An Analysis of the Effects of Implementing Personalized Learning Connections in Broward County Public Schools.
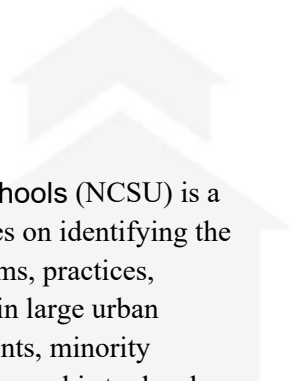
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The National Center on Scaling Up Effective Schools (NCSU) is a national research and development center that focuses on identifying the combination of essential components and the programs, practices, processes and policies that make some high schools in large urban districts particularly effective with low income students, minority students, and English language learners. The Center's goal is to develop, implement, and test new processes that other districts will be able to use to scale up effective practices within the context of their own goals and unique circumstances. Led by Vanderbilt University's Peabody College, our partners include The University of North Carolina at Chapel Hill, Florida State University, the University of Wisconsin-Madison, Georgia State University, the University of California at Riverside, and the Education Development Center.

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Contents

Executive Summary

This report analyzes the effects of implementing a personalization for academic and social emotional learning (PASL) program in selected Broward County high schools. PASL was implemented with a continuous improvement model promoting deliberate adaptations to class- and school-level conditions. PASL practices include goal setting, use of data, educator teams, and points of contact between teachers and students. The implementation of PASL started at three high schools in 2014-2015 (the "innovation year") and expanded to an additional five high schools in the 2015-2016 "scale-out year." Because of the nature of the adaptive continuous improvement, there were many differences in implementation and treatment practices across schools. As a result of these differences, we analyze program effects both collectively and on a school-by-school basis.

Overall, the effects of PASL were quite varied across schools and outcomes. Effects of PASL on test scores were especially variable. Only Pleasant Valley exhibited test score gains across all subjects, and several of the scale-out schools experienced drops in test scores when PASL was employed. Unfortunately, given the variation in treatment and fidelity of implementation across schools and over time, it is hard to determine why the estimated impacts of PASL were so heterogeneous. The generally positive impacts on non-test-score outcomes at Spring Gardens could be due to the way in which PASL was implemented there or to some other unique conditions at the school during the period of implementation. A full understanding of PASL's impacts on students would require an experiment in which schools cannot self-select into the program and the intervention is implemented consistently across all schools.

The most consistent evidence of an impact of PASL is a reduction of major disciplinary incidents in the innovation schools, although there was still a good deal of variation. Among the group of innovation schools, Spring Gardens experienced improvements in student behavior in both years as a result of implementing PASL. The gains at Spring Gardens were quite substantial, at about -0.17 incidents per student for ninth graders. Given the pre-intervention average incidents per student in innovation schools equaled 0.69, this is a reduction of about 25 percent. Of the other innovation schools, Hillview and Summers each enjoyed reductions in the number of major disciplinary incidents per 9th-grade student as a result of PASL in at least one year, despite having increased total disciplinary incidents per student in both years. Among the five scale-out schools, only Meadows saw a reduction in disciplinary incidents attributable to the PASL intervention. The magnitude of the reduction was larger than that at Spring Gardens, -0.33 incidents per 9th-grade student or about a 70 percent reduction in the number of disciplinary incidents per student from the baseline level of 0.48.

The schools with the most consistent evidence of a positive impact of PASL had the highest levels of implementation integrity. The effects on attendance and behavior were consistently positive and large for Spring Gardens. There is evidence that suggests the PASL experiment was associated with increases in attendance of 2.0 to 2.8 percentage points at one of the three innovation schools, Spring Gardens. This is quite substantial, given the average pre-intervention attendance rate of 90.5 percent at innovation schools. It is not clear that this boost was a direct result of PASL, however. The school-wide improvements in attendance during the second year of implementation at Spring Gardens mirrored those of 9th graders, despite the fact that only 9th graders participated in PASL in the second year. Neither of the other two innovation schools, Hillview and Summers, saw improvements in attendance as a result of PASL in the treated grades in either year. Similarly, only one of the five scale-out schools, Pleasant Valley, enjoyed a boost in attendance attributable to the intervention in 2015-16. The gain for Pleasant Valley was smaller than that at Spring Gardens, a little over a one percentage point increase in attendance for 9th-grade students.

Background

Description of the Intervention

The Broward County intervention departs from traditional research methods in its emphasis on scaling up effective programs and practices. In a traditional experimental approach, the primary emphasis is on obtaining unbiased estimates of the causal impact of an intervention. Typically a uniform intervention is applied to a relatively small (randomly selected) sample. In contrast, the process of intervention in Broward County incorporated concepts of improvement science and utilized a continuous improvement approach with the goal of reaching sustainable educational improvement. The continuous improvement methodology allows for cross-school variation in initial implementation, which is followed by rapid-cycle testing and evaluation of the intervention's success. Subsequently, practitioners modify the intervention and the targeted sample of students to accommodate school-level conditions.

To operationalize continuous improvement, district practitioners helped develop an intervention alongside researchers and development specialists known as Personalization for Academic and Social Emotional Learning (PASL). Broadly, PASL is a bundle of practices reflecting an increased awareness of the interdependency of academic and social-emotional activities in schools. PASL practices differ in intentional and unintentional ways across and within schools, but there are some common features

to most PASL programs. Common practices include educator teams that collaborate to plan PASL activities, intentional points of contact such as routine and exploratory rapid check-ins or problem-solving meetings with students, norms of engagement such as high expectations or positive behavioral management, goal-achievement skill development, and use of data or other collected student information to inform subsequent PASL practices. Features of PASL that differed across schools include composition of the School Innovation Design Teams (SIDTs), selection process of PASL teachers, interpretation of PASL practices, collaboration between teachers on implementing PASL practices, school and teacher fidelity to newly-created PASL standards, the timing of different PASL components, and the frequency with which teachers exercised PASL practices.

More abstractly, some schools *compartmentalized* PASL practices in a pattern of piecemeal adoption, while other schools *integrated* all PASL standards into a new school culture. Differences in PASL adoption across schools can be described as either *mutual adaption* of old practices with PASL or as *cooption* of existing practices with PASL terminology. In the case of cooption, few practices changed in a substantial way. Most differences in PASL adoption were caused by time and resource constraints, technical support, policy alignment with school missions, and teacher willingness to adopt the new practices.

While the continuous improvement approach may hasten the adoption of an intervention and could yield better outcomes by quickly adapting the intervention to the specific context of a school, it also makes the task of evaluating the efficacy of the intervention very difficult. Since the intervention and its implementation are not uniform across schools, the effective sample may be reduced to a single school, limiting generalizability and statistical power to determine whether or not the intervention was effective. Likewise, to the extent that the intervention evolved over time, it is hard to know if changes in outcomes over time are due to fade-out of the efficacy of the intervention or to change in the nature of the intervention over time.

Summaries of PASL Practices by School

This section describes local PASL adaptations to educator teams, intentional points of contact (IPCs), norms of engagement, goal-achievement skill development, and intentional use of information. The section concludes with a matrix of PASL treatments by school, grade, and year.

Spring Gardens High School – Innovation School

Educator teams at Spring Gardens High School in the innovation year included all first period teachers, although monthly professional development and teacher cross-talks took place with a smaller subset

of freshmen teachers. The second year of treatment scaled back to including just 9th-grade instructors in the PASL program. Despite all instructors participating in PASL practices in the first year, the focus of implementation was largely on 9th-grade students. All 9th graders were assigned a PASL instructor based on their 1st period class. Rapid check-ins (RCIs) occurred daily in 1st period for most teachers, but different teachers engaged in RCIs with varying frequency. Norms of engagement included PASL messaging, a school survey, a freshmen class assembly, and ice cream honor roll recognition. Goal achievement practices were administered during 1st period in the form of goal worksheets, extracurricular activity forms, weekly journaling of progress, and one written academic goal. 9th grade students also received planners. In addition, all teachers participated in a goal-writing professional development session. Intentional use of information came in the form of student support referrals and freshmen teacher cross-talks on focus students and "D & F" list students.[1] Spring Gardens High School was unique in administering several other adaptations. The school held quarterly school-wide cross talks, created a 9th grade mentoring program and crisis prevention support groups, supplemented 1st period lesson plans, and had decision making support lessons. Spring Gardens also made efforts to improve test scores by piloting a "Targeted Remediation Enrichment" of math and reading skills for 9th and 10th grade students.

Summers High School – Innovation School

Summers High School educator teams included 15 9th-grade HOPE (Health Opportunities with the Integration of Physical Education), English I, and Environmental Science teachers, although all teachers received three 30-minute professional development courses on creating a school culture. All 9th-grade students were assigned to one of these teachers in groups of 18-25. Every three weeks these PASL educator teams engaged in rapid check-ins with their students, sending students with special needs to guidance counselors for additional support. Norms of engagement included daily PASL announcements, a PASL bulletin board, and a PASL goal-setting kiosk at lunch. PASL teachers provided goal achievement lessons to their students, and school assemblies were also used to advance goal achievement awareness. Intentional use of information involved quarterly discussion of student-level reports and goals sheets among PASL teachers of the same students, who would then collaborate to better serve the student's needs. Summers also implemented English class book reports to be completed by students, which may have influenced reading test scores.

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[1] The precise nature of the "D & F" list is not entirely clear and may have varied across schools. In general, students on the D & F list were high-risk students with greater perceived needs. These lists were not static and the students on these lists could have changed during the year.

Hillview High School – Innovation School

Educator teams at Hillview included all 2nd period 9th-grade teachers and teachers of HOPE classes. These teachers administered the PASL program to all 9th-grade students. Intentional points of contact were conducted twice per month as rapid check-ins before 2nd period and HOPE classes. Hillview also expanded intentional points of contact to include student mentors as well as administrator mentor groups for all students on the D & F list. Goal achievement lessons were taught in HOPE classes twice per year. The school shared the D & F list of high-needs students with teachers to make intentional use of information. Subsequent crosstalks occurred between teachers sharing the same D & F students. To make intentional use of information, students created quarterly goals sheets that were shared with all teachers using the Socrative application, a mobile student response system. Hillview's unique adaptations include the "PASL pals" collaboration between school innovation design team members and small groups of PASL teachers. The school also made use of iObservation to reward teachers conducting rapid check-ins.

Winter Ridge High School – Scale-Out School

Winter Ridge High School assigned all 1st period 9th-grade teachers to implement the PASL program for all 9th-grade students. These teachers were instructed to administer intentional points of contact in the form of weekly rapid check-ins and follow-ups with students of concern. The school also increased contact by assigning upper-class students to meet with 9th-grade students as peer mentors twice per month. Goal achievement lessons were administered through PASL teachers and the upper-class mentors. Counselors also met with focus students in need of additional support. The school made intentional use of information on student goals, student goal progress, and RCI frequency across PASL teachers. By sharing student goals with peer mentors, PASL faculty, school counselors, and administration, the school was able to assess student progress and identify students in need of additional support. School norms of engagement included mandatory 9th grade club participation and teacher follow-ups with students asking questions. One unique feature of Winter Ridge's PASL program was departmental lessons in studying skills. As part of these departmental lessons, math teachers taught organization, magnet teachers taught time management, English teachers taught decision making, science teachers taught stress management, and social studies teachers taught self-awareness.

Pleasant Valley High School – Scale-Out School

PASL teachers at Pleasant Valley High School were assigned based on location in any of four hallways, conditional on teaching a 9th-grade 1st-period class. Reading and critical thinking teachers were excluded from PASL educator team assignment. Accordingly, approximately 535 students were

assigned to a PASL teacher. Pleasant Valley provided intentional points of contact in the form of weekly rapid check-ins. Goal achievement lessons were taught in PASL classes. Guidance counselors and administrators held bi-monthly meetings with groups of ten students on the D & F list to provide follow-up goal achievement support. Pleasant Valley made use of information by creating a Google document of student goals and a D & F list of high-need students. The Google document and D & F list were shared with all teachers to facilitate teacher strategy crosstalks on students in common. Norms of engagement took the form of professional study days on the first Thursday of each month to discuss PASL data.

White Mountain High School – Scale-Out School

White Mountain High School assigned five teachers to implement the PASL program based on whether the instructors taught English or Math to 9th-grade students in first or second period. As a result, only a select number of the 9th grade class (approximately 109 students) received PASL treatment. These five teachers participated in five professional development training sessions on PASL philosophy, PASL skills, goal achievement lessons, creating a school culture, and teacher collaboration. Intentional points of contact took the form of rapid check-ins during PASL classes every three weeks. Separately, guidance counselors held casual meetings with students of greatest need to provide additional support. Goal achievement lessons were delivered by English I teachers who collected goals sheets. Grade assemblies were also used to introduce goal achievement lessons. Intentional use of information took the form of quarterly specialist reports that helped to establish focal groups of students. Student goals sheets from English courses were shared with all teachers to facilitate crosstalks. White Mountain High School created new norms of engagement by changing the school mission statement to align with PASL and holding quarterly assemblies.

Silver Oak High School – Scale-Out School

Silver Oak High School assigned 14 teachers to implement PASL for about 150 9th grade students, which means that only a subsample of all 9th grade students received the treatment. PASL teachers conducted intentional points of contact in the form of rapid check-ins on a monthly basis at minimum. Goal achievement lessons took place during HOPE and JROTC classes. PASL teachers collected and weekly goal sheets and reinforced the goals. Although Silver Oak collected goals sheets, it is unclear whether these goals were shared among PASL teachers in the same way as other treatment schools made intentional use of information. D & F lists were shared among PASL teachers using a tailored information system. The school adopted norms of engagement through freshmen introductions, morning announcements, and adjustments to the school mission.

Meadows High School – Scale-Out School

Meadows High School assigned seven 4th-period 9th-grade teachers to implement PASL for the entire freshmen class of 179 students. Rapid check-ins were introduced in the fourth week of the semester. Guidance counselors taught goal achievement lessons during 4th period in the first week of the second quarter, and teachers supported goal achievement practices with follow-up assignments catering to class-specific curriculums. Meadows High School made intentional use of information in the form of D & F reports, which were distributed to PASL teachers sharing the same students. Teacher crosstalks on the goal reports took place on Thursday mornings. PASL norms of engagement included incorporation of all community members in PASL goals, promotion of high expectations, encouraging student participation in extracurricular activities, positive data-focused communication practices and alignment of the school mission to PASL. Meadows High School made a number of unique adaptations to the PASL program. In particular, the school delivered stress management lessons during 4th period that featured relevant GPA and graduation information. PASL teachers were also instructed to arrange "Wildcat Chats" with each other in addition to regular crosstalks.

District Summary

Figure 1 summarizes the timing and extent of the intervention across high schools and across grades within schools in Broward County. Cells that are blacked out indicate that all students within a given school and grade were targeted by the intervention, whereas a grayed-out cell indicates that only a subset of students within a school and grade were targeted. With the exception of Spring Gardens in the initial innovation year, only freshmen were targeted for the intervention.

Figure 1: Broward County Treatments by School, Grade, and Year

School	Grade	2013-14	2014-15	2015-16
Summers	9		■	■
Summers	10			
Summers	11			
Summers	12			
Spring Gardens	9		■	■
Spring Gardens	10		■	
Spring Gardens	11		■	
Spring Gardens	12		■	
Hillview	9		■	■
Hillview	10			
Hillview	11			
Hillview	12			

Winter Ridge	9			■
Winter Ridge	10			
Winter Ridge	11			
Winter Ridge	12			
Pleasant Valley	9			■
Pleasant Valley	10			
Pleasant Valley	11			
Pleasant Valley	12			
White Mountain	9			▓
White Mountain	10			
White Mountain	11			
White Mountain	12			
Silver Oak	9			▓
Silver Oak	10			
Silver Oak	11			
Silver Oak	12			
Meadows	9			■
Meadows	10			
Meadows	11			
Meadows	12			

Note: Cells shaded black indicate full exposure of the grade in that year; regions shaded gray indicate partial exposure of the grade in that school year.

Data and Methods

Data

The Broward County data consists of individual-level information on all middle and high school students from the 2000-01 school year to the 2015-16 school year. The large size of the district means there are over 1 million student-year observations. Each observation includes time-constant demographic information such as race, gender, language spoken at home, disability status, and foreign-born status. Time-varying variables for each student include end-of-grade and end-of-course test scores, attendance rates, disciplinary incidents, free-and-reduced price lunch, limited English proficiency, gifted status, and number of schools attended in the school year. Information on class enrollment and class grades are also known but excluded from the analysis. Likewise, school-level

demographics are known for some years, but missing data and changes to recording practices mean this information cannot be used for the regression analysis.

Empirical Strategy

To analyze the Broward County intervention in all its complexity, we utilize multiple empirical strategies over various analytic samples and across multiple student outcomes. We employ two types of analyses: a graphical analysis that compares trends over time between treated and not-treated schools and a multivariate regression analysis that controls for observable differences between students. Analytic samples in each school are all students, 9th-grade students only, cohorts of individual students entering high school during one of the treatment years, and the combination of schools, years, and grade levels where at least some student received the PASL intervention. Student outcomes of interest over these analytic samples include attendance, total and major disciplinary incidents per student, and test scores in four subject areas. To convey the impact of PASL and continuous improvement practices across different school environments, all results are presented both by category of treatment and by school.

Graphical assessment of the effects of the intervention is a short time-series design that compares student outcomes before and after the school-wide intervention. The essential feature of these graphs is the display of underlying pre-intervention trends at ever-treated and never-treated schools. Post-treatment departures from the pre-intervention period difference between ever-treated and never-treated schools provides suggestive evidence of the effects of the PASL treatment. Average trend lines, however, can be misleading because they do not account for changing demographics at schools or sample size differentials across treatment groups.

To circumvent potential shortcoming of the graphical analysis, additional difference-in-difference regression strategies are employed across all outcomes and analytic samples. The estimates from these regressions show whether the pre/post treatment-period change in student outcomes is statistically different for treatment and control populations. As such, the regressions perform a similar exercise as the graphical analysis, but provide greater clarity by incorporating significance tests and controls for individual-level student characteristics. Three regression models are employed in the analysis, and within each model there are multiple specifications.

Regression Model 1 – Difference-in-Differences

The first regression model is a straightforward difference-in-differences regression. Intuitively, this regression specification asks whether the change in outcomes between the pre-treatment and post-

treatment period for students at PASL schools differs from the change over the same time period for students who attend schools that never participated in PASL, conditional on observable student characteristics and district-wide trends. The simplest specification of this model, which corresponds analytically to the plotted figures by treatment, is of the form:

$$Outcome_{igst} = \alpha + \beta_1 X_{it} + \beta_2 Year_t + \beta_3 Grade_{igt} + \beta_4 EverPASLSchool_{it} \qquad (1.1)$$
$$+ \beta_5(EverPASLSchool_{it} \times Post_t) + \epsilon_{igst}$$

In this equation, X_{it} is a set of characteristics for student i in school s in year t. Additional controls for year and grade allow student average outcomes to differ across grades and years. The variable $EverPASLSchool_{it}$ is an indicator for whether student i attends a school in year t that ever participates in PASL (i.e. an innovation or a scale-out school); it controls for average static differences between these schools and never treated schools. It is important to note that the indicator for schools that ever participate in PASL is an average across all innovation or scale-out schools, thus masking variation within the group of innovation and scale-out schools. The coefficient of interest is β_5, which captures the effect of being in an innovation or a scale-out school during the years in which these schools received PASL treatment. For the innovation schools, the effect is estimated separately for the first and second year of treatment. In addition, equation (1.1) is estimated separately for the sample of 9th-grade students (who were the only students receiving the PASL intervention, save for 10th-12th graders at Spring Gardens in the initial innovation year). By restricting the analysis sample to 9th graders, we limit treatment effects to those students actually being targeted, but we also ignore comparisons between treated and un-treated students within a school.

