PEER DISRUPTION AND LEARNING: LINKS BETWEEN SUSPENSIONS AND THE EDUCATIONAL ACHIEVEMENT OF NON-SUSPENDED STUDENTS

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Abstract

To evaluate the net effects of classroom disciplinary practices, policy makers and educators must understand not only their effects on disciplined students but also their effects on non-disciplined peers. In this study, we estimate the link between peer suspensions and non-suspended students' learning trajectories in a California school district where middle and high school students took up to twelve basic skills tests in mathematics and English Language Arts (ELA) over the course of the 2009–10, 2010–11, and 2011–12 school years. We find that Hispanic students, students eligible for free or reduced-price lunch, English language learners, students enrolled in special education, and low-achieving students are disproportionately exposed to classmate suspensions. Analyses with student and classroom fixed effects show that student achievement in mathematics increases when their classmates receive suspensions, particularly suspensions attributed to disruptive behavior. We find no association between classmate suspension and ELA achievement. Because these results come from schools in which suspensions are relatively rare events, they may not generalize to settings with draconian disciplinary cultures. Nonetheless, our findings imply that suspensions, when used appropriately, can improve the academic achievement of non-suspended students, particularly for students from vulnerable populations.

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1. INTRODUCTION

Educators describe suspension and other forms of exclusionary discipline as "a last resort" strategy for dealing with disruptive classroom behaviors, and scholars express concerns about the adverse effects of suspensions on suspended students (American Psychological Association 2008; American Academy of Pediatrics 2013). Although we lack decisive evidence on the causal effects of suspension on suspended students (American Psychological Association 2008; Steinberg and Lacoe 2017), studies demonstrate that suspensions are linked with a host of negative outcomes, from decreased educational performance (Arcia 2006; Morris and Perry 2016; Hwang 2018; Anderson, Ritter, and Zamarro 2019) to increased risk of contact with the criminal justice system (Monahan et al. 2014).

By comparison, there exists much less consensus about the consequences of exclusionary discipline on the educational experiences of non-suspended peers. Many educators believe it is sometimes necessary to remove disruptive students from the classroom in order to maintain an effective learning environment (Public Agenda 2004). Consistent with this theory, existing empirical evidence shows that removing peers with behavioral problems has positive effects on student outcomes (e.g., Figlio 2007; Aizer 2008; Carrell and Hoekstra 2010; Fletcher 2010; Neidell and Waldfogel 2010). However, overuse of exclusionary school discipline can be perceived as unfair and inconsistent, impairing school climate and learning environments (Way 2011). Studies demonstrate that an increase in schoolmate suspension correlates with a decrease in educational performance, even after controlling for time-invariant school and student characteristics (Perry and Morris 2014; Hinze-Pifer and Sartain 2018).[1]

In this paper, we use data from a large California school district to answer the following research questions:

(1) What are the characteristics of students who are more likely to be exposed to classmate suspensions?
(2) What are the links between peer suspensions and academic achievement (i.e., math and English language arts [ELA] test scores)?
(3) Do the links between peer suspensions and academic achievement vary across infraction types?

Our study contributes to the literature in several important ways. First, we measure both schoolmate suspensions and classmate suspensions. Existing studies examining peer suspensions and achievement use school-level suspension data (see Perry and Morris 2014; Hinze-Pifer and Sartain 2018). Although school-level suspension (i.e., number of suspensions in a school) is a measure that can capture school climate and culture, the classroom-level suspension (i.e., number of suspensions in a classroom) is arguably more indicative of a student's direct learning environment.

Moreover, we examine variations in the links between peer suspensions and achievement by infraction type. Schools suspend students for various reasons from

1. Although Hinze-Pifer and Sartain (2018) and Perry and Morris (2014) show that schoolmate suspensions are negatively associated with student achievement, they are not able to isolate the effects of peer suspensions from peer misbehavior.

major to minor misbehavior (e.g., Morrison and D'Incau 1997; Skiba, Peterson, and Williams 1997; Raffaele Mendez 2003; Raffaele Mendez and Knoff 2003). We categorize infractions into three groups: major infractions (i.e., weapons, drugs, fighting, bullying, theft, vandalism, and sexual harassment), disruptive infractions (i.e., classroom disruption and defiance), and minor infractions (i.e., truancy, no show for detention, tardiness, mischievous behavior, no homework, dishonesty, and nonspecified other infractions). By examining the extent to which the links between peer suspensions and achievement vary across these three types, we differentiate disciplinary actions that maintain classroom order from more draconian uses of exclusionary discipline.

Finally, our analyses take advantage of quarterly achievement tests that allow us to better estimate how changes in classroom suspension events associate with changes in student achievement. We compile a panel of twelve quarterly benchmark exams that students took over three academic years and use a two-way fixed effects identification strategy, including both student and classroom fixed effects. This strategy makes it possible to track quarter-by-quarter changes in student achievement, and to link those changes to shifts in the use of suspension in students' classrooms. Like other papers in this literature (e.g., Perry and Morris 2014; Hinze-Pifer and Sartain 2018), we are unable to fully separate the effects of peer suspension from the effects of peer misbehavior on student learning. However, because our data make it possible to link short-term changes in classroom suspension events with quarter-by-quarter shifts in student achievement, we are arguably able to produce less-biased estimates than earlier studies of the links between peer suspension and educational achievement.

