once in the 2017/18 school year.
- Grade 10 students who had not obtained 25 percent of the credits needed to graduate during the 2017/18 school year, when they were in grade 9.[1]

These subgroups of students are not necessarily the same students who were identified and supported by an EIIS. An EIIS is supposed to allow districts to identify students rapidly, as soon as they begin to stop meeting attendance, behavior, or course progression and academic achievement goals; allow them to continue identifying new students as they stop meeting one of these goals; and allow students to move in and out of interventions as needed throughout the school year. In contrast, the sample in each of these subgroups is made up of students who were identified once (at the end of the year before EIIS adoption). Although students in these subgroups might have been more likely to be identified as needing interventions during the program year than the average student, they would not be expected to overlap completely with the group of students identified through an EIIS. The study team was unable to collect information about which students were identified for and received support through an EIIS during the program year.

For students who were severely chronically absent in the year before EIIS adoption, an EIIS did not change the proportion of students who were chronically absent, had disciplinary infractions, met the course-progression goals needed to be considered on track to graduate at the end of grade 9, or scored at or above the proficiency level on the English language arts test in grade 11 (table C2). The program does appear to have increased by 9.5 percentage points the proportion of students in this subgroup with math test scores at or above the proficiency level: the comparison districts underperformed their baseline trend's projection by 4.2 percentage points, while the EIIS districts outperformed their baseline trend's projection by 5.2 percentage points. However, this finding needs to be interpreted with caution. Of the 39 impact estimates reported for these subgroups, this is the only one that is statistically significant at the 5 percent level. Typically, one would expect to see 1 of every 20 estimates be statistically significant at this level in the absence of true effects.

[1] Because the on-track indicator is available only for students in grade 9, this subgroup includes only students in grade 10 whose on-track indicators from the previous school year were not missing.

Table C2. Estimated effects of early indicator and intervention systems (EIISs) on chronic absenteeism, disciplinary infractions, course progression, and academic achievement in 2018/19 for students identified as chronically absent in the previous year (2017/18)

Outcome	Difference between actual and projected outcomes (percentage points)		Estimated effect[b] (percentage points)	95% confidence interval (percentage points)		Effect size	Standard error	*p*-value for estimated effect
	EIIS districts[a] (*n* = 46)	Comparison districts (*n* = 23)		Lower bound	Upper bound			
Percentage of students who were chronically absent								
All grades	–6.2*	–3.8	–2.5	–9.9	4.9	–0.05	3.76	.512
Grade 9	–8.3*	–3.5	–4.7	–16.2	6.7	–0.11	5.80	.413
Grade 10	–1.5	–0.3	–1.1	–12.4	10.1	–0.02	5.72	.844
Grade 11	–6.2	–8.2*	2.0	–7.1	11.1	0.04	4.63	.665
Grade 12	–5.4	–4.7	–0.6	–10.8	9.5	–0.01	5.17	.901
Percentage of students who were severely chronically absent								
All grades	–6.6*	–4.4	–2.2	–10.7	6.4	–0.06	4.33	.616
Grade 9	–4.4	–10.0	5.7	–8.6	19.9	0.17	7.23	.434
Grade 10	1.8	–1.5	3.4	–9.8	16.5	0.09	6.68	.614
Grade 11	–10.7*	–9.0	–1.7	–16.6	13.2	–0.04	7.57	.824
Grade 12	–6.7	3.6	–10.3	–22.1	1.5	–0.24	6.00	.086
Percentage of students with disciplinary infractions								
All grades	0.4	–0.7	1.1	–3.3	5.5	0.05	2.22	.628
Grade 9	0.6	–8.1*	8.6	–1.2	18.5	0.33	4.99	.085
Grade 10	0.4	4.3	–3.9	–14.0	6.2	–0.16	5.13	.445
Grade 11	0.2	3.1	–2.8	–9.8	4.1	–0.13	3.54	.425
Grade 12	–1.3	–2.5	1.2	–3.9	6.2	0.07	2.58	.656
Percentage of students meeting course progression goals								
Grade 9	4.6	5.8	–1.2	–15.7	13.2	–0.03	7.36	.865
Percentage of students proficient or above in math								
Grade 11	5.2	–4.2	9.5*	0.3	18.6	0.20	4.63	.042
Percentage of students proficient or above in English language arts								
Grade 11	–5.3	–6.2	0.9	–15.2	17.0	0.02	8.16	.912

* Significant at $p < .05$.