A second specification of regression model (1) allows for the treatment effect to vary across ever-treated schools. This specification takes the form:

$$Outcome_{igst} = \alpha + \beta_1 X_{it} + \beta_2 Year_t + \beta_3 Grade_{igt} + \beta_4 School_{ist} \qquad (1.2)$$
$$+ \beta_5(School_{ist} \times Post_t) + \epsilon_{igst}$$

where $School_{ist}$ indicates that student i attends a particular ever-treated school s in year t. This second specification controls for the same time-varying student characteristics, year effects, and grade variables as does the first specification. In this specification, however, the scale-out and innovation indicators are replaced by individual school indicators. The vector β_5 comprises the coefficients of interest in this specification, which are the estimated effects of being in a particular treated school in a year when the school received treatment. As before, the innovation school effect is estimated separately for the first and second year of treatment.

The second regression model employed is a cohort analysis. Whereas the analytic sample of the first regression model is all high school students, the cohort analysis restricts the sample to just 9th grade students in the 2014-15 school year. The key difference between the initial and cohort-based analyses is that the identity of the students being studied is held constant and the grade level of students varies over time in the cohort analysis, whereas in the initial model the grade level is held constant and the identity of students varies over time. The cohort approach allows for two additional analyses. First, by holding the identity of students constant over time, one can determine if results from the initial analysis are influenced by changes in the composition of grade-level cohorts over time that happen to coincide with treatment. Second, the cohort approach allows one to determine if there are residual effects from participating in PASL. For example, 9th graders in innovation schools in 2014-15 participate in PASL, but they are no longer participating in PASL when they are observed as 10th graders in 2015-16. Performance gains in 2015-16 could therefore be attributed to a lasting effect of PASL participation in the prior year. The simplest specification of this model is of the form:

$$Outcome_{igst} = \alpha + \beta_1 X_{it} + \beta_2 Grade_{igt} + \beta_3 EverPASLSchool_{it} \qquad (2.1)$$
$$+ \beta_4 (EverPASLSchool_{it} \times Post_t) + \epsilon_{igst}$$

In this equation, controls for student characteristics and grade are the same as before. Year controls are dropped because the analytic sample is the same grade for all years, so the grade and year controls perform the same function. The indicator $EverPASLSchool_{it}$ controls for static differences between cohorts that enter innovation schools in 2014-2015, allowing students that ever receive PASL to have different performance averages than untreated students. The coefficient of interest is β_4, which captures the effect of entering an innovation school in 9th grade during PASL treatment years as opposed to entering a non-PASL school as a 9th-grade student in the same year. The effect is estimated separately for the first and second year of treatment at innovation schools.

A second specification of regression model (2) allows for the cohort treatment effect to vary across schools. This specification takes the form:

$$Outcome_{igst} = \alpha + \beta_1 X_{it} + \beta_2 Grade_{igt} + \beta_3 School_{ist} + \beta_4 (School_{ist} \times Post_t) + \epsilon_{igst} \quad (2.2)$$

The second specification controls for the same time-varying student characteristics and grade variables. The scale-out and innovation indicators are replaced by individual school indicators. The vector β_5 comprises the coefficients of interest in this specification, which are the estimated effects

of being in a particular treated cohort in the year of treatment or the year after treatment. As before, the innovation school effect is estimated separately for the first and second year of treatment.

Regression Model 3 – Difference-in-Differences-in-Differences

The third regression model controls for dynamic variation across grades in different schools and years, allowing each grade-year, grade-school type and year-school type to have its own baseline average outcome. The first specification assumes zero persistence in treatment effects (see Figure 1). The basic triple-difference regression model takes the following form:

$$Outcome_{igst} = \alpha + \beta_1 X_{it} + \beta_2 Year_t + \beta_3 Grade_{igt} + \beta_4 EverPASLSchool_{it} \hspace{2em} (3.1.1)$$
$$+ \beta_5\big(EverPASLSchool_{it} \times Grade_{igt}\big)$$
$$+ \beta_6\big(EverPASLSchool_{it} \times Year_t\big) + \beta_7\big(Grade_{igt} \times Year_t\big)$$
$$+ \beta_8 PASL\ Cohort_{igt} + \epsilon_{igst}$$

where X_{it} is a set of student characteristics for student i in year t, $EverPASLSchool_{it}$ indicates that student *i* is enrolled in an ever-treated school *s*, $Grade_{igt}$ are a set of dummies indicating that student *i* is enrolled in grade *g* in year *t*, and $Year_t$ are a set of effects for each year of the sample. The interaction term $\big(EverPASLSchool_{it} \times Grade_{igt}\big)$ allows for differing outcomes across ever-treated and never-treated schools at each grade level. The $\big(EverPASLSchool_{it} \times Year_t\big)$ term allows for differing time trends between ever-treated and never-treated schools and $\big(Grade_{igt} \times Year_t\big)$ controls for differing time trends by grade level across all schools. $PASL\ Cohort_{igt}$ represents a student who is enrolled in a school-grade-year combination in which either full or partial treatment occurred. The coefficient of interest in this specification is β_8, which is the effect of being in an ever-treated school in a year and grade in which the PASL intervention was carried out, with effects averaged across innovation and scale-out treatment groups.

The difference between the difference-in-difference and the triple-difference approaches can be seen by comparing equation (3.1.1) to equation (1.1). The difference-in-difference model (1.1) does not include the two-way interactions, $\big(EverPASLSchool_{it} \times Grade_{igt}\big)$, $\big(EverPASLSchool_{is} \times Year_t\big)$, and $\big(Grade_{igt} \times Year_t\big)$, and thus does not control for grade-specific and year-specific differences between ever-treated and never-treated schools. Most importantly, the triple-difference approach replaces the term $\big(EverPASLSchool_{it} \times Post_t\big)$ with $\big(PASL\ Cohort_{igt}\big)$, meaning identification of the impact of the intervention comes from differences between treated and non-treated grades within a year in which a school received the PASL intervention.

Equation (3.1.2) is a simple extension of the basic triple-difference specification that differentiates between full and partial treatment within a grade. $Partial\ PASL_{igt}$ indicates a student was in a partially treated grade in year t. White Mountain and Silver Oak High School 9th grade students in 2015-2016 receive the partial indicator. $Full\ PASL_{igt}$ indicates that a student was in a fully treated grade in a PASL school.

$$
\begin{aligned}
Outcome_{igst} = {} & \alpha + \beta_1 X_{it} + \beta_2 Year_t + \beta_3 Grade_{igt} + \beta_4 EverPASLSchool_{it} \qquad (3.1.2) \\
& + \beta_5 (EverPASLSchool_{it} \times Grade_{igt}) \\
& + \beta_6 (EverPASLSchool_{it} \times Year_t) + \beta_7 (Grade_{igt} \times Year_t) \\
& + \beta_9 Partial\ PASL_{igt} + \beta_{10} Full\ PASL_{igt} + \epsilon_{igst}
\end{aligned}
$$

A second specification of regression model (3) allows treatment effects to vary across schools. This specification takes the form:

$$
\begin{aligned}
Outcome_{igst} = {} & \alpha + \beta_1 X_{it} + \beta_2 Year_t + \beta_3 Grade_{igt} + \beta_4 School_{ist} \qquad (3.2) \\
& + \beta_5 (School_{ist} \times Grade_{igt}) + \beta_6 (School_{ist} \times Year_t) \\
& + \beta_7 (Grade_{igt} \times Year_t) + \beta_8 (School_{ist} \times PASL\ Cohort_{igt}) + \epsilon_{igst}
\end{aligned}
$$

The second specification controls for the same time-varying student characteristics, year effects, grade variables, and interaction terms as equation (3.1.1). However, the scale-out and innovation indicators are replaced by individual school indicators. The vector β_8 comprises the coefficients of interest in this specification, which are the estimated effects of being in a particular treated school in a year and grade when the school received treatment.

Results

Attendance

Attendance measures the proportion of enrollment days over which a student is marked present, with no adjustment for excused absences. Broward County changed enrollment recording practices from 2012-13 to 2013-14, meaning that the observed attendance measurement after the 2012-13 school year is a more precise accounting of attendance at each school a student attended in the year. For consistency, attendance measurements after 2012-13 are created by summing all regular-semester enrollments over the year and assigning a student to the school of longest enrollment. The

change in recording practices from 2012-13 to 2013-14 does not appear to have affected the figures or attendance regression analysis. It is important to note that averaging attendance masks idiosyncratic variation in attendance patterns across schools, grade levels, and student characteristics. Although averages are informative, there are distributional differences across schools that may not be captured by these figures and tables.

Descriptive Evidence

As illustrated in Figure 1, innovation schools tended to have lower attendance than never-treated schools prior to the innovation year, while scale-out schools tended to have higher attendance rates. In the innovation year, average attendance in high schools improved throughout the district, though the improvement appears to have been somewhat larger in the innovation schools. The scale-out schools, while also increasing attendance, did so less than the never-treated schools over the same period. Interestingly, both the schools that were treated in the innovation year (the innovation schools) as well as those that would not be treated until the following year (the scale-out schools) experienced comparable gains in attendance during the innovation year. The attendance patterns over time for high school freshman (Figure 2) mirror those for high schools as a whole. In contrast, if one looks only at the 2014-15 cohort of 9th-grade students (Figure 3), there is little difference in attendance rates between innovation schools, scale-out schools and non-treated schools. Further, the attendance improvements experienced for 9th graders at Spring Gardens appear to be completely reversed when those students are in 10th grade.

The summary statistics presented in Table 1 indicate that pre-treatment attendance patterns were roughly similar across innovation, scale-out, and never-treated high schools. Scale-out schools had the highest attendance levels, at nearly 92 percent, beating the innovation schools with 90.5 percent attendance and the never treated high schools with 91.3 percent. After treatment, attendance increased at all high schools in Broward County, but the largest gains were made by the innovation schools. These schools increased attendance by over four percentage points to a level mirroring the scale-out and never-treated schools. Scale-out schools increased average attendance from 91.93% to 94.76%, or nearly three percentage points. The schools that never received PASL treatment increased attendance by three and a half percentage points, which is one percentage point less than the effect for scale-out schools and nearly one percentage point higher than the effect for innovation schools.

Figure 1. Attendance by Treatment Status

Attendance by Treatment
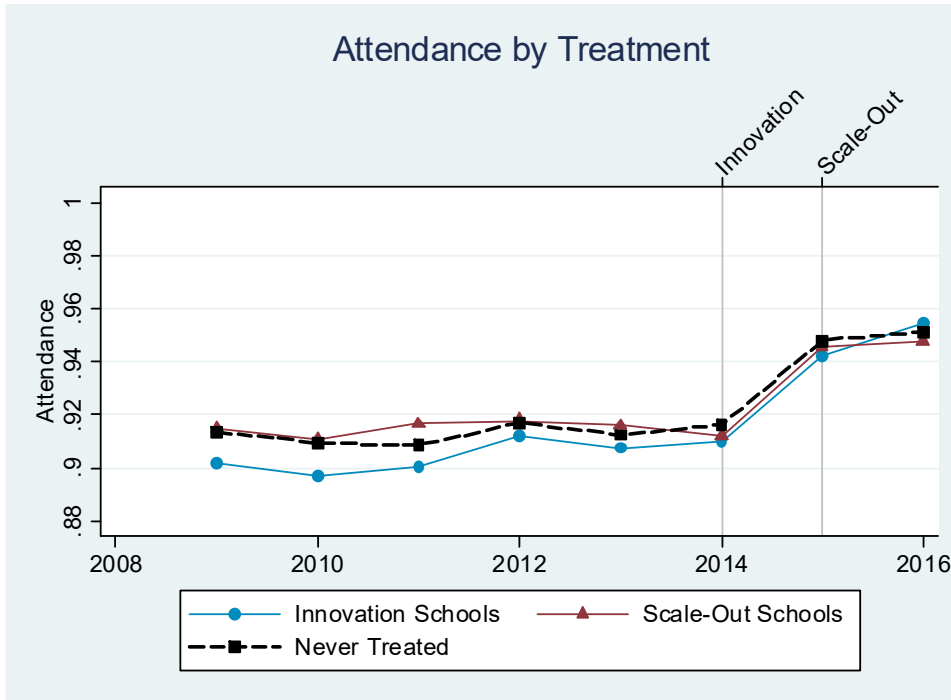
Figure 2. Attendance of 9th Graders by Treatment Status

9th Grade Attendance by Treatment
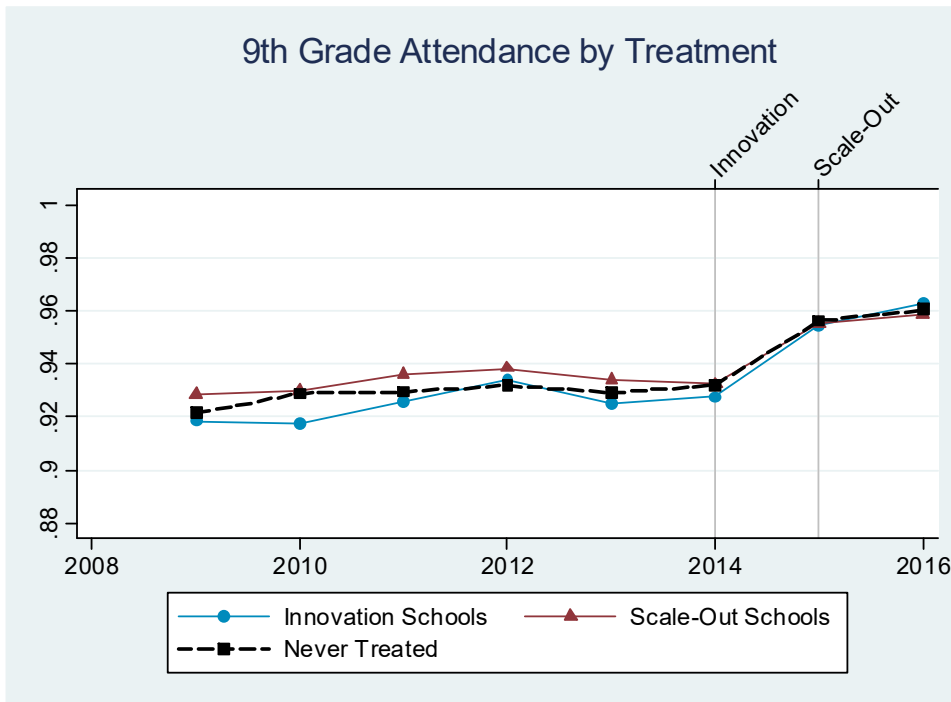
Figure 3. Attendance by Treatment Status – 2014-15 9th Grade Cohort
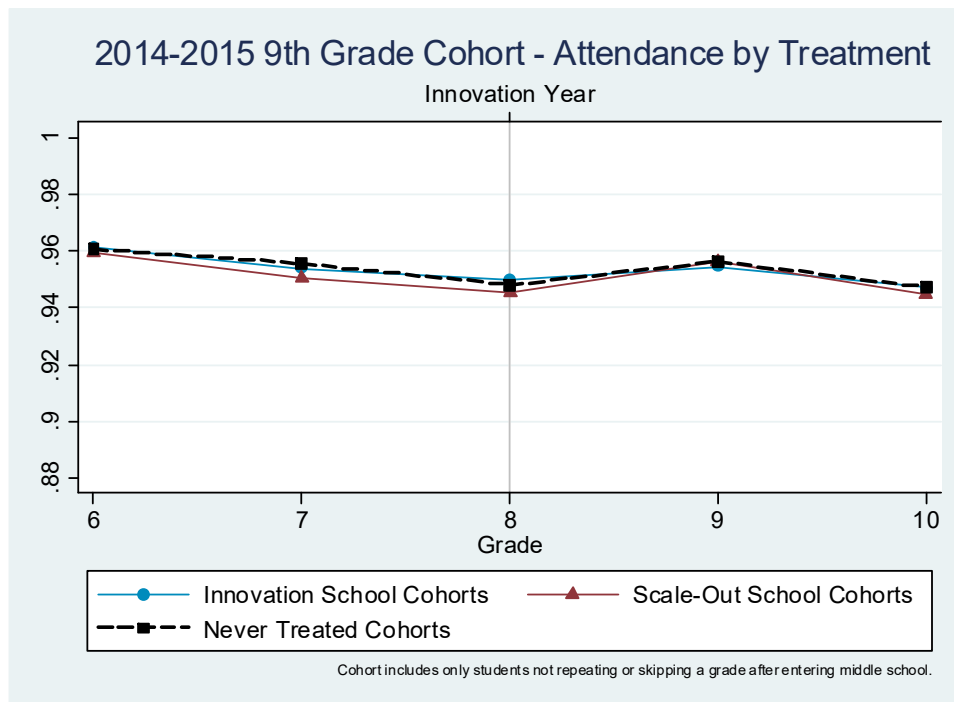
Difference-in-Differences Results

Table 2.1 presents results from the difference-in-difference estimation for both all grades at a school and for 9th-grade students only. During the first and second years of treatment, both the innovation and the scale-out schools had comparable attendance changes relative to the never-treated (control) schools.

Estimates from the difference-in-difference model that allows for variation in the effects of PASL among treated schools are presented in Table 2.2. Spring Gardens High School improved attendance relative to the control schools in the first and second years of treatment. Hillview and Summers High Schools had lower attendance relative to control schools in the first year of PASL, but were comparable in the second year of treatment. Among scale-out schools, Winter Ridge, Silver Oak, Meadows, and White Mountain High Schools saw reduced attendance relative to control schools, while Pleasant Valley High School had improved attendance.

As shown in Table 3.1, among the cohort of students in 9th grade in 2014-15 there was no significant overall improvement in attendance at innovation schools (relative to the change in non-treated schools). Hillview was the only innovation school to see significantly different cohort attendance relative to the district, with attendance rates lowered by 2.0 percentage points during the year in

which the students received treatment, 2014-15 (Table 3.2). Interestingly, the effect of PASL participation appears to persist among the 2015-2016 Hillview cohort in their second year of treatment when they were no longer participating in the PASL treatment.

Results from the triple-difference analysis, which controls for both changes over time in attendance rates between students in each grade in treated and non-treated schools and for school-wide changes over time for all students in treated schools, are presented in Tables 4.1 and 4.2. The findings are positive for Spring Gardens and Summers High Schools, negative for Hillview, Winter Ridge, and Meadows High Schools, and indistinguishable from zero for all other schools. The reason why these findings differ from the twice-differenced results can be seen by comparing the estimates in the first and second columns of Table 2.2. Take, for example, the case of Hillview. In 2014-15, the average impact for all grades was a decrease in the attendance rate of 1.5 percentage points and a decrease of 1.75 percentage points for 9th-grade students. In the second year of treatment, the school-wide losses were indistinguishable from zero while 9th grade losses were 0.8 percentage points. The triple difference estimated effect of PASL on 9th-grade attendance, at -0.92, is roughly the gap between the difference-in-difference estimated effects for students of all grades and for those in 9th-grade. The triple difference estimates make this sort of within-school comparison and thus produce an estimated impact that is significantly different from zero.

Table 1: Attendance by Treatment Status

	Innovation schools		Scale-Out Schools		Never Treated Schools	
	Before Treatment	After Treatment	Before Treatment	After Treatment	Before 2014-2015	After 2014-2015
Attendance	90.47%	94.84%	91.93%	94.76%	91.3%	94.9%
	(0.100)	(0.064)	(0.090)	(0.066)	(0.0942)	(0.0614)
Observations	46,222	15,165	75,615	11,038	295,927	100,092

Note: Displayed values are the average attendance of all students in all innovation, scale-out, and never-treated schools. Standard errors are in parentheses.

Table 2.1: Attendance Difference-in-Differences by Treatment

	Attendance Percentage - All Grades	Attendance Percentage - Grade 9
Innovation School x 2015	-0.158	-0.081
	(1.04)	(1.05)
Innovation School x 2016	0.589	0.446
	(0.55)	(0.82)
Scale-Out School x 2016	-0.592	-1.838
	(0.62)	(0.77)
Observations	1,093,079	317,128

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include individual indicators for gender, foreign-born, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year and for whether the school is an innovation or a scale-out school. Robust standard errors are clustered at the school level.