We find that students from vulnerable populations (e.g., Hispanic students, students eligible for free or reduced-price lunch, and English language learners) are more likely to be exposed to suspended classmates. Our results show, on average, classmate suspensions are associated with improved math achievement but schoolmate suspensions are not. Unlike math achievement, we find that both classmate suspensions and schoolmate suspensions are not associated with ELA achievement. We also find suggestive evidence that the associations between classmate suspensions and increased math achievement are driven by suspensions attributed to major and disruptive infractions rather than minor infractions. Overall, our findings suggest that removing classmates with behavioral challenges can improve math achievement, particularly for students from vulnerable populations.

Because our data only have measures of student misbehavior that result in suspension, we are not able to control for similar misbehavior that does not result in suspension. Based on the assumption that this unmeasured variance introduces a negative bias, we interpret our findings as lower-bound estimates of the links between peer suspension and the achievement of non-suspended students. Furthermore, our findings may not generalize to all educational settings. Our data are from a racially and socioeconomically diverse district located in an inner-ring California suburb. Although the district in our study reflects racial composition statewide (i.e., in our sample, more than half of the students are Hispanic and a third are Asian), it has just 1 percent black students. In addition, suspensions were relatively rare events in this district. During the period for which we have data, educators in the district used exclusionary discipline sparingly, suspending students at approximately half the national rate (U.S. Department of Education 2016).

2. BACKGROUND

The Consequences of Exclusionary School Discipline

Exclusionary school disciplinary practices are controversial in U.S. education. Critics have argued that suspensions not only fail to correct student misbehavior but also lead to even more negative consequences for suspended students (Noguera 2003; Arcia 2006; Christle, Jolivette, and Nelson 2007; American Psychological Association 2008; Lee et al. 2011; American Academy of Pediatrics 2013; Morris and Perry 2016; Mittleman 2018). A prior study with the same quarterly benchmark test scores in the district of our study also shows that suspensions are linked to negative academic achievement for suspended students (Hwang 2018). In addition, researchers show that the dropout rate for ninth graders who receive one suspension is twice as high as it is for ninth graders who never receive suspensions (Balfanz, Byrnes, and Fox 2014). Whether these links are causal remains an open question, however, given that disciplined students tend to be low achievers, and low achievers also tend to exhibit behavioral problems (Arcia 2006; Miles and Stipek 2006; Choi 2007; McIntosh et al. 2008), a suspension therefore may be a symptom rather than a cause of negative youth outcomes. Studies using relatively rigorous identification strategies indicate selection bias may drive much (Hwang 2018) or all of the link between suspension and negative student achievement (Anderson, Ritter, and Zamarro 2019).

If the negative link between suspension and achievement is causal, racial and socioeconomic disparities in exclusionary school discipline contribute to unequal educational outcomes (Gregory, Skiba, and Noguera 2010; Losen and Martinez 2013; Losen et al. 2015). Black students are suspended at three times the rate of white students (Wallace et al. 2008; U.S. Department of Education Office for Civil Rights 2016) and students who are from lower socioeconomic family backgrounds are also at an elevated risk for suspension (Brantlinger 1991; Costenbader and Markson 1998; Nichols 2004; Petras et al. 2011). Motivated by equity concerns, the U.S. Department of Justice and the U.S. Department of Education vowed to reduce disproportionality in school discipline and improve school climate (U.S. Department of Education/Department of Justice 2014). School districts across the country have been experimenting with various approaches to reduce suspensions (Skiba and Losen 2016; Steinberg and Lacoe 2017; Anderson 2018). In December of 2018, however, the Trump administration repealed such guidance in the name of safe and orderly school environments (Vara-Orta 2018).

Unanswered Questions: The Effects of Suspension on Non-Suspended Students

The key rationale for removing disruptive students from classrooms hinges on the assumption that disciplinary problems disrupt classroom learning environments, undermining all students' educational experiences (Eden 2017, 2019; Public Agenda 2004). If this widely held lay theory holds, suspending disruptive students should improve learning outcomes for non-suspended students. However, this theory remains largely untested and existing work provides inconsistent predictions regarding the direction of the effects of peer suspension on non-suspended students' outcomes.

One body of research demonstrates a negative association between schoolmate suspension rates and the academic achievement of students in the school (Rausch and Skiba 2004; Perry and Morris 2014; Hinze-Pifer and Sartain 2018). Perry and Morris (2014) use data from students in grades 6 through 10 in a large Kentucky public school

district over a three-year period. Perry and Morris estimate the effects of schoolmate suspensions controlling for time-invariant heterogeneity in student and school characteristics. Their analyses indicate that non-suspended students exhibit lower math and reading scores when school-level suspension rates rise. Similarly, Hinze-Pifer and Sartain (2018) investigate the extent to which schoolmate suspensions are associated with student outcomes by using data from high school students in Chicago Public Schools. Using student and school fixed effects and taking advantage of policy-induced changes in school suspension, Hinze-Pifer and Sartain find modest improvements in academic performance and attendance when schools reduce their reliance on exclusionary discipline. These findings are consistent with research suggesting that excessive use of suspensions and other exclusionary discipline policies can damage classroom learning environments by undermining the legitimacy of school authority and leading students to perceive the school as a fundamentally unjust place (Morris 2005; Nolan 2011; Way 2011).

However, the presence of disruptive peers can undermine classroom learning environments and hurt academic achievement (Epple and Romano 2011; Sacerdote 2011). Disruptive classmates, classmates with emotional problems, and classmates with untreated learning disabilities can lower student achievement (Aizer 2008; Carrell and Hoekstra 2010; Fletcher 2010; Neidell and Waldfogel 2010). These negative peer effects may help to explain why recent policy efforts to reduce the use of exclusionary discipline in schools have returned mixed results. A randomly selected group of Pittsburgh public schools with restorative justice improved teacher reports of school climate and reduced the use of suspensions but had negative effects on student achievement in math achievement (Augustine et al. 2018). A difference-in-difference analysis of disciplinary reforms in Philadelphia demonstrates that discipline policy changes can reduce the use of suspensions for nonviolent student behavior (Lacoe and Steinberg 2018). However, these reductions come with poor performance in math and ELA, and increased truancy in schools where the discipline reform was not fully implemented (Lacoe and Steinberg 2018).

