UNIVERSITY OF CALIFORNIA,
IRVINE

Suspension and its Consequences: Individual and Classroom Effects

DISSERTATION

submitted in partial satisfaction of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

in Education

by

NaYoung Hwang

Dissertation Committee:
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DEDICATION

To my grandma, who never had the opportunity to learn how to read, and to my mom, who has given everything for my education.

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ACKNOWLEDGMENTS

Completing my doctorate has been quite a journey. It was challenging, frustrating, and nerve-wracking. Thanks to the people around me, however, it was also enjoyable, intriguing and rewarding. This adventure has broadened my worldview and enabled me to see the world in ways I never imagined.

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Thad's unwavering support and guidance have enabled me to navigate many challenges in pursuit of my career goals. During my first year at UCI, my weekly Friday meetings with Thad served to reassure me that I belonged in this community and that I was capable of working here. His confidence in my abilities – and my desire to reward that confidence – has been a great motivator throughout this dissertation. I also wish to thank Thad for recruiting me into the Evaluating the Quality of Universal Algebra Learning (EQUAL) project. Collaborating with Thad and other EQUAL team members has been an invaluable opportunity in my scholarly growth.

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ABSTRACT OF THE DISSERTATION

Suspension and its Consequences:

Individual and Classroom Effects

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Distinguished Professor Greg J. Duncan, Chair

During the 2011-2012 academic year, approximately 3.5 million students received suspensions across the United States. Scholars and professionals have raised concerns regarding the frequent use of exclusionary discipline. In fact, research shows that receiving suspensions is associated with a wide range of negative youth outcomes. However, because isolating the causal effects of suspension is difficult, to what extent the associations are causal is still an open question. Moreover, little is known about the effects of suspension on the educational achievement of non-suspended students.

The purpose of this dissertation is to investigate the consequences of suspensions on students and their non-suspended peers by focusing on within-person variations, comparing change in achievement for the same students before and after the time of their suspensions and classmate suspensions. The results of Study 1 show that students from disadvantaged backgrounds have an elevated risk of exposure to an environment with classmates who receive suspensions. In Study 2, the results suggest that receiving multiple out-of-school suspensions can

lead to negative educational achievement, whereas receiving one out-of-school suspension or receiving in-school suspension have little effects on the educational achievement of suspended students. Finally, in Study 3, I find that classmate suspensions positively affect the math achievement of non-suspended students.

Taken together, the findings from the three studies provide new empirical evidence about the consequences of using classroom or school removal as a school disciplinary policy. In recent years, many school districts have discouraged suspension practices and have implemented alternative ways to discipline students. As a result, suspension rates plummeted in some school districts. The findings imply that the effort to reduce suspension rates may benefit students at risk of suspension, but may also harm overall learning environments. Such findings have important implications for policies regarding how to best discipline and teach students with behavioral challenges.

INTRODUCTION

A safe and orderly environment is a prerequisite for student learning and development in school. Antisocial and disruptive student behavior can reduce instructional time, hamper the quality of instruction, and cause teacher burnout (Brouwers & Tomic, 1999; Hastings & Bham, 2003). Teachers have also stressed that student misbehavior undermines their ability to teach (Bauer, 1985; U.S. Department of Education, 2000). In addition, peer misbehavior can negatively impact educational and behavioral outcomes (Aizer 2008; Carrell & Hoekstra 2010; Figlio, 2007; Fletcher 2010).

One way that schools deal with problematic behavior is by removing students with challenging behavior from classrooms. However, many scholars and professional associations have expressed concerns regarding these exclusionary disciplinary practices, including suspension and expulsion (American Academy of Pediatrics, 2013; American Psychological Association, 2008; Noguera, 2003; Skiba, Michael, Nardo, & Peterson, 2002; Townsend, 2000). Research shows that students from disadvantaged backgrounds receive suspensions more frequently than students from advantaged backgrounds (Brantlinger, 1991; Nichols, 2004; Petras et al., 2011; Skiba, Peterson, & Williams, 1997). In particular, many researchers have found that suspension rates among racial minorities, particularly black students, are higher than those among white students (Costenbader & Markson, 1998; Hilberth & Slate, 2014; Mcfadden et al., 1992; Noltemeyer et al., 2010; Skiba et al., 2014; Petras et al., 2011; Stevens et al., 2015; Wallace et al., 2008; Wright et al., 2014). Further, researchers have consistently warned that "get tough" school discipline practices leading to harsh punishments may not only fail to correct misbehavior (Raffaele Mendez, 2003; Fabelo et al, 2011), but also result in more negative outcomes for the suspended students themselves (Arcia, 2006; Morris & Perry, 2016) and their

non-suspended peers (Perry & Morris, 2014). Some go even further in expressing their concern by describing disciplinary practices as part of the "prison track," "school-to-prison pipeline," or "school-to-jail pipeline" (Fowler, 2011; Wald & Losen, 2003; Rocque & Paternoster, 2011).

In response to the critics of suspension, the U.S. Department of Justice and the U.S. Department of Education have recently vowed to reduce racial disparities in school discipline and improve school climates (U.S. Department of Education/Department of Justice, 2014). Along those lines, the Los Angeles Unified School District (LAUSD) banned suspensions for "willfully defiant" students and developed programs that deter negative behaviors and encourage positive ones (LA Daily News, 2013). Although research shows that suspension is associated with negative educational outcomes for both suspended and non-suspended students, to what extent the associations are causal is still an open question because estimating the causal effects of suspension is challenging.

In my dissertation, I ask three main research questions:

(1) Does exposure to frequent classmate suspension vary by student characteristics, including race/ethnicity, free and reduced-price lunch status, and academic track assignment?

(2) What are the effects of suspension on the educational achievement of suspended students?

(3) What are the effects of suspension on the educational achievement of non-suspended students?

In Study 1, I describe the links between student characteristics and exposure to peer suspension. Given that schools sort students into vertically differentiated courses, I pay particular attention to the role of track assignment in exposure to classmate suspension. In Study 2, by

using student fixed effects, I compare achievement change for a given student across school quarters with varying levels of suspension. Because student fixed effects allow me to use a student as his or her own control, the procedures in Study 2 should yield less biased estimation of the effects of suspension on educational achievement. In Study 3, given that one key rationale of suspending student is to provide orderly learning environments for the remaining students, I investigate the effects of suspension on the educational achievement of non-suspended students. Taking advantage of a unique data measuring student achievement at 12 time points across three academic years, I compare achievement change for a given student across school quarters with varying types and levels of classmate suspensions. Recently, many policies that aim to reduce suspension rates have been implemented at the federal as well as school district levels. Thus, the results of this dissertation provide critical implications on the recent school discipline reform. Below I summarize the findings from each study.

Overview of Studies

Study 1: Unequal Learning Environment: Academic Track Assignment and Exposure to Classmate Suspension

Many scholars have focused on differential suspension rates across subgroups, including gender, race, and socioeconomic status. However, researchers have paid little attention to whether a certain subgroup has an elevated risk of exposure to classmates who receive disciplinary responses, including in-school suspensions and out-of-school suspensions. In Study 1, I use data from two school districts in California to describe student characteristics that are linked with exposure to classmate suspension. Given that exposure to different learning environments play a role in student development, it is critical to examine subgroup (e.g., race,

family socioeconomic status, and achievement level) differences in exposure to classmate suspension.

The results from Study 1 show that students with disadvantaged characteristics tend to be vulnerable to higher exposure to classmate suspension. Hispanic students are more likely to face classmate suspensions than their white counterparts. In addition, students who are eligible for free or reduced-price lunch, students in special education programs, English language learners, and low-achieving students are more likely to have classmates who received suspensions. Importantly, I find that being assigned to a lower track class is the strongest factor that accounts for higher exposure to classmate suspension. These findings suggest that academic track assignment within schools may contribute to nonequivalent classroom learning environments across students.

Study 2: Suspension and Achievement: Do the Effects of Receiving Suspension Vary by Type and Frequency?

Although researchers have shown that suspensions are associated with undesirable educational consequences, including lower educational achievement, lower grades, and higher high school dropout rates, they fail to take into account differences between students who received suspensions and students who did not. Because histories of being suspended can be both symptom and cause of developmental challenges, analyses that compare the educational outcomes of suspended with the outcomes of non-suspended students are susceptible to omitted variable biases.

To overcome the shortcomings of the prior studies, I use student fixed effects to compare educational achievement change for a given student across quarters with varying levels of suspension. This comparison enables me to use a student as her or his own counterfactual to test

whether receiving suspensions in a quarter decreases achievement at the end of quarters. By using student fixed effects, I compare the educational achievement change for a given student across school quarters with varying levels of suspension.

My findings show that the effects of receiving suspension may vary across suspension types (i.e., in-school suspensions vs. out-of-school suspensions) as well as across frequency of suspensions (i.e., single suspension vs. multiple suspensions). I find that receiving multiple out-of-school suspensions can lead to lower math and ELA achievement, whereas receiving one out-of-school suspension has little impact on the end-of-quarter achievement of suspended students. In addition, the results suggest that receiving in-school suspension either once or multiple times does not lead to negative educational achievement.

Study 3: Unintended Consequences: Does the Effort to Reduce Suspensions Harm Learning Environments?

In Study 3, I investigate to what extent classmate suspension affects the educational achievement of non-suspended students. One of the goals of school discipline is to provide orderly and productive learning environments. However, existing literature is relatively silent on the effects of suspension on the educational outcomes of non-suspended students. On one hand, isolating students with behavioral challenges from classrooms may help the remaining classmates behave better and learn more (Carrell & Hoekstra, 2010; Figlio, 2007). On the other hand, overly punitive environments may have adverse consequences for non-suspended peers (Perry and Morris, 2014).

I use student fixed effects to compare educational achievement in quarters in which students were exposed to a higher classroom suspension rate with achievement in quarters in which they were exposed to a lower classroom suspension rate. This approach allows me to use

students as their own counterfactuals to examine whether and to what extent the effects of suspension impact the educational achievement of non-suspended students. Student fixed effects reveal that classmate out-of-school suspension positively affects the math achievement of non-suspended students. These findings imply that without addressing disruptive student misbehavior, simply reducing suspension rates can damage the learning environments.

Conclusion

Investigating the consequences of school disciplinary actions is critical for student development. However, existing literature does not provide sufficient empirical evidence on the effects of disciplinary responses, including in-school and out-of-school suspensions. Particularly, research on the effects of suspensions on non-suspended students' youth outcomes has been extremely limited. The results of my studies reveal that receiving multiple out-of-school suspensions can lower math and ELA achievement (Study 2), but classmate suspension (i.e., a higher classroom suspension rate) can positively affect the educational achievement of non-suspended students (Study 3). Given that students from disadvantaged backgrounds are more likely to be exposed to classmate suspensions (Study 1), these findings imply that eliminating suspension may solve one problem but create another problem. In the absence of mitigating disruptive student behavior, reducing suspension rates may harm learning environments, particularly for those from disadvantaged backgrounds who share classrooms with students at risk for suspension.

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CHAPTER 1

Study 1. Unequal Learning Environments: Academic Track Assignment and Exposure to Classmate Suspension

Abstract

A large body of research has shown disparities in the frequency of suspensions across subgroups, including gender, race/ethnicity, socioeconomic status, and achievement level. However, little is known about the degrees to which students from these groups tend to be more frequently exposed to classmate suspension. Using administrative data from two large school districts in California, I describe student characteristics that are linked to exposure to high levels of classmate suspension in 8th grade. The results show that track assignment is a driving force behind varying levels of exposure to classmate suspension across students. I find that disadvantaged student characteristics, including free and reduced-price lunch eligibility, enrollment in special education, English language learner status, low educational performance, and being Hispanic (compared with being white) are positively associated with higher exposure to classmate suspension, but the associations became weaker or disappeared after taking track assignment into account. These findings imply that at-risk students are more likely to be exposed to frequent classmate suspension, and that track assignment is associated with the presence of unequal educational environments across students.

Keywords: suspensions, track assignment, classroom environments, educational inequality

Exclusionary school disciplinary practices, including in-school suspensions and out-of-school suspensions, have been common disciplinary responses in U.S. schools. Approximately one out of nine secondary school students received suspensions during 2009–2010 academic year (Losen & Martinez, 2013). Many researchers have examined student characteristics that are linked to an elevated risk for receiving suspensions. As an example, disproportionality in school discipline across race/ethnicity (Costenbader & Markson, 1998; Hilberth & Slate, 2014; Noltemeyer & Mcloughlin, 2010; Wallace, Goodkind, Wallace & Bachman, 2008) and family socioeconomic status (Brantlinger, 1991; Nichols, 2004; Skiba, Peterson, & Williams, 1997) has been well documented.

While researchers have paid great attention to disparity in school discipline across subgroups (e.g., gender, race/ethnicity, and socioeconomic groups), little is known about the factors that are linked to exposure to classroom environments with suspended students. A high peer suspension rate can be a marker of a punitive learning climate that is linked to negative educational achievement (Perry & Morris, 2014). Further, because peer behavior influences educational and behavioral outcomes (Aizer, 2008; Carrell & Hoekstra, 2010; Figlio, 2007), sharing a classroom with students with behavioral challenges may hinder student outcomes. Given that classroom environments play a critical role in learning (Barth, Dunlap, Dane, Lochman, & Wells, 2004; Kellam, Ling, Merisca, Brown, & Ialongo, 1998), it is important to examine whether a certain group of students tends to experience more frequent classmate suspension.

To fill this gap in the literature, in Study 1, I use administrative data from two California school districts to describe student characteristics that are associated with exposure to a classroom environment with suspended classmates in 8th grade. By taking advantage of this unique dataset, which allows me to identify a student's course and classmates, I provide descriptive analyses on factors that are linked to an increase in percent of classmate suspension in the classroom. Study 1 contributes to the literature in a few important ways. First, although peer behavior is likely to be an important mechanism that accounts for the consequences of academic tracking, we lack existing empirical work on the links between tracking and peer behavior. Scholars have pointed out different classroom characteristics across tracks by showing varying levels of peer achievement and demographic composition (Attewell & Domina, 2008; Conger, Long, & Iatarola, 2009), but the measure of peer behavior in this literature is not satisfying. In Study 1, I describe the links between academic tracking and exposure to classmates who receive suspensions. Second, I examine whether and to what extent student demographic characteristics and achievement levels are linked to exposure to classmate suspension after taking assignment tracking into account. Finally, by using data from two districts that exhibit contrasting suspension rates (i.e., high suspension rates vs. low suspension rates), I compare factors that are linked to classmate suspension exposure between two district contexts with varying levels of suspension rates.

Background: Exclusionary School Discipline and Classroom Environments

No known studies have explicitly examined the factors that are associated with exposure to classmate suspension. However, prior research suggests that students from disadvantaged backgrounds (e.g., poor families, racial/ethnic minority families) have higher exposure to classmate suspension. Students with disadvantaged characteristics, including racial/ethnic

minorities, students from low-income families, and low-achieving students, have an elevated risk of receiving suspensions (Skiba et al., 2014; Petras, Masyn, Buckley, Ialongo & Kellam, 2011; Stevens, Sartain, Allensworth, & Levenstein, 2015). In addition, students from disadvantaged backgrounds are more likely to be in the classroom with students with similar demographic backgrounds (Attewell & Domina, 2008; Conger, Long, & Iatarola, 2009). In the following section, I review two lines of research that guide the hypotheses of the current study. I first discuss literature on student characteristics that are linked to receiving suspensions. Then I review studies on unequivalent educational experience across students from different racial and socioeconomic groups, and the role of track assignment in unequal classroom environments.

Subgroup Disparities in School Discipline

Research has highlighted patterns of disproportionate disciplinary actions based on gender, race/ethnicity, family socioeconomic status (SES), academic achievement, and special education status. In terms of gender, male students receive suspensions more often than female students (Costenbader & Markson, 1998; Mcfadden, Marsh, Price & Hwang, 1992; Hemphill, Plenty, Herrenkohl, Toumbourou, & Catalano, 2014; Skiba et al., 2014; Stevens et al., 2015). For example, Mcfadden and colleagues (1992) used data from a southern Florida school district during the 1987-1988 academic year and found that over 75% of discipline referrals were for males. Research also shows that racial minorities, particularly black students, disproportionally receive school disciplinary measures (Costenbader & Markson, 1998; Hilberth & Slate, 2014; Mcfadden et al., 1992; Noltemeyer & Mcloughlin, 2010; Skiba et al., 2014; Petras et al.,2011; Stevens et al., 2015; Wallace et al., 2008; Wright, Morgan, Coyne, Beaver & Barnes, 2014). Wallace and colleagues (2008) found that black students are at least three times more likely to be

suspended or expelled than their white peers. These discipline patterns across gender and race/ethnicity are consistent with recent reports (Skiba et al., 2014; Stevens et al., 2015).

In addition to gender and racial/ethnic differences, low family socioeconomic status (Brantlinger, 1991; Nichols, 2004; Petras et al., 2011; Skiba et al., 1997), lower educational achievement (Arcia, 2006; Hemphill et al, 2014; Stevens et al, 2015), enrollment in special education (Losen et al., 2015; Morrison & D'Incau, 1997; Skiba et al., 1997), and ELL status (Losen et al., 2015) are positively associated with receiving suspensions. For example, students who are eligible for free and reduced-price lunch (FRL) receive suspensions more frequently than their more affluent counterparts (Costenbader & Markson, 1998), and students with learning disabilities or behavioral disorders have a higher risk of being suspended or expelled than other students (Losen et al., 2015; Morrison & D'Incau, 1997). Stevens and colleagues (2015) used data from Chicago public schools and found that 27% of students in the lowest quartile of achievement received out-of-school suspensions, whereas only 7% of students whose prior achievement was in the highest quartile were suspended during the same period.

While disparities in exclusionary school disciplinary responses across subgroups have received attention from many researchers, we have limited evidence about whether disparities exist in exposure to high levels of classmate suspension. Because peers play a critical role in student development, examining whether a certain group of students has an elevated risk for peer suspension exposure provides profound implications. No known studies have focused on the characteristics that are associated with exposure to classmate suspension, but research suggests that between-school segregation and within-school tracking (i.e., sorting students into distinct courses) serve as the underlying mechanisms that explain to what extent vulnerable populations are likely to face the highest exposure. Therefore, I next discuss the segregation and tracking

literature that describes unequal environments across different racial and socioeconomic backgrounds.

Unequal Learning Environments

Because students from similar socioeconomic and racial backgrounds tend to live close to each other (Domina, 2006; Massey, Rothwell, & Domina, 2009) and also attend the same school (Frankenberg, 2013; Frankenberg, Siegel-Hawley, Wang, & Orfield, 2012; Reardon, Yun, & Eitle, 2000), scholars have raised concerns regarding unequal educational opportunities and resources across schools (Clotfelter et al., 2007; Phillips & Chin, 2004; Rumberger & Palardy, 2005). For example, high poverty schools tend to have less qualified teachers and principals than low poverty schools (Clotfelter et al., 2007). In addition, students in schools with a high proportion of minorities and students from low SES families tend to have lower instructional expenditure and higher crime risk exposure (Roscigno, 2000).

Educational experiences can also vary between classrooms within a school (Carbonaro & Gamoran, 2002; Gamoran & Nystrand, 1994; Van Houtte, 2004). Given that schools sort students into differentiated courses, learning environments that students experience in lower track courses tend to be different from those that students experience in higher track courses. Students in a lower track class are exposed to less beneficial classroom environments, including lower teacher expectations, less instruction time, and less rigorous academic content (Carbonaro & Gamoran, 2002; Gamoran & Nystrand, 1994; Oakes, 1985). Because students from poor and racial/ethnic minority family backgrounds and students with less educated parents tend to be assigned to lower track classes (Oakes, 1985; Useem, 1992), grouping students into different courses can lead to unequal learning opportunities. Further, students who are low achievers,

racial minorities, and/or from low-income families tend to have novice teachers (Kalogrides & Loeb, 2013).

In sum, existing research suggests that the learning environments vary across schools and classrooms, and students from vulnerable populations tend to be exposed to less advantageous educational environments. However, little is known about whether and to what extent a certain group of students is more likely to experience environments with higher exposure to classmate suspension. Therefore, this study advances our understanding of different learning environments across subgroups in critical ways. First, given that racial and socioeconomic background characteristics as well as academic performance play a role in sorting students within schools (Attewell & Domina, 2008; Conger, Long, & Iatarola, 2009; Gamoran & Mare, 1989; Hallinan, 1992; Mickelson, 2001; Mickelson & Everett, 2008; Jones, Vanfossen, & Ensminger, 1995), describing whether and to what extent track assignment is linked to exposure to classmate suspension deepens our understanding of the consequences of grouping students into distinct courses. Because the classroom environment is an important factor in explaining different learning experiences, it is critical to examine whether a certain group of students faces suboptimal learning environments that may hamper the educational process. Second, given that classmate suspension rates can indicate important classroom characteristics, including peer misbehavior, the quality of student-teacher interactions, and teachers' classroom management skills, this study contributes to the literature by documenting the links between student characteristics and different exposure to classmate suspension. Finally, by using data from two districts (i.e., a low suspension rate district vs. a high suspension rate district), I examine to what extent tracking assignment contributes to peer suspension exposure across two districts.

Hypotheses of Study 1

In Study 1, I test the following hypotheses based on prior research.

(a) Disadvantaged factors that are associated with high risk of receiving suspensions, including lower academic track assignment, racial/ethnic minority family backgrounds, low-income family backgrounds, enrollment in special education, lower prior achievement level, and English Language Learner (ELL) status are also associated with exposure to classmate suspension.

(b) Schools assign students into vertically differentiated courses, and the track assignment is associated with classmate characteristics, including classmate achievement and classmate behavior. I hypothesize that track assignment is the strongest predictor of high exposure to classmate suspension even after controlling for student demographic characteristics, prior educational achievement, and prior suspension history.

(c) Track assignment is a critical factor that determines levels of peer suspension exposure in both low and high suspension rate districts.

Methods

Data

In Study 1, I use administrative data from two large public school districts in California. The two districts are Applemill Unified School District (AUSD) and Greenwater Unified School District (GUSD), which are pseudonyms. These data have student demographic information such as gender, race/ethnicity, ELL status, FRL eligibility, annual California Standard Test (CST)

mathematics and English Language Arts (ELA) scores, math and ELA classroom identifiers, and discipline records, including in-school suspensions and out-of-school suspensions. Table 1.1 provides a descriptive profile of the two districts based on these administrative data.

[Insert Table 1.1 here]

The sample includes longitudinal data on 11,995 8th graders from three cohorts at eight different middle schools in Applemill district from the 2010-2011 through 2012-2013 academic years as well as data from their seventh grade year (i.e., 2009-2010 through 2011-2012). The sample also includes data on 9,313 8th graders from three cohorts at ten different middle schools in Greenwater district from the same years. Approximately half of students in these school districts are female. Although race/ethnicity composition between the two districts is different (i.e., Applemill district has a higher percentage of Hispanic students than Greenwater district), the demographic characteristics of the two districts are otherwise mostly similar. Approximately two thirds of students are eligible for FRL in both districts, and 18% of Applemill students and 25% of Greenwater students are ELL. Although the sample of the study is not nationally representative of all public school students in the U.S., it is similar to California student population characteristics overall.