Table 2.2: Attendance Difference-in-Differences by School

	Attendance Percentage - All Grades	Attendance Percentage - Grade 9
Spring Gardens x 2015	2.828***	2.478***
	(0.30)	(0.33)
Hillview x 2015	-1.483***	-1.749***
	(0.30)	(0.33)
Summers x 2015	-0.728**	-0.151
	(0.30)	(0.34)
Spring Gardens x 2016	2.050***	2.363***
	(0.28)	(0.35)
Hillview x 2016	0.337	-0.800**
	(0.27)	(0.34)
Summers x 2016	-0.207	0.172
	(0.27)	(0.34)
Winter Ridge x 2016	-2.277***	-2.715***
	(0.24)	(0.29)
Silver Oak x 2016	-2.438***	-2.334***
	(0.23)	(0.26)
Meadows x 2016	-0.539**	-1.443***
	(0.25)	(0.30)
Pleasant Valley x 2016	1.218***	1.375***
	(0.27)	(0.34)
White Mountain x 2016	-0.636***	-0.818***
	(0.23)	(0.28)
Observations	1,093,079	317,128

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include individual indicators for gender, foreign-born, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year and for whether the school is an innovation or a scale-out school. Robust standard errors are clustered at the school level.

Table 3.1: Cohort Attendance Difference-in-Differences by Treatment

	Cohort Attendance Percentage
Innovation School x 2015	-0.219
	(0.57)
Innovation School x 2016	-0.030
	(0.52)
Observations	10,228

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include individual indicators for gender, foreign-born, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for whether the school is an innovation or a scale-out school. Robust standard errors are clustered at the school level.

Table 3.2: Cohort Attendance Difference-in-Differences by School

	Cohort Attendance Percentage
Spring Gardens x 2015	1.179
	(1.03)
Hillview x 2015	-1.953***
	(0.42)
Summers x 2015	-0.045
	(0.94)
Spring Gardens x 2016	0.670
	(0.85)
Hillview x 2016	-1.090**
	(0.43)
Summers x 2016	-0.267
	(0.79)
Observations	10,228

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include individual indicators for gender, foreign-born, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for whether the school is an innovation or a scale-out school. Robust standard errors are clustered at the school level.

Table 4.1: Attendance Difference-in-Differences-in-Differences by Treatment

	Attendance Percentage	Attendance Percentage
All Students in Treated Grades Receive PASL	0.236 (0.51)	
Some Students in Treated Grades Receive PASL	-0.633 (0.42)	
Student Grade Receives Full or Partial PASL		0.121 (0.51)
Observations	1,093,079	1,093,079

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include individual indicators for gender, foreign-born, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year and for whether the school is ever treated. Interaction terms in the model include treatment-by-grade, treatment-by-year, and grade-by-year indicators. Robust standard errors are clustered at the school level.

Table 4.2: Attendance Difference-in-Differences-in-Differences by School

	Attendance Percentage
Student Grade Receives PASL - Spring Gardens	0.744*** (0.19)
Student Grade Receives PASL - Hillview	-0.922*** (0.19)
Student Grade Receives PASL - Summers	0.515*** (0.19)
Student Grade Receives PASL - Winter Ridge	-0.702*** (0.18)
Student Grade Receives PASL - Silver Oak	0.155 (0.14)
Student Grade Receives PASL - Meadows	-1.148*** (0.18)
Student Grade Receives PASL - Pleasant Valley	0.209 (0.19)
Student Grade Receives PASL - White Mountain	-0.218 (0.15)
Observations	1,093,079

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include individual indicators for gender, foreign-born, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year and for each treated school. Interaction terms in the model include school-by-grade, school-by-year, and grade-by-year indicators. Robust standard errors are clustered at the school level.

Discipline

Broward County records all suspensions, major disciplinary incidents, and minor disciplinary incidents. Major disciplinary incidents are serious crimes such as battery, possession of an illicit substance, vandalism, and arson. The measure of major disciplinary incidents per student in the following figures is the average number of major offenses committed by a given student in a school and year. Minor disciplinary incidents include lesser transgressions such as skipping class. The sum of major and minor incidents is total disciplinary incidents. Because the vast majority of total disciplinary incidents are minor incidents, analysis of minor disciplinary incidents is presented in the appendix. In-school suspensions per student and out-of-school suspensions are also reported in the appendix because they roughly correspond to the number of total and major disciplinary incidents.

Descriptive Evidence

Summary statistics for the number of disciplinary per student, broken down by school type and by pre/post treatment period are provided in Table 5. "Minor" incidents are about 10 times more likely than are major disciplinary incidents. Correspondingly, out-of-school suspensions are about 8 times more likely to occur than in-school suspensions.

As illustrated in Figure 4, prior to the innovation year (2014-15), there was a general downward trend in the number of disciplinary incidents per student in high schools throughout the district. While innovation and never-treated schools exhibited similar levels of disciplinary incidents over time, the scale-out schools had substantially fewer disciplinary incidents per student in every year before the innovation year. In the innovation and scale-out years, the long-run downward trend flattened out, with the scale-out schools experiencing an uptick in disciplinary problems in the innovation year (the year prior to treatment for the scale-out schools).

Major disciplinary incidents exhibit more variability from year to year than do the total number of incidents per student (Figure 5). This is not surprising given the relatively low number of major disciplinary incidents per student. As with the total number of incidents, the number of major infractions per student exhibited a general downward trend throughout Broward County high schools prior to the innovation year but remain roughly constant after that time.

While there are notable changes from year to year, there are no reductions in disciplinary incidents per student that are clearly associated with PASL treatment. For example, while both total and major disciplinary incidents per student fall at Spring Gardens High School in the innovation year, these improvements in behavior appear to be part of a longer-term trend. Likewise, while total disciplinary

incidents per student rise at Summers High School during the innovation year, the upward trend appears to have started in the year prior to the introduction of PASL.

The patterns for 9th grade students (Figures 6 - 9), are similar to those for all students at a school. The only improvement that does not appear to be part of a longer-term trend is a drop in major disciplinary incidents per student at Hillview High School during the innovation year. This decrease does not continue for the second cohort of treated students in 2015-16, however.

Figure 4. Total Number of Disciplinary Incidents per Student by Treatment Status
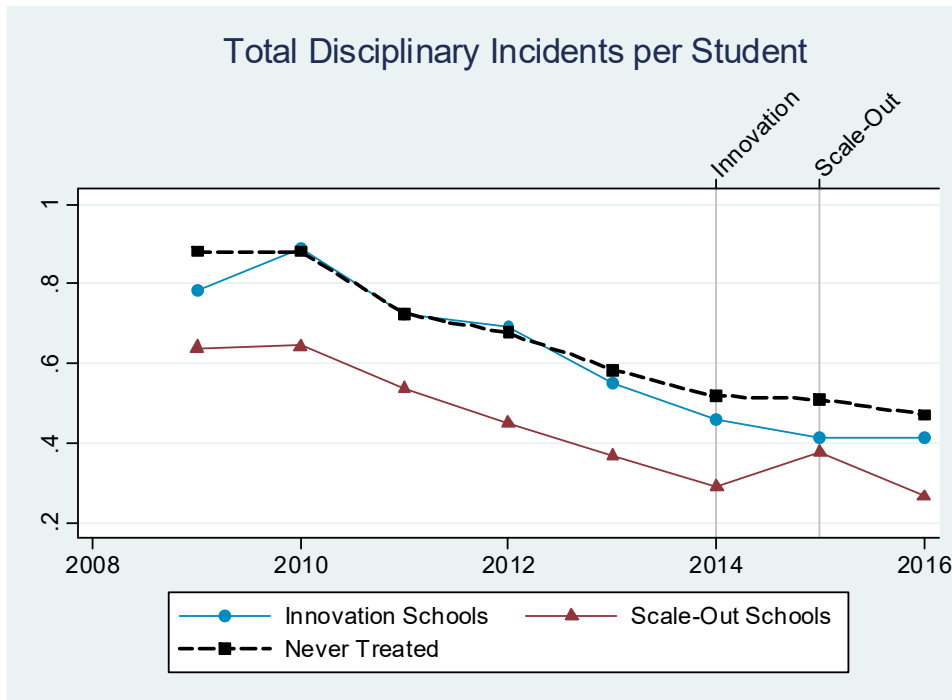
Figure 5. Number of Major Disciplinary Incidents per Student by Treatment Status
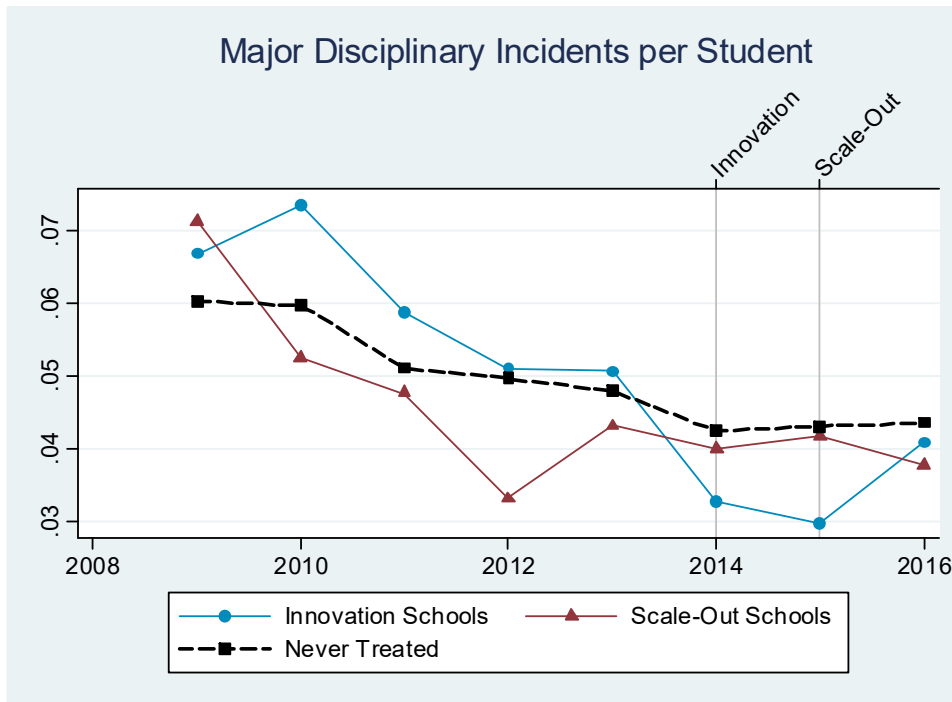
Figure 6. Total Number of Disciplinary Incidents per 9th-Grade Student by Treatment Status

Figure 6. Total Number of Disciplinary Incidents per 9th-Grade Student by Treatment Status

Figure 7. Number of Major Disciplinary Incidents per 9th-Grade Student by Treatment Status
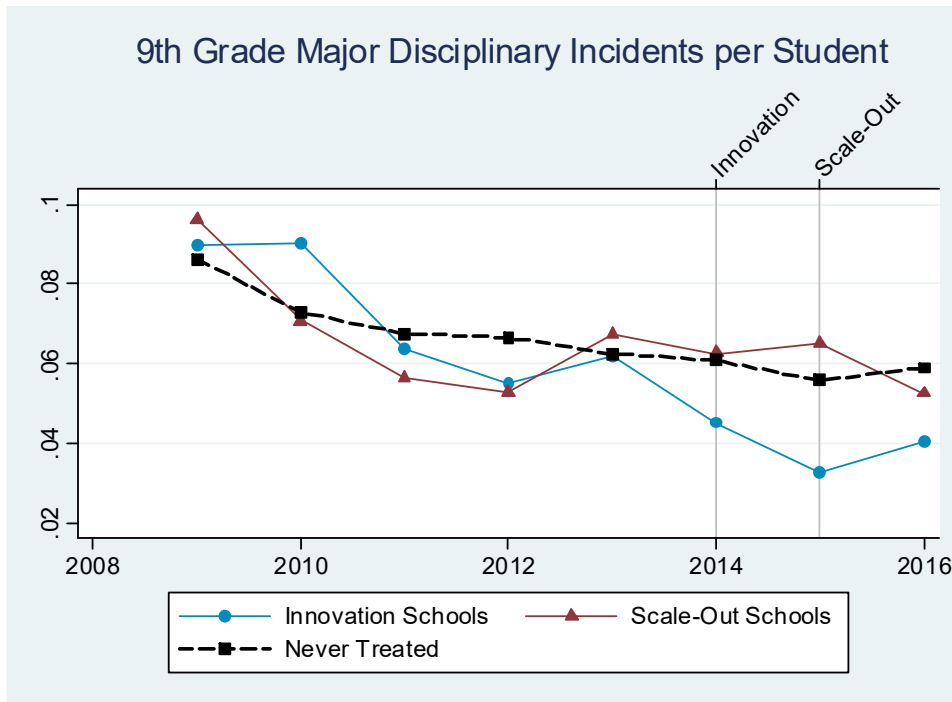
Figure 8. Total Number of Disciplinary Incidents by Treatment Status – 2014-15 9th Grade Cohort
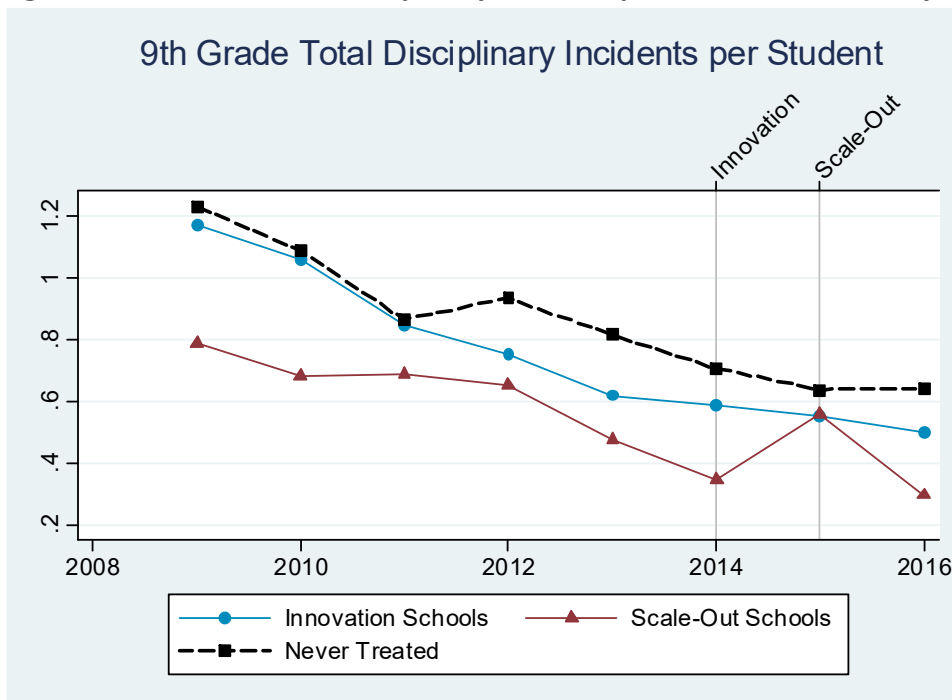
2014-2015 9th Grade Cohort - Total Disciplinary Incidents
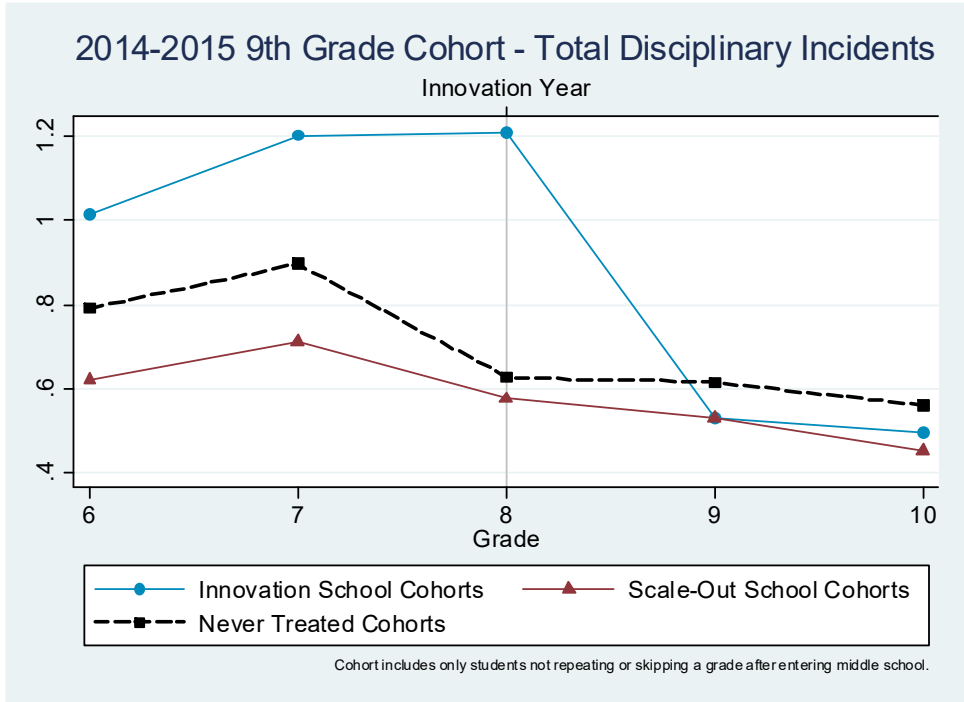
Figure 9. Number of Major Disciplinary Incidents by Treatment Status – 2014-15 9th Grade Cohort
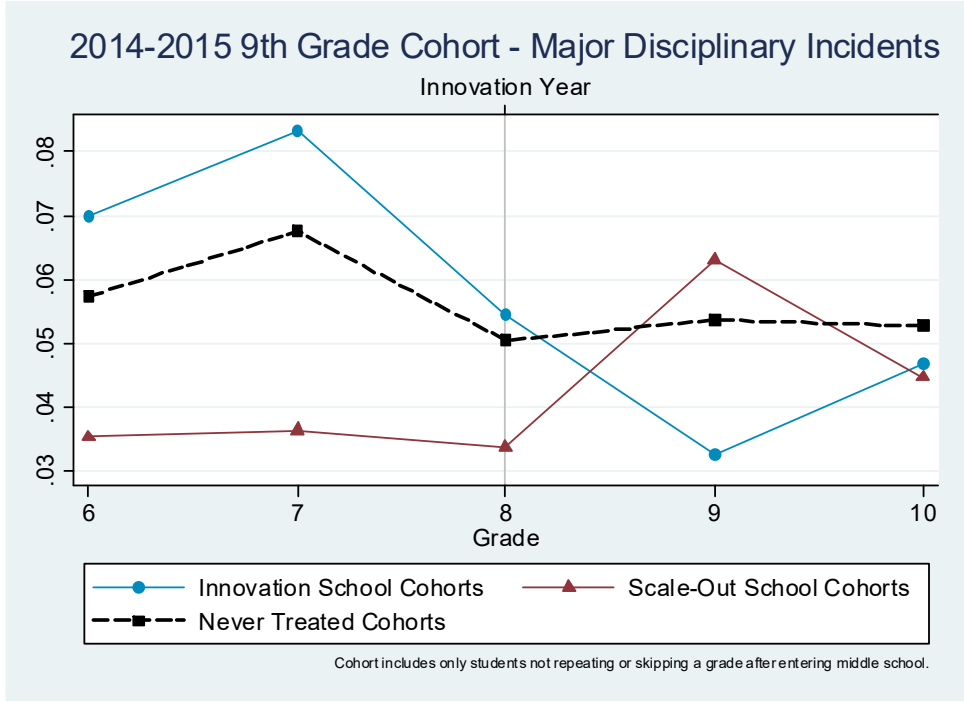
2014-2015 9th Grade Cohort - Major Disciplinary Incidents

School-level per-student total disciplinary patterns did not significantly change in either the first or the second year of treatment for innovation schools as a whole, although average major disciplinary events decreased in the first year of treatment for innovation schools (Table 6.1). Similarly, as a group, the scale-out schools saw no changes to major or total disciplinary incidents. Among just 9th-grade students, innovation schools saw decreased major disciplinary incidents in both the 2014-15 and the 2015-16 school year (relative to never-treated schools). With reductions in the number of major disciplinary incidents per student of -0.15 or -0.21, depending on year, this effect represents a 25 to 40 percent decrease.