Attending to the infractions that result in school disciplinary actions may help reconcile these seemingly contradictory findings. Whereas suspensions for seemingly trivial, nondisruptive infractions may undermine school culture, suspensions for infractions that disrupt school learning environments and put students at risk of harm may be both justified and beneficial to non-suspended students. When students perceive that suspension is legitimate for misbehaving classmates and the teacher's use of suspension is fair and consistent, the act of suspension can secure teacher authority and also signal teachers' high expectations (Bryk and Schneider 2003; Arum 2005).

3. DATA

We use administrative data from one public school district in California to investigate the links between peer suspension and academic achievement. The data include a sample of 15,928 students (grades 7–11) in seventeen different schools in the 2009–10, 2010–11, and 2011–12 academic years. We observe quarterly student achievement and the number of suspensions that students received in each quarter. We use panel data, so the number of observations per student varies from one to twelve over the three academic years. These data include student demographic information, such as gender,

race/ethnicity, English language learner status, free or reduced-price lunch eligibility, teacher and classroom identification, quarterly math and ELA scores, and discipline records (such as in-school and out-of-school suspensions).

In the district, on average, approximately 3 percent of students received at least one in-school suspension each year and 5 percent of students received at least one out-of-school suspension each year. We use the full sample to measure suspension at the school and classroom levels. However, because our focus is the effects of peer suspensions on non-suspended students, we exclude students who received either in-school or out-of-school suspensions from the analysis sample. As a result, we have 15,408 non-suspended students and 135,979 student-quarter observations for the math analysis, and 131,671 student-quarter observations for the ELA analysis. This is similar to the strategy used by Perry and Morris (2014), which dropped suspended students from the analysis sample in order to examine the links between schoolmate suspension and the educational achievement of non-suspended students.[2]

Table 1 reports the descriptive statistics of the sample of the study (i.e., non-suspended students). The majority of students in the study are from low-income family households (i.e., 71 percent of the students are eligible for free or reduced-price lunch). More than half of the students are Hispanic, one third are Asian, 12 percent are white, and only 1 percent are black. The student characteristics of the sample in our study are different from the population of California students overall.[3] Our sample has a higher proportion of Asian students and students eligible for free or reduced-priced lunch, but fewer black students compared with average California demographic student characteristics. However, the proportion of female, Hispanic, and English language learner students in our sample is very similar to the average California student demographics.

We measure peer suspension based on the number of suspension events in a given school as well as a given classroom, distinguishing between major, disruptive, and minor infractions. On average, approximately eight in-school and twelve out-of-school suspension events occur in a given quarter in a given school, respectively. The mean number of in-school and out-of-school suspension events in math and ELA classrooms is about 0.2 and 0.3, respectively.[4] The mean number of in-school suspension events in a math classroom for major, disruptive, and minor infractions is 0.07, 0.07, and 0.09, respectively. The mean number of out-of-school suspension events in a math classroom for major, disruptive, and minor infractions is 0.21, 0.09, and 0.05, respectively. The average number of suspension events among ELA classmates is similar to that of math classmates.

2. The findings are robust with data that include both suspended and non-suspended students. The results are available upon request.
3. In the 2011–12 school year, 6.5 percent black, 8.6 percent Asian, 52.0 percent Hispanic, and 26.1 percent white students constituted public school enrollment in California (www.kidsdata.org). In addition, 54 percent of students were eligible for free or reduced-price lunch (www.nces.ed.gov).
4. Although in-school and out-of-school suspensions result in classroom removal, we decided to separately examine these effects for three reasons. First, because the number of classmate in-school suspension and out-of-school suspension events are weakly correlated, the independent effects of these two forms of suspension are empirically separable. Second, if exposure to a classroom with many suspended peers hurts student achievement by undermining non-suspended students' school bonds, one might hypothesize that these effects would be more pronounced for out-of-school suspension rates than in-school suspension rates. Finally, because out-of-school suspensions are more likely to lead to longer-term removal, isolating the effects of suspension by types of suspension may yield informative findings.

Table 1. Descriptive Statistics of Student Characteristics and Suspensions

Number of Non-Suspended Students ($N = 15{,}408$)				
	Mean	**Standard Deviations**	**Minimum**	**Maximum**
Female	0.50			
Hispanic	0.53			
Asian	0.33			
White	0.12			
Black	0.01			
Other	0.01			
Free or reduced-price lunch eligibility	0.71			
English language learner	0.22			
Special education status	0.07			
Math benchmark score	64.86	17.65	8.50	100.00
ELA benchmark score	64.70	15.32	8.00	97.50
Number of Schoolmates' Disciplinary Events in a Quarter (All)				
ISS	8.09	10.90	0.00	83.00
OSS	11.79	7.60	0.00	41.00
Number of Classmates' Disciplinary Events in a Quarter (All)				
ISS (math)	0.19	0.46	0.00	6.00
OSS (math)	0.28	0.51	0.00	6.00
ISS (ELA)	0.20	0.50	0.00	9.00
OSS (ELA)	0.30	0.53	0.00	7.00
Number of Classmates' Disciplinary Events in a Quarter (Major)				
ISS (math)	0.07	0.25	0.00	5.00
OSS (math)	0.21	0.42	0.00	6.00
ISS (ELA)	0.07	0.25	0.00	3.00
OSS (ELA)	0.24	0.45	0.00	5.00
Number of Classmates' Disciplinary Events in a Quarter (Disruptive)				
ISS (math)	0.07	0.25	0.00	3.00
OSS (math)	0.09	0.29	0.00	5.00
ISS (ELA)	0.08	0.27	0.00	7.00
OSS (ELA)	0.10	0.30	0.00	6.00
Number of Classmates' Disciplinary Events in a Quarter (Minor)				
ISS (math)	0.09	0.29	0.00	4.00
OSS (math)	0.05	0.19	0.00	4.00
ISS (ELA)	0.09	0.32	0.00	9.00
OSS (ELA)	0.05	0.20	0.00	5.00