Demographic characteristics of the two districts are similar, but the suspension rates between them are very different. As Table 1.1 shows, approximately 17% of students in Applemill district received in-school suspensions, whereas 2% of students in Greenwater district received in-school suspensions. Approximately 10% of students in Applemill district received an out-of-school suspension, whereas 5% of students in Greenwater district received an out-of-school suspension. Because the suspension rate is higher in Applemill district than Greenwater district, more students in Applemill district are exposed to classmate suspension. For example,

the in-school suspension rate for math classmates is 16% on average, but the figure is only 2% in Greenwater. Similarly, the out-of-school suspension rate for math classamate is 9% in Applemill, but it is only 5% in Greenwater.

Given that the two districts have similar demographic characteristics, differences in in-school suspension rates between districts are striking. Although it is challenging to pinpoint the underlying reasons for different suspension rates across the two districts, informal conversations with administrative staff and teachers reveal differences in disciplinary practices between the two districts. Many schools in Applemill district had designated in-school suspension areas, whereas schools in Greenwater did not. Having a designated space in school may lead to high in-school suspension rates. Furthermore, conversations with staff in Greenwater suggest that schools in Greenwater have provided several behavioral interventions for students before suspensions, whereas staff in Applemill have avoided any conversations on disciplinary actions.

To measure to what degree differences between schools account for exposure to classmate suspension, I conducted supplementary analyses. The results suggest that differences between schools account for approximately 24% of the observed variation in in-school suspension rates, whereas these differences account for approximately 9% of the observed variation in out-of-school suspension in math classrooms in Applemill. In Greenwater, schools account for approximately 17% of the observed variation in in-school suspension rates, whereas these differences account for approximately 19% of the observed variation in out-of-school suspension rates. The results are similar in ELA classrooms. These findings suggest that most variation exists between classrooms within a school by showing between 76% and 91% of observed variation in peer suspension rate comes from within-school variations. In addition, there is more variation across schools in in-school peer suspension rates than in out-of-school

peer suspension rates in Applemill. In Greenwater, the observed variation in in-school and out-of-school peer suspension rates between schools is similar.

Measure

Dependent variables:

Percent of classmate suspension. Exposure to classmate suspensions represents a student being exposed to a math or ELA classmate suspension in 8th grade. This is a continuous variable that indicates the percentage of the classmates who were suspended. I created a variable that indicates exposure to classmate suspension in math and in ELA classrooms. For students who received suspensions, I measured exposure to classmate suspension excluding the suspended students themselves. For example, when a student received one suspension in a class of 20, the percent of classmate suspension for the suspended student is zero, and the percent of classmate suspension for the other 19 students is approximately 11% [i.e., (1/19)*100≈11]. I created variables for percent of classmate in-school suspension and percent of classmate out-of-school suspension.

Independent variables:

Track assignment. I created a categorical variable for track assignment to examine the links between track assignment and exposure to classmate suspension. Although the number of available math and ELA courses differs across schools, all schools sort students into vertically differentiated math courses (e.g., Pre-Algebra, Algebra, and Geometry) and ELA courses (e.g., Literacy Support, English, and Intensive Literacy). Based on conversation with district officials and catalogue on course assignment, I categorized the courses into three groups: a low-track class, a mid-track class, and a high-track class.

Student Demographic Characteristics. I used student demographic characteristics including gender, race/ethnicity, FRL eligibility, enrollment in special education, and ELL status.

Prior Educational Performance. Grade Point Average (GPA) in 7th grade is a continuous variable that ranges from 0 to 4. I also used a continuous variable of educational achievement that indicates a student's 7th grade CST scores in mathematics and ELA.

Suspension History. I created a continuous variable that indicates the sum of receiving in-school and out-of-school suspension in 7th grade.

Analyses

I ran Ordinary Least Squares (OLS) regression models to examine factors that are associated with being exposed to a classroom environment with suspended students. First, I ran bivariate regression to examine the relation between student characteristics and exposure to classmate suspension. Second, I ran regression with other controls. The model is expressed as:

$$Y_{icd} = \gamma_0 + \theta \mathrm{I}_{icd} + \delta_c + \omega_d + \varepsilon_{icd}$$

Y_{icd} denotes the percent of classmates who receive suspensions for student *i* in cohort *c* and in school *d.* I_{icd} indicates a student characteristic including gender, race/ethnicity, FRL eligibility, special education status, and prior educational performance (i.e., GPA in 7th grade and math or ELA CST scores in 7th grade), prior suspension history (i.e., the number of being suspended in 7th grade), and track assignment (i.e., low-, mid-, and high-track class) in 8th grade. δ_c indicates cohort fixed effects, ω_d indicates school fixed effects, and ε_{icd} is the error term. θ captures the associations between student characteristics and exposure to classmate suspension in math or

ELA classrooms. To take into account the fact that classrooms are nested in a school, I clustered standard error at the school level. I ran these models for each district separately.

Results

I first explored the bivariate associations between student characteristics and exposure to classmate suspension, and I next examined the extent to which the associations remain consistent when taking into account other controls. Columns 1 through 4 of Table 1.2 show the results from Applemill district and columns 5 through 8 show the results from Greenwater district. The first column shows the predicted estimates from bivariate regression models. For example, 10.1 on the low track suggests that low track assignment is associated with about 10.1% higher exposure to classmate in-school suspension in math classrooms than mid track assignment, without controlling for any other variables. Similarly, -13.2 on high track shows that high track assignment is associated with 13.2% lower exposure to in-school suspension of math classmates than mid track assignment.

All variables in the bivariate models are significantly associated with exposure to classmate suspension in bivariate regression. Black, Hispanic, and other racial and ethnic minority students are more likely to have a higher proportion of classmates who received suspension, whereas Asian students are less likely to have a higher proportion of suspended classmates than their white counterparts. Female students are marginally less likely to be exposed to a higher level of classmate suspension in math classrooms. In addition, students who are eligible for FRL, students in special education programs, and ELLs are more likely to be in math classes with classmates who receive in-school suspensions. Students with lower CST scores and lower GPAs are more likely to be exposed to classmate suspension in math classes. The results from bivariate regression analyses show that a 1 SD increase in CST score is

associated with approximately 9.1% lower suspension exposure. A 1 SD higher GPA is associated with 6.8% lower classmate suspension exposure. Finally, receiving suspension in 7th grade is associated with higher exposure to classmate suspension.

Multivariate analyses show the relations between student characteristics and exposure to classmate suspension with covariates, including demographic characteristics and prior achievement and suspension history. Although the magnitude of the coefficient of track assignment has decreased with controls, track assignment remains to be a strongest predictor that explains varying level of classmate suspension exposure. A low- and high-track assignment is associated with 7.0% and -7.6% exposure to classmates who receive in-school suspension, respectively, compared with a mid-track class assignment.

Analyses that include other controls lead to changes in coefficient direction for Asian variables. Being Asian is associated with about a 2.1% increase in exposure to classmate suspension after controlling for track assignment, prior educational performance, suspension history, and other demographic characteristics. These coefficient direction changes suggest that Asian students are overrepresented in the higher track and the top part of distribution. Being black, Hispanic, or FRL status, enrollment in special education, and prior suspension history is no longer linked to exposure to classmate suspension with controls. Although ELL status, having prior lower CST or GPA scores, or having prior suspensions is still significantly associated with higher exposure to classmate suspension, the magnitude of the coefficient has become smaller.

Columns 3 and 4 in Table 1.2 show the factors that are linked to exposure to out-of-

school suspension of math classmates in Applemill.[1] These results also confirm that the associations between track assignment and exposure to classmate out-of-school suspension are strongest even after controlling for other variables. Assignment to a low-track class is associated with 9.5% higher exposure to classmate out-of-school suspension, whereas assignment to a high-track class is associated with 7.7% lower exposure to classmate out-of-school suspension, compared with a mid-track class assignment. Although the magnitude of the coefficient became smaller, ELL status and lower prior educational performance are associated with higher exposure to classmate suspension with controls.

Next, I ran analyses with data from Greenwater district to examine whether and to what extent the factors that are linked to classmate suspension exposure in high suspension rate contexts are different from those in low suspension rate contexts. Columns 5 through 8 show the relations between student characteristics and exposure to classmate suspension. Although the magnitude of coefficients is smaller in Greenwater district than in Applemill district, the results suggest that track assignment is a main factor that contributes to varying levels of exposure to classmate suspension in Greenwater as well. In Greenwater, the links between track assignment and exposure suspension of math classmates are almost identical, with or without controlling for demographic characteristics, prior achievement, and prior suspension history. The results from multivariate analyses suggest that demographic characteristics, prior achievement, and suspension history are little associated with exposure to classmate suspension after controlling for track assignment.

Table 1.3 displays the associations between student characteristics and percent of

[1] The correlation between exposure to in-school suspension of math classmates and out-of-school suspension of math classmates is 0.59.

classmate suspension in ELA classrooms. Overall, the results suggest that the links between student characteristics and exposure to classmate suspension in ELA classrooms show similar findings to those from math classrooms. In Applemill district, multivariate analysis show that being assigned to a low-track ELA class is associated with 6.6% higher exposure to classmate in-school suspension and being assigned to a high-track class is associated with 12.3% lower exposure to classmate in-school suspension, compared with being assigned to a mid-track class. Hispanic students tend to be more exposed to higher levels of classmate in-school suspension than white students. Although the size of coefficient becomes smaller in multivariate analysis, these results are consistent with and without control variables. Bivariate analysis suggests that Asian students are less likely to be exposed to classmate in-school suspension than their white counterparts, but multivariate analysis suggests that Asian students are more likely to be exposed to classmate in-school suspension than white students. These findings suggest that because Asian students tend to exhibit higher educational performance and they are overrepresented in high-track classes, the direction of coefficient has changed when taking prior achievement and track assignment into account.

Similar to findings from bivariate analyses of exposure to suspension of math classmates, students who are eligible for FRL tend to be overexposed to a classroom with suspended students (both in- and out-of-school suspensions) in ELA classrooms as well. Enrollment in special education, ELL status, a lower level of prior educational performance (i.e., GPA and ELA achievement in 7^{th} grade), and suspension history are also associated with a higher level of exposure to suspended classmates in 8^{th} grade. However, because track assignment is a main contributor to varying levels of classmate suspension in ELA classrooms, after controlling for track assignment, the magnitude of demographic characteristics, enrollment in special education,

and prior GPA, achievement, and suspension became smaller or the associations are no longer significant.

Columns 5 through 8 in Table 1.3 confirmed the similar findings from results in Table 1.2 for Greenwater district. Bivariate analyses show that demographic characteristics and prior educational performance, as well as prior suspension history are linked to suspension of ELA classmates. However, after controlling for track assignment, the significant links between other student characteristics (i.e., demographic characteristics, prior educational performance, and prior suspension history) and exposure to classmate suspension become either weaker or disappear. Similar to the findings from exposure to math classmate suspension analyses, being in a lower track is associated with high levels of exposure to classmate suspension even after controlling for demographic characteristics and prior educational performance.

Figures 1.1 and 1.2 show the relations between track assignment and percent of math and ELA classmate suspension. These graphs indicate that classmate suspension exposure is less likely to happen in high-track classes. In addition, they suggest that the majority of students did not have any classmates who received suspension. Therefore, I also conducted logistic regression analyses with a dichotomous dependent variable (i.e., had at least one classmate who received suspension vs. never had a classmate who received suspension). The results are mostly similar, suggesting that track assignment is associated with varying levels of classmate suspension exposure, even after controlling for demographic characteristics, achievement levels, and prior suspension history (see Appendix Table 1.1).

I also ran analyses to describe the links between student characteristics and frequency of suspension events in the classroom. I measured exposure to peer suspension as number of

classmate suspension events instead of percent of classmate who received suspensions. For example, when one student receive suspension five times in a class of 20, I calculated 26.3 {i.e., [5/(20-1)]*100 ≈26.3} as exposure to classmate suspension for non-suspended students. The results show the consistent findings that track assignment explains most of varying levels of classmate suspension. (see Appendix Table 1.2).

Discussion

In Study 1, I provide descriptive analyses of the links between student characteristics and higher exposure to classmate suspension. The results show that lower track assignment, eligibility for FRL, enrollment in special education, ELL status, and being Hispanic or black (compared with being white) are associated with higher exposure to classmate suspension. The results also show that track assignment remains a significant predictor of varying levels of exposure to classmate suspension after other indicators of risk factors are controlled. In addition to this overall trend, I also find that the links between track assignment and exposure to classmate suspensions are stronger in the district with a higher suspension rate than the district with a lower suspension rate, but track assignment is the strongest predictor of having more suspended classmates in both districts.

The results of the study show that students with at-risk factors (e.g., eligibility for FRL, enrollment in special education, racial/ethnic minority backgrounds) experience more frequent exposure to classmate suspension. Given that the classroom environment plays a critical role in student learning, disparities in exposure to classrooms with high suspension rates across subgroups may indicate different educational experiences across students, which can contribute to inequality in educational opportunity. The results echo the findings of prior studies showing that the educational experiences of students from disadvantaged backgrounds are different from

those from advantaged backgrounds across schools (Clotfelter et al., 2007; Rumberger & Palardy, 2005) and classrooms (Kalogrides & Loeb, 2013).

A higher classmate suspension rate can be a marker that reflects various aspects of learning environments. First, a higher classmate suspension rate indicates frequent classroom disruption. Suspending students from the classroom leads to classroom composition changes that can interrupt learning because teachers and students may need to adjust to these changes. Second, the process of suspension is likely to decrease instruction time. For example, correcting student misbehavior, asking a student to leave the classroom, and waiting for a student to leave all shorten the learning time for other students. Third, a higher classmate suspension rate can indicate that overly controlling disciplinary practices dominate classroom environments, which can result in weak student-teacher relationships and school bonding even for non-suspended students (Perry & Morris, 2014). Weak attachment to teachers and schools may lead to school disengagement, which ultimately may result in negative youth outcomes (Archambault, Janosz, Fallu, & Pagani, 2009; Dornbusch, Erickson, Laird, & Wong, 2001). Finally, being in classrooms with higher suspension rates indicates increased chances of interactions with peers with behavioral challenges. Considering that peer behavior influences educational and behavioral outcomes (Aizer, 2008; Carrell & Hoekstra, 2010; Figlio, 2007), exposure to a classroom with frequent suspension can be a risk factor that impairs positive development.

The results underscore the fact that lower track assignment is associated with exposure to a classroom with high suspension rates. Tracking literature notes that being assigned to a higher track is linked to advantageous classroom qualities, including more academically rigorous content, higher teacher expectations, high achieving peers, and more inquiry-based instruction (Carbonaro & Gamoran, 2002; Gamoran & Nystrand, 1994; Oakes, 1985). My findings add to

the literature by showing that being assigned to a lower track is linked with high-suspension classroom environments that may eventually hinder student learning and development.

One important caveat that needs to be addressed is that no exposure to classmate suspension does not always equate to positive learning environments. If the levels of classroom disruption are high, removing disruptive students can, in fact, help other students to learn more by reducing the amount of exposure to classmates with challenging behavior (Aizer, 2008; Carrell & Hoekstra, 2010; Figlio, 2007). Therefore, although orderly learning environments without suspending students are ideal, zero classmate suspension does not necessarily equal optimal learning environments. Especially, under a recent discipline reform that pushes for lower suspension rates, the suspension rates can be a poor indicator of learning environments. However, in most cases, no exposure to classmate suspension is more likely to indicate undisruptive learning environments.

In Study 1, I describe the associations between student characteristics and higher levels of exposure to classmate suspension, and the findings point to several avenues of future research. First, because the results of Study 1 rely on data from two districts where the majority of students are Hispanic or Asian, they provide little information about comparisons between black and white students' exposure to classmate suspension. Given that much research has focused on the disparities in suspension between black and white students, future research that uses other data sources with a larger percentage of black students will be informative. Second, documenting factors that are linked to classmate suspension for a longer period of time helps us to further understand the unequal educational experiences that may play a role in achievement gaps. Given that once students are assigned to a lower track they are less likely to move upward into a higher track (Kerckhoff & Glennie, 1999), it is important to explore whether a certain group of students

is consistently exposed to an elevated risk of classmate suspension, and to what extent exposure to such an environment hinders student outcomes. Third, high levels of classmate suspension can be an indicator of peer misbehavior, punitive learning environments, or lack of teacher classroom management skills, but this study did not examine which factor or factors are the main contributors in accounting for high suspension rates at the classroom level. Future studies that investigate the role of these factors in contributing to high classmate suspension rates would help us further understand the disciplinary actions and learning environments.

One source of gaps in student outcomes across racial and socioeconomic backgrounds is exposure to different environments. Numerous studies show that children from low-income and racial minority families face suboptimal environments at home (Cox et al., 2003; Fantuzzo & Mohr, 1999) and at school (Clotfelter et al., 2007; Rumberger & Palardy, 2005). The findings of Study 1 show that tracking practices play a key role in exposure to classmate suspension environments and opportunities. Furthermore, the results suggest that peer disciplinary climate is therefore an underappreciated mechanism that accounts for the ways in which tracking may contribute to differential and socially unequal outcomes.

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Table 1.1

Descriptive Statistics of Student Characteristics, Suspension, and Percent of Classmate Suspension across Two Districts

	Applemill District (N=11995)				Greenwater District (N=9313)				CA
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max	Mean
Female	0.50		0.00	1.00	0.50		0.00	1.00	0.49
Asian	0.15		0.00	1.00	0.34		0.00	1.00	0.11
Black	0.03		0.00	1.00	0.01		0.00	1.00	0.07
Hispanic	0.68		0.00	1.00	0.53		0.00	1.00	0.51
White	0.13		0.00	1.00	0.11		0.00	1.00	0.27
Other	0.01		0.00	1.00	0.01		0.00	1.00	0.04
FRL (8^{th})	0.73		0.00	1.00	0.72		0.00	1.00	0.54
Special Education (8^{th})	0.07		0.00	1.00	0.03		0.00	1.00	0.11
EL (8^{th})	0.20		0.00	1.00	0.27		0.00	1.00	0.26
Receiving at least one ISS (8^{th})	0.17		0.00	1.00	0.02		0.00	1.00	
Receiving at least one OSS (8^{th})	0.10		0.00	1.00	0.05		0.00	1.00	
Number of receiving ISS (8^{th})	0.46	1.45	0.00	22.00	0.03	0.21	0.00	5.00	
Number of receiving OSS (8^{th})	0.39	1.37	0.00	21.00	0.06	0.37	0.00	9.00	
Total Number of receiving SUS (7^{th})	0.68	2.16	0.00	43.00	0.09	0.43	0.00	8.00	
CST Math (7^{th})	347.94	65.59	188	600	379.90	69.02	187	600	
CST ELA (7^{th})	348.33	55.35	188	574	368.63	58.65	194	600	
GPA (7^{th})	2.72	0.88	0.00	4.00	2.93	0.76	0.11	4.00	
% Math classmate ISS (8^{th})	16.46	15.54	0.00	75.00	1.93	3.65	0.00	44.44	
% Math classmate OSS (8^{th})	9.32	9.80	0.00	100.00	4.68	6.26	0.00	57.14	
% ELA classmate ISS (8^{th})	15.09	14.46	0.00	80.00	2.34	4.35	0.00	38.89	
% ELA classmate OSS (8^{th})	9.33	10.87	0.00	100.00	5.40	6.83	0.00	47.37	
Math low-track class (8^{th})	0.14		0.00	1.00	0.14		0.00	1.00	
ELA low-track class (8^{th})	0.15		0.00	1.00	0.04		0.00	1.00	
Math mid-track class (8^{th})	0.66		0.00	1.00	0.72		0.00	1.00	
ELA mid-track class (8^{th})	0.64		0.00	1.00	0.52		0.00	1.00	
Math high-track class (8^{th})	0.21		0.00	1.00	0.14		0.00	1.00	
ELA high-track class (8^{th})	0.21		0.00	1.00	0.44		0.00	1.00	

Note. The table is based on the individual student of the sample. California (CA) mean for gender and race is based on 8^{th} graders. For FRL, EL, and special education status, the means are based on all K-12 population in California. FRL indicates free or reduced-price lunch eligibility, EL indicates English Language Learners, and CST indicates California Standard Tests. ISS indicates in-school suspension and OSS indicates out-of-school suspension. Total Number of receiving SUS (7^{th}) indicates the sum of receiving in-school suspension and out-of-school suspension.