There is evidence that Spring Gardens decreased major and total disciplinary incidents in the first and second year of treatment (Table 6.2). The impacts were substantial, ranging from a reduction of 0.14 to 0.17 total incidents per student, depending on the grade level and year. Hillview High School managed to decrease major disciplinary incidents in the 2014-15 school year but also experienced an increase in the total number of incidents per student among 9th graders that year. Summers High School saw increases in total incidents in 2014-15 and 2015-16, but had decreases to major incidents in the second year of PASL treatment. Among scale-out schools, Meadows High School substantially decreased both major and total disciplinary incidents relative to never-treated schools in the 2015-16 school year. Meadows High School 9th-grade students had both fewer major and total incidents than untreated 9th-grade students in the scale-out year, with decreases of roughly twice the magnitude as the effect at Spring Gardens in 2014-15 for total incidents. In contrast, Winter Ridge experienced increases in both major and total disciplinary incidents during the scale-out year, both for 9th graders and for the student body. Pleasant Valley saw increases to major and total disciplinary incidents in the scale-out year for 9th-grade students. Silver Oak achieved a slightly lower level of major disciplinary incidents without any change to total incidents for all students, but had increased total incidents for 9th-grade students. White Mountain's total disciplinary incidents went up in the first year of treatment for all students while major disciplinary incidents decreased among 9th-grade in the scale-out year.

The cohort of 2014-15 freshman at innovation schools improved both major and total disciplinary incidents in the first year of treatment relative to 9th-grade students attending never-treated high schools in the same year (Table 7.1). The effect on total incidents does not persist into the 2015-16 school year for total disciplinary incidents, although the effect remains negative but indistinguishable from zero for both major and total incidents. Spring Gardens High School appears responsible for

most of the innovation school effect, with its 9th-grade cohort having one fewer disciplinary incident per student in both the 2014-15 and 2015-16 school years (Table 7.2). Since the average number of total disciplinary incidents per student for never-treated schools is about 0.7, this represents a fairly drastic change. Although effects are generally negative for the 9th-grade cohort of Summers in both treatment years, the effects are not significantly different from zero at standard confidence levels. The cohort of 9th-grade students at Hillview had significantly higher total disciplinary incidents per student in the 2015-16 year after treatment but had comparable rates of disciplinary incidents in the 2014-15 PASL innovation year.

Most, though not all, of the improvements in student behavior can be attributed to the PASL intervention when we employ the triple-difference approach, which makes comparisons across treated and untreated grades within ever-treated schools. Estimates from the triple-difference model, which are presented in Tables 8.1 and 8.2, indicate that the intervention was effective in lowering the number of major disciplinary incidents per student at Spring Gardens, Summers, Meadows and White Mountain. However, the reduction in total disciplinary incidents for Spring Gardens in the difference-in-difference analysis is no longer statistically different from zero in the tripe-difference analysis.

Table 5: Disciplinary Incidents per Student by Treatment

	Innovation Schools		Scale-Out Schools		Never Treated Schools	
	Before Treatment	After Treatment	Before Treatment	After Treatment	Before 2014-2015	After 2014-2015
Major Incidents	0.0561	0.0353	0.0471	0.0378	0.052	0.0433
	(0.27)	(0.21)	(0.26)	(0.24)	(0.27)	(0.24)
Minor Incidents	0.6344	0.3791	0.4282	0.228	0.664	0.4476
	(1.78)	(1.22)	(1.34)	(0.94)	(1.88)	(1.47)
Total Incidents	0.6905	0.4144	0.4752	0.2658	0.716	0.4909
	(1.87)	(1.28)	(1.43)	(1.02)	(1.97)	(1.55)
Out-of-School Suspensions	0.0527	0.0245	0.0591	0.0161	0.0726	0.0241
	(0.30)	(0.18)	(0.33)	(0.14)	(0.38)	(0.20)
In-School Suspensions	0.3915	0.191	0.1828	0.0883	0.2973	0.2181
	(1.20)	(0.75)	(0.74)	(0.45)	(0.99)	(0.84)
Observations	46,222	15,165	76,350	11,038	295,927	100,092

Note: Displayed values are the average number of disciplinary incidents per student across all students in treatment, treatment expansion, and never treated schools. Standard errors are in parentheses.

Table 6.1: Disciplinary Event Difference-in-Differences by Treatment

	No. Total Discipline Incidents per Student - All Grades	No. Total Discipline Incidents per Student - 9th Grade	No. Major Discipline Incidents per Student - All Grades	No. Major Discipline Incidents per Student - 9th Grade
Innovation School x 2015	0.027	0.172	-0.015*	-0.021*
	(0.08)	(0.14)	(0.01)	(0.01)
Innovation School x 2016	0.078	0.123	-0.003	-0.015**
	(0.11)	(0.15)	(0.00)	(0.01)
Scale-Out School x 2016	-0.005	-0.037	0.001	0.005
	(0.10)	(0.13)	(0.01)	(0.03)
Observations	1,093,079	317,128	1,093,079	317,128

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include individual indicators for gender, foreign-born, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year and for whether the school is an innovation or a scale-out school. Robust standard errors are clustered at the school level.

Table 6.2: Disciplinary Event Difference-in-Differences by School

	No. Total Discipline Incidents per Student - All Grades	No. Total Discipline Incidents per Student - 9th Grade	No. Major Discipline Incidents per Student - All Grades	No. Major Discipline Incidents per Student - 9th Grade
Spring Gardens x 2015	-0.137**	-0.168**	-0.030***	-0.040***
	(0.05)	(0.07)	(0.00)	(0.01)
Hillview x 2015	0.041	0.341***	-0.017***	-0.025***
	(0.05)	(0.07)	(0.00)	(0.01)
Summers x 2015	0.138**	0.257***	-0.000	-0.001
	(0.05)	(0.07)	(0.00)	(0.01)
Spring Gardens x 2016	-0.154***	-0.172**	-0.012***	-0.020***
	(0.05)	(0.07)	(0.00)	(0.01)
Hillview x 2016	0.240***	0.354***	-0.002	-0.008
	(0.05)	(0.07)	(0.00)	(0.01)
Summers x 2016	0.095*	0.161**	0.005	-0.018***
	(0.05)	(0.07)	(0.00)	(0.01)
Winter Ridge x 2016	0.131***	0.149**	0.018***	0.026***
	(0.05)	(0.06)	(0.00)	(0.01)
Silver Oak x 2016	0.063	0.130**	-0.007**	-0.009
	(0.05)	(0.06)	(0.00)	(0.01)
Meadows x 2016	-0.230***	-0.332***	-0.015***	-0.036***
	(0.05)	(0.06)	(0.00)	(0.01)
Pleasant Valley x 2016	0.070	0.137**	0.054***	0.160***
	(0.05)	(0.06)	(0.00)	(0.01)
White Mountain x 2016	0.153***	0.013	-0.002	-0.020***
	(0.05)	(0.06)	(0.00)	(0.01)
Observations	1,093,079	317,128	1,093,079	317,128

Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include individual indicators for gender, foreign-born, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year and for whether the school is an innovation or a scale-out school. Robust standard errors are clustered at the school level.

Table 7.1: Cohort Disciplinary Events Difference-in-Differences by Treatment

	(1) No. Cohort Total Discipline Incidents per Student	(2) No. Cohort Major Discipline Incidents per Student
Innovation School x 2015	-0.498[*]	-0.059[**]
	(0.26)	(0.03)
Innovation School x 2016	-0.379	-0.023
	(0.28)	(0.03)
Observations	10,228	10,228

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include 8th grade reading and math scores, individual indicators for gender, foreign-born status, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year and for whether the school is an innovation or a scale-out school. Robust standard errors are clustered at the school level.

Table 7.2: Cohort Disciplinary Events Difference-in-Differences by School

	No. Cohort Total Discipline Incidents per Student	No. Cohort Major Discipline Incidents per Student
Spring Gardens x 2015	-1.008***	-0.064
	(0.25)	(0.04)
Hillview x 2015	0.164	-0.030
	(0.16)	(0.03)
Summers x 2015	-0.629	-0.074*
	(0.47)	(0.04)
Spring Gardens x 2016	-0.968***	-0.069**
	(0.21)	(0.03)
Hillview x 2016	0.390***	0.017
	(0.15)	(0.02)
Summers x 2016	-0.570	-0.014
	(0.39)	(0.03)
Observations	10,228	10,228

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include 8th grade reading and math scores, individual indicators for gender, foreign-born status, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year and for whether the school is an innovation or a scale-out school. Robust standard errors are clustered at the school level.

Table 8.1: Disciplinary Event Difference-in-Differences-in-Differences by Treatment

	No. Total Discipline Incidents per Student	No. Total Discipline Incidents per Student	No. Major Discipline Incidents per Student	No. Major Discipline Incidents per Student
Schools Ever Implementing PASL	-0.262*** (0.08)	-0.262*** (0.08)	-0.003 (0.01)	-0.003 (0.01)
All Students in Treated Grades Receive PASL	-0.081 (0.13)		-0.017** (0.01)	
Some Students in Treated Grades Receive PASL	-0.038 (0.06)		-0.027* (0.01)	
Student Grade Receives Full or Partial PASL		-0.076 (0.12)		-0.019** (0.01)
Observations	1,093,079	1,093,079	1,093,079	1,093,079

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include individual indicators for gender, foreign-born, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year and for whether the school is ever treated. Interaction terms in the model include treatment-by-grade, treatment-by-year, and grade-by-year indicators. Robust standard errors are clustered at the school level.

Table 8.2: Disciplinary Event Difference-in-Differences-in-Differences by Treatment

	No. Total Discipline Incidents per Student	No. Major Discipline Incidents per Student
Student Grade Receives PASL - Spring Gardens	0.007 (0.03)	-0.010** (0.00)
Student Grade Receives PASL - Hillview	0.313*** (0.03)	-0.006 (0.00)
Student Grade Receives PASL - Summers	0.177*** (0.03)	-0.010** (0.00)
Student Grade Receives PASL - Winter Ridge	0.011 (0.03)	0.010** (0.00)
Student Grade Receives PASL - Silver Oak	0.086** (0.04)	-0.002 (0.00)
Student Grade Receives PASL - Meadows	-0.126*** (0.03)	-0.026*** (0.00)
Student Grade Receives PASL - Pleasant Valley	0.159*** (0.04)	0.145*** (0.00)
Student Grade Receives PASL - White Mountain	-0.141*** (0.04)	-0.019*** (0.00)
Observations	1,093,079	1,093,079

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include individual indicators for gender, foreign-born, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year and for whether the school is ever treated. Interaction terms in the model include treatment-by-grade, treatment-by-year, and grade-by-year indicators. Robust standard errors are clustered at the school level.

Test Scores

The analysis of the effects of PASL on student achievement is restricted to test scores from the reading end-of-grade exam and the Algebra I, Biology, and Geometry end-of-course exams. Other end-of-grade or end-of-course exams were excluded because they either were not given to 9th-grade students at PASL schools during treatment years (e.g. exams in Science, Math, Civics, and American History) or they were only given after PASL treatment had occurred at the innovation schools (e.g. Algebra 2). Further, each of the end-of-course exams were administered to students at varying grade levels during the PASL intervention, so the estimated effects of the PASL intervention may be conflating the actual effects of PASL with the mix of students who take the exams at particular grade levels. The Appendix contains a section entitled, "School Patterns in End-of-Course Test Taking Over Time," which provides a description of changes in the grade level at which students take end-of-course exams and an explanation of why these could lead to biased estimates of the achievement effects of PASL. All test scores are normalized by subtracting the average score within each grade from an individual student's score and dividing by the standard deviation of scores across the district. Normalization of test scores allows easier comparison of performance across tests with differing score scales and achievement distributions.

Descriptive Evidence

The pattern of average test scores across treatment categories corresponds roughly to that found for attendance and for disciplinary incidents. Innovation schools have the lowest pre-treatment scores on all examined tests, while scale-out schools had the highest pre-treatment test scores (see Table 9 and Figures 10, 13, 15 and 17). The plots of average test scores over time suggest that PASL did not lead to consistent improvement in student achievement. Average test scores declined in innovation schools during both the innovation and scale-out years in Reading. For the scale-out schools, reading scores dropped during the treatment year while never-treated schools experienced modest improvement in reading scores during the scale-out year. For Algebra I, Biology and Geometry, average test scores rose in the first year of PASL treatment at innovation schools, then fell back during the second (scale-out) year. Test performance in the scale-out schools varied considerably across subjects. The scale-out schools improved relative to never-treated schools in Algebra I and Biology, but fell in comparison to never-treated school in Geometry. Among innovation schools, the only school with test score gains in both the innovation and scale-out years was Summers, with gains in average biology test scores, relative to never-treated schools. Results are similar when limiting the sample to 9th graders, as the majority of students taking the selected end-of-course exams are freshman (see Figures 11, 14, 16, 18).

Figure 10. Reading Test Scores by Treatment Status

Reading Test Scores by Treatment
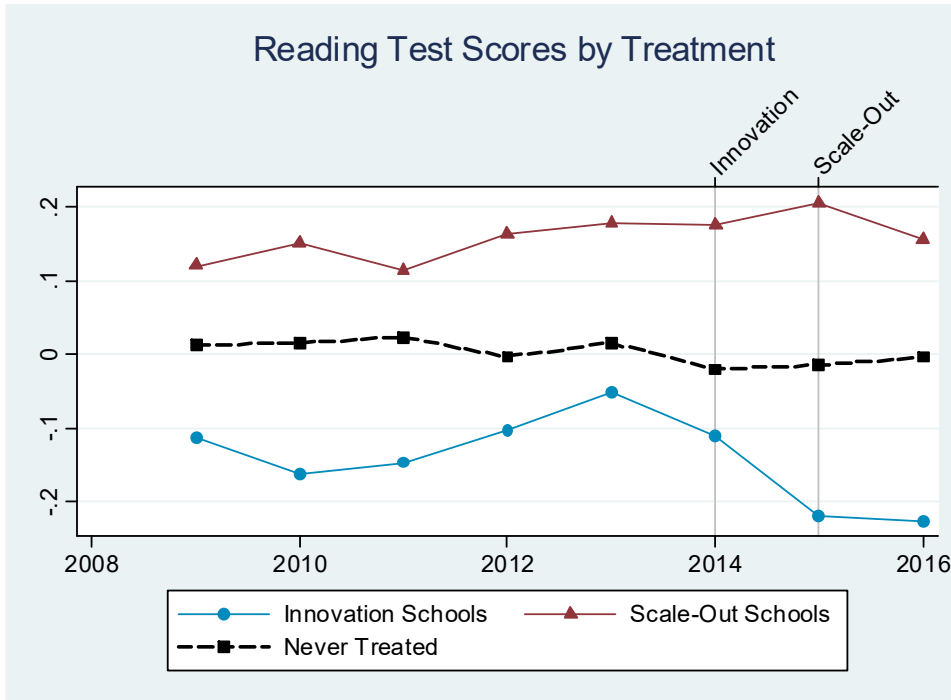
Figure 11. Reading Test Scores of 9th Graders by Treatment Status

9th Grade Reading Test Scores by Treatment
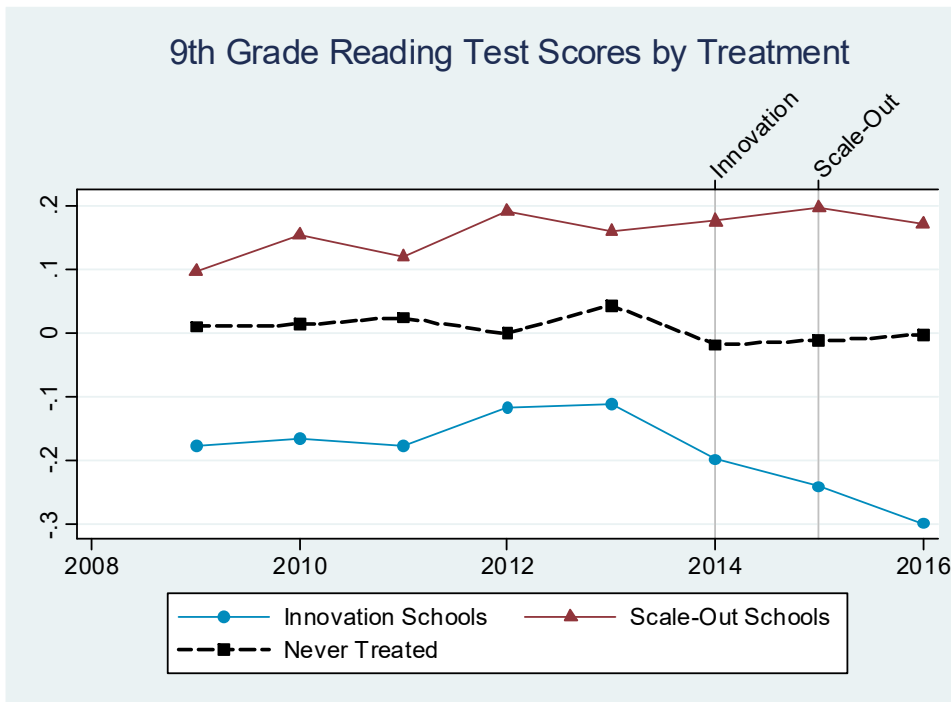
Figure 12. Reading Test Scores by Treatment Status – 2014-15 9th Grade Cohort

2014-2015 9th Grade Cohort - Reading Test Scores

Cohort includes only students not repeating or skipping a grade after entering middle school.
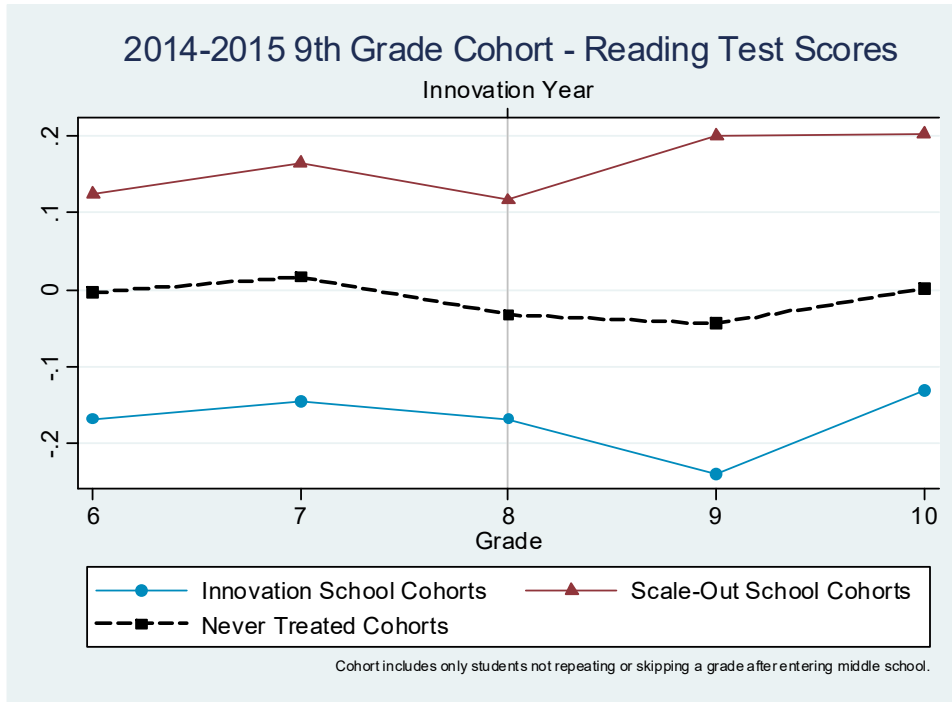
Figure 13. Algebra I Test Scores by Treatment Status