Notes: Major infraction includes weapons, drugs, fighting, theft, vandalism, and sexual harassment. Disruptive infraction includes classroom disruption and defiant behavior. Minor infraction includes truancy, no show, tardiness, mischievous behavior, no homework, dishonesty, and non-specified other infractions. ISS = in-school suspension; OSS = out-of-school suspension; ELA = English language arts.

Schools use suspensions as disciplinary actions for varying types of student misbehavior. We divide these infraction types into three categories for our analytic models.[5] Major infractions include weapons, drugs, fighting, bullying, theft, vandalism,

5. Although it is desirable to detect the links between peer suspensions and achievement by each individual category, we categorize these infraction types into three groups due to small cell sizes.

and sexual harassment. Disruptive infractions include classroom disruption and defiance. Minor infractions include truancy, no show for detention, tardiness, mischievous behavior, no homework, dishonesty, and other non-specified infractions. Appendix Table 1 summarizes detailed data on these infraction types.[6]

4. ANALYTIC APPROACH

To estimate the changes in student achievement associated with changes in peer suspensions, our analyses leverage quarterly measurements of student achievement and repeated measures of the number of suspensions that occurred in each of the district's schools and classrooms during the 2009–10, 2010–11, and 2011–12 school years. The district in this study has administered benchmark tests four times a year to evaluate students' learning progress to guide teacher instruction across schools since the 2007–08 academic year. Teachers and school administrators also use the test results as one of the criteria for class assignment (e.g., remedial-track class). *Benchmark Test Scores* are continuous variables from math and ELA test scores. For math achievement, students took different math tests depending on their courses (e.g., algebra or geometry). We therefore create standardized scores for each math course to estimate the effects of suspension on non-suspended classmates based on each quarter. In other words, we standardize math scores for each combination of course and quarter. For ELA achievement, because students took ELA tests by grade, we use standardized ELA scores for each combination of grade and quarter.[7]

Our first model follows prior research (Perry and Morris 2014) that examines the associations between school-level suspensions and academic achievement. This model uses student fixed effects to compare achievement for a given student across quarters with varying levels of schoolmate suspension. Student fixed effects enable us to control for not only observable between-student differences such as gender and race/ethnicity but also unobservable (or unmeasurable) between-student differences that may influence the educational outcomes. In addition, we use classroom fixed effects to control for both unobservable and observable differences between classrooms. The model with suspension at the school level is as follows:

$$Y_{icsgt} = \beta X_{icsgt} + \theta \mathrm{I}_{sgt} + \omega_g + \tau_t + \lambda_c + \mu_i + \varepsilon_{icsgt}. \quad (1)$$

In equation 1, the standardized achievement level, Y_{icsgt}, is the End of Quarter standardized benchmark score of student i in classroom c, in school s, in grade g, and in quarter/year t. X_{icsgt} is a vector of time-varying controls, including eligibility for free or reduced-price lunch, English language learner status, special education status, and

6. All appendix tables are available in a separate online appendix that may be accessed on *Education Finance and Policy*'s Web site at https://doi.org/10.1162/edfp_a_00308.

7. It is important to note that each of the quarterly tests upon which our analyses is based are similarly low-stakes. Because the assessments are aligned to curricular pacing guides that are used by teachers throughout the district, the assessments typically measure student achievement in the material to which they have been most recently exposed. As such, the district discourages educators from using fourth-quarter assessment results as a cumulative measure of student achievement, and students receive a separate end-of-grade assessment under the state accountability system. When the assessments are used for course placement, educators consider the results of multiple quarterly assessment results at once.

school size. I_{sgt} indicates the number of suspension events in a school in that quarter/year (in-school and out-of-school suspension events are measured as two separate variables included in the same model),[8] ω_g indicates grade fixed effects, τ_t indicates year and quarter fixed effects, λ_c indicates classroom fixed effects,[9] μ_i indicates student fixed effects, and ε_{icsgt} is the error term. Standard errors are clustered at the school level. θ captures the links between schoolmate suspension and educational achievement, indicating to what extent one additional school suspension event is associated with non-suspended students' achievement.