Note: All values were aggregated to the district level. The chronically absent subgroup included students who were absent for more than 15 percent of school days in the previous year. Only districts with at least one student identified for this subgroup in the program year (2018/19) and the last baseline year (2017/18) are included in the analysis. A two-tailed t-test was applied to each estimated difference between the EIIS districts and the comparison districts. Rounding might cause slight discrepancies in calculating the sums and differences.

a. Values are the estimated differences between actual and projected outcomes for districts that adopted an EIIS in 2018/19.

b. Values are the differences between the EIIS districts and the comparison districts in the differences between their actual and projected outcomes.

Source: Authors' analysis based on student-level data from the Oregon Department of Education and school-level data from U.S. Department of Education (n.d.), for school years 2013/14–2018/19.

For students who were ever suspended or expelled during the year before (2017/18), the EIIS adoption (2018/19), an EIIS does not appear to have produced any effects on the measured outcomes (table C3). Some estimated effects were large in magnitude, but the small sample sizes mean that it is more likely to find spurious results and

less likely for outcomes to be statistically significant. For example, the estimated effect for this subgroup on the proportion of students with disciplinary infractions in grade 10 is 9.9 percentage points, but it is not statistically significant.

Table C3. Estimated effects of early indicator and intervention systems (EIISs) on chronic absenteeism, disciplinary infractions, course progression, and academic achievement in 2018/19 for students with disciplinary infractions in the previous year (2017/18)

Outcome	Difference between actual and projected outcomes (percentage points)		Estimated effect[b] (percentage points)	95% confidence interval (percentage points)		Effect size	Standard error	*p*-value for estimated effect
	EIIS districts[a] (*n* = 50)	Comparison districts (*n* = 26)		Lower bound	Upper bound			
Percentage of students who were chronically absent								
All grades	–5.4*	–8.5***	3.1	–3.7	9.9	0.07	3.47	.372
Grade 9	–0.5	–2.8	2.3	–10.7	15.3	0.05	6.60	.727
Grade 10	–4.3	–7.3	3.1	–10.0	16.1	0.07	6.62	.644
Grade 11	–5.5	–13.1*	7.6	–6.7	21.8	0.16	7.24	.296
Grade 12	–5.8	–11.0*	5.2	–8.6	19.0	0.11	7.01	.459
Percentage of students who were severely chronically absent								
All grades	–6.0*	–6.0*	0.0	–6.6	6.6	0.00	3.36	1.000
Grade 9	–0.2	–4.3	4.2	–7.5	15.8	0.12	5.90	.482
Grade 10	–7.7	–2.4	–5.3	–17.4	6.8	–0.14	6.14	.391
Grade 11	–11.0*	–9.7	–1.4	–15.1	12.3	–0.03	6.96	.842
Grade 12	–2.9	–7.8	4.9	–9.0	18.8	0.11	7.04	.488
Percentage of students with disciplinary infractions								
All grades	0.5	–4.6*	5.1	–0.4	10.6	0.23	2.79	.067
Grade 9	–2.4	–5.7	3.3	–7.4	14.0	0.13	5.43	.544
Grade 10	5.9	–4.0	9.9	–0.1	19.8	0.40	5.06	.052
Grade 11	–1.3	–3.0	1.6	–8.1	11.4	0.08	4.96	.743
Grade 12	–5.5	–3.3	–2.2	–11.8	7.3	–0.14	4.85	.646
Percentage of students meeting course-progression goals								
Grade 9	2.8	–2.8	5.6	–6.6	17.8	0.15	6.19	.365
Percentage of students proficient or above in math								
Grade 11	–2.1	2.3	–4.4	–13.0	4.2	–0.09	4.36	.313
Percentage of students proficient or above in English language arts								
Grade 11	–4.6	–1.3	–3.3	–16.6	9.9	–0.07	6.73	.620

* Significant at $p < .05$; *** significant at $p < .001$.