Algebra 1 Test Scores by Treatment
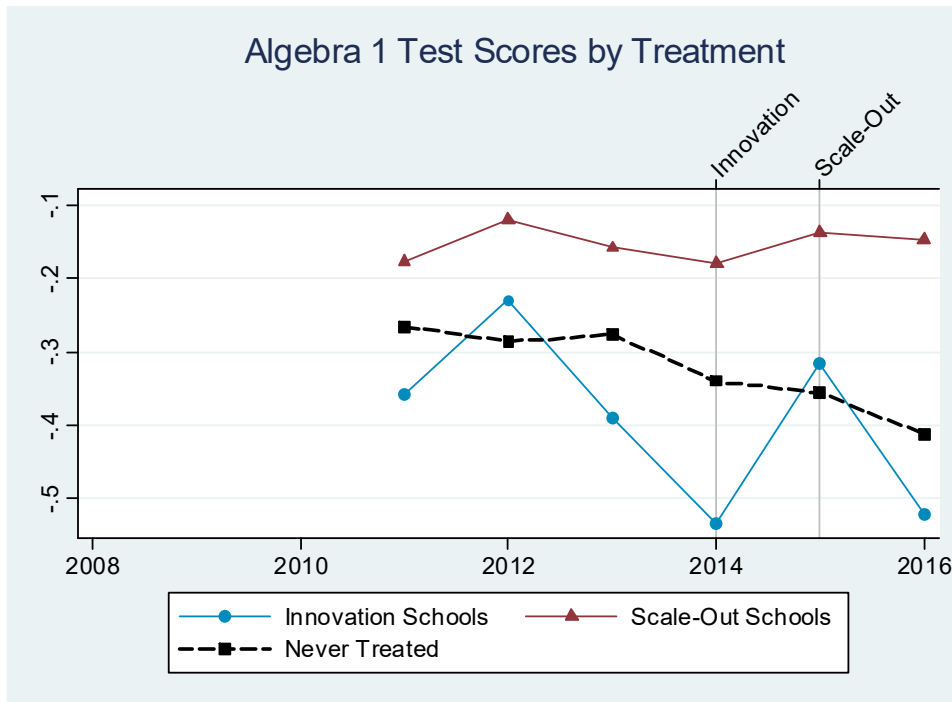
Figure 14. Algebra I Test Scores of 9th Graders by Treatment Status
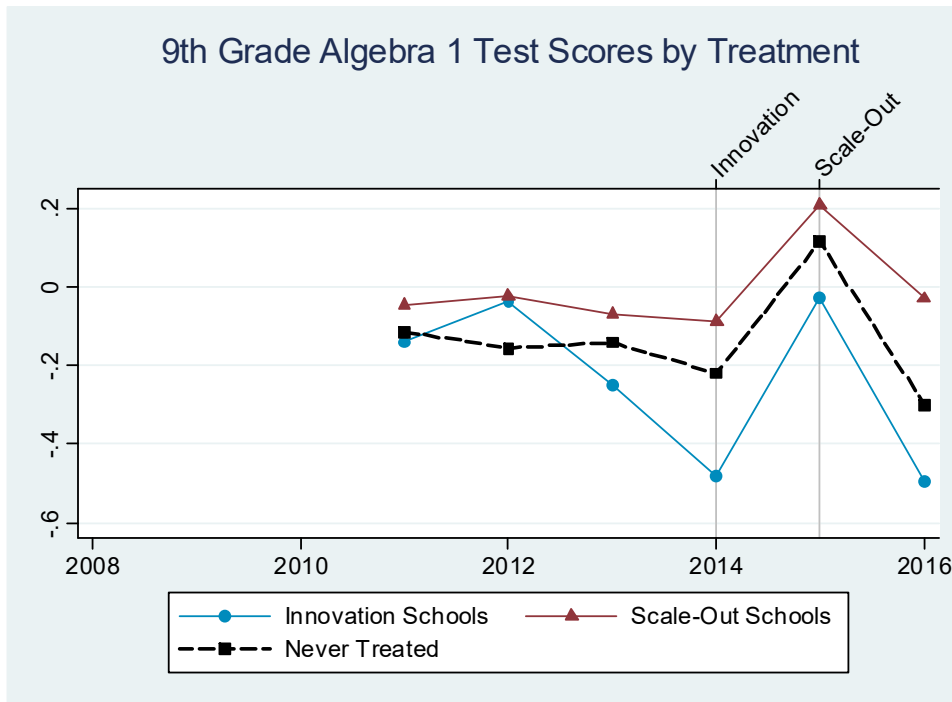
Figure 15. Biology Test Scores by Treatment Status
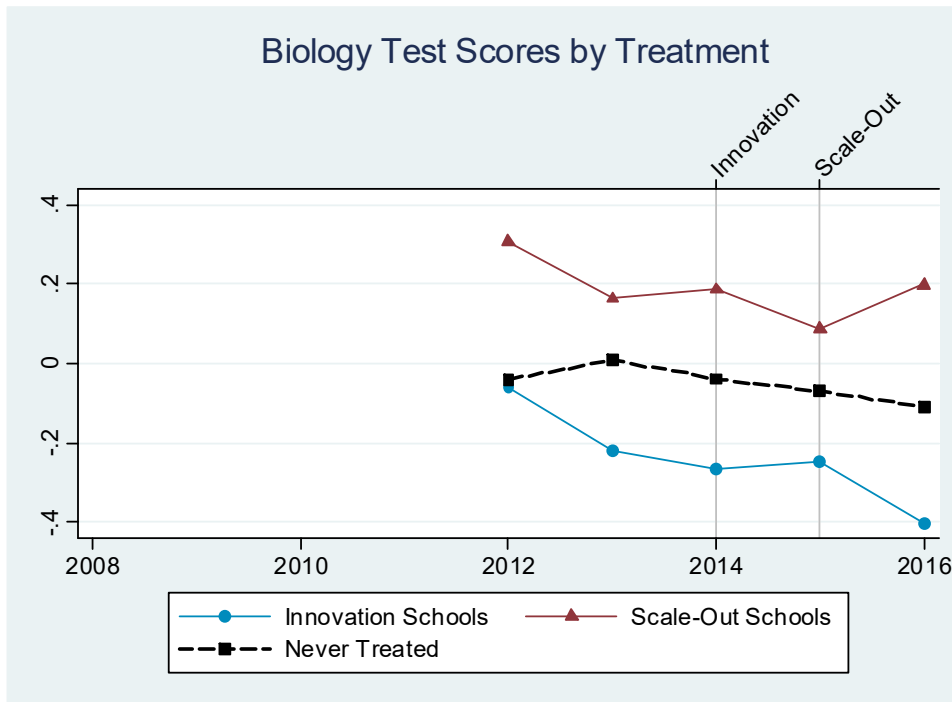
Figure 16. Biology Test Scores of 9th Graders by Treatment Status

9th Grade Biology Test Scores by Treatment
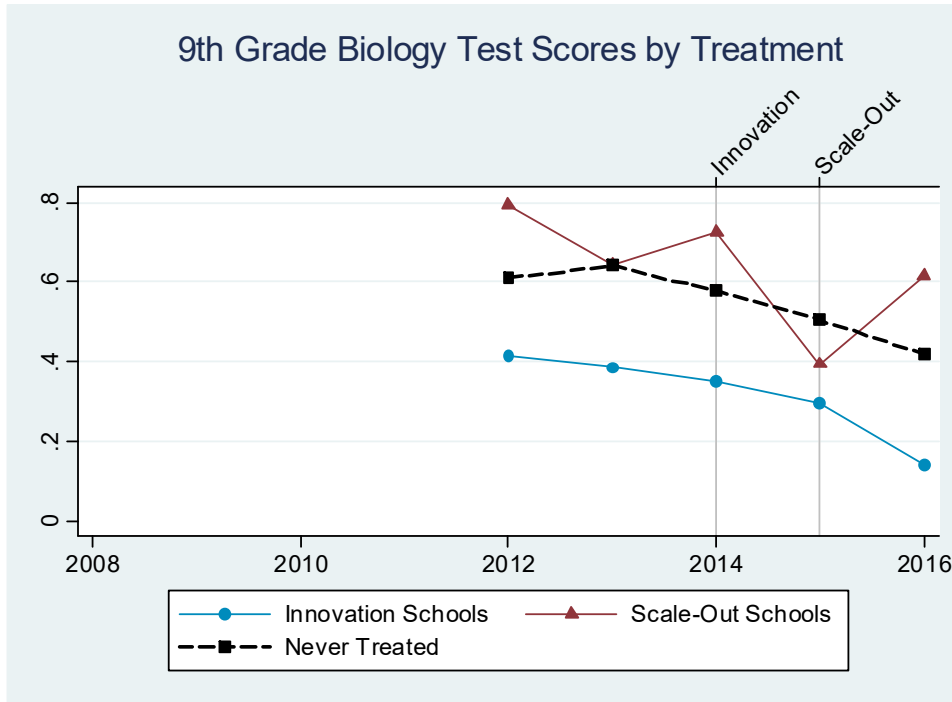
Figure 17. Geometry Test Scores by Treatment Status

Geometry Test Scores by Treatment
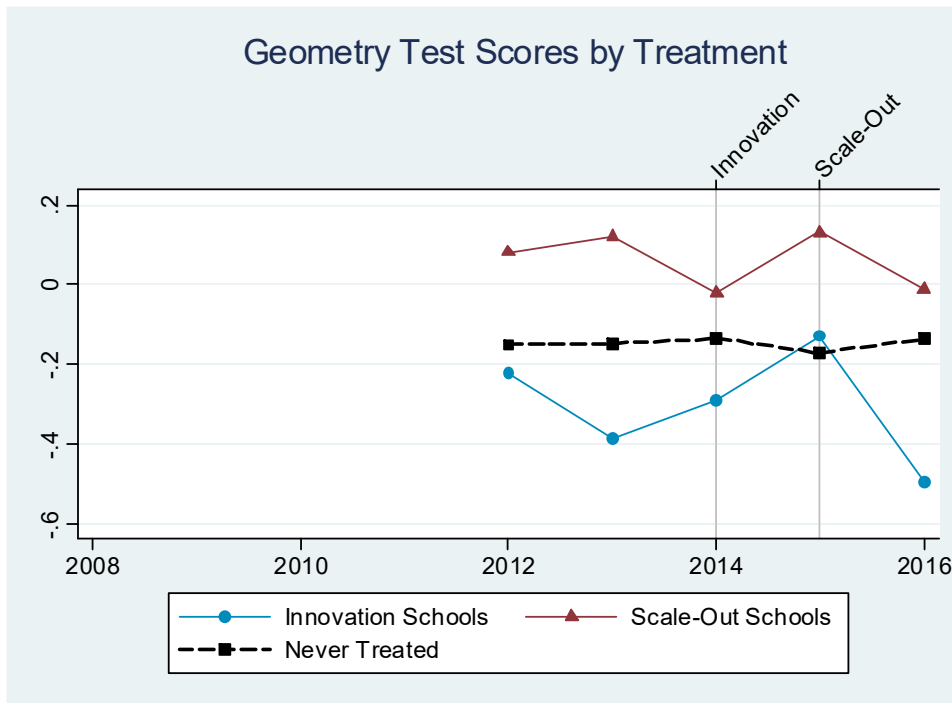
Figure 18. Geometry Test Scores of 9th Graders by Treatment Status
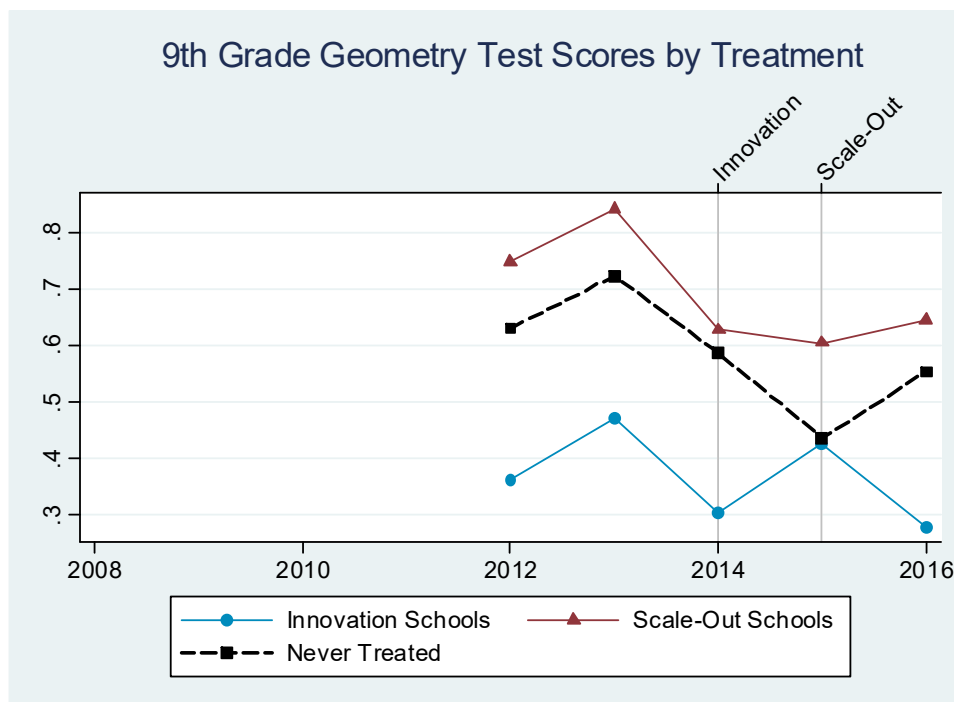
Difference-in-Differences Results

Estimated impacts of the PASL intervention for innovation schools as a group and scale-out schools as a group are provided in Tables 10.1 (for all students) and 10.2 (for only 9th graders). Since the PASL intervention primarily targeted 9th graders, we focus on the 9th-grade only results. Collectively, innovation schools saw no significant changes to any test score outcome in either year of PASL treatment. Similarly, there were also no significant impacts on test scores in any of the four subjects for scale-out schools during their first year of implementation.

Average test score changes mask considerable variation among PASL innovation schools. 9th-grade students at Spring Gardens saw improved Biology scores in both years of treatment offset by declines in reading scores (see Tables 10.3 and 10.4). Improvements to Algebra I and Geometry for Spring Gardens increased in the first year and then decreased in the second year of PASL implementation. During the innovation year, Hillview improved Algebra I scores but lost ground in Biology; in the second year of PASL, however, Hillview increased Reading, Algebra I, and Geometry test scores relative to the comparison control. Summers saw large improvements to Geometry and Biology end-of-course exams in the innovation year despite reductions in reading scores. During the scale-out year, Summers High School reversed its reading test score results from the innovation year and

experienced persistently positive Geometry and Biology test scores. Summers's gains in Biology may stem from their selection of Biology and Earth Science teachers for the PASL intervention.

Among the scale-out schools, Winter Ridge and Pleasant Valley experienced relative improvement in reading scores in 2015-16 of 0.10 and 0.06 standard deviations, respectively. In contrast, White Mountain and Silver Oak each had decreased relative reading scores for 9th-grade students. The scale-out schools were split between gains in Algebra I scores at Meadows and Pleasant Valley and decreases at Silver Oak and White Mountain. Pleasant Valley improved test scores while White Mountain experienced a statistically significant decrease in Geometry scores for 9th graders as a result of PASL. In Biology, Pleasant Valley was the only one of the five scale-out schools to obtain relative test score improvements for their 9th graders.

When the analysis is limited to the cohort of students who are high school freshman in 2014-15, we find no significant positive effects of PASL on student reading scores. This is true both for the innovation schools as a whole (Table 11.1), although Hillview appears to have improved reading scores among the cohort of 2014-15 9th-grade students in the scale-out year (Table 11.2).[2] In one of the innovation schools, Spring Gardens, the initial year of PASL treatment is associated with declines in relative reading scores, and these negative effects persist in the second year of implementation.

The estimated impacts of PASL on test scores are mixed when employing the triple difference model, which compares students across treated and untreated grades within schools. In no case were there statistically significant gains in relative test scores attributable to the PASL intervention for innovation schools as a group or for scale-out schools as a group (see Tables 12.1 and 12.2). For reading, the estimated effects of PASL participation were consistently negative, ranging from -0.03 to -0.11 standard deviations, depending on the specification. Furthermore, the negative effects on reading scores were found for all but three of the eight schools where PASL was implemented. There were, however, some instances where specific schools experienced test score gains on particular end-of-course exams (see Table 12.3). These included Hillview, Winter Ridge and Silver Oak in Algebra I; Hillview, Summers and Pleasant Valley in Biology; and Summers, Winter Ridge, Silver Oak and Coconut Beach in Geometry. These results must be viewed with caution, however, since they are based on cross-grade comparisons and students who take the same end-of-course exam at different grade levels may differ in unobservable ways that are correlated with test performance.

Table 9: Test Scores by Treatment Status

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[2] Note that since students only take end-of-course exams once, the single-cohort analysis (which relies on multiple observations of the outcome variable for a student over time) is not relevant.

	Innovation Schools		Scale-Out Schools		Never Treated Schools	
	Before Treatment	After Treatment	Before Treatment	After Treatment	Before 2014-2015	After 2014-2015
Reading	-0.116	-0.223	0.157	0.157	0.007	-0.008
	(0.95)	(0.98)	(0.94)	(0.98)	(1.00)	(1.00)
Observations	27,332	7,666	41,808	6,153	196,783	61,073
Algebra 1	-0.379	-0.403	-0.154	-0.148	-0.292	-0.381
	(0.86)	(0.85)	(0.87)	(0.82)	(0.92)	0.96)
Observations	6,153	2,831	9,858	1,703	42,999	22,384
Biology	-0.188	-0.328	0.179	0.199	-0.022	-0.090
	(0.94)	(0.93)	(0.94)	(0.90)	(1.01)	(1.01)
Observations	4,951	3,387	10,243	2,455	37,881	27,445
Geometry	-0.286	-0.316	0.078	-0.012	-0.144	-0.153
	(0.89)	(0.85)	(0.83)	(0.86)	(0.95)	(0.98)
Observations	4,321	3,303	8,563	2,355	32,879	24,800

Note: Displayed values are the average number of disciplinary incidents per student across all students in innovation, scale-out, and never treated schools. Standard errors are in parentheses.

Table 10.1: Test Score Difference-in-Differences for All Grades by Treatment

	Reading - All Grades	Algebra 1 - All Grades	Geometry - All Grades	Biology - All Grades
Innovation School x 2015	-0.017	0.048	0.150**	0.049
	(0.02)	(0.05)	(0.07)	(0.06)
Innovation School x 2016	0.005	-0.021	0.030	0.012
	(0.03)	(0.09)	(0.03)	(0.08)
Scale-Out School x 2016	0.019	0.050	-0.049	-0.073
	(0.02)	(0.08)	(0.03)	(0.05)
Observations	471,234	62,006	55,610	63,782

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include 8th grade reading and math scores, individual indicators for gender, foreign-born status, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year, for the proportion of students taking a given End-of-Course exam before high school, and for whether the school is an innovation or a scale-out school. Robust standard errors are clustered at the school level.

Table 10.2: Test Score Difference-in-Differences for 9th Grade by Treatment

	Reading - 9th Grade	Algebra 1 - 9th Grade	Geometry - 9th Grade	Biology - 9th Grade

Innovation School x 2015	-0.046	0.073	0.161	0.022
	(0.03)	(0.05)	(0.10)	(0.07)
Innovation School x 2016	0.001	0.010	0.080	0.082
	(0.03)	(0.08)	(0.05)	(0.08)
Scale-Out School x 2016	-0.016	0.038	-0.033	-0.069
	(0.03)	(0.09)	(0.05)	(0.05)
Observations	232,090	52,910	13,007	29,664

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include 8th grade reading and math scores, individual indicators for gender, foreign-born status, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year, for the proportion of students taking a given End-of-Course exam before high school, and for whether the school is an innovation or a scale-out school. Robust standard errors are clustered at the school level.