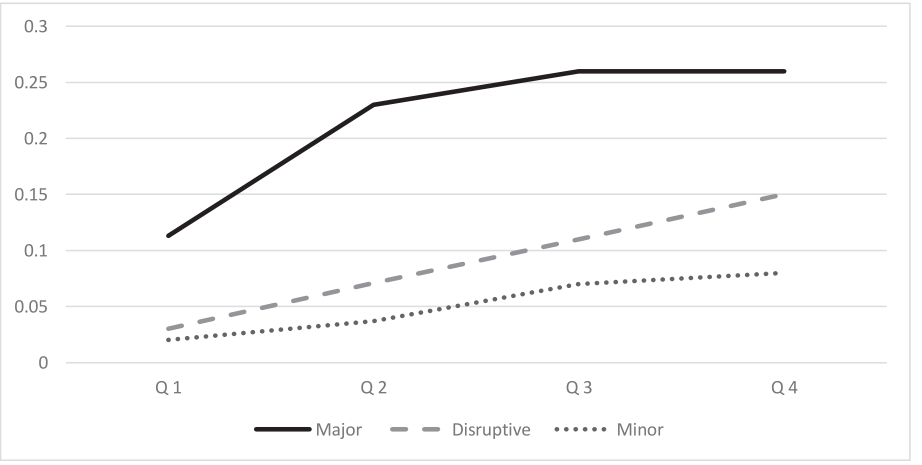
Next, we estimate the associations between classmate suspensions and academic achievement. For this analysis, the main source of variation is from different exposure to classmate suspensions across quarters. The model with suspension at the classroom level is as follows:[10]

$$Y_{icsgt} = \beta X_{icsgt} + \theta I_{cgt} + \omega_g + \tau_t + \lambda_c + \mu_i + \varepsilon_{icsgt}. \quad (2)$$

In this model, I_{cgt} indicates the number of suspension events in a classroom in that quarter/year (again, in-school and out-of-school suspension events are measured in two separate variables that are included in the same model),[11] and the control variables include classroom size rather than school size. The remaining variables in equation 2 are the same as in equation 1. Classroom fixed effects (λ_c) control for time-invariant differences between classrooms. We control for math classroom fixed effects for math achievement and ELA classroom fixed effects for ELA achievement. Given that classroom climate likely varies across classrooms, controlling for classroom fixed effects is essential for our identification strategy. Our main variable—the number of suspensions at the classroom level—does vary over time, enabling us to detect the links between classmate suspension and academic achievement after controlling for time-invariant differences between classrooms. For math outcomes, we include math classmate suspensions in the models. Similarly, for ELA outcomes, we include ELA classmate suspensions in the models.[12]

Finally, we investigate the links between peer infraction types (i.e., major, disruptive, and minor) and non-suspended students' educational achievement. To investigate the links between peer suspensions that are related to a certain type of infraction and academic achievement, we run models with the number of schoolmate or classmate suspensions that are related to major, disruptive, and minor infractions. These infractions are continuous variables that measure the number of major, disruptive, and minor infractions in a given quarter. In our models with infraction types, θ captures the links between peer infractions and educational achievement, indicating the extent to which

8. We find a moderately positive correlation ($r = 0.41$) between schoolmate in-school suspension and schoolmate out-of-school suspension.
9. Due to multicollinearity, school fixed effects are automatically dropped in the models that include classroom fixed effects. The results are consistent with school fixed effects instead of classroom fixed effects.
10. Our models dropped 228 cases (0.17 percent) for math and 185 cases (0.14 percent) for ELA models due to singleton observations.
11. We find a small positive correlation ($r = 0.29$) between classmate in-school suspension and classmate out-of-school suspension.
12. Our data do not indicate whether suspensions actually occurred in the math or ELA classroom but they do allow us to count the number of math and ELA classmate suspension events.



Notes: This figure is based on the pooling data across grades 7 through 11 between 2009–10 and 2011–12. The suspension rate is based on out-of-school suspensions. Major infraction includes weapons, drugs, fighting, theft, vandalism, and sexual harassment. Disruptive infraction includes classroom disruption and defiant behavior. Minor infraction includes truancy, no show for detention, tardiness, mischievous behavior, no homework, dishonesty, and non-specified other infractions.

Figure 1. Number of Out-of-School Suspension Events for Math Classmates across Quarters by Infraction Type

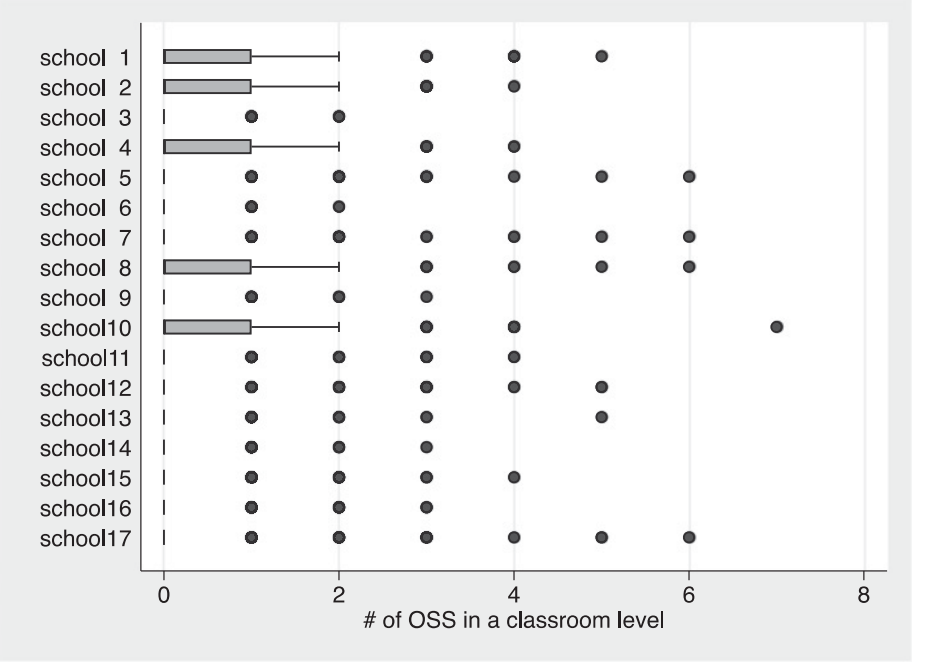
peer infractions are associated with academic achievement. Because of multicollinearity, we include each infraction type separately in our models.