Table 1.2

Ordinary Least Squares Regression Models Predicting Exposure to Peer Suspension in Math Classroom in 8th grade

	Applemill District				Greenwater District			
	Classmate ISS exposure		Classmate OSS exposure		Classmate ISS exposure		Classmate OSS exposure	
	Bivariate	Multivariate	Bivariate	Multivariate	Bivariate	Multivariate	Bivariate	Multivariate
Track assignment (Reference group: Mid track)								
Low track (Math)	10.096***	6.983*	9.499***	7.136***	1.517***	1.559*	3.197***	4.099**
	(3.034)	(2.037)	(1.334)	(1.004)	(0.510)	(0.636)	(1.349)	(1.179)
High track (Math)	-13.231***	-7.578**	-7.709***	-3.729***	-1.900***	-1.828*	-3.541***	-2.920**
	(2.185)	(1.622)	(0.899)	(0.685)	(0.542)	(0.623)	(0.822)	(0.697)
Race/Ethnicity (Reference group: white)								
Asian	-3.640***	2.053*	-3.601***	0.253	-0.294	-0.021	-0.444	0.266
	(0.537)	(0.611)	(0.464)	(0.401)	(0.197)	(0.085)	(0.341)	(0.179)
Black	5.549***	1.646	2.496***	0.176	0.403	0.205	0.971	-0.291
	(0.867)	(1.016)	(0.597)	(0.354)	(0.396)	(0.305)	(0.707)	(0.813)
Hispanic	9.665***	1.001	2.977***	-0.339	0.765**	0.233	2.388***	0.302
	(0.769)	(0.659)	(0.552)	(0.204)	(0.234)	(0.148)	(0.415)	(0.164)
Other	3.995**	-0.358	1.252	-0.429	1.125*	0.671	1.117	-0.156
	(1.350)	(0.724)	(0.937)	(0.540)	(0.470)	(0.382)	(0.572)	(0.424)
Female	-0.798**	0.281	-0.508*	0.388**	-0.015	0.068	-0.202	-0.004
	(0.307)	(0.252)	(0.207)	(0.098)	(0.057)	(0.053)	(0.118)	(0.094)
FRL (grade 8)	9.908***	-0.412	4.174***	0.096	0.612***	-0.170*	1.399***	-0.390*
	(0.749)	(0.211)	(0.473)	(0.285)	(0.151)	(0.061)	(0.274)	(0.148)
Special education (grade 8)	7.141***	0.966	6.577***	1.573	1.126*	0.530	2.226*	0.907
	(1.509)	(1.646)	(0.925)	(0.801)	(0.564)	(0.505)	(0.927)	(0.837)
ELL (grade 8)	13.432***	2.731*	6.964***	0.729	1.281***	0.331	2.834***	0.132
	(0.882)	(0.950)	(0.569)	(0.454)	(0.217)	(0.244)	(0.382)	(0.307)
CST (grade 7)	-9.098***	-2.310**	-5.476***	-1.749**	-0.666***	0.136	-1.814***	0.063
	(0.447)	(0.646)	(0.287)	(0.369)	(0.104)	(0.142)	(0.210)	(0.169)
GPA (grade 7)	-6.821***	-1.637*	-4.255***	-1.415***	-0.861***	-0.073	-1.799***	-0.215
	(0.428)	(0.507)	(0.266)	(0.222)	(0.121)	(0.108)	(0.225)	(0.166)
Number of ISS or OSS (grade 7)	1.629***	0.245	0.866***	0.007	0.656***	-0.050	0.985***	-0.110
	(0.142)	(0.152)	(0.127)	(0.097)	(0.129)	(0.086)	(0.235)	(0.126)
Constant		7.196*		6.040***		3.746***		6.022***
		(2.106)		(0.514)		(0.586)		(1.075)
With controls?	No	Yes	No	Yes	No	Yes	No	Yes
N	11995	11995	11995	11995	9313	9313	9313	9313

Note. Exposure to peer suspension indicates percent of classmates who received suspensions. Bivariate columns show the associations between student characteristics and exposure to classmates' suspension without any controls. FRL indicates free or reduced-price lunch eligibility, ELL indicates English Language Learners, and CST indicates California Standard Tests. ISS indicates in-school suspension and OSS indicates out-of-school suspension. Multivariate models also include cohort and school fixed effects.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 1.3

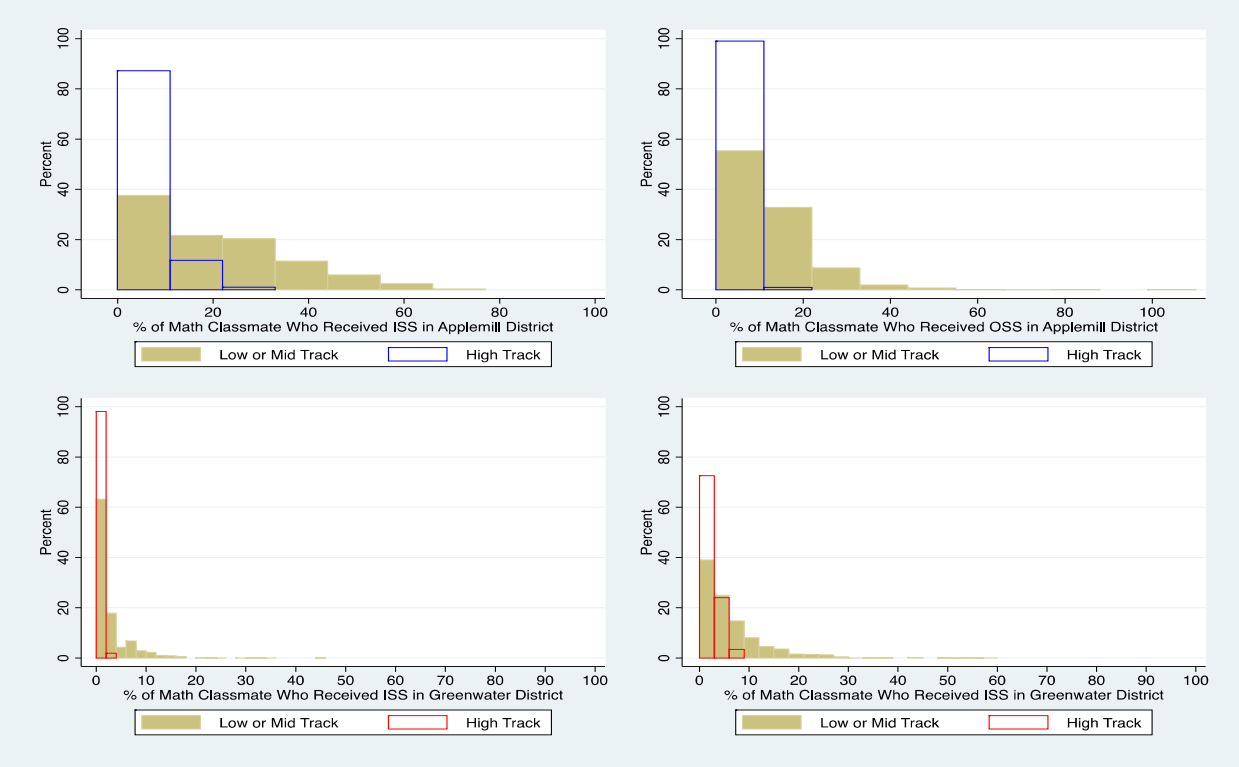
Ordinary Least Squares Regression Models Predicting Exposure to Peer Suspension in ELA Classroom in 8th grade

	Applemill District				Greenwater District			
	Classmate ISS exposure		Classmate OSS exposure		Classmate ISS exposure		Classmate OSS exposure	
	Bivariate	Multivariate	Bivariate	Multivariate	Bivariate	Multivariate	Bivariate	Multivariate
Track assignment (Reference group: Mid track)								
Low track (ELA)	11.330***	6.644***	7.985***	5.496***	0.121*	-0.364	2.743***	2.146*
	(2.320)	(3.371)	(1.623)	(1.555)	(1.242)	(1.139)	(2.399)	(2.827)
High track (ELA)	-12.474***	-12.302***	-4.760***	-6.808***	-2.802***	-3.018**	-5.569***	-5.072***
	(2.192)	(1.562)	(0.397)	(0.657)	(0.887)	(0.894)	(0.900)	(0.992)
Race/Ethnicity (Reference group: white)								
Asian	-2.345***	1.351	-2.605***	-0.326	-0.113	0.160	-0.120	0.102
	(0.512)	(0.580)	(0.376)	(0.492)	(0.285)	(0.198)	(0.496)	(0.251)
Black	4.392***	1.814*	1.294**	0.015	-0.225	-0.218	0.658	-0.453
	(0.856)	(0.640)	(0.478)	(0.217)	(0.470)	(0.514)	(0.701)	(0.476)
Hispanic	8.366***	0.947	2.780***	-0.571	1.062**	0.288	2.825***	0.091
	(0.709)	(0.772)	(0.484)	(0.359)	(0.320)	(0.187)	(0.558)	(0.192)
Other	5.179***	1.243	0.478	-0.937	0.875	0.174	2.138*	0.368
	(1.156)	(0.941)	(0.876)	(0.465)	(0.508)	(0.263)	(0.863)	(0.762)
Female	-1.384***	-0.064	-1.084***	0.138	-0.225**	0.149*	-0.681***	0.052
	(0.311)	(0.203)	(0.230)	(0.118)	(0.071)	(0.062)	(0.146)	(0.131)
FRL (grade 8)	8.455***	-0.519	3.876***	0.239	0.753***	-0.310**	1.894***	-0.268
	(0.675)	(0.309)	(0.443)	(0.182)	(0.214)	(0.093)	(0.345)	(0.165)
Special education (grade 8)	4.596**	1.186	6.210***	0.658*	0.943*	-0.139	1.837*	-0.285
	(1.622)	(1.151)	(1.086)	(0.273)	(0.418)	(0.370)	(0.742)	(0.660)
ELL (grade 8)	10.825***	2.047*	6.519***	0.506	2.232***	0.455	4.482***	0.485
	(0.964)	(0.809)	(0.654)	(0.672)	(0.377)	(0.281)	(0.525)	(0.275)
CST (grade 7)	-7.550***	-0.508	-4.316***	-0.310	-1.186***	0.067	-2.495***	0.152
	(0.387)	(0.412)	(0.279)	(0.195)	(0.162)	(0.088)	(0.239)	(0.152)
GPA (grade 7)	-4.770***	-0.266	-3.054***	-0.445	-1.304***	-0.042	-2.455***	-0.361
	(0.360)	(0.469)	(0.267)	(0.206)	(0.182)	(0.149)	(0.213)	(0.237)
Number of ISS or OSS (grade 7)	1.273***	0.252	0.675***	0.067	1.170***	0.254	1.423***	0.016
	(0.133)	(0.138)	(0.130)	(0.088)	(0.250)	(0.211)	(0.252)	(0.151)
Constant		4.380		4.011***		4.723***		7.242***
		(2.220)		(0.595)		(0.549)		(0.905)
With controls?	No	Yes	No	Yes	No	Yes	No	Yes
N	11995	11995	11995	11995	9313	9313	9313	9313

Note. Exposure to peer suspension indicates percent of classmates who received suspensions. Bivariate columns show the associations between student characteristics and exposure to classmates' suspension without any controls. FRL indicates free or reduced-price lunch eligibility, ELL indicates English Language Learners, and CST indicates California Standard Tests. ISS indicates in-school suspension and OSS indicates out-of-school suspension. Multivariate models also include cohort and school fixed effects. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 1.1

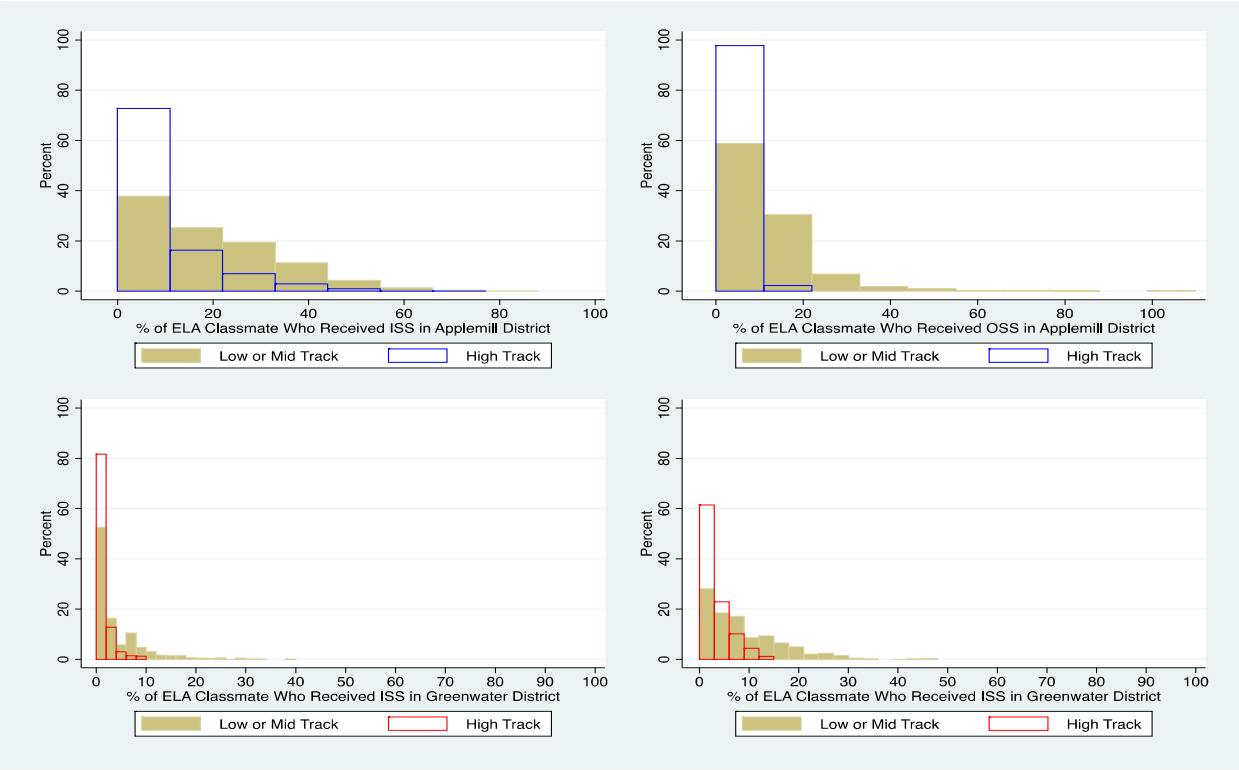
Exposure to Peer Suspension in Math Classroom by Track Assignment (i.e. Low or Mid track vs. high track) in Two School District



Note. The graphs are based on the exposure to classmate suspension in 8th grade in two districts.

Figure 1.2

Exposure to Peer Suspension in ELA Classroom by Track Assignment (i.e. Low or Mid track vs. high track) in Two School District



Note. The graphs are based on the exposure to classmate suspension in 8th grade in two districts

Appendix Table 1.1

Logistic Regression Models Predicting Exposure to at Least One Classmate Suspension in 8th grade (Odd ratios)

	Exposure to Math Classmate Suspension				Exposure to ELA Classmate Suspension			
	Applemill District		Greenwater District		Applemill District		Greenwater District	
	ISS	OSS	ISS	OSS	ISS	OSS	ISS	OSS
Track assignment (Reference group: Mid track)								
Low track	2.957***	62.347***	1.733	2.018***	0.473***	0.742	0.205***	0.250***
	(2.728)	(30.755)	(0.525)	(0.297)	(0.106)	(0.456)	(0.097)	(0.085)
High track	0.088***	0.171***	0.027***	0.239**	0.075***	0.090***	0.156***	0.222***
	(0.027)	(0.050)	(0.016)	(0.127)	(0.032)	(0.038)	(0.039)	(0.078)
Race/Ethnicity (Reference group: white)								
Asian	1.243**	0.944	0.941	1.053	0.928*	0.698***	1.004	1.097
	(0.101)	(0.105)	(0.103)	(0.102)	(0.035)	(0.060)	(0.111)	(0.187)
Black	1.952	0.985	1.292	1.177	1.081	0.894	0.672	0.928
	(0.703)	(0.099)	(0.338)	(0.475)	(0.152)	(0.055)	(0.327)	(0.226)
Hispanic	1.075	0.888	0.955	1.128	1.014	0.759***	1.041	1.128
	(0.167)	(0.103)	(0.102)	(0.103)	(0.052)	(0.030)	(0.117)	(0.171)
Other	0.861	0.942	1.188	1.000	0.912	0.565**	0.815	0.910
	(0.241)	(0.185)	(0.312)	(0.264)	(0.141)	(0.107)	(0.178)	(0.175)
Female	1.148*	1.127	1.027	1.033	1.017	0.985	1.097*	1.081
	(0.062)	(0.098)	(0.044)	(0.043)	(0.060)	(0.045)	(0.050)	(0.045)
FRL (grade 8)	0.974	1.005	0.916	0.935	1.027	1.042	0.839**	0.872**
	(0.082)	(0.051)	(0.066)	(0.049)	(0.064)	(0.057)	(0.046)	(0.043)
Special education (grade 8)	1.013	0.858	0.774	0.846	1.347	1.373	0.903	0.998
	(0.188)	(0.084)	(0.194)	(0.179)	(0.230)	(0.682)	(0.247)	(0.171)
ELL (grade 8)	1.157	1.510***	1.075	0.979	0.977	1.005	1.105	0.946
	(0.164)	(0.169)	(0.095)	(0.115)	(0.146)	(0.159)	(0.141)	(0.118)
CST (grade 7)	0.894*	0.724***	1.020	0.984	0.945	1.086	0.983	1.002
	(0.044)	(0.066)	(0.090)	(0.087)	(0.058)	(0.057)	(0.060)	(0.059)
GPA (grade 7)	0.761***	0.705***	0.955	0.980	0.944	0.978	0.930	0.826*
	(0.061)	(0.062)	(0.075)	(0.077)	(0.094)	(0.063)	(0.063)	(0.072)
Number of ISS or OSS (grade 7)	0.975	1.027	1.014	0.956	0.980	0.999	1.007	0.917*
	(0.028)	(0.048)	(0.039)	(0.059)	(0.029)	(0.016)	(0.085)	(0.041)
N	11995	11995	9313	9313	11995	11995	9313	9313

Note. Exposure to peer suspension indicates percent of classmates who receive suspensions. FRL indicates free or reduced-price lunch eligibility, EL indicates English Language Learners, and CST indicates California Standard Tests. ISS indicates in-school suspension and OSS indicates out-of-school suspension. Multivariate models also include cohort and school fixed effects. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix Table 1.2

Ordinary Least Squares Regression Models Predicting Exposure to Classmate Suspension in 8th grade

	Exposure to Math Classmate Suspension				Exposure to ELA Classmate Suspension			
	Applemill District		Greenwater District		Applemill District		Greenwater District	
	ISS	OSS	ISS	OSS	ISS	OSS	ISS	OSS
Track assignment (Reference group: Mid track)								
Low track	27.439**	30.903***	2.800*	8.492**	23.067*	19.736*	-0.065	4.548*
	(9.621)	(5.806)	(1.196)	(3.241)	(9.361)	(5.856)	(1.389)	(4.216)
High track	-20.124**	-14.569**	-2.325*	-4.856**	-34.673**	-26.167***	-4.428*	-7.754***
	(5.255)	(2.932)	(0.934)	(1.033)	(6.486)	(3.533)	(1.758)	(1.477)
Race/Ethnicity (Reference group: white)								
Asian	7.160**	2.516	0.028	0.633	5.144**	-0.493	0.301	0.206
	(1.981)	(1.594)	(0.120)	(0.445)	(1.330)	(1.866)	(0.311)	(0.451)
Black	2.693	0.115	0.213	-1.019	5.066*	-0.730	-0.025	-0.326
	(3.199)	(1.757)	(0.370)	(1.377)	(2.103)	(1.254)	(0.801)	(0.549)
Hispanic	3.263	-0.418	0.412	0.523	4.210	-1.544	0.478	-0.011
	(2.309)	(0.864)	(0.293)	(0.424)	(2.873)	(1.416)	(0.379)	(0.383)
Other	2.121	0.091	0.661	-0.683	3.294	-2.026	0.196	0.503
	(2.847)	(2.405)	(0.410)	(0.680)	(3.428)	(2.425)	(0.376)	(1.242)
Female	1.272	1.761***	0.075	0.056	0.049	0.221	0.177	0.283
	(0.834)	(0.277)	(0.071)	(0.195)	(0.792)	(0.326)	(0.093)	(0.237)
FRL (grade 8)	-2.387**	-0.177	-0.244	-0.740	-1.969	1.221*	-0.369*	-0.348
	(0.668)	(0.791)	(0.117)	(0.377)	(1.392)	(0.494)	(0.124)	(0.255)
Special education (grade 8)	3.064	8.682	0.913	1.867	3.654	4.599	-0.025	0.523
	(6.389)	(5.171)	(0.765)	(1.697)	(5.112)	(2.141)	(0.562)	(1.106)
ELL (grade 8)	11.262**	4.817	0.455	0.237	9.877**	4.582	0.712	0.902
	(3.144)	(2.140)	(0.360)	(0.485)	(2.237)	(2.495)	(0.524)	(0.470)
CST (grade 7)	-6.948*	-6.562**	0.258	-0.054	-0.959	-1.235	0.122	0.189
	(2.786)	(1.571)	(0.245)	(0.293)	(1.405)	(0.801)	(0.113)	(0.223)
GPA (grade 7)	-5.695*	-5.675**	-0.205	-0.310	-1.113	-1.370	0.007	-0.545
	(1.977)	(1.233)	(0.171)	(0.311)	(1.491)	(1.028)	(0.289)	(0.374)
Number of ISS or OSS (grade 7)	0.981	0.308	-0.124	-0.251	0.615	0.410	0.566	0.021
	(0.609)	(0.445)	(0.159)	(0.219)	(0.487)	(0.358)	(0.477)	(0.320)
Constant	23.162*	28.177***	6.217***	9.933***	11.690	21.129***	7.824***	11.553***
	(7.169)	(2.137)	(0.842)	(2.053)	(6.700)	(3.550)	(0.919)	(1.661)
N	11995	11995	9313	9313	11995	11995	9313	9313

Note. Exposure to peer suspension indicates percent of classmate suspension that is measure by number of suspension events. FRL indicates free or reduced-price lunch eligibility, EL indicates English Language Learners, and CST indicates California Standard Tests. ISS indicates in-school suspension and OSS indicates out-of-school suspension. Multivariate models also include cohort and school fixed effects. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

CHAPTER 2

Study 2. Suspension and Achievement: Do the Effects of Receiving Suspension Vary by Type and Frequency?

Abstract

Researchers have shown that receiving out-of-school suspension is associated with negative educational outcomes, including lower grades and higher dropout rates. However, because existing studies fail to control for unobservable differences between those students who received suspensions and those who did not, the extent to which this relation is causal remains unclear. Take advantage of a unique data measuring student achievement at 12 time points across three academic years, I compare achievement change for a given student across school quarters with varying types and levels of suspensions. The results suggest that multiple out-of-school suspensions may reduce math and ELA achievement, while single out-of-school suspensions and in-school suspensions seem to have no effect.

Keywords: suspension, student achievement, student fixed effects

Exclusionary disciplinary practices, such as in-school suspensions and out-of-school suspensions, are common in schools in the U.S. During the 2011-2012 academic year, approximately 3.5 million students from across the United States received at least one suspension, and one third of those suspended students received multiple suspensions (Losen et al, 2015). Suspension rates vary considerably across subgroups. The suspension rate is more than three times higher for black students than whites (Losen & Gillespie, 2012). In addition, students from low socioeconomic backgrounds (Brantlinger, 1991; Nichols, 2004; Petras, Masyn, Buckley, Ialongo, & Kellam, 2011; Skiba, Peterson, & Williams, 1997), students who receive special education services (Losen et al., 2015; Morrison & D'Incau, 1997; Skiba, Peterson, & Williams, 1997), and low-achieving students (Arcia, 2006; Morrison & D'Incau, 1997; Stevens, Sartain, Allensworth, & Levenstein, 2015) are about 1.5 times higher risk for suspension. Although overall suspension rates have decreased in recent years, discipline gaps across subgroups remain largely unchanged (Stevens et al., 2015).

The stark differences in suspension rates across subgroups are particularly problematic in light of evidence suggesting that suspension is not only ineffective as an approach to modifying the suspended students' behavior, but also counter-productive for these youth's academic development. Receiving suspensions is linked with negative educational outcomes, such as lower grades (Arcia, 2006; Raffaele Mendez, 2003), lower achievement growth (Morris & Perry, 2016) and higher dropout rates (Arcia, 2006; Christle, Nelson, & Jolivette, 2004; Christle, Jolivette, & Nelson, 2007; Lee, Cornell, Gregory, & Fan, 2011). On top of losing instruction time, receiving suspensions can emotionally and psychologically alienate students from their teachers and schools. This weakened bond between students and teachers as well as between students and schools can result in undesirable educational consequences. Therefore, scholars argue that

discipline gaps can alienate disadvantaged students from school (Lee et al, 2011), and contribute to achievement gaps (Gregory, Skiba, & Noguera, 2010; Losen et al. 2015).

Importantly, however, the extent to which associations between suspension and unfavorable youth outcomes are causal is unclear. Because schools use suspensions to discipline students with challenging behavior, students' suspension histories are likely both symptom and cause of developmental difficulties. Controlling for the differences between students who received suspensions and students who did not that likely bias estimates of suspension effects on educational outcomes is thus challenging. In this study, I take advantage of a unique dataset measuring quarterly student achievement as well as detailed information on the type and timing of suspensions to estimate the effects of receiving suspensions. By using student fixed effects, I compare educational achievement in quarters when a student received suspensions with quarters when the same student received no or fewer suspensions. Although student fixed effects are not able to control for time-variant differences between quarters for a given student, using a student as his or her own control should yield less biased estimates of the effects of receiving suspension on educational achievement.