Table 10.3: Test Score Difference-in-Differences for All Grades by School

	Reading - All Grades	Algebra 1 - All Grades	Geometry - All Grades	Biology - All Grades
Spring Gardens x 2015	-0.034**	0.079**	0.289***	0.141***
	(0.02)	(0.03)	(0.03)	(0.02)
Hillview x 2015	0.019	0.099***	0.054	-0.070***
	(0.02)	(0.04)	(0.04)	(0.02)
Summers x 2015	-0.040**	-0.023	0.151***	0.116***
	(0.02)	(0.04)	(0.04)	(0.01)
Spring Gardens x 2016	-0.018*	-0.158***	-0.046*	0.056
	(0.01)	(0.03)	(0.02)	(0.04)
Hillview x 2016	0.060***	0.149***	0.075**	-0.124***
	(0.01)	(0.03)	(0.03)	(0.03)
Summers x 2016	-0.030***	-0.110***	0.063	0.143***
	(0.01)	(0.03)	(0.04)	(0.02)
Winter Ridge x 2016	0.089***	-0.083	-0.231***	-0.080***
	(0.01)	(0.08)	(0.07)	(0.03)
Silver Oak x 2016	-0.050***	-0.120***	-0.034	-0.069**
	(0.01)	(0.02)	(0.02)	(0.03)
Meadows x 2016	0.021**	0.188***	-0.041*	-0.171***
	(0.01)	(0.03)	(0.02)	(0.03)
Pleasant Valley x 2016	0.079***	0.142***	-0.094**	0.041*
	(0.01)	(0.02)	(0.04)	(0.02)
White Mountain x 2016	-0.026***	0.006	0.033	-0.020
	(0.01)	(0.03)	(0.03)	(0.03)
Observations	471,234	62,006	55,610	63,782

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include 8th grade reading and math scores, individual indicators for gender, foreign-born status, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year, for the proportion of students taking a given End-of-Course exam before high school, and for whether the school is an innovation or a scale-out school. Robust standard errors are clustered at the school level.

Table 10.4: Test Score Difference-in-Differences for 9th Grade by School

	Reading - 9th Grade	Algebra 1 - 9th Grade	Geometry - 9th Grade	Biology - 9th Grade
Spring Gardens x 2015	-0.075***	0.147***	0.350***	0.050**
	(0.02)	(0.04)	(0.03)	(0.02)
Hillview x 2015	0.005	0.084**	0.022	-0.086***
	(0.02)	(0.04)	(0.04)	(0.02)
Summers x 2015	-0.082***	0.002	0.169***	0.189***
	(0.02)	(0.04)	(0.05)	(0.02)
Spring Gardens x 2016	-0.052***	-0.144***	-0.077**	0.095**
	(0.01)	(0.03)	(0.03)	(0.05)
Hillview x 2016	0.060***	0.150***	0.132***	-0.039
	(0.01)	(0.03)	(0.04)	(0.03)
Summers x 2016	-0.003	-0.052	0.179***	0.239***
	(0.01)	(0.03)	(0.05)	(0.03)
Winter Ridge x 2016	0.095***	-0.079	-0.204**	-0.022
	(0.01)	(0.09)	(0.08)	(0.03)
Silver Oak x 2016	-0.070***	-0.101***	0.034	-0.088***
	(0.01)	(0.02)	(0.03)	(0.03)
Meadows x 2016	-0.021	0.183***	-0.004	-0.156***
	(0.01)	(0.03)	(0.03)	(0.03)
Pleasant Valley x 2016	0.056***	0.122***	0.169***	0.215***
	(0.01)	(0.03)	(0.04)	(0.03)
White Mountain x 2016	-0.096***	-0.116***	-0.112***	-0.029
	(0.01)	(0.03)	(0.03)	(0.03)
Observations	232,090	52,910	13,007	29,664

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include 8th grade reading and math scores, individual indicators for gender, foreign-born status, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year, for the proportion of students taking a given End-of-Course exam before high school, and for whether the school is an innovation or a scale-out school. Robust standard errors are clustered at the school level.

Table 11.1: Cohort Reading Test Difference-in-Differences by Treatment

	Cohort Reading
Innovation School x 2015	-0.039
	(0.09)
Innovation School x 2016	0.002
	(0.07)
Observations	5,015

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include 8th grade reading and math scores, individual indicators for gender, foreign-born status, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for whether the school is an innovation or a scale-out school. Robust standard errors are clustered at the school level.

Table 11.2: Cohort Reading Test Difference-in-Differences by School

	Cohort Reading
Spring Gardens x 2015	-0.169***
	(0.06)
Hillview x 2015	0.045
	(0.04)
Summers x 2015	-0.056
	(0.05)
Spring Gardens x 2016	-0.081*
	(0.05)
Hillview x 2016	0.074**
	(0.03)
Summers x 2016	-0.048
	(0.04)
Observations	5,015

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include 8th grade reading and math scores, individual indicators for gender, foreign-born status, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for whether the school is an innovation or a scale-out school. Robust standard errors are clustered at the school level.

Table 12.1: Test Score Difference-in-Differences-in-Differences by Treatment

	Reading	Algebra 1	Biology	Geometry
Schools Ever Implementing PASL	-0.023 (0.02)	-0.050 (0.06)	0.047 (0.05)	-0.042 (0.06)
Student Grade Receives Full or Partial PASL	-0.083*** (0.02)	0.019 (0.04)	-0.006 (0.04)	0.028 (0.03)
Observations	471,234	62,006	63,782	55,610

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include individual indicators for gender, foreign-born, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year and for each treated school. Interaction terms in the model include school-by-grade, school-by-year, and grade-by-year indicators. Robust standard errors are clustered at the school level.

Table 12.2: Test Score Difference-in-Differences-in-Differences by Treatment with Differential Effects for Partial Exposure

	Reading	Algebra 1	Biology	Geometry
Schools Ever Implementing PASL	-0.023 (0.02)	-0.050 (0.06)	0.046 (0.05)	-0.043 (0.06)
All Students in Treated Grades Receive PASL	-0.079*** (0.03)	0.027 (0.04)	-0.023 (0.05)	0.018 (0.03)
Some Students in Treated Grades Receive PASL	-0.106*** (0.03)	-0.141* (0.07)	0.105 (0.07)	0.091 (0.10)
Observations	471,234	62,006	63,782	55,610

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include individual indicators for gender, foreign-born, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year and for whether the school is ever treated. Interaction terms in the model include treatment-by-grade, treatment-by-year, and grade-by-year indicators. Robust standard errors are clustered at the school level.

Table 12.3: Test Score Difference-in-Differences-in-Differences by School

	Reading	Algebra 1	Biology	Geometry
Student Grade Receives PASL - Spring Gardens	-0.060***	-0.310***	0.026	-0.102***
	(0.01)	(0.04)	(0.03)	(0.03)
Student Grade Receives PASL - Hillview	-0.005	0.105*	0.085***	-0.012
	(0.01)	(0.05)	(0.02)	(0.03)
Student Grade Receives PASL - Summers	-0.014	-0.016	0.138***	0.120***
	(0.01)	(0.10)	(0.02)	(0.03)
Student Grade Receives PASL - Winter Ridge	0.001	0.457***	-0.028	0.095**
	(0.01)	(0.05)	(0.04)	(0.04)
Student Grade Receives PASL - Silver Oak	-0.044***	0.675***	-0.015	0.090**
	(0.01)	(0.04)	(0.03)	(0.04)
Student Grade Receives PASL - Meadows	-0.106***	-0.167***	0.047	-0.043
	(0.01)	(0.04)	(0.03)	(0.03)
Student Grade Receives PASL - Pleasant Valley	-0.026**	0.078	0.328***	0.259***
	(0.01)	(0.05)	(0.03)	(0.03)
Student Grade Receives PASL - White Mountain	-0.143***	-0.092*	0.036	-0.183***
	(0.01)	(0.05)	(0.03)	(0.03)
Observations	471,234	62,006	63,782	55,610

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include individual indicators for gender, foreign-born, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year and for each treated school. Interaction terms in the model include school-by-grade, school-by-year, and grade-by-year indicators. Robust standard errors are clustered at the school level.

Appendix

Selection of Comparison Control Schools

All figures, summary statistics, and regression output make use of a comparison group of 22 never-treated schools in Broward County. These schools were selected from a group of 74 other schools serving high school students because of their similarity in student population and institutional factors to the innovation and scale-out schools. The comparison group excludes technical schools, charter schools, magnet schools, alternative schools for students with disabilities or behavioral problems and continuation schools serving non-high school grades.

Table A.1: List of Innovation, Scale-Out, and Control Schools

Innovation Schools	Scale-Out Schools	Never Treated Schools
Spring Gardens HS	Pleasant Valley HS	All other (22) non-alternative
Hillview HS	Winter Ridge HS	high schools
Summers HS	Silver Oak HS	
	Meadows HS	

Minor Disciplinary Incidents

Figure A.1: Number of Minor Disciplinary Incidents per Student by Treatment Status
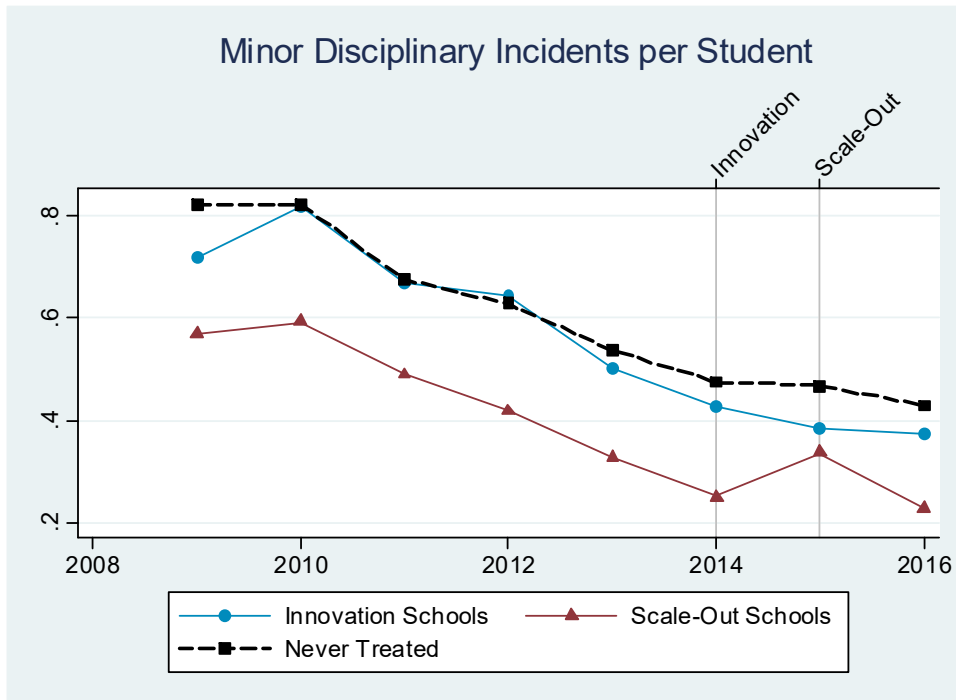
Figure A.2: Number of Minor Disciplinary Incidents per 9th-Grade Student by Treatment Status
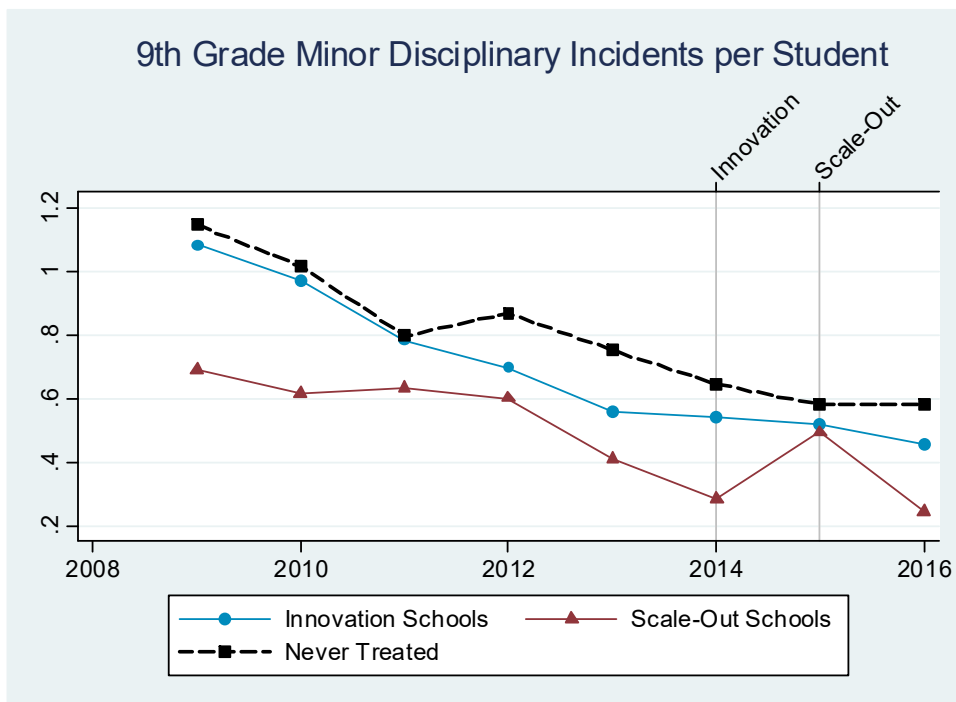
Figure A.3: Number of Minor Disciplinary Incidents by Treatment Status – 2014-15 9ᵗʰ Grade Cohort

2014-2015 9th Grade Cohort - Minor Disciplinary Incidents

Innovation Year

Grade

Innovation School Cohorts   Scale-Out School Cohorts

Never Treated Cohorts

Cohort includes only students not repeating or skipping a grade after entering middle school.
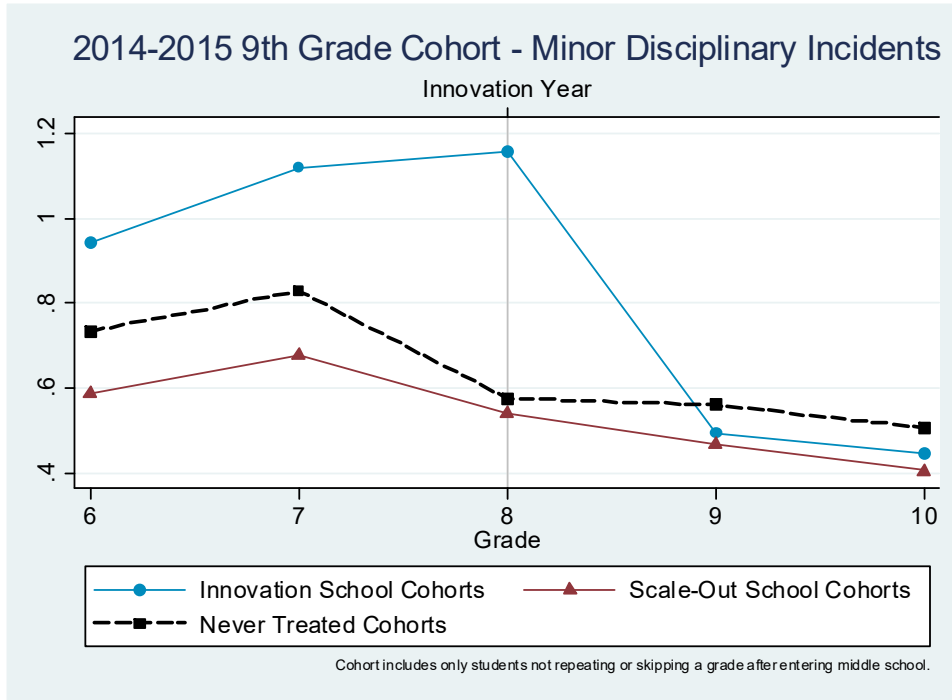
In-School Suspensions

Figure A.4: Number of In-School Suspensions per Student by Treatment Status
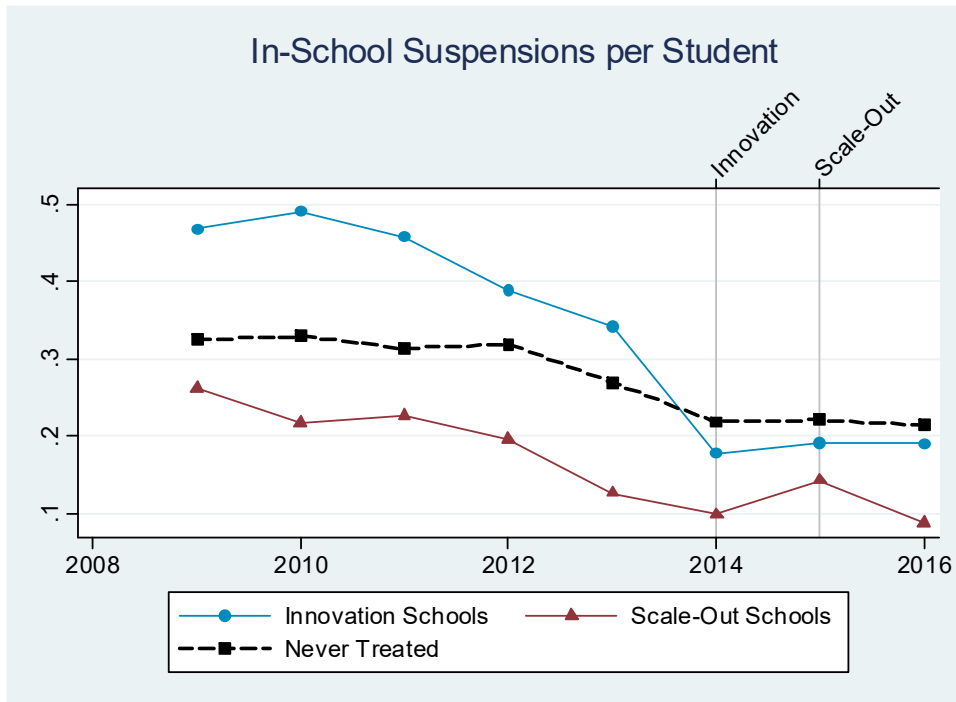
Figure A.5: Number of In-School Suspensions per 9th-Grade Student by Treatment Status
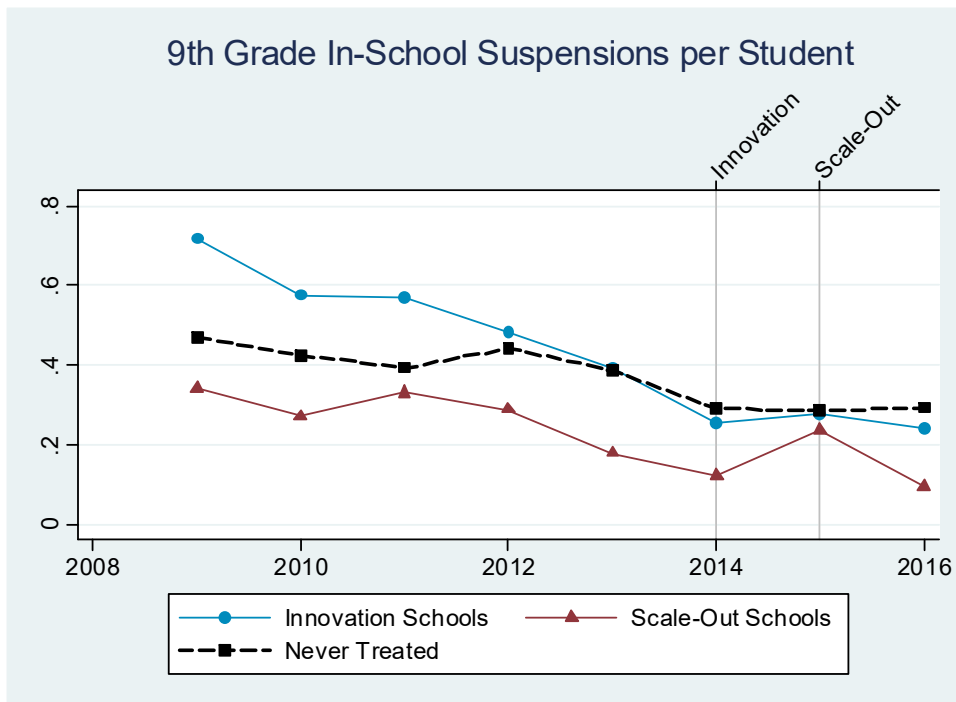
Figure A.6: Number of In-School Suspensions by Treatment Status – 2014-15 9th Grade Cohort