5. RESULTS

Figures 1 and 2 demonstrate the patterns of peer suspension in this district. Figure 1 displays the average number of out-of-school suspension events for math classmates across quarters by infraction type. Overall, students are exposed to classmate out-of-school suspension events for major and disruptive infractions more frequently than for minor infractions. The pattern also shows that the suspensions increase over the academic year. In the first quarter, the average number of out-of-school suspension events for math classmates is 0.11 for major infractions, 0.03 for disruptive infractions, and 0.02 for minor infractions. In the fourth quarter, the average number of classmate out-of-school suspensions is 0.26 for major infractions, 0.15 for disruptive infractions, and 0.08 for minor infractions.

The box plots in figure 2 provide a graphic representation of the number of out-of-school suspension events in a math classroom in a quarter across seventeen different schools. They show that suspensions are relatively rare events in this district in a given quarter. Nevertheless, the number of suspensions varies considerably within a school. The number of suspensions in an ELA classroom also shows similar patterns to those of the math classroom, suggesting exposure to math and ELA classmate suspensions differs within a school.

To address our first research question, we describe the characteristics of students associated with exposure to suspended classmates. The analyses reported in table 2 compare the demographic characteristics of students exposed to at least one suspended classmate and students never exposed to suspended classmates over the study period (i.e., up to three years). Hispanic students are overrepresented among students exposed



Notes: The box plot shows the average number of OSS events in a math classroom in a given quarter. This figure is based on the pooling data across grades 7 through 11 between 2009–10 and 2011–12. Because suspensions are relatively rare events in this district, schools have median suspension events that are zero in a given quarter.

Figure 2. Number of Math Classmate Out-of-School Suspension (OSS) Events in a Given Quarter across Seventeen Secondary Schools in a California School District

to at least one classmate suspension (60 percent vs. 39 percent), whereas Asian students are underrepresented in that group (27 percent vs. 45 percent). In addition, students eligible for free or reduced-price lunch (73 percent vs. 65 percent), English language learners (26 percent vs. 15 percent), and students enrolled in special education (8 percent vs. 6 percent) tend to be overexposed to classmate suspension in comparison with their counterparts. The average test scores for students who are exposed to at least one suspended student are 62 (out of 100) for both math and ELA, whereas the scores are 70 for math and 69 for ELA for students who are never exposed to classmate suspensions.

To answer our second research question, we examine the links between peer suspension and educational achievement. The first column in table 3 shows the estimated associations between schoolmate suspension and math achievement, and the second column shows the estimated associations between schoolmate suspension and ELA achievement. The results indicate that neither schoolmate in-school suspensions nor schoolmate out-of-school suspensions are associated with the educational achievement of non-suspended students.

We replace schoolmate suspensions with classmate suspensions in analyses reported in the third and fourth columns in table 3.[13] Although schoolmate suspensions

13. We also examine whether the peer suspension effects are subject-specific by testing whether math classmate suspensions are associated with ELA achievement and vice versa. We find that math classmate suspensions

Table 2. Student Characteristics and Exposure to Suspended Classmates in Math Classroom

	Exposure to at Least One Suspended Classmate ($N = 10,739$)	No Exposure to Suspended Classmates ($N = 4,669$)	Mean Difference	*t* Test
Female	0.495	0.493	−0.002	−0.285
Asian	0.268	0.454	0.186	24.378***
Black	0.009	0.008	−0.001	−0.562
Hispanic	0.600	0.392	−0.208	−25.668***
White	0.112	0.136	0.024	4.47***
Other	0.011	0.010	−0.001	−0.537
FRPL	0.734	0.650	−0.083	−11.806***
ELL	0.255	0.149	−0.106	−16.113***
Special education	0.078	0.061	−0.017	−4.068***
Math achievement	62.070	69.736	7.667	26.400***
ELA achievement	62.292	68.809	8.949	30.901***

Notes: This is based on the pooling data across grades 7 through 11 in a California district. FRPL = students who are eligible for free or reduced-price lunch; ELL = students who are English language learners; ELA = English language arts.

***$p < 0.001$.

Table 3. Link between the Number of Peer Suspensions and Academic Achievement Controlling for Student and Classroom Fixed Effects

	Schoolmate Suspension		Classmate Suspension	
	Math	ELA	Math	ELA
Number of ISS events	0.000	0.001	0.011	0.009
	(0.001)	(0.001)	(0.013)	(0.007)
Number of OSS events	0.002	0.000	0.024***	−0.001
	(0.002)	(0.001)	(0.004)	(0.005)
N	135,979	131,671	135,979	131,671

Notes: All models control for student, year, quarter, classroom, and grade fixed effects as well as free or reduced-price lunch eligibility, special education, English language learner status, and class size (or school enrollment). Standard errors are clustered at the school level. For math outcome, we include math classmate suspensions in the model. For English language arts (ELA) outcome, we include ELA classmate suspensions in the model. We present the full models in online appendix table A.2. ISS: in-school suspension; OSS: out-of-school suspension.

***$p < 0.001$.

can indicate overall school climate, classmate suspensions are a more direct measure of removal of disruptive peers. The third column in table 3 shows that classmate in-school suspension is not associated with math achievement, whereas classmate out-of-school suspension is associated with increased math achievement.[14] We find that an increase

are not associated with ELA outcomes and ELA classmate suspensions are not associated with math outcomes (see table A.3). These results show that peer suspension effects are subject-specific, implying that instruction time may explain the links between classmate suspensions and increased math achievement.