Receiving Suspensions and Negative Development

Scholars and professionals have consistently warned that "get tough" school disciplinary practices and harsh punishments (e.g., suspension and expulsion) result in negative outcomes for the suspended students (American Academy of Pediatrics, 2013; American Psychological Association, 2008). Receiving out-of-school suspensions is linked with a wide range of short- and long-term negative behavioral outcomes. For instance, once students receive out-of-school suspensions, they are more likely to be suspended in the future (Raffaele Mendez, 2003), and

having a history of receiving out-of-school suspension is associated with lower political and civic participation (Kupchik & Catlaw, 2015).

Further, the links between receiving out-of-school suspension and involvement of criminal justice system are well documented (Fabelo et al, 2011; Monahan et al., 2014). Fabelo and colleagues (2011), for instance, demonstrated that students who received out-of-school suspensions or expulsions are three times more likely to be involved with the juvenile justice system, compared with students who did not receive any suspensions or expulsions. Although this association is robust to controls for school and student demographic characteristics, the extent to which it reflects the causal effects of suspension is unclear. Since schools ostensibly administer suspensions as a punishment for student misbehavior, suspended students are likely more delinquent, less engaged in learning, and lower achievers than their non-suspended peers. Separating the effects of suspensions from the confounding characteristics of suspended students is thus difficult.

In order to overcome this limitation, Monahan and colleagues (2014) investigated the effects of suspensions and expulsions on arrest by focusing on variations within a person. By using person fixed effects regression, Monahan and colleagues were able to compare an individual who was suspended in a certain month with the same individual who was not suspended in another month. They found that suspension or expulsion from school is associated with an increase in the likelihood of arrest in the same month. Because student fixed effects are not able to control for time-variant differences (e.g., changes in student motivation, changes in family structure, or changes in family income) across months for a given student, Monahan and colleagues (2014) were not able to fully take into account the fact that suspension might be an indicator of a downward development spiral. However, their findings further deepen our

understandings on the effects of receiving suspensions by controlling for time-invariant characteristics (e.g., gender and race/ethnicity) of suspended students that are important to yield less biased estimates.

Along with negative behavioral outcomes, out-of-school suspensions are associated with negative educational outcomes. Schools with higher suspension rates exhibit lower achievement levels and higher dropout rates (Christle et al., 2004; Christle et al., 2007; Lee et al., 2011; Fabelo et al., 2011). Christle et al. (2004) used data from Kentucky and found that schools with high suspension rates are associated with lower achievement scores. Using high schools in Virginia as a unit of analysis, Lee et al. (2011) demonstrated that schools with high suspension rates are associated with high dropout rates even after controlling for school demographics and student aggressiveness.

Similarly, individuals who receive suspension exhibit negative future academic outcomes such as lower educational performance and failure to graduate on time (Arcia, 2006; Raffaele Mendez, 2003). Using individual student data from a large urban school district in which participants were mostly low-income racial minorities (59% Hispanic and 29% Black, 75% free and reduced-price lunch program), Arcia (2006) found that suspended students exhibit poorer educational achievement and make less academic progress than non-suspended students after suspensions. Morris and Perry (2016) used data from students in grades 6 through 10 in Kentucky and found that receiving suspensions is associated with slower math and ELA achievement growth over two years. Because suspensions remove students from learning environment, reduced classroom time is likely to negatively affect educational outcomes. Prior studies have shown the associations between receiving suspensions and negative educational outcomes, but we have no evidence about to what extent the links are robust after taking time-

invariant characteristics (e.g., gender and race) of suspended students into account. As Monahan et al., (2014) provide better evidence on the effects of receiving suspension on arrest by comparing probability of arrest for a given student across months, investigating whether receiving suspension is associated with negative educational outcomes for a given student is important.

Potential Varying Effects of Suspension Type and Frequency

Although in-school suspension is also a common disciplinary response, little is known about the effects of receiving in-school suspension. Both in-school and out-of-school suspensions reduce instruction time for suspended students, but the consequences of receiving in-school suspensions can be different from receiving out-of-school suspensions. First, receiving out-of-school suspensions is likely to increase unsupervised time, which may lead to delinquent behavior (Flannery, Williams, & Vazsonyi, 1999; Griffin, Botvin, Scheier, Diaz, & Miller, 2000). Second, because receiving out-of-school suspensions is, by definition, physical removal from both classroom and school, receiving out-of-school suspensions may make students feel more isolated from the school than receiving in-school suspensions. Out-of-school suspensions that prevent students from entering school grounds as a punishment can weaken student-teacher relationships and school bonding. Considering that low levels of attachment to school are a predictor in negative educational and behavioral outcomes (Archambault, Janosz, Fallu, & Pagani, 2009; Dornbusch, Erickson, Laird, & Wong, 2001), receiving out-of-school suspension may hamper positive development or increase negative development. Finally, in-school suspension is more likely than out-of-school suspension to provide time for self-study. As an example, unlike out-of-school suspensions, in-school suspensions that lead to staying in either

the principal's office or in a designated suspension space in school can lead to time for reading or studying.

This study contributes to the body of literature in several ways by investigating whether and to what extent receiving suspensions impacts the educational achievement of suspended students. First, this study uses student fixed effects to control for differences between suspended students and non-suspended students. One important limitation of prior studies of the effects of receiving suspension on achievement is that they did not take into account the unobservable differences between suspended students and non-suspended students. Comparisons between educational outcomes of suspended students with those of non-suspended students are likely to produce biased estimations due to failure to control for potentially important differences between them. By using student fixed effects, this study allows us to compare achievement change for a given student across quarters with a varying number of suspensions.

Second, I examine the effects of in-school suspension on suspended students. Although in-school suspension is also a common disciplinary practice, we have little empirical research that explores the effects of in-school suspension, which may differ from out-of-school suspension. Finally, I examine whether and to what extent receiving suspension once impacts educational achievement and whether that differs from receiving multiple suspensions. The consequences of receiving one suspension are likely to be different from receiving multiple suspensions, but existing studies only focus on whether or not students receive suspension. Given that approximately one third of suspended students in the U.S. receive suspensions multiple times (Losen et al., 2015), it is important to examine varying associations between receiving suspensions and educational outcomes across the number of suspension times.

Hypotheses

Based on prior studies, I test the following hypotheses:

(a) Receiving suspension is associated with negative educational achievement.

(b) The negative associations between receiving suspension and educational outcomes are stronger when students are suspended more than once.

(c) Although both in-school suspensions and out-of-school suspensions remove students from learning environments, receiving out-of-school suspension is likely to be associated with more negative educational achievement than in-school suspension.

Method

Data

I used administrative data from one large California school district. The study's sample includes data on 7th grade through 11th grade students in 17 different schools over a three-year period from 2009-2010 through 2011-2012, and I observed the end of quarter math and ELA achievement four times a year. The full sample includes about 15,251 students and provides a total of 139,847 student-quarter observations for math and 139,538 observations for ELA models over three years. Table 1 shows descriptive statistics of the sample. Approximately 50% of students in the school district are girls. The majority of students are Hispanic (53%) and Asian (33%). In addition, 12% of students are white, 1% of students are black, and 1% of students are some other race/ethnicity. Approximately 71% of students are eligible for free and reduced-price lunch, 23% of students are English language learners (ELL) and 7% are special education students. The yearly suspension rates of the sample are approximately 3% for in-school suspension and 5% for out-of-school suspension, and the quarterly suspension rates are 1% for in-school suspension and 2% for out-of-school suspension.

[Insert Table 2.1 here]

Table 2.2 shows the percentage of suspended students across quarters. Only a few students receive suspension in the beginning of the academic year, but more students receive suspension toward the end of the academic year. For example, 0.24% of students received in-school suspensions and 0.58% of students received out-of-school suspensions in the first quarter, whereas 0.82% of students received in-school suspensions and 1.34% of students received out-of-school suspensions in the last quarter.

[Insert Table 2.2 here]

Measures

Dependent variables:

I used *Benchmark Test Scores* as dependent variables to investigate to what extent receiving suspensions for a given student across school quarters predicts educational achievement. Students across all school sites take the benchmark tests four times a year, and teachers and administrators use the test scores to make informed decisions about class placement and to learn about how well students are progressing toward mastery of content. *Benchmark Test Scores* of math and ELA are continuous variables. Given that students took different math tests depending upon their courses (e.g., Algebra, Geometry, or Trigonometry), I standardized math scores for each course based on each school quarter and year (i.e., math scores for each combination of course, quarter, and year). For ELA achievement, considering that students took ELA tests by grade, I used standardized ELA scores for each combination of grade, quarter, and year. Student fixed effects with these standardized scores for math and ELA enable me to compare the educational achievement of the same students across quarters with varying levels of suspensions.

Independent variables:

Receiving suspension. The key variable is receiving suspension for an individual student. I measured receiving suspensions in two different ways. First, to examine whether the associations between number of suspensions and educational achievement are linear, I included a continuous variable that indicates the number of suspensions that students received. Second, to compare the associations between receiving suspension once and multiple times, I included a categorical variable that measures the frequency of suspension in a given quarter (i.e., receiving one suspension, receiving multiple suspensions). I created variables in these two different ways for in-school suspensions as well as out-of-school suspensions.

Control variables:

I included several control variables – free or reduced-price lunch (FRL) eligibility, English language learner (ELL) status, and special education enrollment status – in the models. The records are from the district-wide administrative data system in the district. I created a variable that indicates whether a student is eligible for FRL. FRL eligibility is coded as 1 when a student is eligible for FRL and is coded 0 when a student is not. I also created a variable that indicates whether a student is an ELL. ELL is coded as 1 when a student is ELL and is coded 0 when a student is not. Similarly, I created a variable that indicates whether a student is enrolled in special education. Enrollment in special education is coded as 1 when a student is enrolled in special education and is coded 0 when a student is not.

Analyses

To investigate the associations between receiving suspensions and student achievement, I used a student fixed effects approach. The student fixed effects approach allows me to compare

the educational achievement of the same students across quarters in which the frequency of suspension varied. This is similar to the approach used by Monahan, VanDerhei, Bechtold, and Cauffman (2014) who used student fixed effects with 1,354 juvenile offenders to investigate whether receiving out-of-school suspensions or expulsions increases the probability of arrest. The model is as follows:

$$Y_{isgt} = \beta X_{isgt} + \theta \mathrm{I}_{isgt} + \delta_s + \omega_g + \tau_t + \mu_i + \varepsilon_{isgt}$$

Y_{isgt} denotes the end of quarter standardized benchmark score for student *i* in school *s,* in grade *g* and at time *t* (where *t* denotes year and quarter). X_{isgt} indicates student characteristics that change over time (e.g., ELL status), I_{isgt} indicates how many times a student *i* received suspensions in quarter/year *t*. δ_s indicates school fixed effects, ω_g indicates grade fixed effects, τ_t indicates year and quarter fixed effects, μ_i indicates student fixed effects, and ε_{isgt} is the error term. Standard errors are clustered at the student level. θ captures the main effect of receiving suspension on student achievement.

Results

To evaluate the effects of receiving suspension on the educational achievement of non-suspended students, I examine the association between the number of suspensions in a given quarter and educational achievement at the end of the quarter. Table 2.3 reports results from models with student fixed effects, which compare educational achievement change for a given student across quarters with varying levels of suspension. The key variable for Models 1 and 4 is the number of in-school suspensions, and the key variable for Models 2 and 5 is the number of out-of-school suspensions that a student received in a quarter. Models 3 and 6 include both in- and out-of-school suspensions. Models 1 through 3 show that receiving suspension is associated

with negative math benchmark test scores, but the associations are not statistically significant. Models 4 through 6 including ELA achievement as a dependent variable show whether receiving suspension is associated with ELA achievement of suspended students. Model 4 indicates that receiving in-school suspension is negatively associated with ELA achievement, but the association is not statistically significant. Model 5 indicates that receiving out-of-school suspension one time is significantly associated with a .039 SD decrease in ELA achievement. Model 6 with both in- and out-of-school suspensions shows similar results.

[Insert Table 2.3 here]

Next, I include a categorical variable that indicates whether a student received one suspension or multiple suspensions in a quarter. Models in Table 4 allow me to compare student achievement in quarters with one suspension with the same student achievement in quarters with no suspension. Table 2.4 also shows the comparisons between a student's educational achievement in quarters with multiple suspensions and the same student's educational achievement in quarters with no suspension.

The results show that the associations between receiving suspension and educational outcomes vary by type and frequency. Model 1 shows that receiving in-school suspension once or multiple times is not associated with math achievement. Model 2 shows that receiving one out-of-school suspension is not significantly linked to math achievement, but receiving two or more out-of-school suspensions is significantly linked to declined math achievement. Receiving multiple out-of-school suspensions is linked to a .22 SD decrease in math achievement, compared with math achievement scores of the same students with no suspensions.

Models 4 through 6 in Table 2.4 show the associations between suspensions and ELA achievement outcomes for a given student across quarters. Model 4 shows that receiving one in-school suspension is positively associated with ELA achievement, but receiving multiple in-school suspensions is negatively associated with ELA achievement. However, these links are not statistically significant. Model 5 with out-of-school suspensions shows that receiving out-of-school suspension is associated with a .19 SD decrease in ELA achievement. The results from Model 6 with both in- and out-of-school suspensions are consistent. Figure 2.1 shows the estimated effects of receiving suspension by type and frequency based on Table 2.4.

[Insert Tables 2.4 here]

Alternative Specification Models

I also ran models with alternative specifications to provide better understanding regarding the associations between receiving suspension and educational achievement. First, I conducted a falsification test as a robustness check to examine whether there are potential reverse causations that threaten the estimations. In this analysis, I examined whether the future suspensions predict prior educational achievement. That is, I ran models that test whether suspension in quarters 4, 3, and 2 predicts educational achievement in quarters 3, 2 and 1, respectively. The results showed that there are no associations between future suspensions and prior achievement test scores (Appendix Table 2.1). The findings from the placebo regression suggest that the estimations are less susceptible to the spuriousness of the suspension effects on the educational achievement of suspended students.

Second, I included teacher fixed effects in the model to examine whether the estimated effects remain unchanged even after controlling for teacher effects. With teacher fixed effects,

receiving out-of-school suspensions multiple times is still negatively associated with lower educational achievement. In addition, the negative associations between receiving in-school suspension multiple times and math achievement became significant (Appendix Table 2.2).

Third, I conducted the main models without student fixed effects to investigate to what extent controlling for student differences plays a role in the associations between receiving suspension and educational achievement. Without student fixed effects, the magnitude of associations between suspensions and negative educational achievement is larger (see Appendices Tables 2.3 and 2.4). The results show that student fixed effects that allow me to use a student as his or her own counterfactual yield smaller estimates for the effects of receiving suspension on educational achievement.

Finally, I investigated whether the negative effects of receiving suspension last longer than the quarter in which students receive suspension. In this analysis, I ran models to test whether receiving suspensions predicts educational achievement in the following quarter. I examined whether receiving suspensions in quarters 1, 2, and 3 predicts educational achievement in quarters 2, 3, and 4, respectively. I found little evidence that receiving suspensions is associated with educational achievement in the following quarters (Appendix Table 2.5).

One big concern about disciplinary practice is that receiving suspension can lead to a downward spiral trajectory for youth development. In contrast to this concern, I find that negative associations between receiving suspensions and educational achievement disappear after one school quarter. This finding suggests that students who receive multiple out-of-school suspensions suffer from lower achievement for a short period of time, but the negative effects of receiving suspension do not last long. However, it may be hasty to conclude that the negative

effects of receiving suspension are only temporal for the following reasons. First, as benchmark tests are quarter-based content assessment rather than cumulative assessment, it is plausible that I was not able to capture any longer-term effects of receiving suspension due to the nature of dependent variables. Second, because only a small number of students receive suspension during the first three quarters, these null findings may due to lack of statistical power. Finally, it is also possible that the negative effects of receiving suspension can appear after more than a quarter.

Discussion

This study advances our understanding of whether and to what extent receiving suspensions hinders educational achievement. To date, research on the effects of suspension has predominantly focused on out-of-school suspension. Moreover, prior studies have failed to control for differences between suspended students and non-suspended students. By using student fixed effects, I compare a student's educational achievement before receiving suspension with their educational achievement after receiving suspension. The results show that a student's math and ELA test scores decline (.22 SD decline for Math; .19 SD decline for ELA) when they receive multiple out-of-school suspensions, whereas their scores change little when they receive one or more in-school suspensions or they receive out-of-school suspension only once. The results suggest that suspension type and frequency play a key role in the effects of suspension on students who receive suspensions.

My finding, that receiving out-of-school suspensions can be detrimental to educational achievement (at least for a quarter), is consistent with prior studies that show the links between receiving suspension and lower educational outcomes (Arcia, 2006, Morris & Perry, 2016). The deprivation of learning opportunities for suspended students can explain a great deal about the

negative association between receiving suspension and lower educational achievement. Unlike in-school suspension, out-of-school suspension does not allow suspended students to stay on school grounds. Having been barred from school, these students are less likely to spend time in a learning environment of any sort, which may negatively affect their educational outcomes (Arcia, 2006; Christle, Nelson, & Jolivette, 2004; Christle, Jolivette, & Nelson, 2007; Lee et al., 2011). In addition, given that low levels of school engagement and attachment predict high dropout rates (Archambault et al., 2009) and initiation of delinquent behavior (Dornbusch et al., 2001), school removal can hinder youth development.

This finding – that receiving multiple out-of-school suspensions is linked to lower educational achievement – implies that spending more time outside of school is likely to lead to lower educational achievement at least for the short term. Although both in- and out-of-school suspensions deprive students of classroom learning, pushing students away from school may further inhibit student learning. In addition to negative educational outcomes, increased time without adult supervision may also contribute to the development of unhealthy behaviors, including substance abuse (Richardson et al., 1989) and smoking (Greene & Banerjee, 2008).

As in-school suspension is not associated with negative educational outcomes, it appears to be a preferable alternative form of discipline. However, any policy implications from these findings require extra caution: because this study focuses on short-term educational achievement (i.e., end of quarter assessment), it does not provide evidence about the long-term effects of receiving suspension. Given that in-school suspension also results in missed learning opportunities, this form of discipline may also have negative long-term consequences if academic support for suspended students is inadequate.

Importantly, the effects of in-school suspension vary according to its definition. For example, receiving in-school suspension can mean staying in a principal's office, working in the designated in-school suspension classroom, or receiving behavioral intervention. Given that interventions that allow at-risk youth to spend more time with other at-risk youth can exacerbate problematic behavior (Dodge, Dishion, & Lansford, 2006; McCord, 2003), in-school suspensions that increase a student's chances of interacting with other students with challenging behavior can also hamper positive development.

The findings of this study deepen our understanding of the effects of suspension on educational achievement, and yet this study has limitations. First, although the total days of suspension in a given quarter allow me to investigate whether the loss of instructional time due to suspension leads to lower educational achievement, this study is only able to measure the frequency of suspensions that students receive in a quarter. Future research that compares the days missed from receiving suspensions and absence will inform us whether and to what extent losing instructional time leads to lower educational achievement. Second, this data is from one district in California and educational achievement is measured by the district-specific benchmark test. Thus, it is important to examine whether the findings of this study would extend to other tests in other settings. Third, this study is able to control for time-invariant differences between students by comparing educational achievement of the same student with suspensions and with no or fewer suspensions. However, because student fixed effects are not able to control for time-variant differences between quarters (e.g., changes in student motivation, changes in a student's home environment), the results of analyses are not able to completely isolate causal effects from other unmeasured endogenous factors. Finally, because this study focuses on achievement changes across quarters, it is not able to estimate the effects of suspension on long-term youth

outcomes for suspended students. Given that receiving suspension is linked to negative outcomes, including more frequent problematic behavior and a higher likelihood of school dropout, it is important to explore the longer-term impacts of receiving suspensions.

With these caveats in mind, however, this study nevertheless advances the research on the effects of receiving suspension on educational achievement. The results show that receiving out-of-school suspension multiple times is associated with lower levels of math and ELA achievement, whereas receiving one out-of-school suspension or one or more in-school suspensions is not linked to lower educational achievement, controlling for individual differences between suspended students and non-suspended students. The goal of disciplinary responses should be to deter future student misbehavior instead of depriving students of learning opportunity. Isolating students from school is unlikely to correct misbehavior and is more likely to hamper student-teacher relationships and school bonding. In addition, loss of instruction time can push students further away from schools, leading to irreversible negative consequences.

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Table 2.1

Descriptive Statistics of Student Demographic Characteristics, Educational Achievement, and Suspensions in a California School District

	Observations (N=139,847)			
	Mean	S.D.	Min	Max
Female	0.502			
Asian	0.341			
Black	0.009			
Hispanic	0.520			
White	0.121			
Other	0.010			
Free and reduced-price lunch	0.713			
English language learner	0.231			
Special education status	0.072			
Math benchmark	63.852	17.000	6.000	100.000
ELA benchmark	64.892	16.250	10.000	100.000
Number of ISS in a quarter	0.006	0.091	0.000	6.000
Number of OSS in a quarter	0.011	0.114	0.000	6.000
Receiving once ISS once in a quarter	0.004			
Receiving once OSS in a quarter	0.011			
Receiving once ISS twice or more in a quarter	0.002			
Receiving once OSS twice or more in a quarter	0.002			

Note. ISS indicates in-school suspension and OSS indicates out-of-school suspension.

Table 2.2

Descriptive Information of % of Suspended Students across Quarters

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
% of students who receive ISS at least once	0.24% (N=109)	0.61% (N=278)	0.65% (N=295)	0.82% (N=368)
% of students who receive OSS at least once	0.58% (N=259)	1.17% (N=519)	1.47% (N=654)	1.34% (N=596)

Note. ISS indicates in-school suspension and OSS indicates out-of-school suspension.