Cohort includes only students not repeating or skipping a grade after entering middle school.
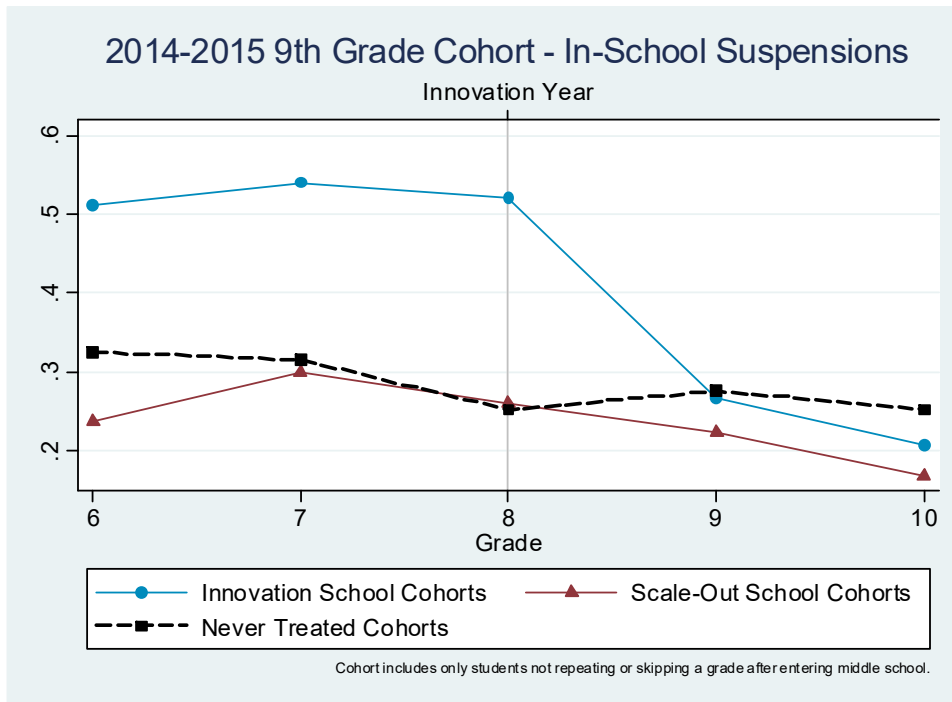
Out-of-School Suspensions

Figure A.7: Number of Out-of-School Suspensions per Student by Treatment Status

Out-of-School Suspensions per Student
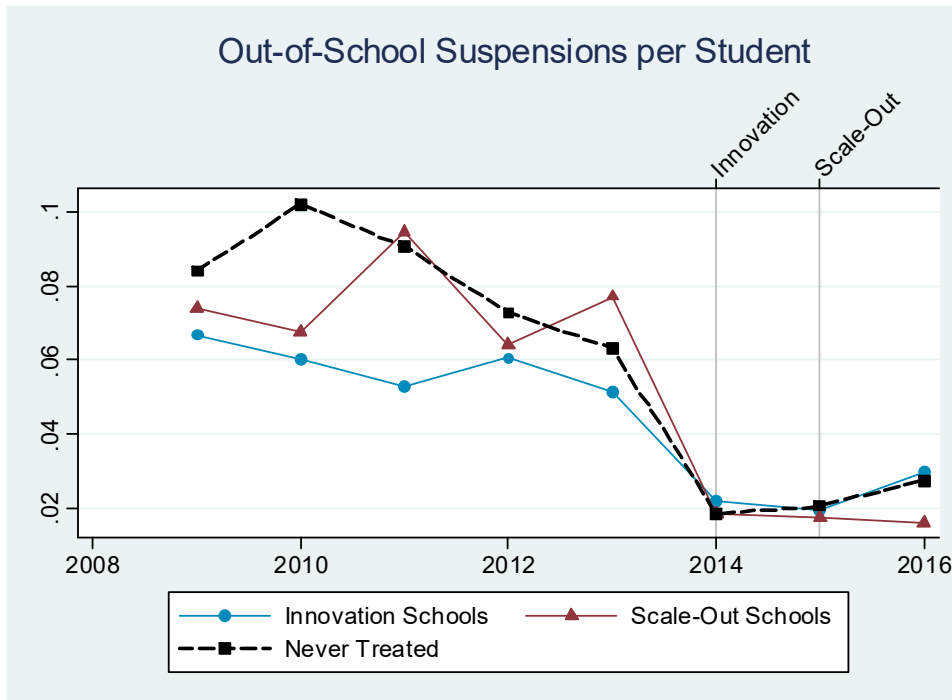
Figure A.8: Number of Out-of-School Suspensions per 9th-Grade Student by Treatment Status

9th Grade Out-of-School Suspensions per Student
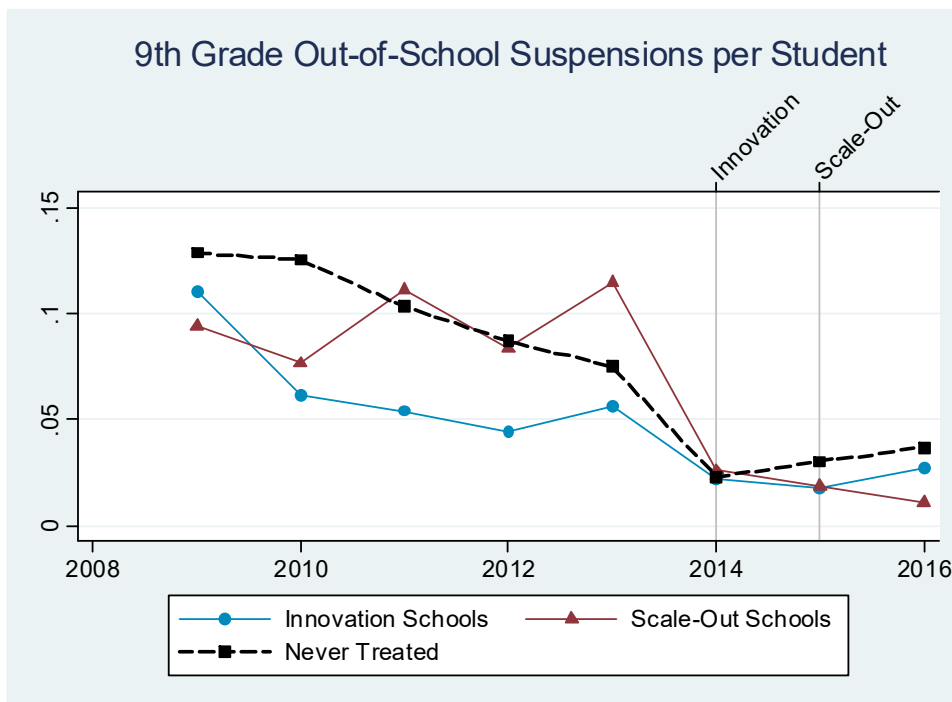
Figure A.9: Number of Out-of-School Suspensions by Treatment Status – 2014-15 9ᵗʰ Grade Cohort
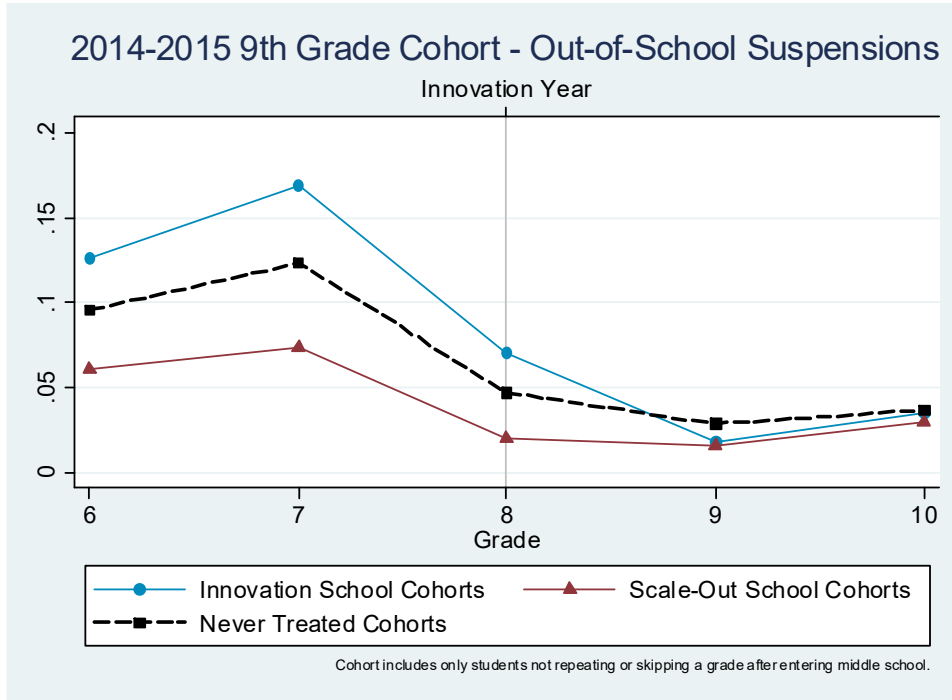
All Disciplinary Events

Table A.2: Disciplinary Event Difference-in-Differences for All Grades by Treatment

	No. Minor Discipline Incidents per Student - All Grades	No. In-School Suspensions per Student - All Grades	No. Out-of-School Suspensions per Student - All Grades
Innovation School x 2015	0.041	-0.017	0.019
	(0.08)	(0.04)	(0.01)
Innovation School x 2016	0.080	-0.003	0.025*
	(0.10)	(0.06)	(0.01)
Scale-Out School x 2016	-0.007	-0.016	0.001
	(0.10)	(0.04)	(0.02)
Observations	1,093,079	1,093,079	1,093,079

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include individual indicators for gender, foreign-born, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year and for whether the school is an innovation or a scale-out school. Robust standard errors are clustered at the school level.

Table A.3: Disciplinary Event Difference-in-Differences for 9th Grade by Treatment

	(1) No. Minor Discipline Incidents per Student - 9th Grade	(2) No. In-School Suspensions per Student - 9th Grade	(3) No. Out-of-School Suspensions per Student - 9th Grade
Innovation School x 2015	0.194	0.056	0.033*
	(0.14)	(0.08)	(0.02)
Innovation School x 2016	0.138	0.021	0.032*
	(0.15)	(0.07)	(0.02)
Scale-Out School x 2016	-0.042	-0.032	0.003
	(0.11)	(0.05)	(0.03)
Observations	317,128	317,128	317,128

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include individual indicators for gender, foreign-born, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year and for whether the school is an innovation or a scale-out school. Robust standard errors are clustered at the school level.

Table A.4: Disciplinary Event Difference-in-Differences for All Grades by School

	(1) No. Minor Discipline Incidents per Student - All Grades	(2) No. In-School Suspensions per Student - All Grades	(3) No. Out-of-School Suspensions per Student - All Grades
Spring Gardens x 2015	-0.107**	-0.096***	0.024***
	(0.05)	(0.03)	(0.01)
Hillview x 2015	0.058	0.004	0.035***
	(0.05)	(0.03)	(0.01)
Summers x 2015	0.138**	0.023	-0.006
	(0.05)	(0.02)	(0.01)
Spring Gardens x 2016	-0.141***	-0.120***	0.042***
	(0.05)	(0.03)	(0.01)
Hillview x 2016	0.242***	0.083***	0.035***
	(0.05)	(0.03)	(0.01)

	(1)	(2)	(3)
Summers x 2016	0.090*	0.001	-0.000
	(0.05)	(0.03)	(0.01)
Winter Ridge x 2016	0.113**	0.048*	0.039***
	(0.05)	(0.03)	(0.01)
Silver Oak x 2016	0.070	0.059**	0.006
	(0.05)	(0.03)	(0.01)
Meadows x 2016	-0.215***	-0.088***	0.011*
	(0.05)	(0.03)	(0.01)
Pleasant Valley x 2016	0.016	-0.064**	-0.069***
	(0.05)	(0.03)	(0.01)
White Mountain x 2016	0.154***	0.006	0.026***
	(0.05)	(0.02)	(0.01)
Observations	1,093,079	1,093,079	1,093,079

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include individual indicators for gender, foreign-born, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year and for whether the school is an innovation or a scale-out school. Robust standard errors are clustered at the school level.

Table A.5: Disciplinary Event Difference-in-Differences for 9th Grade by School

	(1) No. Minor Discipline Incidents per Student - 9th Grade	(2) No. In-School Suspensions per Student - 9th Grade	(3) No. Out-of-School Suspensions per Student - 9th Grade
Spring Gardens x 2015	-0.128*	-0.129***	0.042***
	(0.07)	(0.04)	(0.01)
Hillview x 2015	0.366***	0.131***	0.051***
	(0.07)	(0.04)	(0.01)
Summers x 2015	0.258***	0.124***	-0.002
	(0.07)	(0.04)	(0.01)
Spring Gardens x 2016	-0.152**	-0.119***	0.048***
	(0.07)	(0.04)	(0.01)

Hillview x 2016	0.362***	0.128***	0.052***
	(0.07)	(0.04)	(0.01)
Summers x 2016	0.179***	0.041	-0.004
	(0.06)	(0.04)	(0.01)
Winter Ridge x 2016	0.122**	0.062*	0.087***
	(0.06)	(0.03)	(0.01)
Silver Oak x 2016	0.139**	0.088***	0.021*
	(0.06)	(0.03)	(0.01)
Meadows x 2016	-0.296***	-0.136***	0.021**
	(0.06)	(0.03)	(0.01)
Pleasant Valley x 2016	-0.023	-0.088**	-0.129***
	(0.06)	(0.04)	(0.01)
White Mountain x 2016	0.033	-0.048	0.018**
	(0.06)	(0.03)	(0.01)
Observations	317,128	317,128	317,128

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include individual indicators for gender, foreign-born, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year and for whether the school is an innovation or a scale-out school. Robust standard errors are clustered at the school level.

Table A.6: Cohort Disciplinary Event Difference-in-Differences by Treatment

	(1) No. Cohort Minor Discipline Incidents per Student	(2) No. Cohort In-School Suspensions per Student	(3) No. Cohort Out-of-School Suspensions per Student
Innovation School x 2015	-0.440*	-0.304**	-0.079*
	(0.25)	(0.14)	(0.04)
Innovation School x 2016	-0.356	-0.278*	-0.055
	(0.27)	(0.14)	(0.04)
Observations	10,228	10,228	10,228

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include individual indicators for gender, foreign-born status, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year and for whether the school is an innovation or a scale-out school. Robust standard errors are clustered at the school level.

Table A.7: Cohort Disciplinary Event Difference-in-Differences by School

	(1) No. Cohort Minor Discipline Incidents per Student	(2) No. Cohort In-School Suspensions per Student	(3) No. Cohort Out-of-School Suspensions per Student
Spring Gardens x 2015	-0.944***	-0.716***	-0.060*
	(0.23)	(0.16)	(0.04)
Hillview x 2015	0.194	0.101	-0.054
	(0.16)	(0.10)	(0.08)
Summers x 2015	-0.555	-0.288	-0.129
	(0.45)	(0.24)	(0.08)
Spring Gardens x 2016	-0.899***	-0.679***	-0.029
	(0.19)	(0.13)	(0.03)
Hillview x 2016	0.374**	0.139	-0.038
	(0.15)	(0.10)	(0.07)
Summers x 2016	-0.556	-0.275	-0.101
	(0.38)	(0.20)	(0.07)
Observations	10,228	10,228	10,228

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include individual indicators for gender, foreign-born status, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year and for whether the school is an innovation or a scale-out school. Robust standard errors are clustered at the school level.

Table A.8: Disciplinary Event Difference-in-Differences-in-Differences by Treatment

	(1)	(2)	(3)
	No. Minor Discipline Incidents per Student	No. In-School Suspensions per Student	No. Out-of-School Suspensions per Student
Schools Ever Implementing PASL	-0.259*** (0.07)	-0.084* (0.05)	-0.046** (0.02)
Student Grade Receives Full or Partial PASL	-0.057 (0.11)	-0.020 (0.06)	-0.012 (0.01)
Observations	1,093,079	1,093,079	1,093,079

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include individual indicators for gender, foreign-born, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year and for each treated school. Interaction terms in the model include school-by-grade, school-by-year, and grade-by-year indicators. Robust standard errors are clustered at the school level.

Table A.9: Disciplinary Event Difference-in-Differences-in-Differences by Treatment

	(1)	(2)	(3)
	No. Minor Discipline Incidents per Student	No. In-School Suspensions per Student	No. Out-of-School Suspensions per Student
Schools Ever Implementing PASL	-0.259*** (0.07)	-0.084* (0.05)	-0.046** (0.02)
All Students in Treated Grades Receive PASL	-0.064 (0.13)	-0.023 (0.07)	-0.016 (0.01)
Some Students in Treated Grades Receive PASL	-0.011 (0.06)	0.002 (0.05)	0.013 (0.01)
Observations	1,093,079	1,093,079	1,093,079

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include individual indicators for gender, foreign-born, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year and for whether the school is ever treated. Interaction terms in the model include treatment-by-grade, treatment-by-year, and grade-by-year indicators. Robust standard errors are clustered at the school level

Table A.10: Disciplinary Event Difference-in-Differences-in-Differences by Treatment

	(1) No. Minor Discipline Incidents per Student	(2) No. In-School Suspensions per Student	(3) No. Out-of-School Suspensions per Student
Schools Ever Implementing PASL	-0.259*** (0.07)	-0.084* (0.05)	-0.046** (0.02)
Student Grade Receives Full or Partial PASL	-0.057 (0.11)	-0.020 (0.06)	-0.012 (0.01)
Observations	1,093,079	1,093,079	1,093,079

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include individual indicators for gender, foreign-born, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year and for each treated school. Interaction terms in the model include school-by-grade, school-by-year, and grade-by-year indicators. Robust standard errors are clustered at the school level.

Table A.11: Disciplinary Event Difference-in-Differences-in-Differences by Treatment

	(1) No. Minor Discipline Incidents per Student	(2) No. In-School Suspensions per Student	(3) No. Out-of-School Suspensions per Student
Student Grade Receives PASL - Spring Gardens	0.017 (0.03)	0.009 (0.02)	0.011** (0.01)
Student Grade Receives PASL - Hillview	0.319*** (0.03)	0.120*** (0.02)	0.028*** (0.01)
Student Grade Receives PASL - Summers	0.187*** (0.03)	0.115*** (0.02)	0.011* (0.01)
Student Grade Receives PASL - Winter Ridge	0.000 (0.03)	0.023 (0.02)	0.059*** (0.01)
Student Grade Receives PASL - Silver Oak	0.088** (0.04)	0.042* (0.02)	0.017*** (0.01)
Student Grade Receives PASL - Meadows	-0.100*** (0.03)	-0.059*** (0.02)	0.013** (0.01)
Student Grade Receives PASL - Pleasant Valley	0.014 (0.03)	-0.006 (0.02)	-0.072*** (0.01)
Student Grade Receives PASL - White Mountain	-0.121*** (0.03)	-0.070*** (0.02)	-0.001 (0.01)
Observations	1,093,079	1,093,079	1,093,079

Note: Standard errors are in parentheses. Results significant at the *** 1%, ** 5%, and * 10% level. Controls include individual indicators for gender, foreign-born, primary language spoken at home, race, disability by type, grade level, free-and-reduced price lunch, limited English proficiency, gifted, and number of schools attended in the school year. Additional controls include indicators for year and for each treated school. Interaction terms in the model include school-by-grade, school-by-year, and grade-by-year indicators. Robust standard errors are clustered at the school level.