Note: All values were aggregated to the district level. The subgroup of students with disciplinary infractions included students who were ever suspended or expelled in the previous year. Only districts with at least one student identified for this subgroup in the program year (2018/19) and the last baseline year (2017/18) are included in the analysis. A two-tailed *t*-test was applied to each estimated difference between the EIIS districts and the comparison districts. Rounding might cause slight discrepancies in calculating the sums and differences.

a. Values are the estimated differences between actual and projected outcomes for districts that adopted an EIIS in 2018/19. Rounding might cause slight discrepancies in calculating the sums and differences.

b. Values are the differences between the EIIS districts and the comparison districts in the differences between their actual and projected outcomes.

Source: Authors' analysis based on student-level data from the Oregon Department of Education and school-level data from U.S. Department of Education (n.d.), for school years 2013/14–2018/19.

For students in grade 10 who did not attain the credits needed to be considered on track to graduate at the end of grade 9 the study team was able to assess only the effects of an EIIS on three outcome measures: the two chronic absenteeism measures and the disciplinary infractions measure. The program does not appear to have produced any effects on these three outcomes (table C4).

Table C4. Estimated effects of early indicator and intervention systems (EIISs) on chronic and severely chronic absenteeism and disciplinary infractions in 2018/19 for grade 10 students who had not obtained 25 percent of the credits needed to graduate by the end of grade 9 in the previous year (2017/18)

	Difference between actual and projected outcomes			95% confidence interval				
Outcome	EIIS districts[a] (n = 60)	Comparison districts[b] (n = 34)	Estimated effect[c]	Lower bound	Upper bound	Effect size	Standard error	p-value for estimated effect
Percentage of students who were chronically absent								
Grade 10	–1.0	–2.5	1.5	–9.0	11.9	0.03	5.31	0.780
Percentage of students who were severely chronically absent								
Grade 10	–3.7	1.2	–4.9	–14.8	4.9	–0.13	5.02	0.326
Percentage of students with disciplinary infractions								
Grade 10	2.4	3.4	–1.0	–6.1	4.1	–0.04	2.61	0.700

Note: All values were aggregated to the district level. The subgroup of students who failed to meet the course-progression goal included grade 10 students who failed to obtain at least 25 percent of the credits required for high school graduation by the end of grade 9 in the previous year. Only districts with at least one student identified for this subgroup in the program year (2018/19) and the last baseline year (2017/18) were included in the analysis. A two-tailed t-test was applied to each estimated difference between the EIIS districts and the comparison districts. None of the findings was statistically significant. Rounding might cause slight discrepancies in calculating the sums and differences.

Values are the estimated differences between actual and projected outcomes for districts that adopted an EIIS in 2018/19. Rounding might cause slight discrepancies in calculating the sums and differences.

b. Values are the estimated differences between the actual and projected outcomes for the comparison districts.

c. Values are the differences between the EIIS districts and the comparison districts in the differences between their actual and projected outcomes.

Source: Authors' analysis based on student-level data from the Oregon Department of Education and school-level data from U.S. Department of Education (n.d.), for school years 2013/14–2018/19.

Overall, there was no strong evidence indicating that an EIIS benefited subgroups of students not meeting attendance, behavior, and course-progression goals in the year before the EIIS adoption.

Reference

U.S. Department of Education, National Center for Education Statistics. (n.d.). *Common Core of Data*. Public Elementary/Secondary School Universe Survey, 2013/14–2017/18. Retrieved October 1, 2019, from https://nces.ed.gov/ccd/.