Table 2.3

Summary of Results from OLS Regression of Suspension on the Educational Achievement of Suspended Students, with Student Fixed Effects

	Math			ELA		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Number of ISS	-0.023		-0.021	-0.011		-0.006
	(0.033)		(0.033)	(0.027)		(0.027)
Number of OSS		-0.017	-0.015		-0.039*	-0.038*
		(0.024)	(0.024)		(0.018)	(0.018)
Constant	0.129**	0.128**	0.129**	0.191***	0.190***	0.191***
	(0.046)	(0.046)	(0.046)	(0.023)	(0.023)	(0.023)
N	139847	139847	139847	139535	139535	139535

Note. In addition to student fixed effects, all models control for free or reduce price lunch eligibility, English language learner status, special education enrollment status, and year, quarter, and grade fixed effects. ISS indicates in-school suspension and OSS indicates out-of-school suspension. Number of ISS and OSS are continuous variable. Standard errors are clustered at the student level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.4

Summary of Results from OLS Regression of Suspension (None vs. Once, None vs. More than Once) on the Educational Achievement of Suspended Students, with Student Fixed Effects

	Math			ELA		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
ISS (Reference group: No suspension)						
ISS once	-0.003		0.000	0.010		0.016
	(0.039)		(0.040)	(0.033)		(0.033)
ISS more than once	-0.159		-0.149	-0.037		-0.018
	(0.116)		(0.116)	(0.085)		(0.085)
OSS (Reference group: No suspension)						
OSS once		0.005	0.006		-0.025	-0.026
		(0.026)	(0.027)		(0.020)	(0.020)
OSS more than once		-0.225*	-0.220*		-0.189*	-0.189*
		(0.104)	(0.103)		(0.080)	(0.080)
Constant	0.129**	0.128**	0.129**	0.190***	0.190***	0.190***
	(0.046)	(0.046)	(0.046)	(0.023)	(0.023)	(0.023)
N	139847	139847	139847	139535	139535	139535

Note. In addition to student fixed effects, all models control for free or reduce price lunch eligibility, English language learner status, special education enrollment status, and year, quarter, and grade fixed effects. ISS indicates in-school suspension and OSS indicates out-of-school suspension. The results of joint significant tests in ELA models show that OSS once is significantly different from OSS more than once, whereas the other joint significant tests do not show significant associations. Standard errors are clustered at the student level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix Table 2.1

Falsification Test: Summary of Results from OLS Regression of Suspension (None vs. Once, None vs. More than Once) on the Educational Achievement of Suspended Students in the Previous Quarter, with Student Fixed Effects

	Math			ELA		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
ISS (Reference group: No suspension)						
ISS once	-0.036		-0.032	-0.063		-0.064
	(0.042)		(0.042)	(0.034)		(0.034)
ISS more than once	0.017		0.027	-0.072		-0.074
	(0.115)		(0.114)	(0.103)		(0.103)
OSS (Reference group: No suspension)						
OSS once		-0.025	-0.024		0.004	0.008
		(0.027)	(0.027)		(0.024)	(0.024)
OSS more than once		-0.096	-0.094		-0.002	0.009
		(0.097)	(0.097)		(0.080)	(0.080)
Constant	0.143**	0.143**	0.143**	0.242***	0.240***	0.241***
	(0.046)	(0.045)	(0.046)	(0.026)	(0.026)	(0.026)
N	106662	106662	106662	98674	98674	98674

Note. All models control for free or reduced price lunch eligibility, English language learner status, special education enrollment status, and year, quarter, grade, school, and student fixed effects. ISS indicates in-school suspension and OSS indicates out-of-school suspension. Standard errors are clustered at the student level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix Table 2.2

Summary of Results from OLS Regression of Suspension (None vs. Once, None vs. More than Once) on the Educational Achievement of Suspended Students, with Student Fixed Effects and Teacher Fixed Effects

	Math			ELA		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
ISS (Reference group: No suspension)						
ISS once	-0.014		-0.011	0.028		0.033
	(0.039)		(0.039)	(0.033)		(0.033)
ISS more than once	-0.231*		-0.220*	-0.026		-0.009
	(0.104)		(0.104)	(0.091)		(0.092)
OSS (Reference group: No suspension)						
OSS once		-0.003	-0.001		-0.024	-0.026
		(0.026)	(0.026)		(0.021)	(0.021)
OSS more than once		-0.203	-0.192		-0.181*	-0.183*
		(0.118)	(0.117)		(0.091)	(0.092)
Constant	0.402***	0.403***	0.402***	0.028	0.029	0.029
	(0.037)	(0.037)	(0.037)	(0.028)	(0.028)	(0.028)
N	138641	138641	138641	138723	138723	138723

Note. In addition to student and teacher fixed effects, all models control for free or reduced price lunch eligibility, English language learner status, special education enrollment status, and year, quarter, and grade fixed effects. ISS indicates in-school suspension and OSS indicates out-of-school suspension. Standard errors are clustered at the student level.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix Table 2.3

Summary of Results from OLS Regression of Suspension on the Educational Achievement of Suspended Students, without Student Fixed Effects

	Math			ELA		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Number of ISS	-0.109***		-0.096**	-0.084**		-0.071**
	(0.031)		(0.031)	(0.026)		(0.026)
Number of OSS		-0.094***	-0.086***		-0.103***	-0.097***
		(0.023)	(0.023)		(0.017)	(0.018)
Constant	0.196***	0.194***	0.196***	0.333***	0.332***	0.334***
	(0.022)	(0.022)	(0.022)	(0.016)	(0.016)	(0.016)
N	139847	139847	139847	139535	139535	139535

Note. All models control for free or reduced price lunch eligibility, English language learner status, special education enrollment status, and year, quarter, and grade fixed effects, but do not control for student fixed effects. ISS indicates in-school suspension and OSS indicates out-of-school suspension. Number of ISS and OSS are continuous variable. Standard errors are clustered at the student level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix Table 2.4

Summary of Results from OLS Regression of Suspension (None vs. Once, None vs. More than Once) on the Educational Achievement of Suspended Students, without Student Fixed Effects

	Math			ELA		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
ISS (Reference group: No suspension)						
ISS once	-0.095*		-0.080*	-0.073*		-0.058
	(0.038)		(0.039)	(0.033)		(0.033)
ISS more than once	-0.309**		-0.284**	-0.166		-0.132
	(0.108)		(0.109)	(0.086)		(0.087)
OSS (Reference group: No suspension)						
OSS once		-0.079**	-0.072**		-0.094***	-0.090***
		(0.026)	(0.026)		(0.020)	(0.020)
OSS more than once		-0.332***	-0.312**		-0.287***	-0.272***
		(0.101)	(0.101)		(0.078)	(0.078)
Constant	0.196***	0.194***	0.196***	0.333***	0.332***	0.334***
	(0.022)	(0.022)	(0.022)	(0.016)	(0.016)	(0.016)
N	139847	139847	139847	139535	139535	139535

Note. All models control for free or reduced-price lunch eligibility, English language learner status, special education enrollment status, and year, quarter, and grade fixed effects, but do not control for student fixed effects. ISS indicates in-school suspension and OSS indicates out-of-school suspension. Standard errors are clustered at the student level.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix Table 2.5

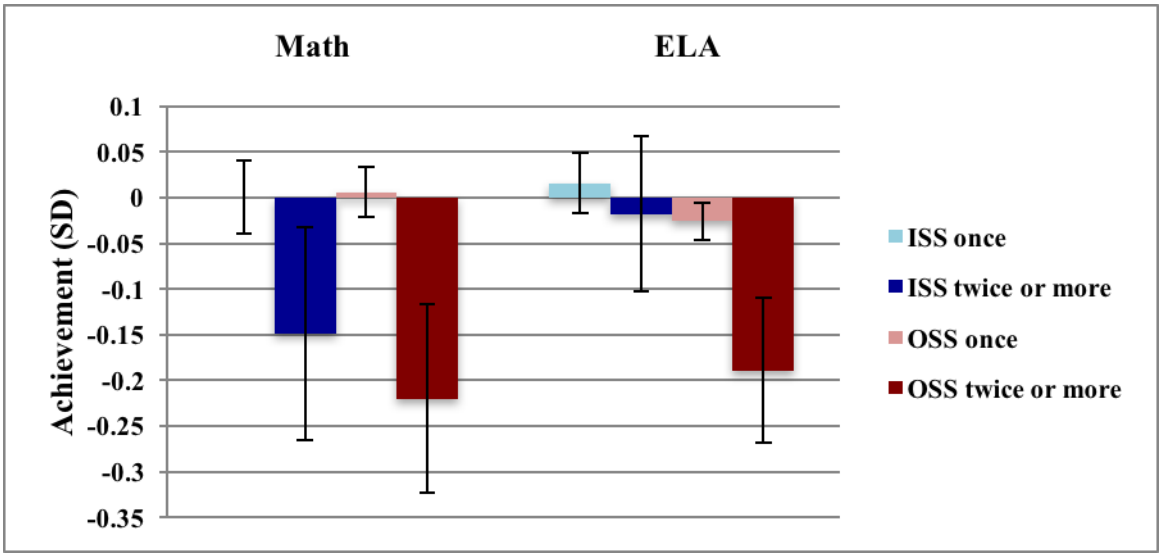
Summary of Results from OLS Regression of Suspension (None vs. Once, None vs. More than Once) on the Educational Achievement of Suspended Students in the Following Quarter, with Student Fixed Effects

	Math			ELA		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
ISS (Reference group: No suspension)						
ISS once	0.008		0.010	0.037		0.043
	(0.043)		(0.043)	(0.038)		(0.038)
ISS more than once	-0.153		-0.146	-0.052		-0.037
	(0.111)		(0.110)	(0.095)		(0.096)
OSS (Reference group: No suspension)						
OSS once		-0.004	-0.004		-0.027	-0.029
		(0.030)	(0.030)		(0.022)	(0.022)
OSS more than once		-0.119	-0.113		-0.148	-0.150
		(0.115)	(0.115)		(0.088)	(0.089)
Constant	0.136**	0.136**	0.136**	0.107***	0.107***	0.107***
	(0.044)	(0.044)	(0.044)	(0.029)	(0.029)	(0.029)
N	106899	106899	106899	103805	103805	103805

Note. All models control for free or reduced-price lunch eligibility, English language learner status, special education enrollment status, and year, quarter, grade, student, and school fixed effects. ISS indicates in-school suspension and OSS indicates out-of-school suspension. Standard errors are clustered at the student level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 2.1

Estimated Effects of Suspension on the Educational Achievement of Suspended Students, with Student Fixed Effects



Note. All models control for free or reduced-price lunch eligibility, English language learner status, special education enrollment status, year, quarter, school, grade and student fixed effects. ISS indicates in-school suspension and OSS indicates out-of-school suspension.

CHAPTER 3

Study 3. Unintended Consequences: Does the Effort to Reduce Suspensions Harm Learning Environments?

Abstract

Researchers have shown the links between receiving suspension and negative youth development, raising concerns regarding the effects of suspension. Motivated by these findings, many school districts introduce policies aimed at reducing suspension rates, and yet we have little understanding of the effects of suspension on non-suspended classmates. In this study, I use data from a large school district in California to investigate the effects of suspension on the educational outcomes of non-suspended students. I find that classmate suspension has a positive effect on the math achievement of non-suspended students, and this positive effect is especially important for the achievement of students in a lower track class (i.e., Pre-Algebra). The findings suggest that efforts to reduce schools' use of suspensions may have unintended negative effects for non-suspended students.

Keywords: suspension, peer effects, school disciplinary policy, student fixed effects

Peer influence plays an important role in human development. The people surrounding an individual have an effect on the individual's behavioral (Duncan, Boisjoly, Kremer, Levy, & Eccles, 2005; Gaviria & Raphael, 2001) and educational outcomes (Hanushek, Kain, Markman, & Rivkin, 2003; Imberman, Kugler & Sacerdote, 2012; Kristoffersen, Krægpøth, Nielsen, & Simonsen, 2015; Zimmerman, 2003). For example, exposure to an environment with delinquent peers can increase the frequency of a student's misbehavior (Dodge, Dishion, & Lansford, 2006; McCord, 2003), whereas exposure to high-achieving peers can enhance a student's learning (Betts & Zau, 2004; Hanushek et al., 2003; Whitmore, 2005). Because peer effects have significant implications for a wide range of educational policies such as tracking, busing, and school choice, scholars have paid substantial attention to the ways in which peers influence a student's development.

One school policy that can lead to frequent changes in peer effects is exclusionary discipline, which typically involves in-school or out-of-school suspension. By removing classmates from the classroom, suspensions impact the learning environment and can thus influence the educational achievement of the remaining students. Nationally representative data indicate that 10-15% of secondary school students received either in-school or out-of-school suspension at least once in the U.S.[2] While considerable research attention has focused on the effects of suspension on students who have been suspended (Arcia, 2006, Noguera, 2003; Morris & Perry, 2016; Raffaele Mendez, 2003; Skiba, Michael, Nardo, & Peterson, 2002; Townsend, 2000), relatively little information is available regarding the ways in which exclusionary discipline practices influence classroom learning experiences.

[2] National Educational National Education Longitudinal Study (NELS) of 1988, Education Longitudinal Study (ELS) of 2002, and High School Longitudinal Study (HSLS) of 2009 report that approximately 9-10% receive in-school suspensions and 6-8% receive out-of-school suspensions.

I use data from a large California school district to investigate the effects of suspension on the educational achievement of non-suspended students in secondary school. This study contributes to the literature in critical ways. First, the data allow us to measure suspension at the classroom level instead of the school level. Although school-level suspension is a critical measure that captures school climate and culture, the classroom-level suspension is more indicative of a student's direct learning environment. Thus, using classroom-level suspension can help us better understand the effects of suspensions on the educational achievement of non-suspended students. Second, given that schools use suspensions as disciplinary responses for various behavioral issues, I investigate whether the effects of suspension vary across infraction types. Finally, I examine whether and to what extent the effects of suspension on non-suspended classmates differ across academic tracks.

Background: Exclusionary discipline and its consequences

Researchers and professionals have raised concerns regarding the frequent use of suspensions as a disciplinary measure (American Academy of Pediatrics, 2013; American Psychological Association, 2008; Noguera, 2003; Skiba et al., 2002; Townsend, 2000). Critics argue that exclusionary discipline such as suspension not only fails to correct student misbehavior but also leads to even more negative consequences for suspended students. In fact, research shows that suspensions are linked with suspended students' negative development, including more future suspensions (Raffaele Mendez, 2003), lower educational performance (Arcia, 2006, Morris & Perry, 2016), higher dropout rates (Arcia, 2006; Christie, Nelson, & Jolivette, 2004; Christle, Jolivette, & Nelson, 2007; Lee, Cornell, Gregory, & Fan, 2011), and a higher likelihood of involvement in the juvenile justice system (Monahan, VanDerhei, Bechtold, & Cauffman, 2014). Furthermore, black students receive suspensions between two and three

times more than their white counterparts (Costenbader & Markson, 1998; Wallace, Goodkind, Wallace, & Bachman, 2008; Stevens et al., 2015) and students who are from lower family socioeconomic backgrounds are also at an elevated risk for suspension (Brantlinger, 1991; Costenbader & Markson, 1998; Nichols, 2004; Petras, Masyn, Buckley, Ialongo, & Kellam, 2011). Thus, scholars argue that suspension deprives disadvantaged students of learning opportunities and that the discipline gaps may contribute to educational achievement gaps (Gregory, Skiba, & Noguera, 2010; Losen et al., 2015).

The U.S. Department of Justice and the U.S. Department of Education recently vowed to reduce racial disparities in school discipline and improve school climates (U.S. Department of Education/Department of Justice, 2014) and school districts across the country are experimenting with various approaches to reduce suspensions (Skiba & Losen, 2016). As a result, there has been a rapid suspension reduction in the recent years across the U.S. In Chicago Public Schools, 24% of students received suspensions in 2009-2010, whereas 16% of students received suspensions in 2013-2014 (Stevens et al., 2015). Similarly, in California the suspension rate has declined from 5.7% in 2011-2012 to 3.8% in 2014-2015 (California Department of Education, 2016).

Effects of suspension on non-suspended students

A substantial body of research documents the relation between peer effects and student learning outcomes (Epple & Romano, 2011; Sacerdote, 2011; Whitmore, 2005) and suggests that peer behavior is one important mechanism that explains the influence of peers. Classroom with a higher proportion of female students have positive effects on student achievement (Hoxby, 2000; Sacerdote, 2011) because female students are less likely to exhibit disruptive classroom behavior relative to their counterparts (Lavy & Schlosser, 2011). Conversely, recent research provides

strong evidence to suggest that disruptive classmates as well as classmates with emotional problems and untreated learning disabilities inhibit student achievement (Aizer, 2008; Carrell & Hoekstra, 2010; Fletcher 2010).

The key rationale for removing problematic students from classrooms hinges on the assumption that doing so improves the learning outcomes of students who remain in the classroom. However, theory provides inconsistent predictions regarding the direction and magnitude of these effects and a limited number of studies investigate whether suspending students has an effect on their non-suspended classmates. Below I discuss prior studies that help us to predict the effects of suspension on the educational outcomes of non-suspended students.

Researchers have shown that suspension is negatively associated with the achievement of non-suspended students (Perry & Morris, 2014; Rausch & Skiba, 2004). Using data from Indiana public schools, Rausch and Skiba (2004) found that schools with high suspension rates tend to have lower levels of student achievement. Their findings are robust even after controlling for other factors such as poverty rate, race/ethnicity, school size, and school type. However, because they did not take into account all other potential individual student differences that influence both suspension rates and educational outcomes in the models, their findings remain inconclusive.

Perry and Morris (2014) employed a fixed-effects strategy with longitudinal data from students in a large Kentucky public school district to estimate the effects of peer 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. Perry and Morris hypothesize that frequent suspensions may hamper educational outcomes for non-suspended students because overly controlling punitive

disciplinary practices may weaken student-teacher relationships and school bonding for all students (Perry & Morris, 2014). It is also plausible that unstable classroom climate can require teachers and students to frequently adjust to a changing classroom dynamic, hindering effective teaching and weakening student engagement.

Although informative, the Perry and Morris (2014) findings are not conclusive. First, Perry and Morris measure suspension at the school level (i.e., number of suspended students in a school) to estimate the impact of suspension on non-suspended students. Although the measure of school-level suspension is a useful school climate indicator, it fails to capture whether student entry and exit from the classrooms has a more direct effect on the educational achievement of non-suspended students. In addition, given that classroom environments can differ across academic tracks (remedial class vs. honors class), suspension rates likely vary across class within the same school. It is plausible that although two students attend the same school, one student never has classmates who receive suspensions and the other student has many suspended classmates. Therefore, measuring classmate suspension at the classroom level is likely to provide better evidence for the consequences of suspension.

In contrast to findings from Perry and Morris (2014), a line of research suggests that removing challenging peer behaviors can benefit the remaining students (Aizer, 2008; Carrell & Hoekstra 2010; Figlio, 2007; Fletcher, 2010). For example, having peers with behavioral problems decreases educational outcomes (Carrell & Hoekstra 2010; Neidell & Waldfogel, 2010) and increases delinquent behavior (Dodge et al., 2006; Figlio, 2007). Given that the majority of suspension is related to mild misbehavior, including defiance or disruptive classroom behavior (Morrison & D'Incau, 1997; Skiba, Peterson, & Williams, 1997; Raffaele Mendez &

Knoff, 2003), research on the effects of peer misbehavior provides important implications on the effects of suspension on non-suspended students.

The effects of suspension on the educational outcomes of non-suspended students can be positive for several reasons. Classrooms with fewer students with challenging behavior influence teachers' pedagogical methods (Lavy, Paserman, & Schlosser, 2012)[3] that can lead to positive learning outcomes. For example, classrooms that have fewer students with challenging behaviors may allow teachers to cover more advanced material and emphasize more analytical and critical skills, enhancing educational achievement. In addition, because student misbehavior can increase teachers' fatigue and burn-out (Brouwers & Tomic, 1999; Clunies-Ross, Little, & Kienhuis, 2008), non-suspended students may benefit from more effective teaching due to classmate suspensions. Fewer disruptive students can increase instruction time, which improves learning for other classmates; teachers can spend more time on instruction rather than spending time dealing with student misbehavior.

Potentially Varying Effects of Suspensions on the Achievement of Non-Suspended Classmates

The effects of suspension on the educational outcomes of non-suspended students can vary across several factors. First, given that students receive suspensions for various reasons, the effects of suspension on the remaining students can vary by infraction type. Second, considering that some students are more susceptible to peer influence than others (Sacerdote, 2011), a non-disruptive learning environment may be particularly important for a certain group of students. Finally, because sorting students into vertically differentiated courses is a common practice across schools (Mickelson, 2001; Domina, Hanselman, Hwang, & McEachin, 2016), students in lower track classrooms may have more classmates who have an elevated risk of receiving

[3] Lavy, Paserman, and Schlosser (2012) capture teachers' pedagogical strategy in the following ways: (1) instilling knowledge and enhancement of comprehension, (2) instilling analytical and critical skills, (3) transparency, fairness and feedback, (4) individual treatment of students, (5) instilling capacity for individual study.

suspensions. Below I discuss potential factors can lead to heterogeneous effects: varying effects across infraction types, varying effects of classmate suspension across academic tracks, and varying levels of classmate suspension exposure.

Schools use suspensions as disciplinary responses for various behavior problems from serious delinquent behavior such as drugs or weapons to mild behavior issues such as defiance (Morrison & D'Incau, 1997; Skiba, Peterson, & Williams, 1997; Raffaele Mendez & Knoff, 2003). Suspensions that are related to violent and disruptive behavior can provide productive learning environments, whereas suspensions that are related to non-violent and non-disruptive behavior may have little impact. For example, the effects of classroom removal of students with violent and disruptive behavior are likely to differ from the removal of students with truancy problems. Although infraction type can play a critical role in the effects of suspension, prior studies did not investigate the potential effects of suspension by infraction type.

Given that some students are more susceptible to peer influence than others (Sacerdote, 2011), it is possible that the effects of suspensions on non-suspended classmates can be stronger for academically struggling students. First, orderly classroom environments may be particularly critical for students in low track classes, because students who struggle the most are likely to be disengaged due to peer disruption. Non-disruptive learning environments can be a valuable resource that can affect students' cognitive and socio-emotional development, and this may be particularly important for students who face the most challenges. Second, because academically weak students are more likely associated with other academically weak students (Kang, 2007), and low-achieving students tend to receive suspensions more frequently than high-achieving ones (Arcia, 2006; Stevens et al, 2015), the impact of suspension can be stronger for non-suspended students in low track classes. If suspension means that fewer disruptive peers are

associating with students, removing the disruptive students may result in more enhanced educational achievement for those students in the lower track. Finally, given that low-achieving students tend to be involved in delinquent behavior and are also often scared to go to school because of violent peer behavior (Lavy, Paserman, & Schlosser, 2011), the reduced peer misbehavior that results from suspension provides a productive environment for students who normally interact with these suspended peers.

Because a classroom environment varies within a school (Conger, 2005; Clotfelter, Ladd, & Vigdor, 2002; Kalogrides & Loeb, 2013), suspension rates at the classroom level likely vary not only across schools but also within schools. Considering that achievement level is one influential factor that determines track assignment (Gamoran, 1992; Jones, Vanfossen, & Ensminger, 1995; Vanfossen, Jones, & Spade; 1987) and that low achievement levels are associated with suspension rates (Arcia, 2006; Hemphill, Plenty, Herrenkohl, Toumbourou, & Catalano, 2014; Stevens et al, 2015), students in a lower track class are likely to have classmates face classmate suspension more frequently than high-achieving students. Thus, the impacts of peer suspension may be particularly important for students in a lower track class where the suspension rate is likely to be higher.

In sum, although it is essential to understand the effects of suspension on non-suspended students, we have little understanding of whether and to what extent suspension hinders the learning of non-suspended classmates. Moreover, little is known about whether the impact of suspension varies across students. In this study, I measure peer suspension based on the number of students who receive suspensions in a given classroom to examine the consequences of suspension on non-suspended classmates. Perry and Morris (2014) used suspension at the school level that captures the school climates affecting student learning, but the school suspension rates

failed to detect changes of learning environment in a classroom. Moreover, because the authors used data from a school district in Kentucky where both suspension rates and the percentage of black students were relatively high, it is important to examine whether the findings are consistent in other contexts. Third, although suspension can have a heterogeneous effect across infraction types, no studies have examined the potential varying effects by type of infraction. Finally, given that classroom suspension rates vary within a school, I explore whether students in lower-track classes are more likely to be exposed to classmate suspension and examine whether and to what extent the effects of suspension are different across academic tracks.