14. Although both in-school and out-of-school suspensions result in classmate removal, the effects of peer in-school suspensions can be different from out-of-school suspensions given that conversations with district staff inform us that out-of-school suspensions are usually longer than in-school suspensions. It is also plausible that both students and teachers may feel safer and concentrate better on learning and teaching when students with serious behavioral issues are absent from schools.

in an out-of-school suspension event in a classroom is associated with a 0.024 standard deviation (SD) increase in the math achievement of non-suspended students.[15] The results reported in table 3's fourth column point to no significant associations between classmate suspension and the ELA achievement of non-suspended students. Our results may suggest that orderly learning environments play a more critical role in math achievement than reading achievement (Bryk and Raudenbush 1989). Given that many students find math a challenging subject and show high levels of math anxiety (Wigfield and Meece 1988; Ramirez, Shaw, and Maloney 2018), it is also possible that undisruptive learning environments may be more essential for learning math than ELA.

To investigate our third research question, we examine whether the link between peer suspensions and educational performance varies across infraction types. Although some correlations between peer suspensions across infraction types are small, some are quite large (e.g., exposure to schoolmate in-school-suspensions for minor infractions is correlated with exposure to schoolmates out-of-school suspensions for minor infractions by 0.83). We thus run six different models individually, including in-school and out-of-school suspensions for major, disruptive, and minor infraction types in each model. The results reported in the first two columns of table 4 examine the links between schoolmate infraction types and academic achievement. The results show that the links between schoolmate infraction types and math achievement are positive, but the effect sizes are very small in magnitude. The first column in table 4 shows that an increase in a schoolmate in-school suspension event that is related to a disruptive infraction type is associated with a 0.003 SD increase in math achievement. We also find that an increase in a schoolmate out-of-school suspension event that is related to disruptive and minor infractions are associated with a 0.003 SD and 0.005 SD increase in math achievement, respectively. Schoolmate infractions are, however, not associated with ELA achievement.[16]

The results reported in table 4's third and fourth columns examine the associations between classmate infractions and academic achievement.[17] The third column in table 4 shows that an increase in an in-school suspension event that is related to a disruptive infraction type is associated with a 0.047 SD increase in math achievement, whereas increased in-school suspension events that are related to either major or minor behavior are not associated with math achievement. In addition, an increase in out-of-school suspension events that is related to major infractions is associated with a 0.030 SD increase in math achievement, and an increase in an out-of-school suspension event

15. Given that class sizes vary between one and forty students, we ran analyses with class sizes of six or more and also class sizes of eleven or more. Our results show the findings are robust (see online appendix table A.4). In addition, we tested whether the links between classmate suspension and educational achievement vary by class size, and we find some suggestive evidence that the association between classmate suspension and ELA achievement is larger as class size gets smaller but not for math achievement (see online appendix table A.5).
16. We also run models with all three infraction types and we find a few tiny negative links between school infraction types and math achievement (see online appendix table A.6). High correlations across infraction types likely drive these results.
17. As a specification check, we dropped the fourth quarter data and run analyses, given that test stakes might be higher at the end of the school year, and also suspensions occur most frequently in the fourth quarter. We find the results are robust when we only include the first, second, and third quarters in the analyses.

Table 4. Links between Peer Infraction Types and Academic Achievement Controlling for Student and Classroom Fixed Effects

	Schoolmate Suspensions (Without Controlling for the Other Infraction Categories)		Classmate Suspensions (Without Controlling for the Other Infraction Categories)	
	Math	ELA	Math	ELA
Number of ISS events (major)	−0.001	0.001	0.021	0.004
	(0.002)	(0.002)	(0.019)	(0.010)
Number of ISS events (disruptive)	0.003*	0.001	0.047*	−0.001
	(0.001)	(0.001)	(0.019)	(0.009)
Number of ISS events (minor)	−0.001	0.000	−0.014	0.005
	(0.001)	(0.001)	(0.011)	(0.008)
Number of OSS events (major)	0.002	0.001	0.030**	−0.001
	(0.002)	(0.001)	(0.007)	(0.006)
Number of OSS events (disruptive)	0.003*	0.000	0.025*	0.005
	(0.002)	(0.001)	(0.010)	(0.007)
Number of OSS events (minor)	0.005*	0.000	0.019	0.001
	(0.002)	(0.001)	(0.011)	(0.010)
N	135,979	131,671	135,979	131,671

Notes: All models control for student, year, quarter, classroom, and grade fixed effects as well as free or reduced-price lunch eligibility, special education, English language learner status, and class size. For math outcome, we include math classmate suspensions in the model. For English language arts (ELA) outcome, we include ELA classmate suspensions in the model. Standard errors are clustered at the school level. Major infraction includes weapons, drugs, fighting, theft, vandalism, and sexual harassment. Disruptive infraction includes classroom disruption and defiant behavior). Minor infraction includes truancy, no show for detention, tardiness, mischievous behavior, no homework, dishonesty, and non-specified other infractions. Standard errors are clustered at the school level. We present the full models in online appendix tables A.5 (schoolmate) and A.6 (classmate). ISS = in-school suspension; OSS = out-of-school suspension.