Table A.12: Percentage of 9th Grade End-of-Course Test Takers

School	Year	Algebra I # Test Takers	Algebra I Percentage in 9th Grade	Biology # Test Takers	Biology Percentage in 9th Grade	Geometry # Test Takers	Geometry Percentage in 9th Grade
Spring Gardens	2011	313	63.6	-	-	-	-
	2012	379	72.0	401	55.4	389	40.6
	2013	432	72.7	539	44.3	348	26.4
	2014	424	77.4	445	38.0	509	22.0
	2015	452	77.9	401	32.4	480	21.3
	2016	287	85.4	449	18.9	439	17.1
	Total	2,287	74.8	2235	37.8	2165	24.9
Hillview	2011	619	82.4	-	-	-	-
	2012	679	83.8	815	44.2	664	40.2
	2013	556	89.7	664	44.3	290	24.8
	2014	538	95.4	683	48.6	638	16.9
	2015	612	87.7	641	50.4	635	19.5
	2016	529	80.0	714	41.9	568	19.2
	Total	3533	86.4	3517	45.7	2795	24.3
Summers	2011	593	56.5	-	-	-	-
	2012	497	66.2	280	70.7	526	21.5
	2013	499	68.9	551	36.5	329	11.6
	2014	624	69.6	573	24.6	628	10.8
	2015	574	71.4	603	21.7	496	21.8
	2016	377	89.9	579	33.3	685	17.1
	Total	3164	69.2	2586	33.4	2664	16.7
Winter Ridge	2011	112	100.0	-	-	-	-
	2012	120	96.7	333	99.4	228	54.8
	2013	87	98.9	274	99.3	206	44.2
	2014	105	75.2	338	95.6	244	55.7
	2015	117	79.5	327	97.2	229	65.9
	2016	61	95.1	295	97.3	233	66.5
	Total	602	90.4	1567	97.7	1140	57.7
West	2011	403	87.3	-	-	-	-
	2012	492	85.8	699	47.9	574	24.6
	2013	458	86.7	668	48.2	547	18.8
	2014	477	96.6	597	51.9	599	18.7
	2015	488	80.3	601	49.9	594	21.2

	2016	455	96.9	706	53.7	623	30.0
	Total	2773	88.9	3271	50.3	2937	22.8
Meadows	2011	660	82.6	-	-	-	-
	2012	646	92.6	401	73.3	119	78.2
	2013	540	92.8	827	41.7	916	9.5
	2014	638	89.0	702	45.7	668	14.8
	2015	743	83.3	836	52.4	672	13.8
	2016	654	93.7	819	61.5	729	17.7
	Total	3881	88.7	3585	53.1	3104	16.1
Coconut	2011	355	78.9	-	-	-	-
	2012	304	67.4	277	23.8	284	7.0
	2013	276	76.1	318	26.1	186	11.8
	2014	295	54.6	363	17.6	333	10.2
	2015	441	67.8	602	59.1	282	17.7
	2016	106	61.3	88	46.6	348	9.2
	Total	1777	68.7	1648	37.0	1433	11.0
White Mountain	2011	423	74.0	-	-	-	-
	2012	504	80.0	536	39.2	448	15.8
	2013	482	83.4	544	38.6	465	17.0
	2014	254	91.3	484	40.5	511	25.0
	2015	438	47.9	516	32.9	458	31.0
	2016	427	47.5	547	23.2	422	27.5
	Total	2528	69.7	2627	34.8	2304	23.3

School Patterns in End-of-Course Test Taking Over Time

Over the same period as the PASL rollout in Broward County, many schools changed the timing of end-of-course test taking. These changes were not uniform across the district or even among treated schools. For example, by the end of the 2016 school year 75% of Hillview High School students had taken the Biology End-of-Course test before high school, whereas less than 5% of students at Spring Gardens, Summers, and Meadows High Schools had done so. This variation in EOC timing across schools violates the parallel trends assumption of difference-in-differences models.

According to the parallel trends assumption, treated and untreated groups have the same trends over time and differ only with respect to treatment status. The fact that some students in the district increasingly take the same exam at different ages from 2012 to 2016 means that we should expect differences in treated and untreated groups at the same time as treatment but for reasons unrelated to treatment. For this reason, the difference-in-differences estimates of the PASL intervention's contribution to student achievement are biased in potentially arbitrary directions and magnitudes.

The below tables illustrate the changes to the proportion of students taking an end-of-course exam before high school. Each percentage represents the entire high school's proportion of students taking an exam in middle school, so a change from 0% to 5% in one year may represent a much larger change to the proportion of entering freshmen having taken an EOC in middle school. Any highly significant point estimates in the difference-in-difference analysis should be viewed in light of the changing proportions presented below to ensure that the estimate is not capturing selection bias from changing school policies and test-taking student populations.

Appendix Table A.13: Proportion of Pre-High School End-of-Course Test Takers

School	Year	Algebra 1	Obs.	Biology	Obs.	Geometry	Obs.
Spring Gardens	2011	0	1,934	0	0	0	0
	2012	8.58%	1,890	0	0	0	3,030
	2013	14.88%	1,945	2.08%	2,455	0	2,943
	2014	20.61%	2,005	2.51%	2,443	0.05%	3,012
	2015	25.22%	2,065	3.01%	2,533	0.11%	3,167
	2016	28.07%	2,157	4.65%	2,488	0.48%	3,197
Hillview	2011	0	1,934	0	0	0	0
	2012	0	1,890	0	0	0	3,030
	2013	0	1,945	45.99%	1,152	2.65%	2,943
	2014	0.26%	2,005	55.32%	1,195	4.16%	3,012
	2015	2.93%	2,065	65.08%	1,192	6.01%	3,167
	2016	6.39%	2,157	75.47%	1,202	9.49%	3,197
Summers	2011	0	1,934	0	0	0	0
	2012	0	1,890	0	1,250	2.71%	1,617
	2013	2.76%	1,945	0	1,152	5.11%	1,469
	2014	4.48%	2,005	0.35%	1,195	8.46%	1,338
	2015	6.54%	2,065	0.97%	1,192	12.85%	1,528
	2016	10.35%	2,157	4.94%	1,202	18.55%	1,449
Winter Ridge	2011	0	3,274	0	0	0	0
	2012	5.80%	3,161	0	1,250	0	1,617
	2013	9.93%	2,871	14.19%	1,152	0	1,469
	2014	12.83%	2,882	19.70%	1,195	0	1,338
	2015	17.32%	3,000	24.32%	1,192	0.66%	1,528
	2016	20.58%	2,922	34.17%	1,202	3.23%	1,449
Silver Oak	2011	0	3,274	0	0	0	0
	2012	0	3,161	12.64%	2,785	0	1,617
	2013	0.12%	2,871	18.45%	2,560	0.49%	1,469
	2014	0.27%	2,882	19.74%	2,700	0.53%	1,338
	2015	1.03%	3,000	25.79%	2,664	1.13%	1,528
	2016	1.99%	2,922	30.00%	2,739	2.76%	1,449
Meadows	2011	0	3,274	0	0	0	0
	2012	0	3,161	0	2,785	5.60%	2,174
	2013	2.31%	2,871	0	2,560	10.07%	2,118
	2014	2.80%	2,882	0	2,700	15.59%	2,207
	2015	4.16%	3,000	0.13%	2,664	23.17%	2,471
	2016	7.49%	2,922	0.38%	2,739	29.80%	2,451
Coconut	2011	0	2,692	0	0	0	0

	Year	Algebra 1	Obs.	Biology	Obs.	Geometry	Obs.
	2012	4.97%	2,564	0	2,785	0	2,174
	2013	7.91%	2,455	3.73%	2,560	0	2,118
	2014	10.69%	2,443	4.98%	2,700	0	2,207
	2015	15.58%	2,533	7.20%	2,664	0	2,471
	2016	20.89%	2,488	11.72%	2,739	0.59%	2,451
White Mountain	2011	0	2,692	0	0	0	0
	2012	0	2,564	6.87%	3,030	0	2,174
	2013	0	2,455	11.46%	2,943	0.90%	2,118
	2014	0.06%	2,443	14.54%	3,012	2.05%	2,207
	2015	1.39%	2,533	17.64%	3,167	3.94%	2,471
	2016	3.80%	2,488	20.07%	3,197	7.98%	2,451

	Year	Algebra 1	Obs.	Biology	Obs.	Geometry	Obs.
Never Treated Schools	2011	0	49,922	0	0	0	0
	2012	8.29%	50,429	0	50,429	0	50,429
	2013	13.75%	46,186	0.09%	46,186	3.25%	46,141
	2014	17.68%	47,307	0.28%	47,307	4.79%	47,307
	2015	23.05%	49,652	1.41%	49,652	6.88%	49,652
	2016	27.83%	50,440	4.18%	50,440	11.27%	50,440

Appendix Table A.14: Proportion of Pre-High School Algebra I Test Takers by Grade

School	Grade	2011		2012		2013		2014		2015		2016	
		Pct. Pre-HS	Obs.	Pct. Pre-HS	Obs.	Pct. Pre-HS	Obs.	Pct. Pre-HS	Obs.	Pct. Pre-HS	Obs.	Pct. Pre-HS	Obs.
Spring Gardens High School	9th	0.00%	515	16.18%	525	23.64%	598	28.72%	533	27.67%	587	33.60%	637
	10th	0.00%	515	0.34%	447	16.19%	516	25.80%	563	27.54%	524	27.05%	561
	11th	0.00%	480	0.00%	437	0.35%	416	17.07%	492	25.86%	514	27.08%	466
	12th	0.00%	424	0.00%	481	0.00%	415	0.40%	417	17.89%	440	25.52%	492
Hillview High School	9th	0.00%	804	11.71%	794	17.35%	636	18.84%	689	20.90%	783	25.92%	706
	10th	0.00%	879	0.00%	793	12.03%	756	17.35%	685	18.00%	742	20.14%	823
	11th	0.00%	798	0.00%	815	0.00%	714	11.90%	769	17.40%	677	17.82%	724
	12th	0.00%	793	0.00%	759	0.00%	765	0.00%	739	12.36%	798	18.60%	669
Summers High School	9th	0.00%	672	12.38%	609	12.88%	630	14.66%	613	24.69%	615	31.93%	585
	10th	0.00%	700	0.00%	680	12.36%	599	12.02%	692	13.52%	670	26.30%	636
	11th	0.00%	623	0.00%	683	0.00%	613	13.28%	563	11.13%	688	14.40%	600
	12th	0.00%	697	0.00%	592	0.00%	613	0.24%	575	13.16%	560	11.85%	667
Winter Ridge High School	9th	0.00%	350	43.01%	346	67.67%	273	72.88%	329	70.68%	334	82.37%	335
	10th	0.00%	322	0.00%	310	40.24%	321	67.08%	285	77.12%	294	72.10%	327
	11th	0.00%	0	0.00%	282	0.00%	292	40.87%	294	66.81%	278	77.73%	269
	12th	0.00%	0	0.00%	0	0.00%	0	0.00%	287	40.63%	286	67.83%	271
Silver Oak High School	9th	0.00%	664	22.73%	738	28.42%	588	23.25%	654	31.38%	659	34.96%	746
	10th	0.00%	698	0.00%	702	22.39%	691	27.16%	667	22.94%	675	32.09%	688
	11th	0.00%	689	0.00%	673	0.00%	649	21.11%	719	26.42%	654	24.26%	664
	12th	0.00%	0	0.00%	672	0.00%	632	0.00%	660	22.45%	676	27.60%	641
Meadows High School	9th	0.00%	780	13.64%	835	19.58%	740	19.19%	764	16.32%	822	23.28%	863
	10th	0.00%	757	0.00%	759	14.16%	820	19.82%	796	19.12%	816	16.71%	813
	11th	0.00%	747	0.00%	738	0.00%	720	14.22%	783	19.94%	770	18.55%	788
	12th	0.00%	702	0.00%	698	0.00%	663	0.00%	669	14.85%	759	21.63%	733

School	Grade	Pct.	Obs.	Pct.	Obs.	Pct.	Obs.	Pct.	Obs.	Pct.	Obs.
Coconut High School	9th	0.00%	513	6.11%	370	8.52%	423	12.76%	355	17.05%	489	42.98%	386
	10th	0.00%	555	0.00%	405	5.92%	349	11.28%	385	12.77%	367	17.42%	429
	11th	0.00%	496	0.00%	432	0.00%	324	5.75%	297	11.75%	391	14.04%	300
	12th	0.00%	511	0.00%	410	0.00%	373	1.02%	301	7.39%	281	13.10%	334
White Mountain High School	9th	0.00%	528	11.13%	610	18.74%	536	26.81%	593	33.04%	669	44.69%	598
	10th	0.00%	569	0.00%	542	10.84%	570	19.25%	581	26.02%	635	31.94%	668
	11th	0.00%	499	0.00%	537	0.00%	502	10.41%	573	19.28%	586	25.29%	627
	12th	0.00%	558	0.00%	485	0.00%	510	0.00%	460	12.39%	581	20.59%	558
Never Treated Schools	9th	0.00%	12849	15.99%	13628	21.96%	11786	23.66%	12544	28.34%	13390	37.56%	13525
	10th	0.00%	13258	0.20%	12888	16.34%	12286	22.13%	12381	22.69%	13002	27.62%	13388
	11th	0.00%	11258	0.00%	12465	0.17%	10966	17.11%	11622	21.85%	11967	23.13%	12104
	12th	0.00%	9953	0.00%	10873	0.07%	11123	0.31%	10760	17.74%	11293	23.01%	11423

Appendix Table A.15: Proportion of Pre-High School Biology Test Takers by Grade

School	Grade	2012		2013		2014		2015		2016	
		Pct. Pre-HS	Obs.	Pct. Pre-HS	Obs.	Pct. Pre-HS	Obs.	Pct. Pre-HS	Obs.	Pct. Pre-HS	Obs.
Spring Gardens High School	9th	0.00%	525	0.00%	598	0.90%	533	10.28%	587	37.04%	637
	10th	0.00%	447	0.00%	516	0.00%	563	0.89%	524	8.42%	561
	11th	0.00%	437	0.00%	416	0.00%	492	0.00%	514	0.71%	466
	12th	0.00%	481	0.00%	415	0.00%	417	0.00%	440	0.00%	492
Hillview High School	9th	0.00%	794	0.17%	636	0.65%	689	2.21%	783	5.68%	706
	10th	0.00%	793	0.14%	756	0.00%	685	1.39%	742	2.10%	823
	11th	0.00%	815	0.00%	714	0.30%	769	0.18%	677	1.51%	724
	12th	0.00%	759	0.00%	765	0.00%	739	0.15%	798	0.19%	669
Summers High School	9th	0.00%	609	0.00%	630	0.19%	613	5.43%	615	15.72%	585
	10th	0.00%	680	0.00%	599	0.00%	692	0.33%	670	5.88%	636

School	Grade										
	11th	0.00%	683	0.00%	613	0.00%	563	0.00%	688	0.39%	600
	12th	0.00%	592	0.00%	613	0.00%	575	0.22%	560	0.00%	667
Winter Ridge High School	9th	0.00%	346	0.00%	273	0.92%	329	2.45%	334	13.81%	0
	10th	0.00%	310	0.00%	321	0.00%	285	1.02%	294	2.80%	0
	11th	0.00%	282	0.00%	292	0.00%	294	0.00%	278	0.75%	0
	12th	0.00%	0	0.00%	0	0.00%	287	0.00%	286	0.00%	0
Silver Oak High School	9th	0.00%	738	0.00%	588	0.00%	654	0.34%	659	1.04%	746
	10th	0.00%	702	0.00%	691	0.00%	667	0.17%	675	0.48%	688
	11th	0.00%	673	0.00%	649	0.00%	719	0.00%	654	0.17%	664
	12th	0.00%	672	0.00%	632	0.00%	660	0.00%	676	0.00%	641
Meadows High School	9th	0.00%	835	0.00%	740	0.15%	764	0.28%	822	1.56%	863
	10th	0.00%	759	0.00%	820	0.00%	796	0.14%	816	0.42%	813
	11th	0.00%	738	0.00%	720	0.00%	783	0.00%	770	0.15%	788
	12th	0.00%	698	0.00%	663	0.00%	669	0.00%	759	0.00%	733
Coconut High School	9th	0.00%	370	0.00%	423	0.00%	355	1.79%	489	33.87%	386
	10th	0.00%	405	0.00%	349	0.00%	385	0.35%	367	2.28%	429
	11th	0.00%	432	0.00%	324	0.00%	297	0.00%	391	0.00%	300
	12th	0.00%	410	0.00%	373	0.00%	301	0.00%	281	0.00%	334
White Mountain High School	9th	0.00%	610	0.00%	536	0.00%	593	0.00%	669	7.30%	598
	10th	0.00%	542	0.00%	570	0.00%	581	0.00%	635	0.00%	668
	11th	0.00%	537	0.00%	502	0.00%	573	0.00%	586	0.00%	627
	12th	0.00%	485	0.00%	510	0.00%	460	0.00%	581	0.00%	558
Never Treated Schools	9th	0.00%	13604	0.06%	11786	0.69%	12544	5.02%	13390	19.69%	13525
	10th	0.00%	12888	0.19%	12269	0.11%	12381	0.73%	13002	4.67%	13388
	11th	0.00%	12465	0.00%	10965	0.17%	11622	0.08%	11967	0.68%	12104
	12th	0.00%	10295	0.00%	10595	0.00%	10760	0.17%	11293	0.09%	11423

Appendix Table A.16: Proportion of Pre-High School Geometry Test Takers by Grade

School	Grade	2012 Pct. Pre-HS	Obs.	2013 Pct. Pre-HS	Obs.	2014 Pct. Pre-HS	Obs.	2015 Pct. Pre-HS	Obs.	2016 Pct. Pre-HS	Obs.
Spring Gardens High School	9th	0.00%	525	6.95%	598	8.61%	533	10.63%	587	40.94%	637
	10th	0.00%	447	0.00%	516	6.72%	563	7.57%	524	8.87%	561
	11th	0.00%	437	0.00%	416	0.00%	492	6.77%	514	6.71%	466
	12th	0.00%	481	0.00%	415	0.00%	417	0.00%	440	6.47%	492
Hillview High School	9th	0.00%	794	6.88%	636	4.55%	689	7.10%	783	28.76%	706
	10th	0.00%	793	0.00%	756	5.68%	685	4.61%	742	6.33%	823
	11th	0.00%	815	0.00%	714	0.00%	769	5.67%	677	4.01%	724
	12th	0.00%	759	0.00%	765	0.00%	739	0.00%	798	6.20%	669
Summers High School	9th	0.00%	609	6.26%	630	4.27%	613	3.66%	615	15.83%	585
	10th	0.00%	680	0.00%	599	4.68%	692	4.02%	670	3.38%	636
	11th	0.00%	683	0.00%	613	0.00%	563	3.94%	688	3.29%	600
	12th	0.00%	592	0.00%	613	0.00%	575	0.00%	560	4.17%	667
Winter Ridge High School	9th	0.00%	346	32.21%	273	29.68%	329	27.81%	334	44.84%	335
	10th	0.00%	310	0.00%	321	31.25%	285	31.71%	294	28.35%	327
	11th	0.00%	0	0.00%	292	0.45%	294	32.39%	278	30.68%	269
	12th	0.00%	0	0.00%	0	0.00%	287	0.00%	286	33.33%	271
Silver Oak High School	9th	0.00%	738	10.76%	588	7.90%	654	11.38%	659	26.38%	746
	10th	0.00%	702	0.00%	691	9.36%	667	7.67%	675	11.02%	688
	11th	0.00%	673	0.00%	649	0.00%	719	9.08%	654	7.90%	664
	12th	0.00%	672	0.00%	632	0.00%	660	0.00%	676	9.76%	641
Meadows High School	9th	0.00%	835	7.62%	740	7.74%	764	8.59%	822	34.18%	863
	10th	0.00%	759	0.00%	820	7.21%	796	7.60%	816	7.50%	813
	11th	0.00%	738	0.00%	720	0.00%	783	7.12%	770	6.17%	788
	12th	0.00%	698	0.00%	663	0.00%	669	0.00%	759	7.20%	733
Coconut High School	9th	0.00%	370	1.32%	423	0.90%	355	1.92%	489	23.81%	386
	10th	0.00%	405	0.00%	349	0.98%	385	1.21%	367	1.74%	429

	11th	0.00%	432	0.00%	324	0.00%	297	1.02%	391	1.35%	300
	12th	0.00%	410	0.00%	373	0.00%	301	0.00%	281	1.64%	334
White Mountain High School	9th	0.00%	610	2.86%	536	4.94%	593	9.52%	669	29.27%	598
	10th	0.00%	542	0.00%	570	2.72%	581	4.69%	635	8.89%	668
	11th	0.00%	537	0.00%	502	0.00%	573	2.92%	586	4.55%	627
	12th	0.00%	485	0.00%	510	0.00%	460	0.00%	581	3.08%	558
Never Treated Schools	9th	0.00%	13604	9.10%	11768	8.77%	12544	11.37%	13390	31.21%	13525
	10th	0.00%	12888	0.00%	12269	8.39%	12381	8.25%	13002	10.75%	13388
	11th	0.00%	12465	0.00%	10953	0.00%	11622	8.15%	11967	7.95%	12104
	12th	0.00%	11448	0.00%	11103	0.00%	10760	0.07%	11293	8.51%	11423