Research Questions

Based on prior studies, I ask the following research questions:

(a) What are the effects of classmate suspension on the educational achievement of non-suspended students?

(b) Do the effects of classmate suspension on the educational achievement of non-suspended students vary across infraction types?

(c) Do the effects of classmate suspension on the educational achievement of non-suspended students vary across academic tracks?

Data and Methods

I used administrative data from one public school district in California to address these questions. The data include a sample of 15,251 students (grades 7 through 11) in 17 different schools from the 2009-2010 to 2011-2012 academic year. I observed quarterly student achievement and the number of suspensions that students receive in each quarter. I used unbalanced panel data, so the number of observations per student varies from one to 12 over the

three years.[4] These data include student demographic information such as gender, race/ethnicity, language status, free or reduced-price lunch (FRL) eligibility, teacher and classroom identification, quarterly math and English Language Arts (ELA) scores, and discipline records such as in-school suspensions and out-of-school suspensions.

[Insert Table 3.1 here]

On average, approximately 3% of students received at least one in-school suspension each year and 5% of students received at least one out-of-school suspension each year in the district. To investigate the effects of suspension on the educational achievement of non-suspended students, I used the full sample to create suspension at the school level and at the classroom level, but I excluded students who received either in-school or out-of-school suspension at least once from the analysis sample.[5] As a result, I have 14,067 non-suspended students and 135,060 observations for math analysis and 133,859 observations for 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 whether the suspensions affect the educational achievement of non-suspended students.

Table 1 reports the descriptive statistics of the sample of the study (i.e., non-suspended students) and student demographics in the district and in California. On average, quarterly in-school and out-of-school suspension rates at the school level are 0.8% and 1.5%, respectively. Similarly, quarterly in-school suspension and out-of-school suspension rates at the classroom level are 0.8% and 1.4%, respectively.[6] The majority of students in the study were from low-

[4] To check robustness, we also ran models with balanced panel data and the findings were consistent. The results are available upon request.

[5] The findings are robust with data that include all students. The results are available upon request.

[6] Although changes in classroom environment resulting from in-school and out-of-school suspension are identical, we decided to separately examine these effects for three reasons. First, since classroom-level and out-of-school suspension rates are only weakly correlated (alpha=.22), the independent effects of these two forms of suspension

income family households (i.e., 70% of the students were eligible for FRL). More than half of the students were Hispanic, one third was Asian, 12% were white, and only 1% were black. Although non-suspended students' and overall students' demographic characteristics in the district are similar, the non-suspended students' characteristics reflect student subgroups that receive suspensions more frequently than the other groups. For example, the group of non-suspended students has a slightly lower proportion of male students, Hispanic students, students who are eligible for FRL, and English Language Learners. Both math and ELA benchmark scores are higher for non-suspended students. The student characteristics between the sample of the study and those of overall California students are different, but some characteristics, such as the proportion of females, Hispanics, and English Language Learners in the district, are very similar to overall California student demographics.

[Insert Table 3.2 here]

Table 2 shows the links between student characteristics and exposure to classmate out-of-school suspension. I divided classroom suspension into three categories, including zero classmate suspension, a low level of classmate suspension (i.e., 5% or lower classmates who received suspensions), a high level of classmate suspension (i.e., higher than 5% classmates who received suspensions), to examine student characteristics that are linked to the varying levels of exposure to classmate suspension. Hispanic students are more likely to share a classroom with classmates who received suspensions, whereas Asian students are less likely to share a classroom with classmates who received suspensions. In addition, students who are eligible for FRL, ELL students, students who are enrolled in special education, and low-achieving students tend to be

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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.

overexposed to classmate suspension. In terms of exposure to classmate in-school suspension in math class and suspension (both in-school and out-of school) in ELA class, the patterns also suggest that racial minority, FRL, ELL, and special education status, and low achievement are linked to higher exposure to classmates who received suspensions.

Figure 3.1 shows that schools use suspensions as disciplinary actions for varying infraction types. Minor behavior problems, including disruptive classroom behavior and defiance, are the most frequent reasons why students receive suspensions, whereas serious and major behavior problems, including drugs and weapons, are less frequent. These findings are consistent with prior studies that suggest that a majority of infraction types is related to mild behavior issues (Morrison & D'Incau, 1997; Raffaele Mendez & Knoff, 2003; Skiba, Peterson, & Williams, 1997).

[Insert Figure 3.1 here]

Figure 3.2 displays the classmate out-of-classroom suspension rates by math track (i.e., Pre-Algebra, Algebra, and Geometry or higher) across quarters. On average, during the first quarter, the classmate out-of-school suspension rates are approximately 0.6%, whereas during the fourth quarter, the rates are approximately 2%. The classmate out-of-school suspension rates are highest for students in Pre-Algebra, and the rates are lowest for students in Geometry and higher math courses. For students in Pre-Algebra, 2.5% of classmates received suspensions in the fourth quarter, compared with 1.3% of classmates in Geometry or higher in the same period. The rates of in-school suspension are also consistently higher for lower-track classes. The pattern shows that the suspension rates increased toward the end of the academic year. Exposure to classmate suspension is higher for students in the lower track and lower for students in the higher track.

[Insert Figure 3.2 here]

Measures

To examine whether exposure to a classroom with suspended classmates in a given quarter predicts student achievement at the end of the quarter, I used *Benchmark Test Scores* as dependent variables. The district in this study has administered benchmark tests four times a year to evaluate students' learning progress and to guide teacher instruction across schools since the 2007-2008 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, because students took different math tests depending upon their courses (e.g., Algebra or Geometry), I created standardized scores for each math course to estimate the effects of suspension on non-suspended classmates based on each quarter. In other words, I standardized math scores for each combination of course and quarter. For ELA achievement, because students took ELA tests by grade, I used standardized ELA scores for each combination of grade and quarter. These standardized scores for math and ELA with student fixed effects allow us to compare the educational achievement of the same students before and after their classmates' suspensions.

Our key variables are *Schoolmate Suspension* and *Classmate Suspension*, and I measured schoolmate and classmate suspension in three different ways. In terms of schoolmate suspension, I measured (1) the number of schoolmates who received suspensions, (2) the percentage of schoolmates who received suspensions, and (3) the number of suspension events in a school. Similarly, in terms of classmate suspension, I measured (1) the number of classmates who received suspensions, (2) the percentage of classmates who received suspensions, and (3) the number of suspension events in a classroom. Both schoolmate suspension and classmate

suspensions are measured as continuous variables that vary at the school and at the classroom level across school quarters.

These measures are largely independent of one another. For example, the correlation between suspension rates at the school and at the classroom is .30 for in-school suspension and .14 for out-of-school suspension. Supplementary analyses indicate that schools account for only between 15% and 20% of in-school suspension rates at the classroom level, and schools account for approximately 5% of out-of-school suspension rates at the classroom level. These results suggest that attending a school with a high rate of suspension does not imply exposure to a classroom in which many peers are suspended. As Figure 3.2 indicates, schools differentiate students into courses, and students who are assigned to lower track classes are more prone to exposure to classmates with disciplinary problems. The box plots in Figure 3.3 provide a graphic representation of out-of-school suspension rates at the math classroom level across 17 different schools. They show that although the average classroom suspension rates across schools are similar, the rates vary considerably within a school. In-school suspension rates at the math classroom level and suspension (both in-school and out-of-school suspension) rates at the ELA classroom level also show that exposure to classmate suspension differs within a school.

[Insert Figure 3.3 here]

Because students receive suspensions for various reasons, the effects of classmate suspension may vary across infractions. Thus, I created variables that indicate classmate suspension across different types of infraction. When classmate suspension is related to weapons or drugs, fighting, defiance, or disruptive classroom behavior, I coded them as disruptive classmate suspension. When classmate suspension is exclusively related to truancy and other infractions, I coded them as non-disruptive classmate suspension.

I also included several control variables in the models. The records are from district-wide administrative data system in the district. I created a variable that indicates whether a student is eligible for FRL (i.e., coded as 1 when a student is eligible for FRL and otherwise 0). In addition, I created a variable that indicates whether a student is an ELL (i.e., coded as 1 when a student is an ELL and otherwise 0). Similarly, I created a variable that indicates whether a student is enrolled in special education (i.e., coded as 1 when a student is enrolled in special education and otherwise 0).

Analytic approach

Following prior studies (Rausch & Skiba, 2004; Perry & Morris, 2014), I first used suspension at the school level in the model. To examine the effects of suspension at the school level, I used student fixed effects to compare student achievement for a given quarter across quarters with varying levels of schoolmate suspension. By focusing on only within-person variance, all time-invariant heterogeneity of between-student differences is controlled. 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. The model with suspension at the school level is as follows:

$$Y_{icsgt} = \beta X_{icsgt} + \theta \mathrm{I}_{csgt} + \delta_s + \omega_g + \tau_t + \lambda_c + \mu_i + \varepsilon_{icsgt}$$

In this model, 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} indicates student and family characteristics that change over time (e.g., FRL eligibility status), I_{csgt} indicates the percent of classmates who get suspended in that quarter/year,

δ_s indicates school fixed effects, ω_g indicates grade fixed effects, τ_t indicates year and quarter fixed effects, λ_c indicates classroom fixed effects, μ_i indicates student fixed effects, and ε_{icsgt} is the error term. Standard errors are clustered at the school level. θ captures the main effect of schoolmate suspension on the achievement of non-suspended classmates because it indicates achievement changes for a given student during a quarter when schoolmates received suspensions, compared with a quarter when removal did not occur.

Next, because suspension at the classroom level is a more proximal measure and also considerable variations in suspension exist across classes, I used suspension at the classroom level in the analysis. To examine the relation between suspension and non-suspended students' achievement, I used a student fixed effects approach to test the longitudinal associations between suspension in a quarter and non-suspended students' educational outcomes. This student fixed effect approach allows us to compare the educational achievement of the same students across quarters in which classmate suspension varied[7]. The main source of the variation is varying exposure to classmate suspensions across quarters. The model with suspension at the classroom level is as follows:

$$Y_{icsgt} = \beta X_{icsgt} + \theta \mathrm{I}_{csgt} + \delta_s + \omega_g + \tau_t + \mu_i + \varepsilon_{icsgt}$$

In this model, 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} indicates student and family characteristics that change over time (e.g., FRL eligibility status), I_{csgt} indicates the percent of classmates who get suspended in that quarter/year, δ_s indicates school fixed effects, ω_g indicates grade fixed effects, τ_t indicates year and quarter fixed effects,

[7] In this district, all students take math class every quarter and every year until they reach to 11th grade. Thus, the consistent enrollment across quarters and years allows us to compare achievement change for a given student across quarters with varying levels of classmate suspension.

μ_i indicates student fixed effects, and ε_{icsgt} is the error term. Standard errors are clustered at the school level[8]. θ captures the main effect of suspension on the achievement of non-suspended classmates because it indicates achievement changes for a given student during a quarter when classmates were removed from class (i.e., in-school suspension) or school (i.e., out-of-school suspension), compared with a quarter when removal did not occur. To examine whether and to what extent the effects of classmate suspension vary by infraction type, I ran models with variables that indicate infractions that are related to violent and disruptive behavior (e.g., fighting, disruptive classroom behavior, and defiance) and infractions that are not (e.g., truancy). Finally, to test whether the effects of suspension differ across different tracks, I also ran separate analyses for each math track (i.e., Pre-Algebra, Algebra, and Geometry or higher)[9].

Results

Models 1 through 6 in Table 3.3 display the effects of schoolmate suspension on the educational achievement of non-suspended students.[10] Models 1 and 2 include the number of schoolmates who received suspensions, Models 3 and 4 include the percentage of schoolmates who received suspensions, and Models 5 and 6 include the number of suspension events in a school. Models 1 through 6 show that suspension at the school level does not have any effect on the math and ELA achievement of non-suspended students.

Next, I included classmate suspension instead of schoolmate suspension in the models to investigate the effects of suspension at the classroom level on the educational outcomes of non-

[8] I also clustered standard errors at the classroom level and at the student level, and the findings are consistent.

[9] Because students took ELA tests based on their grade levels, I lack information about the ELA course taking. As a result, I was not able to test whether the effects of classmate suspension on the ELA achievement vary by ELA track.

[10] All the full models in this study are available upon request.

suspended students. Similar to models with suspension at the school level, Models 7 and 8 include the number of classmates who received suspensions, Models 9 and 10 include the percentage of schoolmates who received suspensions, and Models 11 and 12 include the number of suspension events in a class.

[Insert Table 3.3 here]

Models 7, 9, and 11 show that the out-of-school suspensions positively affect the math achievement of non-suspended students, whereas in-school suspensions do not have any effect on the math achievement of non-suspended students. Model 7 shows that one classmate out-of-school suspension leads to a .04 SD increase in math achievement of non-suspended students. Model 9 shows that one percent of classmate out-of-school suspension leads to a .008 SD increase in math achievement of non-suspended students. When one student received out-of-school suspension in a math class of 20 students (i.e., 5% of classmate suspension), the math achievement of a non-suspended student increased by .04 SD (i.e., .008*[1/20] = .04). Given that there were 19 non-suspended students, one out-of-school suspension can lead to a .76 SD increase in total (i.e., .04*19 = .76). Model 11 shows that one out-of-school suspension event in a classroom leads to approximately a .04 SD increase in math achievement of non-suspended students. In contrast to math achievement, Models 8, 10, and 12 show that classmate suspension has little impact on the ELA achievement of non-suspended students.

[Insert Table 3.4 here]

Table 3.4 shows whether and to what extent the effects of classmate suspension vary across infraction types.[11] Models 1, 3, and 5 suggest that classmate suspension that is related to

[11] I also ran models to examine whether the effects of schoolmate suspension vary across infraction types, but none of the effects are significant. The results are available upon request.

disruptive behavior (i.e., drugs or weapons, fighting, defiance, or disruptive classroom behavior) may lead to positive effects on the math achievement of non-suspended students, whereas classmate suspension that is related to non-disruptive behavior (i.e., truancy) may have little impact for non-suspended students. Models 1, 3, and 5 show that one out-of-school suspension that is related to disruptive behavior increases the math achievement of a non-suspended student by .03 SD, but out-of-school suspension that is related to non-disruptive behavior has no impact on the educational achievement of non-suspended students. In terms of in-school suspension, classmate suspension does not have any effect on the math achievement of non-suspended students, regardless of types of infraction. Models 2, 4, and 6 show that classmate suspension has little impact on the ELA achievement of non-suspended students.

[Insert Table 3.5 here]

To examine whether the effects of classmate suspension vary across different math tracks, I ran separate analyses for each math course. Models 1, 4, and 7 in Table 5 show the effects of classmate suspension for students who are in a Pre-Algebra class. Models 2, 5, and 8 show the effects of classmate suspension for students who are in an Algebra class. Models 3, 6, and 9 show the effects of classmate suspension for students who are in a Geometry or higher math courses. Models 1, 4, and 7 show that suspensions have positive effects on the math achievement of non-suspended students who are in a Pre-Algebra class. One classmate suspension leads to a .04 SD increase in math achievement of non-suspended students. Supplementary analyses show that the coefficient for classmate out-of-school suspension in a Pre-Algebra class is significantly different from a Geometry or higher math class (see Appendix

Table 3.1)[12]. Figure 3.4 shows the varying effects of classmate suspension on the educational achievement of non-suspended students across varying math track courses.

[Insert Figure 3.4 here]

Alternative Model Specification

To further explore the effects of suspension on the educational achievement of non-suspended students, I ran several alternative models. First, to investigate whether the effects of suspensions on non-suspended classmates' achievement are non-linear, I included variables that indicate a low level of classmate suspension rates (i.e., 5% or less) and a high level of classmate suspension rates (i.e., higher than 5%). Both low and high levels of suspension rates have positive effects on the math educational achievement of non-suspended students, but they have little impact on the ELA achievement of non-suspended students. In addition, I included square terms of classmate suspension rates in the models to test whether the relations are curvilinear, but they were not significant. The results suggest that the effects of suspension on the math achievement of non-suspended students are linear, and also indicate that a smaller proportion of peer suspension (i.e., less than 5%) can help students learn more. I also added teacher fixed effects to the models to test whether the positive suspension effects remain after taking teacher effects into account. The results show that the classmate suspensions have positive effects on the math achievement of non-suspended students even after controlling for teacher effects[13]. These results from alternative model specifications support the main findings (see Appendix Table 3.2).

[12] I also examined whether the effects of suspension vary by infraction type across math tracks. The results show that in-school suspensions that are related to disruptive behavior have positive effects on the math achievement of non-suspended students in the Pre-Algebra track. The results are available upon request.

[13] Adding teacher fixed effects to the models produces the estimation of suspension effects after controlling for teacher effects that may influence the educational achievement of non-suspended students. However, we decided not to include teacher fixed effects to the models for several reasons. First, whether including teacher fixed effects leads to more precise estimation is an empirical question. Second, adding teacher fixed effects comes with costs because we end up losing variations of the students who have no teacher variations. Finally, the results with and without teacher fixed effects are consistent.

To investigate whether the effects vary across other subgroups, I included interactions between classmate suspension and student characteristics, including gender, race/ethnicity, and FRL eligibility. Appendix Tables 3.3 and 3.4 show that the effects are not stronger for students who are eligible for FRL, ELL students, higher-grade level students, or female students. In terms of ELA, there is some evidence which suggests that suspension may be beneficial for students enrolled in special education but less beneficial for black students. However, I did not find any evidence that the effects of suspension on the math achievement of non-suspended students vary across these subgroups.

I also ran analyses starting with bivariate regression and adding controls. In the first model, I ran bivariate regression. In the second model, I added FRL eligibility, ELL status, and special education enrollment to the first model. In the third model, I added school fixed effects, quarter and year fixed effects, and grade fixed effects to the second model. Finally, in the fourth model, I added student fixed effects to the third model. I conducted analyses for both math and ELA models. The results show that including student fixed effects changes the direction of coefficient on exposure to classmate suspension. These findings suggest that controlling for student fixed effects plays a key role in estimating the effects of suspension on the educational achievement of non-suspended students (see Appendix Table 3.5).

Discussion

In recent years, many school districts made their disciplinary codes more lenient to reduce suspension rates. What are the consequences of suspension reduction? In this study, I examined whether and to what extent suspensions affect the learning of non-suspended classmates. Following prior research (Perry & Morris, 2014), I first examined the effects of schoolmate suspension on the educational achievement of non-suspended students. Because

schoolmate suspension is likely to fail to capture classroom learning environments that vary within a school, I next examined whether classmate suspension instead of schoolmate suspensions impact the educational achievement of non-suspended students.

Our analysis provides evidence that classmate suspension can enhance the math achievement of non-suspended classmates, whereas schoolmate suspension has little impact on the educational achievement of the remaining students. In addition, I find that out-of-school suspensions that are related to violent and disruptive behavior infractions have positive effects on the math achievement of remaining students, whereas suspensions that are unrelated to violent and disruptive behavior infractions do not. Moreover, the positive effects of out-of-school suspension on the math achievement of non-suspended classmates are particularly crucial for students in a lower track math class (i.e., Pre-Algebra). Our results suggest that isolating students with behavioral challenges from the classroom helps other students to learn. In fact, these findings are aligned with research on peer effects that show that mitigating disruptive peer behavior can improve student learning (Aizer, 2008; Fletcher, 2010).

Although both in-school and out-of-school suspension leads to changes in the number of students with challenging behavior in a classroom, I find that in-school suspension has little impact on the achievement of non-suspended students. It is possible that because the duration of in-school suspension is likely to shorter period than out-of-school suspensions, the effects of classmate in-school suspension maybe insignificant. The insignificant effects of in-school suspension also may be due to the lack of statistical power because the district in the study has low in-school suspension rate. Given that in-school suspension is a common way of disciplinary responses in U.S. schools, future research that examines the effects of classmate suspension on non-suspended students is essential. In contrast to math achievement, suspension has little impact

on the ELA achievement of non-suspended students. Perhaps an orderly classroom environment is critical for acquiring math skills because learning math may require more attention and instruction time than learning ELA. It is also plausible that students are exposed to learning ELA in multiple classes, including history and social science, whereas learning math is more likely to occur exclusively in the math classroom.

Why are our findings different from prior research? Perhaps contextual differences between a high suspension environment and a relatively lower suspension environment may lead to differential consequences of suspension. Perry and Morris's (2014) findings are based on data from a district in Kentucky where the yearly out-of-school suspension rate is 22%. Frequent suspensions can disturb learning environments because students frequently enter and exit the classroom for disciplinary reasons. This inconsistent classroom environment for teachers as well as classmates can hamper the learning of non-suspended students. In addition, overly punitive environments can lead to disengagement for not only suspended students but also their non-suspended peers. Assuming that a caring and supportive climate enhances student learning, frequent classroom removal creates a harsh environment, which can eventually hinder all student learning. The district in our study has relatively lower suspension rates (i.e., 5% yearly out-of-school suspension rate), which may indicate that teachers use suspension as a disciplinary last resort, which in turn can protect the learning opportunities of non-suspended students.

It is also possible that suspension leads to a less disruptive classroom climate, which can result in a more productive learning environment. The findings of this study are limited to one school district in California, but they provide critical information regarding school disciplinary policy. Given that students with similar racial and socioeconomic backgrounds tend to live close to each other (Domina 2006; Massey, Rothwell, & Domina, 2009), attend the same schools

(Reardon, Yun, & Eitle, 2000), and tend to share classrooms (Carbonaro & Gamoran, 2002; Gamoran & Nystrand, 1994; Van Houtte, 2004), the findings suggest that policies that aim to reduce suspension rates can in fact hinder the learning of well-behaving students from disadvantaged backgrounds who are more likely to share classrooms with suspended students. Our data also demonstrate that exposure to classmate suspension is higher for students who are eligible for FRL, ELL students, and Hispanic students. Further, I find that the positive effects of classmate suspension are mostly for students who are in a lower math track (i.e., Pre-Algebra). Thus, the findings of the study deepen concerns about the consequences of recent policies that are simply targeted at reducing suspension rates.

Nevertheless, the recent policies that discourage suspensions have addressed important issues regarding school discipline. First, these policies draw attention to the fact that an overly punitive environment creates a climate that lacks trust and caring relationships between students and teachers, which may hinder learning. Because school disciplinary practices should aim to promote positive behavior and enhance learning instead of punishing students, simply removing students from the classroom may not be an optimal disciplinary response. Furthermore, given that students may receive unfair treatment due to bias from teachers and principals (Petras et al., 2011; Skiba et al., 2002; Welch & Payne, 2010), recent policies have sought to eliminate unequal treatment and differing use of disciplinary measures across different groups. Policies that focus on reducing suspension rates have the potential to promote a positive school climate, which can improve student cognitive and social-emotional development.

Policies aimed at reducing suspension rates have good intentions and desirable goals. However, simply focusing on lowering suspension rates is likely to miss a critical point – specifically, mitigating disruptive student behavior. Because peer behavior has a significant

effect on student learning (Aizer, 2008; Carrell & Hoekstra 2010; Fletcher, 2010), policies focusing on the immediate reduction of suspension rates or the elimination of suspension without addressing problematic behaviors can in fact damage the learning of others.