*$p < 0.05$; **$p < 0.01$.

that is related to disruptive infractions is associated with a 0.025 SD increase in math achievement. However, an out-of-school suspension event that is related to minor infractions is not associated with math achievement. The fourth column shows that none of the classmate infraction types is associated with ELA achievement, regardless of infraction types.[18]

To contextualize our results, it is informative to point out that one additional day of absence is associated with a 0.003 SD and 0.006 SD decrease in reading and math achievement, respectively (Aucejo and Romano 2016). As such, while the magnitude of our results is small, the effects of peer suspension on math learning are not negligible. Furthermore, it is important to note that our models cannot completely disentangle the effects of suspensions from the effects of disruptive peers because we do not have actual student behavioral measures. Since classroom suspensions and classroom disorder likely correlate, and since classroom disorder may negatively affect student achievement, our estimates of the links between classmate suspension and student achievement are more likely to be downward biased. Accordingly, we suspect our estimates represent lower bound of the effects of classroom peer suspension on

18. We also run models with all other infraction types and the findings are mostly consistent (see online appendix table A.7). One difference is that after controlling for the other infraction types, we find that an increase in classmate in-school suspension is associated with a .030 SD decrease in the math achievement of non-suspended students. The moderate correlations between major, disruptive, and minor infraction types likely lead to this negative link.

non-suspended students. That is, the positive effects of peer suspensions on academic achievement may be larger than our estimates because the directions of potential biases are more likely to be negative than positive.

6. DISCUSSION

By leveraging quarterly assessments in a California school district over the course of the 2009–10, 2010–11, and 2011–12 school years, we examine the links between peer suspensions and academic achievement. Our analyses indicate that the number of schoolmate suspension events are not associated with student achievement. However, we find that classmate suspensions are positively correlated with increased math achievement. These findings are striking and important in light of the descriptive data that show that students from low-income families, Hispanic students, English language learners, low-achieving students, and students enrolled in special education are more likely to be exposed to classmate suspensions.

Our analyses indicate that peer suspensions due to disruptive infractions are associated with improvements in achievement for non-suspended students, while peer suspensions due to minor infractions are not. Disruptive classroom behavior, such as talking with friends, disobedience toward teachers, and cell phone use, may appear to be trivial behavioral issues, however, such nonviolent and nonserious behavior can interrupt the learning of other classmates. A reduction in the number of disruptive peers enables students to better focus on instruction, enhancing student learning. Orderly learning environments can mitigate the negative effects of peer misbehavior, further deterring student misbehavior (Zimmerman and Rees 2014) and enhancing positive student development (Brophy 2003; Gregory et al. 2010).

Our findings on the links between classmate suspensions and increased math achievement highlight the importance of peers in student development. While mitigating peer misbehavior can improve student learning (Figlio 2007; Aizer 2008; Fletcher 2010), associating with misbehaving peers can negatively influence student behavior (Dishion, McCord, and Poulin 1999; Dishion, Poulin, and Burraston 2001). Our results may help to explain experimental and quasi-experimental studies that show suspension-reducing policies lead to decreased educational performance (e.g., Augustine et al. 2018; Steinburg and Lacoe 2018), suggesting that school discipline reform in the absence of adequate support may hurt the learning environments of students from vulnerable populations the most (Cohen 2017).

The question thus arises: Do the benefits of suspension outweigh the costs? Existing studies show that a suspension is associated with a 0.02–0.24 SD decrease in academic achievement for suspended students (Noltemeyer, Ward, and Mcloughlin 2015; Hwang 2018), and our results show that peer suspension is associated with a 0.02–0.05 SD increase in math achievement. Assuming these estimates suffer from the same degree of bias and assuming that in most educational environments non-suspended students outnumber suspended students, it is possible that the aggregate positive effects of peer suspension on non-suspended student achievement is greater than the aggregate negative effects of suspension on suspended students. That said, we reject the idea that a narrow cost–benefit analysis based on a consideration of student achievement characterizes the net consequences of school disciplinary policy. Given that pushing students out of learning environments may put students on a downward pathway that leads to

a series of negative youth outcomes (Balfanz, Byrnes, and Fox 2014; Mittleman 2018), the consequences of suspensions result in other long-term social costs (Rumberger and Losen 2016).[19] As such, these long-term social costs may outweigh the short-term achievement benefits for their non-suspended peers.

Furthermore, we note that our findings may not be generalizable to other settings, given that we use data from a single school district with relatively low suspension rates. Many studies focus on the disparity in school discipline between black and white students, but the sample of this study includes only 1 percent black students. Thus, it is possible that the positive peer effects we observe may not hold in contexts that rely more heavily on suspension. The two existing studies that show a link between schoolmate suspensions and decreased achievement (Perry and Morris 2014; Hinze-Pifer and Sartain 2018) are based on contexts in which the suspension rates are much higher (i.e., at least 15 percent of students received suspensions) than the school district in our study. Future research based on different demographic compositions and in other contexts where districts have high suspension rates is necessary to examine whether the findings are consistent.

Finally, although we examine the varying links between classmate suspensions and academic performance across infraction types, categorizations of infractions may not fully capture what happened in the classroom. For example, dress code violations in the data are really dress code violations followed by a refusal to comply with the dress code rule (i.e., defiance). Similarly, physical aggression such as pushing or kicking a student can be recorded as either classroom disruption or fighting depending on the level of aggressiveness. As such, our estimations across infraction types could miss important nuances, which might help to explain why we find a positive association between schoolmate minor infraction types and math achievement but no association between schoolmate major infraction types and math achievement.

In sum, our study shows that removal of disruptive students with behavioral issues can help the learning of others. We find that students from vulnerable populations (i.e., Hispanic students, students from low-income families, low-achieving students, English language learners, and students enrolled in special education) have an elevated risk of being exposed to classmate suspensions relative to their more privileged counterparts. Temporary removal of disruptive students is sometimes necessary, particularly for the benefit of poor and low-achieving students of color who are more likely to be exposed to classmate disruptions. The results of this study contribute to a critical discussion on school disciplinary policies and the best ways to educate and discipline students with challenging behaviors.

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19. Rumberger and Losen (2016) argue that the total cost of suspending tenth-grade students can exceed $35 billion.

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