Dramatic suspension reduction leads to neither fair school rules nor improved school climate. Ultimately, positive youth development requires both consistent discipline and caring relationships with adults (Gregory et al, 2010). For example, schools with strict discipline rules are associated with few negative effects of peer misbehavior (Zimmerman & Rees, 2014) and insignificant racial achievement gaps between black and white students (Arum & Velez, 2012). In addition, in schools with fewer rules, students perceive school discipline as less strict but also as less fair (Arum, 2003). A recent report on school climate in New York public schools also suggests that recent school disciplinary reform is associated with more violence and more gang activity in schools where more than 90% of students are minorities (Eden, 2017).

If suspending classmates with behavioral challenges helps to enhance the learning of other students, questions arise regarding students who get suspended. Reports suggest that the long-term social cost of suspending students can be enormous because receiving suspensions is linked with higher dropout rates and a greater involvement with the juvenile justice system (Rumberger & Losen, 2016).[14] Given that receiving suspensions is linked with a variety of negative outcomes, it is important to minimize the negative effects that suspensions have on suspended students. For example, schools can provide resources for suspended students, such as academic support and emotional counseling. It is also critical for teachers to understand the culture and context of students from underprivileged backgrounds as a way to mitigate student misbehavior.

[14] Rumberger and Losen (2016) argue that the total cost of suspending 10th grade students can exceed $35 billion.

Although our study contributes to the literature on the effects of suspension on non-suspended students, it has several limitations. First, because I use data from one school district in California, the findings may not be generalizable to other settings. Many studies focus on the disparity in school discipline between black and white students, but the sample of this study has only 1% black students. Future research that is based on different demographic compositions is necessary to examine whether the findings are consistent. Second, models with alternative model specification provides suggestive evidence that the effects of suspension on the educational achievement of non-suspended students may vary by race/ethnicity or by special education enrollment status. Further investigation is needed to examine the varying effects of suspension across subgroups. Third, this study does not examine the effects of alternative ways to discipline students, including restorative justice system or Positive Behavioral Interventions and Supports. Because many school districts have implemented these suspension alternatives in recent years (Skiba & Losen, 2016), it is important to investigate the impacts of recent disciplinary reform. Fourth, it is informative to examine whether and to what extent the effects of office disciplinary referrals (ODRs) differs from the effects of suspension, but I was not able to include ODRs information in our analyses. Future studies with ODRs will help us further understand the effects of disciplinary responses on student learning. Finally, students' perceptions regarding the fairness and consistency of school discipline can play a critical role in the consequences of suspension, but this data does not allow us to account for this critical factor. Future studies with more information will provide a richer understanding of the role of student perceptions of fair and consistent discipline.

Despite its limitations, this study overcomes the critical shortcomings of prior studies and provides new evidence on the effects of suspension. A student fixed effects approach allows us

to compare a student who is exposed to a higher suspension rate with the same student who is exposed to a lower or no suspension rate. Moreover, I use suspensions at the classroom level instead of school level to measure a more direct effect of suspension on non-suspended students. Our findings add to the literature by showing that mitigating disruptive peer behavior can increase student achievement (Aizer, 2008; Carrell & Hoekstra, 2010; Fletcher, 2010). Finally, I find that students in a lower math track class are more likely to be exposed to a classroom environment with a higher proportion of suspension, and also that less disruptive classroom climate is particularly important for struggling learners. Simply reducing suspension rates does not necessarily equal better school discipline. Considering that many recent policies focus on simply reducing suspension rates, the new policies in the absence of addressing student misbehavior may bring unintended consequences. The results of the study initiate a critical discussion on school disciplinary policies and the best ways to educate students with challenging behaviors.

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Table 3.1

Descriptive Statistics of Student Characteristics and Suspensions

	Observations (N=135,060)					
	Mean	S.D.	Min	Max	District Mean	CA Mean
Female	0.51		0.00	1.00	0.50	0.49
Hispanic	0.51		0.00	1.00	0.53	0.51
Asian	0.35		0.00	1.00	0.33	0.11
White	0.12		0.00	1.00	0.12	0.27
Black	0.01		0.00	1.00	0.01	0.07
Other	0.01		0.00	1.00	0.01	0.04
Free or reduced lunch status	0.70		0.00	1.00	0.71	0.54
English language learner	0.22		0.00	1.00	0.23	0.26
Special education status	0.07		0.00	1.00	0.08	0.11
Math benchmark score	64.62	18.73	5.00	100.00	63.85	
ELA benchmark score	65.13	15.56	0.00	97.50	64.49	
Number of suspended schoolmate						
Schoolmates received ISS	7.18	10.79	0.00	63.00		
Schoolmates received OSS	11.05	7.93	0.00	34.00		
Suspension rate at the school level						
ISS rate[c]	0.81	1.08	0.00	5.43		
OSS rate[c]	1.46	1.19	0.00	5.61		
Number of suspended classmate						
Math classmates received ISS	0.10	0.40	0.00	3.25		
Math classmates received OSS	0.16	0.54	0.00	2.75		
ELA classmates received ISS	0.10	0.43	0.00	3.25		
ELA classmates received OSS	0.17	0.58	0.00	2.25		
Suspension rate at the classroom level						
ISS rate[c] (math)	0.83	2.35	0.00	30.00		
OSS rate[c] (math)	1.42	2.36	0.00	31.58		
ISS rate[c] (ELA)	0.81	2.60	0.00	30.00		
OSS rate[c] (ELA)	1.40	2.83	0.00	40.00		
Zero ISS rate (math)	0.85		0.00	1.00		
Low ISS rate (math)	0.10		0.00	1.00		
High ISS rate (math)	0.05		0.00	1.00		
Zero OSS rate (math)	0.74		0.00	1.00		
Low OSS rate (math)	0.16		0.00	1.00		
High OSS rate (math)	0.09		0.00	1.00		
Zero ISS rate (ELA)	0.85		0.00	1.00		
Low ISS rate (ELA)	0.10		0.00	1.00		
High ISS rate (ELA)	0.05		0.00	1.00		
Zero OSS rate (ELA)	0.74		0.00	1.00		
Low OSS rate (ELA)	0.18		0.00	1.00		
High OSS rate (ELA)	0.09		0.00	1.00		

Note. ISS indicates in-school suspension and OSS indicates out-of-school suspension. rate[c] indicates continuous variable. ELA indicates English Language Art. Low suspension rate is 5% or less and high suspension rate is higher than 5% suspension rate. District Mean is based on all the students in the district. California mean is from California Department of Education website (http://dq.cde.ca.gov/dataquest/).

Table 3.2

Student Characteristics and Exposure to Classmates Who Received Out-Of-School Suspensions in Math Classroom

	Zero classmate suspension (*N*=10,514)	Low level of classmate suspension (0-5%) (*N*=2,274)	High level of classmate suspension (>5%) (*N*=1,279)
Female	0.49	0.49	0.46
Asian	0.35	0.27	0.20
Black	0.01	0.01	0.01
Hispanic	0.50	0.60	0.69
White	0.12	0.10	0.10
Other	0.01	0.01	0.01
FRL	0.70	0.74	0.78
ELL	0.22	0.26	0.41
Special education	0.07	0.04	0.40
Math achievement	64.10	63.21	53.90
ELA achievement	64.58	63.53	54.12

Note. FRL indicates students who are eligible for free or reduced-price lunch. ELL indicates students who are English Language Learners. This is based on pooling data across grades 7th through 11th in a California district.

Table 3.3

The Effects of Schoolmate or Classmate Suspension on the Educational Achievement of Non-Suspended Students, with Student Fixed Effects

	Suspension at the School Level						Suspension at the Classroom Level					
	Model 1 Math	Model 2 ELA	Model 3 Math	Model 4 ELA	Model 5 Math	Model 6 ELA	Model 7 Math	Model 8 ELA	Model 9 Math	Model 10 ELA	Model 11 Math	Model 12 ELA
# of schoolmate or classmate received ISS	-0.0006	0.0001					0.0011	0.0026				
	(0.0004)	(0.0003)					(0.0249)	(0.0079)				
# of schoolmate or classmate received OSS	0.0006	0.0000					0.0411***	0.0010				
	(0.0007)	(0.0002)					(0.0082)	(0.0052)				
% of schoolmate or classmate received ISS			-0.0067	-0.0007					0.0030	0.0003		
			(0.0047)	(0.0025)					(0.0040)	(0.0020)		
% of schoolmate or classmate received OSS			0.0059	0.0010					0.0082**	0.0009		
			(0.0061)	(0.0017)					(0.0022)	(0.0012)		
# of ISS events in a school or classroom					-0.0003	0.0000					-0.0003	0.0007
					(0.0003)	(0.0001)					(0.0106)	(0.0060)
# of OSS events in a school or classroom					0.0005	0.0001					0.0350***	0.0012
					(0.0006)	(0.0002)					(0.0072)	(0.0044)
Constant	0.453**	0.088	0.454**	0.091	0.449**	0.089	0.046	0.220***	0.041	0.220***	0.047	0.0007
	(0.1335)	(0.3092)	(0.1320)	(0.3082)	(0.1334)	(0.3091)	(0.068)	(0.018)	(0.064)	(0.018)	(0.068)	(0.018)
N	135060	133859	135060	133859	135060	133859	135060	133859	135060	133859	135060	133859

Note. ISS indicates in-school suspension and OSS indicates out-of-school suspension. All models control for student, year, quarter, school, and grade fixed effects as well as free or reduced-price lunch, special education, and English language learner status. The models with suspension at the school level also include classroom fixed effects. Standard errors are clustered at the school level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3.4

The Effects of Classmate Suspensions on Educational Achievement of Non-Suspended Students by Infraction Type (Non-Disruptive or Disruptive), with Student Fixed Effects

	Model 1 Math	Model 2 ELA	Model 3 Math	Model 4 ELA	Model 5 Math	Model 6 ELA
# of classmate received ISS (non-disruptive)	0.003	-0.007				
	(0.008)	(0.020)				
# of classmate received ISS (disruptive)	-0.007	-0.002				
	(0.020)	(0.007)				
# of classmate received OSS (non-disruptive)	-0.011	-0.002				
	(0.012)	(0.008)				
# of classmate received OSS (disruptive)	0.033**	0.003				
	(0.011)	(0.004)				
% of classmate received ISS (non-disruptive)			0.001	-0.002		
			(0.002)	(0.004)		
% of classmate received ISS (disruptive)			0.002	-0.000		
			(0.002)	(0.001)		
% of classmate received OSS (non-disruptive)			-0.001	-0.001		
			(0.003)	(0.002)		
% of classmate received OSS (disruptive)			0.006	0.001		
			(0.003)	(0.001)		
# of ISS events in a classroom (non-disruptive)					0.007	-0.011
					(0.008)	(0.017)
# of ISS events in a classroom (disruptive)					-0.010	-0.001
					(0.011)	(0.008)
# of OSS events in a classroom (non-disruptive)					-0.002	0.001
					(0.017)	(0.005)
# of OSS events in a classroom (disruptive)					0.027*	0.002
					(0.009)	(0.003)
Constant	0.044	0.221***	0.039	0.221***	0.043	0.220***
	(0.068)	(0.020)	(0.065)	(0.019)	(0.069)	(0.020)
N	135060	133859	135060	133859	135060	133859

Note. ISS indicates in-school suspension and OSS indicates out-of-school suspension. All models control for student, year, quarter, school, and grade fixed effects as well as free or reduced-price lunch, special education, and English language learner status. Disruptive behavior includes weapons or drugs, fighting, defiance, or disruptive classroom behavior related infractions. Non-disruptive behavior includes truancy or other infractions. Standard errors are clustered at the school level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

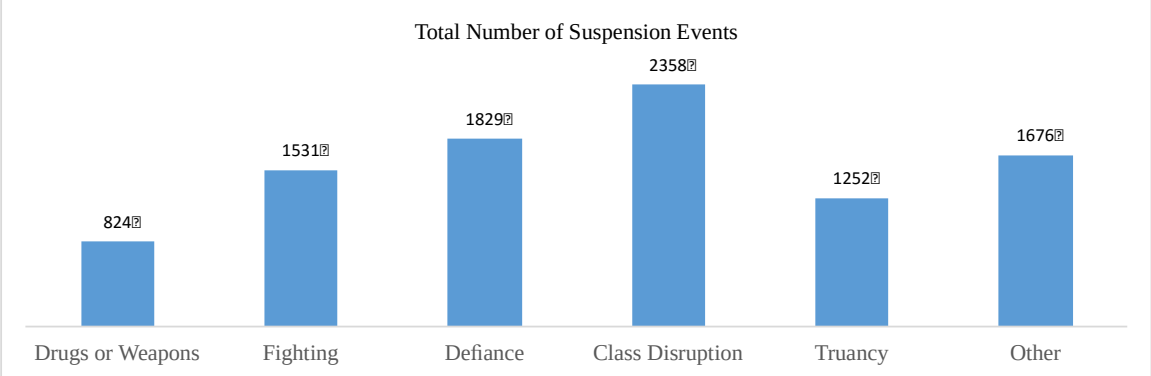
Table 3.5

The Effects of Classmate Suspensions on the Educational Achievement of Non-Suspended Students across Math Courses, with Student Fixed Effects

	Pre-Algebra	Algebra	Geometry or Higher	Pre-Algebra	Algebra	Geometry or Higher	Pre-Algebra	Algebra	Geometry or Higher
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
# of classmates received ISS	0.014	0.013	-0.025						
	(0.030)	(0.026)	(0.050)						
# of classmates received OSS	0.042*	0.019	0.003						
	(0.018)	(0.013)	(0.031)						
% of classmate received ISS				0.004	0.004	-0.002			
				(0.006)	(0.005)	(0.008)			
% of classmate received OSS				0.010	0.002	0.001			
				(0.005)	(0.003)	(0.005)			
# of ISS events in a classroom							0.008	0.016	-0.021
							(0.025)	(0.021)	(0.046)
# of OSS events in a classroom							0.039*	0.013	0.009
							(0.015)	(0.010)	(0.027)
Constant	-0.683*	-0.541*	-0.526*	-0.705*	-0.541*	-0.528*	-0.676*	-0.544*	-0.527*
	(0.292)	(0.207)	(0.245)	(0.288)	(0.208)	(0.246)	(0.291)	(0.207)	(0.245)
N	35125	68323	31210	35125	68323	31210	35125	68323	31210

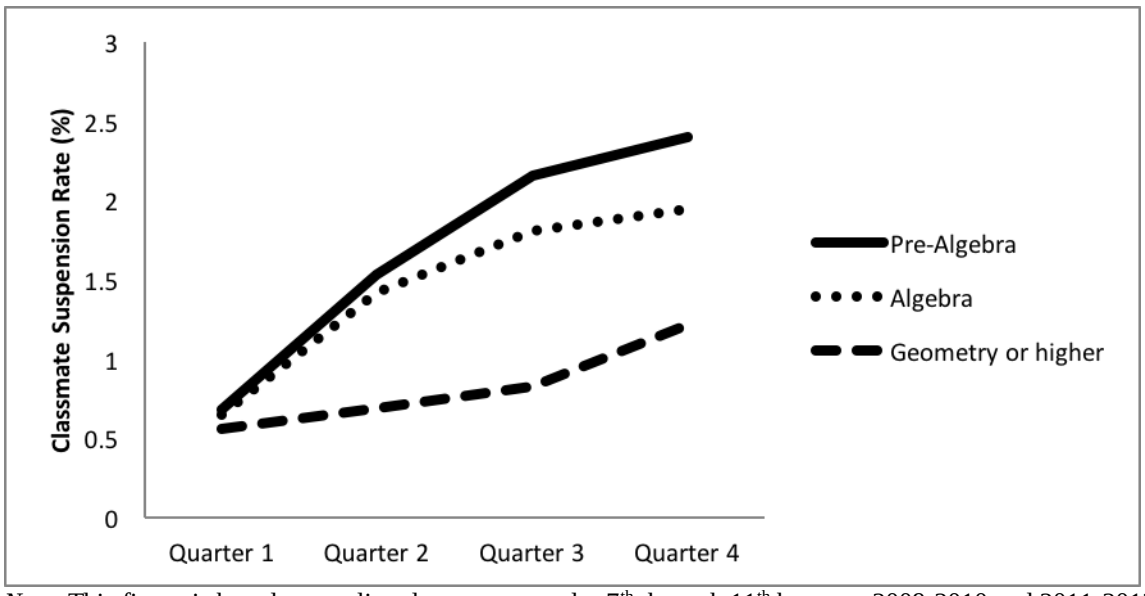
Note. ISS indicates in-school suspension and OSS indicates out-of-school suspension. All models control for student, year, quarter, school, and grade fixed effects as well as free or reduced-price lunch, special education, and English language learner status. Standard errors are clustered at the school level. We ran models for each math course (i.e., Pre-Algebra, Algebra, and Geometry or higher). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 3.1
The Number of Suspension Events across Infraction Types



Note. The number of suspension is based on data across grades 7th through 11th between 2009-2010 and 2011-2012 academic year. One suspension can belong to multiple infraction types.

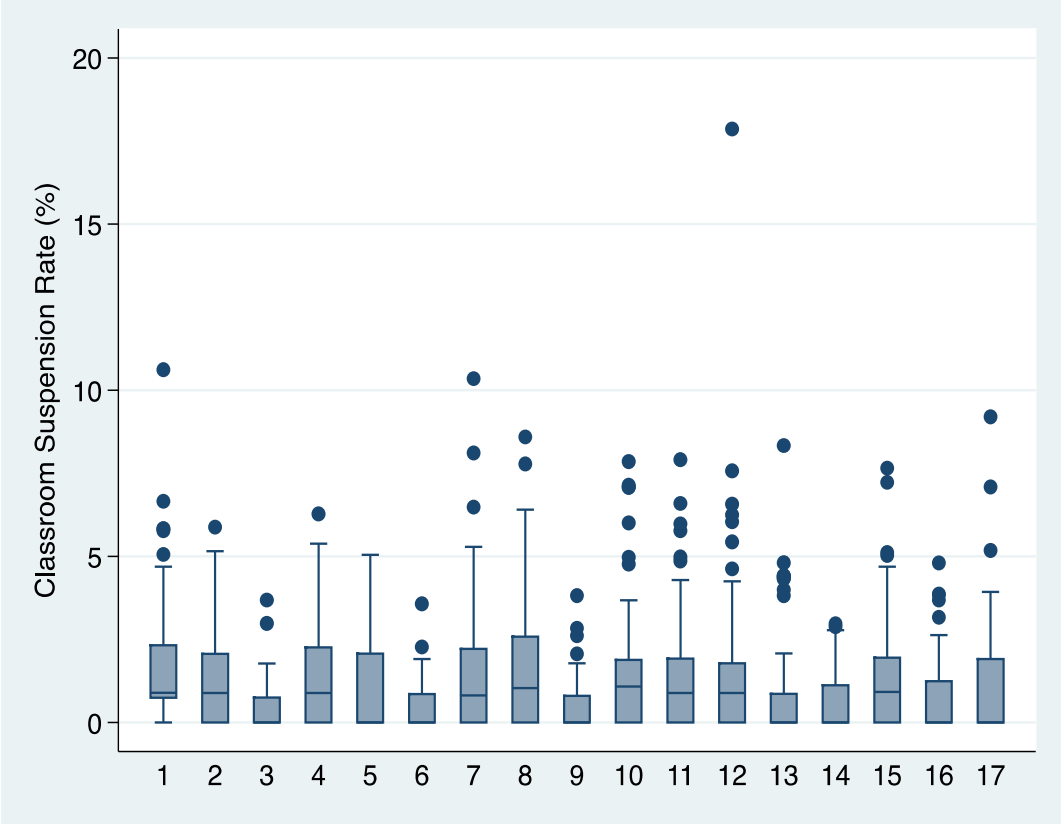
Figure 3.2
Out-Of-School Suspension Rate at the Classroom Level across Quarters by Math Track



Note. This figure is based on pooling data across grades 7th through 11th between 2009-2010 and 2011-2012.

Figure 3.3

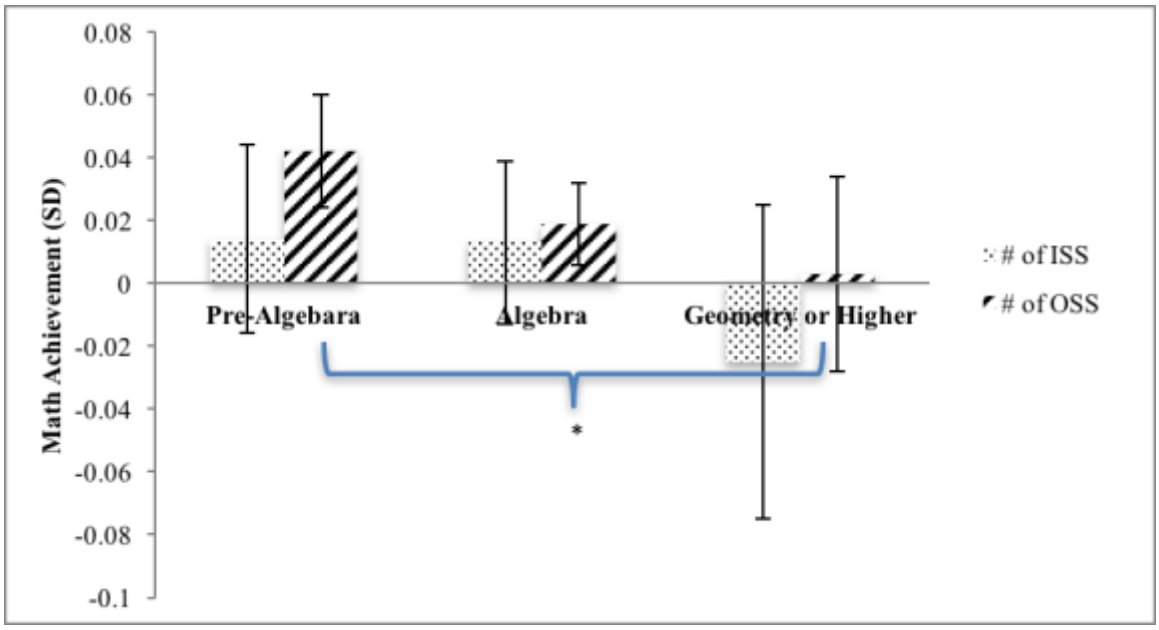
Suspension Rate at the Classroom Level across 17 Secondary Schools in a California School District



Note. The box plot shows the out-of-school suspension rates at the math classroom level.

Figure 3.4

The Effects of Suspension on the Math Achievement of Non-Suspended Students by Math Track, with Student Fixed Effects



Note. ISS indicates in-school suspension and OSS indicates out-of-school suspension.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix Table 3.1
The Effects of Classmate Suspension on the Math Achievement of Non-Suspended Students across Math Tracks, with Student Fixed Effects

	Model 1	Model 2	Model 3
Math Track (Reference: Geometry or higher)			
Pre-Algebra	0.853***	0.847***	0.852***
	(0.122)	(0.122)	(0.122)
Algebra	0.198**	0.196**	0.197**
	(0.064)	(0.064)	(0.064)
# of classmates received ISS	-0.030		
	(0.048)		
# of classmates received OSS	0.003		
	(0.021)		
Pre-Algebra X # of classmates received ISS	0.113		
	(0.055)		
Algebra X # of classmates received ISS	0.019		
	(0.062)		
Pre-Algebra X # of classmates received OSS	0.051*		
	(0.024)		
Algebra X # of classmates received OSS	0.041		
	(0.031)		
% of classmates received ISS		-0.002	
		(0.008)	
% of classmates received OSS		0.002	
		(0.003)	
Pre-Algebra X % of classmates received ISS		0.020*	
		(0.009)	
Algebra X % of classmates received ISS		0.002	
		(0.010)	
Pre-Algebra X % of classmates received OSS		0.010*	
		(0.004)	
Algebra X % of classmates received OSS		0.005	
		(0.005)	
# of ISS events in a classroom			-0.025
			(0.043)
# of OSS events in a classroom			0.003
			(0.019)
Pre-Algebra X # of ISS events in a classroom			0.094
			(0.047)
Algebra X % # of ISS events in a classroom			0.020
			(0.053)
Pre-Algebra X # of OSS events in a classroom			0.045*
			(0.021)
Algebra X # of OSS events in a classroom			0.032
			(0.027)
Constant	-0.590***	-0.591***	-0.591***
	(0.109)	(0.109)	(0.109)
N	135060	135060	135060

Note. ISS indicates in-school suspension and OSS indicates out-of-school suspension. All models control for student, year, quarter, school, and grade fixed effects as well as free or reduced-price lunch, special education, and English language learner status. Standard errors are clustered at the school level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix Table 3.2

The Effects of Classmate Suspension on the Educational Achievement of Non-Suspended Students, with Student Fixed Effects

	No vs. Low or High Suspension		Quadratic Relationship		With Teacher FE	
	Model 1 Math	Model 2 ELA	Model 3 Math	Model 4 ELA	Model 5 Math	Model 6 ELA
No vs. Low or High classmate suspension (Reference group: Zero Suspension)						
< 5% of classmates received ISS	0.015	-0.006				
	(0.030)	(0.011)				
More than 5% of classmates received ISS	0.005	0.003				
	(0.032)	(0.019)				
< 5% of classmates received OSS	0.030*	0.005				
	(0.013)	(0.008)				
More than 5% of classmates received OSS	0.086**	-0.001				
	(0.026)	(0.013)				
Quadratic relationship						
# of classmates received ISS (squared)			-0.012	0.010		
			(0.013)	(0.005)		
# of classmates received OSS (squared)			0.008	-0.001		
			(0.005)	(0.003)		
Teacher Fixed Effects						
# of classmates received ISS			0.024	-0.018	-0.001	-0.000
			(0.030)	(0.016)	(0.021)	(0.009)
# of classmates received OSS			0.027	0.002	0.033***	0.001
			(0.014)	(0.010)	(0.006)	(0.005)
Constant	0.025	0.195***	0.030	0.198***	0.418*	0.162**
	(0.069)	(0.018)	(0.066)	(0.019)	(0.182)	(0.047)
N	135060	133859	135060	133859	135060	133859

Note. ISS indicates in-school suspension and OSS indicates out-of-school suspension. All models control for student, year, quarter, school, and grade fixed effects as well as free or reduced-price lunch, special education, and English language learner status. Standard errors are clustered at the school level. Teacher FE indicates teacher fixed effects. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix Table 3.3

The Effects of Classmate Suspension on the Educational Achievement of Non-Suspended Students by FRL, ELL, or Special Education Status, with Student Fixed Effects

	Interactions with FRL		Interactions with ELL		Interactions with Special Education	
	Math	ELA	Math	ELA	Math	ELA
# of classmates received ISS	-0.007	0.003	0.004	-0.003	0.002	0.004
	(0.028)	(0.007)	(0.025)	(0.008)	(0.026)	(0.008)
# of classmates received OSS	0.031	-0.001	0.044***	0.001	0.041***	-0.001
	(0.016)	(0.008)	(0.009)	(0.006)	(0.009)	(0.005)
FRL	0.009	-0.010	0.013	-0.010	0.013	-0.009
	(0.024)	(0.010)	(0.025)	(0.010)	(0.025)	(0.010)
FRL X # of classmates received ISS	0.011	-0.000				
	(0.023)	(0.009)				
FRL X # of classmates received OSS	0.013	0.003				
	(0.014)	(0.009)				
ELL	-0.086**	-0.058***	-0.081**	-0.062***	-0.086**	-0.058***
	(0.025)	(0.015)	(0.024)	(0.016)	(0.025)	(0.015)
ELL X # of classmates received ISS			-0.011	0.023		
			(0.021)	(0.015)		
ELL X # of classmates received OSS			-0.011	-0.001		
			(0.016)	(0.009)		
Special Education	-0.033	-0.042	-0.033	-0.043	-0.030	-0.049
	(0.042)	(0.024)	(0.042)	(0.024)	(0.037)	(0.024)
Special Education X # of classmates received ISS					-0.033	-0.024
					(0.049)	(0.022)
Special Education X # of classmates received OSS					-0.003	0.033**
					(0.037)	(0.011)
Constant	0.049	0.220***	0.045	0.219***	0.046	0.220***
	(0.068)	(0.018)	(0.067)	(0.018)	(0.067)	(0.018)
N	135060	133859	135060	133859	135060	133859

Note. ISS indicates in-school suspension and OSS indicates out-of-school suspension. All models control for student, year, quarter, school, and grade fixed effects as well as free or reduced-price lunch, special education, and English language learner status. FRL indicates students who are eligible for free or reduced-price lunch. ELL indicates students who are English Language Learners. Standard errors are clustered at the school level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix Table 3.4

The Effects of Classmate Suspension on the Educational Achievement of Non-Suspended Students by Racial/Ethnic Groups, Grade, or Gender, with Student Fixed Effects

	Interactions with Race/Ethnicity		Interactions with Grade		Interactions with Female	
	Math	ELA	Math	ELA	Math	ELA
# of classmates received ISS	0.009	0.003	0.009	0.003	-0.002	0.007
	(0.028)	(0.015)	(0.121)	(0.062)	(0.026)	(0.011)
# of classmates received OSS	0.041	0.004	0.034	-0.019	0.037**	-0.004
	(0.019)	(0.014)	(0.053)	(0.039)	(0.011)	(0.005)
Interactions with Race/Ethnicity						
# of classmates received ISS X Asian	-0.008	0.008				
	(0.039)	(0.022)				
# of classmates received ISS X Black	0.002	0.030				
	(0.078)	(0.031)				
# of classmates received ISS X Hispanic	-0.008	-0.005				
	(0.027)	(0.017)				
# of classmates received ISS X Other	-0.080	0.014				
	(0.049)	(0.025)				
# of classmates received OSS X Asian	0.003	-0.004				
	(0.004)	(0.015)				
# of classmates received OSS X Black	0.004	-0.106**				
	(0.012)	(0.035)				
# of classmates received OSS X Hispanic	-0.001	-0.001				
	(0.005)	(0.015)				
# of classmates received OSS X Other	-0.002	-0.059				
	(0.014)	(0.048)				
Interactions with Grade						
# of classmates received ISS X Grade			-0.001	-0.000		
			(0.014)	(0.007)		
# of classmates received OSS X Grade			0.001	0.002		
			(0.006)	(0.005)		
Interactions with Female						
# of classmates received ISS X Female					0.005	-0.009
					(0.007)	(0.009)
# of classmates received OSS X Female					0.009	0.010
					(0.009)	(0.008)
Constant	0.045	0.219***	0.141	0.421***	0.046	0.220***
	(0.067)	(0.017)	(0.221)	(0.085)	(0.068)	(0.018)
N	135060	133859	135060	133859	135060	133859

Note. ISS indicates in-school suspension and OSS indicates out-of-school suspension. All models control for student, year, quarter, school, and grade fixed effects as well as free or reduced-price lunch, special education, and English language learner status. Standard errors are clustered at the school level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix Table 3.5

The Effects of Classmate Suspension on the Educational Achievement of Non-Suspended Students with a Varying Range of Controls

	Model 1		Model 2		Model 3		Model 4	
	Math	ELA	Math	ELA	Math	ELA	Math	ELA
# of classmate received ISS	-0.059	-0.104**	-0.055	-0.073	-0.111***	-0.111***	0.001	0.003
	(0.063)	(0.032)	(0.073)	(0.038)	(0.020)	(0.019)	(0.025)	(0.008)
# of classmate received OSS	-0.070	-0.204***	-0.028	-0.103***	-0.045*	-0.098***	0.041***	0.001
	(0.035)	(0.020)	(0.030)	(0.014)	(0.019)	(0.013)	(0.008)	(0.005)
FRL, ELL, special education	Not included	Not included	Included	Included	Included	Included	Included	Included
School, quarter, year, grade fixed effects	Not included	Not included	Not included	Not included	Included	Included	Included	Included
Student fixed effects	Not included	Not included	Not included	Not included	Not included	Not included	Included	Included
Constant	0.091	0.123	0.308**	0.468***	0.657***	0.508***	0.046	0.220***
	(0.067)	(0.067)	(0.090)	(0.039)	(0.050)	(0.020)	(0.068)	(0.018)
N	135060	133859	135060	133859	135060	133859	135060	133859

Note. ISS indicates in-school suspension and OSS indicates out-of-school suspension. FRL indicated free or reduced-price lunch eligibility. ELL indicates English language learner status. Standard errors are clustered at the school level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Summary and Conclusion

In recent years, states and school districts have introduced policies aimed at reducing suspension rates and have experimented with alternative ways to discipline students. Do the efforts to reduce suspension benefit those students who are at risk for suspensions but harm learning environments? The purpose of my dissertation is to provide critical information on the consequences of suspension reduction by investigating the effects of suspension on the educational achievement of suspended students as well as non-suspended students.

Summary of Findings

In Study 1, I explore whether a certain group of students has a higher risk of exposure to frequent classmate suspension. I provide descriptive analysis on the links between student characteristics and exposure to classmate suspension. I also describe the extent to which a track assignment is associated with exposure to classmate suspension. I find that Hispanic students tend to be exposed to higher levels of classmate suspension than white students. In addition, students who are eligible for free or reduced-price lunch and low-achieving students are at a higher risk for exposure to classmate suspension. Importantly, I find that these associations disappear or become weaker after taking track assignment into account. The findings suggest that track assignment contributes to unequal classroom environments across students.

In Study 2, I investigate the effects of suspension on the educational achievement of students who received suspensions. I examine whether or not the effects of receiving suspension vary by suspension type (i.e., in-school suspension vs. out-of-school suspension) and frequency

of suspension (i.e., receiving one suspension vs. receiving multiple suspensions). I use student fixed effects to compare the educational achievement change for a given student across quarters with varying levels of suspensions. The results reveal that receiving multiple out-of-school suspensions is associated with negative educational outcomes (.23 SD decrease in math; .19 SD decrease in ELA), whereas receiving out-of-school suspension once is not associated with negative educational outcomes. I also find that receiving in-school suspensions (either once or more than once) in a given quarter is not associated with end-of-quarter achievement.

In Study 3, I examine the effects of suspension on the educational achievement of non-suspended students. I use student fixed effects to compare the educational achievement change for a given student across school quarters with varying levels of exposure to classmate suspension. The results show that a higher classmate suspension rate enhances the math achievement of non-suspended students. For example, 5% classmate suspension (e.g., one student in a class of 20 students received one out-of-school suspension in a quarter) leads to a .04 SD increase in the math achievement of a non-suspended student. Considering that there are 19 non-suspended students, the effect size is .76 SD [i.e., .04 SD * 19 = .76 SD] in total. By contrast, I found no effects of suspension on the ELA achievement of non-suspended students.

Key Lessons Learned

My studies provide empirical evidence for the effects of suspension on the educational outcomes of suspended students and non-suspended students. Given that suspension rates in some school districts have plummeted in recent years, the findings of this dissertation deserve attention from policy makers, educators, and researchers.

Main findings

Scholars and professionals have raised concerns about the negative effects of suspension on students who receive suspensions (American Academy of Pediatrics, 2013; American Psychological Association, 2008; Gregory, Skiba, & Noguera, 2010; Lee, Cornell, Gregory, & Fan, 2011). The results from Study 2 provide empirical evidence that these concerns are valid. These results suggest that receiving multiple out-of-school suspensions leads to lower math and ELA achievement change for suspended students. The findings echo studies that receiving suspension is linked to negative educational outcomes (Arcia, 2006; Morris & Perry, 2016). Given that students from disadvantaged family backgrounds receive suspensions more frequently than students from advantaged family backgrounds, suspensions may contribute to achievement gaps. Removing students from classrooms and schools reduces instruction time and increases the chances of school disengagement for suspended students, which may eventually result in unfavorable educational outcomes. Because low achievement can lead to lower academic interest and less classroom engagement, receiving suspensions can, in fact, increase behavioral problems that lead to a wide range of negative youth outcomes, including future suspensions (Raffaele Mendez, 2003) and dropouts (Christle et al., 2004; Christle et al., 2007; Lee, Cornell, Gregory, & Fan, 2011).

A key rationale for suspending students, however, is to provide productive learning environments for their remaining classmates. In Study 3, I test this important hypothesis. Does suspending students provide better learning environments for non-suspended students? The results from Study 3 show that classmate suspension can actually help non-suspended students learn more. I find that classmate suspension positively affects the educational achievement of non-suspended students. Considering the findings from Study 1 that racial and ethnic minority

students, students from low-income families, and academically struggling students tend to share classrooms with suspended students, the recent dramatic reduction of suspension rates across school districts may in fact damage the learning environments of students from vulnerable populations.

Policy implications

My dissertation shows that suspension may hinder the educational achievement of suspended students but enhance the educational achievement of non-suspended students. Do the positive effects of suspension for non-suspended students outweigh the negative effects of suspension for suspended students? The results from Study 2 and Study 3 say yes to this question for math achievement, but not for ELA achievement. As an example, suppose one student receives out-of-school suspensions twice in a math class with 20 students (i.e., 5% suspension rate at the classroom level). The math achievement of the one suspended student decreases by .23 SD, but the math achievement of 19 non-suspended students are estimated to increase by .04 SD. Because the number of non-suspended students is higher than the number of suspended students (1 suspended student vs. 19 non-suspended students), the positive aggregate effects [i.e., .04 SD *19 = .76 SD] are larger than the negative effects on the suspended student's achievement. Of course, other considerations may cause us to weight the positives and negatives differently. In the case of in-school suspensions, the effects of in-school suspensions on educational achievement are insignificant for both suspended students and non-suspended students.

In contrast to math achievement, the positive effects of suspension do not outweigh the negative effects of suspensions on ELA achievement. Receiving multiple out-of-school suspensions is associated with lower ELA achievement, whereas classmate suspension has little

impact on the ELA achievement of non-suspended students. The findings imply that suspension reduction may benefit students at risk for suspensions, but classmate suspension has little effect on ELA achievement for non-suspended students.

In terms of math achievement, the findings suggest that suspension has positive effects on the achievement of non-suspended students. Therefore, the results provide evidence that reducing suspension rates or eliminating suspensions can result in unintended consequences: damaging the learning environments of students who are mostly from disadvantaged family backgrounds. Without doubt, policies that aim to reduce or eliminate suspensions have good intentions. By discouraging student suspension, schools can keep students in classrooms, provide learning opportunities, and prevent a wide range of negative outcomes for students who are at risk for suspensions. However, policies that lead to a rapid decrease in suspension rates are likely to miss a fundamental issue of school discipline — student misbehavior. In the absence of addressing disruptive student behavior, keeping students with behavioral challenges in the classroom is likely to hinder teachers in their teaching and harm learning environments.

Studies have demonstrated that a majority of offense reasons are related to mild behavior problems, including classroom disruptions (Morrison & D'Incau, 1997; Skiba, Peterson, & Williams, 1997) and disobedience (Raffaele Mendez & Knoff, 2003). In addition, disruptive classroom behavior is a main contributing factor to high teacher stress levels (Klassen & Chiu, 2010) and teacher burnout (Brouwers & Tomic, 1999; Clunies- Ross, Little, & Kienhuis, 2008). High teacher turnover is also related to little autonomy over student misbehavior (Ingersoll, 2003). Considering that peer misbehavior is likely to affect both educational and behavioral outcomes (Aizer 2008; Carrell & Hoekstra 2010; Fletcher 2010), overlooking disruptive classroom behavior in school disciplinary policy is likely to harm educational processes.

Furthermore, misbehaving students may have few negative effects on their peers in schools with strict discipline rules (Zimmerman & Rees, 2014), and schools with greater levels of school discipline may also have insignificant racial achievement gaps between black and white students (Arum & Velez, 2012).

Students from disadvantaged family backgrounds are more likely to live close to students from similar racial and socioeconomic backgrounds (Domina, 2006; Massey, Rothwell, & Domina, 2009) and attend schools with higher percentages of low-income and minority students (Frankenberg, 2013; Frankenberg, Siegel-Hawley, Wang, & Orfield, 2012; Reardon, Yun, & Eitle, 2000). Further, students who are racial minorities and from low-income families tend to be assigned to lower track classrooms (Oakes, 1985; Useem, 1992). Given that students from vulnerable populations are more likely to receive suspensions than their advantaged counterparts, and their classmates are also likely to be from disadvantaged backgrounds, students who are exposed to high levels of classmate suspensions are more likely to be from vulnerable populations. In fact, Study 1 in this dissertation shows that low-achieving at-risk students are more likely to be exposed to higher levels of classmate suspension, mainly due to within-school sorting practices (i.e., track assignment).

Taken together, dramatic suspension reduction can create detrimental learning environments especially for those from vulnerable populations. A recent report on the school climate of New York public schools also raises considerable concerns on school discipline reforms by showing that school disorder has increased after school districts made their disciplinary codes more lenient (Eden, 2017). Furthermore, the links between the recent discipline reform and negative school climates are stronger in schools with a higher percentage of racial/ethnic minorities.

The findings from my dissertation suggest that removing disruptive students from the classroom can enhance the learning of remaining students. However, concluding that suspension is a desirable policy may be premature. Classroom removal or school removal is unlikely to deter or correct student misbehavior. Particularly for students who are not interested in learning and have lower school engagement, suspension may encourage them to misbehave more frequently to avoid being in school. Students from racial minorities and low socioeconomic status backgrounds tend to exhibit more behavioral problems, in part because they are more likely to be exposed to stressful home environments, including a lack of home resources and higher chances of domestic violence (Cox, Kotch, & Everson, 2003; Fantuzzo & Mohr, 1999). Thus, sending students with challenging behavior back home to remove them from schools may not be an optimal disciplinary response.

Furthermore, in this dissertation, I was only able to examine the short-term effects of suspension on educational achievement. Considering that receiving suspension may affect a variety of critical long-term outcomes, including dropping out and involvement in the juvenile justice system, the negative effects of suspending students may not offset the positive effects of suspension in the longer term. Failure to provide adequate support during the vulnerable adolescent period may produce more individuals with less education and more individuals with criminal records, which in turn creates a larger burden for society.

Finally, the findings of this study may not be generalizable for other contexts. I used data from one school district that has relatively lower suspension rates. It is plausible that the effects of suspension are positive only when schools use suspensions as a last resort. Because the process of suspending students itself reduces instruction time and disrupts student learning, frequent use of suspensions may harm the learning of all students.

Despite its limitations, the findings of this dissertation provide several critical implications for school disciplinary policy. First, the results demonstrate that disciplining students with challenging behavior is a daunting task. Students with at-risk factors – including students who are eligible for FRL, ELL, enrolled in special education, and low achieving students – are more likely to face classmate suspension. Thus, eliminating the negative effects of a disruptive classmate is particularly critical for providing a productive learning environment for students from vulnerable populations. At the same time, suspension can hinder positive development by, for example, lowering academic achievement for suspended students who are also from vulnerable populations. Considering that suspension remains a common means of disciplining students, policy makers and educators should aim for programs or interventions that minimize the negative effects of receiving suspension.

Second, the findings of this dissertation suggest that using suspension rates as a measure of school accountability may actually endanger a school's overall climate. Lower suspension rates are ideal only if they indicate that students are behaving better. If schools receive rewards based on the lower suspension rates, schools have incentives to reduce suspension rates. Reducing the number of suspensions without improving student behavior merely leads to school disorder.

Finally, the results point to the importance of preventing disruptive behavior. A body of research emphasizes the importance of teachers' classroom management skills; the value of strong student-teacher relationships; and the impact of engaging lesson plans in maintaining a positive learning environment. Given that the negative effects of misbehavior for both misbehaving students themselves as well as their classmates, it is crucial to explore ways to mitigate disruptive behavior.

Future Research

The findings of my dissertation point to future research avenues that would further advance our understanding of exclusionary disciplinary policy. First, although the rationale of suspension is to provide productive learning environments for the remaining students, researchers have been surprisingly silent on this issue. Up until now, only one study has been available, but its findings are not consistent with mine. Their study, which uses data from Kentucky, finds that suspension has negative effects on the educational achievement of non-suspended students (Perry & Morris, 2014), whereas my study (i.e., Study 3), with data from California, finds that suspension has positive effects on the educational achievement of non-suspended students. Thus, future research on school districts with varying suspension rates can help us better understand the consequences of classmate suspension on student learning.

Second, investigating the long-term impacts of receiving suspension is both challenging and critical. Research shows that histories of receiving suspension are linked to long-term negative consequences, including a higher dropout rate, lower political participation, and a higher chance of involvement in the criminal justice system. However, whether and to what extent these links are causal is still an open question. Given that students from disadvantaged backgrounds are likely to receive suspensions, the studies that isolate the effects of suspension from other confounding effects will have important policy implications regarding the role of disciplinary responses on the developmental outcomes of suspended students.

Third, qualitative research on student perception about suspension as well as classmate suspension will provide a richer understanding of school discipline policy. Student perceptions of the fairness and consistency of disciplinary policy play a key role in the effects of receiving suspension as well as classmate suspension. Future research with qualitative data, including

interviews and observation, will provide essential information on the impacts of school discipline on educational and behavioral outcomes.

Finally, the findings of this dissertation underscore the challenges that schools face regarding student misbehavior. “Get tough” school disciplinary practices are unlikely to correct or deter misbehavior. Furthermore, as Study 2 shows, removing students from classrooms and schools is likely to lower the educational outcomes of suspended students. However, because mitigating disruptive student behavior can create productive environments, classmate suspension may enhance the learning of non-suspended students. Therefore, future research that investigates the best ways to deter disruptive behavior and discipline students with behavioral challenges will provide important insights and policy implications for U.S. schools.

Conclusion

In recent years, motivated by research that shows the associations between receiving suspensions and a wide range of negative youth developmental outcomes, many school districts have implemented new disciplinary policies that aim to reduce or eliminate suspensions. The findings of this dissertation suggest that receiving suspensions decreases the educational achievement of suspended students, and yet classmate suspension increases the educational achievement of non-suspended students. In the absence of addressing student misbehavior, policies that simply reduce suspension rates may harm learning environments, particularly for those students who are assigned to lower track classes.

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