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ABSTRACT

Student Disruptions and Teacher Turnover

This paper examines how exposure to disruptive students affects teacher retention using linked teacher-student administrative records from North Carolina. To address non-random classroom assignment, we instrument for classroom exposure using the school-by-grade share of disruptive students based on prior-year disciplinary infractions. A one standard deviation increase in the share of disruptive students raises the probability of a teacher leaving the school in the following year by 1.6 percentage points. We do not find differential effects by teacher characteristics. However, working in a school environment with supportive leadership and greater teacher input into decision-making mitigates the impact of student disruptions.

JEL Classification: I29, J45
Keywords: teacher turnover, student behavior

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1 Introduction

Teacher turnover is an increasingly prominent problem in the U.S. education system. It exacerbates teacher shortages and imposes financial as well as non-pecuniary burdens for schools that aim to fill vacancies.[1] Turnover and on-the-job dissatisfaction have been elevated in recent years, with the onset of the pandemic accelerating this trend (Diliberti & Schwartz, 2022). In the 2021-2022 school year, 8 percent of all public school teachers moved to a different school while another 8 percent left the teaching profession (Taie & Lewis, 2023). Turnover is highest for early career teachers, with almost a quarter of teachers entering public schools leaving the profession within the first three years (Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2008). High rates of teacher shortages across the country add to the urgency of understanding the contextual, institutional, and individual factors that contribute to teacher turnover, particularly among less experienced teachers (U. S. Government Accountability Office, 2022).

One class of factors that may have significant impacts on teachers' employment decisions is teacher working conditions, which include teacher autonomy, administrative support, student behavior, relationships with colleagues, facilities and resources, and safety. Among this group, a relatively under-studied attribute is student behavior. This is somewhat surprising given its status as one of the most commonly cited reasons for departing teaching, particular among early career teachers.[2] Existing literature on the role of student behavior in teacher turnover decisions provide mostly descriptive evidence (Aloe et al., 2014; Kukla-Acevedo, 2009; Penner et al., 2023).

This paper provides evidence on the causal contributions of student behavior to teacher turnover, and explores how this attribute interacts with other aspects of teachers' working environment. Efforts to estimate the effect of student characteristics on teacher turnover are complicated by endogenous classroom assignment. We rely on administrative data from North Carolina that link teachers to students and classrooms, and use the school-by-grade share of disruptive students as an instrument for the corresponding student share that a given teacher is exposed to in their own classrooms. This alleviates concerns of within-school sorting among a given cohort of teachers based on unobservables and

[1] Estimates of the cost of replacing a single teacher range from $11,000-$25,000 (Tan & Patrick, 2024). It can also lower education quality by increasing the share of less experienced teachers, those teaching out of their subject area of certification, or those scoring less well on teacher licensure tests (Sorensen & Ladd, 2020).

[2] For example, a survey of the most important factor shaping New York City teachers' decision to leave the profession yielded the most votes for administrator support, followed by student behavior (Boyd et al., 2011). Penner, Liu, and Ainsworth (2023) find that the share of students receiving exclusionary discipline predicts higher turnover across all staff groups.

administrator discretion.

A consideration in formulating the treatment variable is that we do not want to conflate with contemporaneous measures that may reflect teachers' own pedagogical approaches. As such, we identify potentially disruptive students based on their disciplinary records from the *prior year*. The resulting instrument captures variation in students with already-documented behavioral issues, which may subsequently affect teachers' classroom management. The inclusion of less severe office referral records in disciplinary data minimizes concerns about selective reporting and allows for examining effects across disruptive behavior intensity and type.

Our findings indicate that a 10 percentage point increase in the classroom share of potentially disruptive students increases teacher turnover by 1.0 percentage points, or nearly 4 percent of the baseline mean. An alternative view is that turnover increases by 1.6 percentage points following a one standard deviation shift in the share of disruptive students. Achieving a change in turnover rates of equivalent magnitude using these two measures would require a 6-10% pay raise based on available estimates of the causal effect of teacher salaries (Hendricks, 2014). The size of the student behavior effect appears uniform across our two types of turnover (moving to a different public school in the North Carolina system or leaving the system entirely), but it is larger when the students are involved in more serious disciplinary incidents.

We then explore whether effects vary by common teacher and school attributes. We do not find evidence that turnover is more responsive to student behavior for particular teacher gender or racial groups, or by school-level measures of student composition across achievement, demographic, and socioeconomic dimensions. Instead, we find differential effects by teacher working conditions, specifically those on school leadership, student conduct policies, and teacher input into school decision-making. Teachers working in schools ranking in the bottom half for supportive leadership, respectful and trustful atmosphere, and the extent to which leadership help teachers manage student disciplinary issues are significantly more likely to turn over, while those in the top half are buffered against the effects of student disruption. Similarly, there is higher turnover in response to disruptive student behavior among teachers whose school environments permit less teacher input into aspects of decision-making such as school improvement plans. Notably, these differential responses are only salient for teachers leaving the North Carolina public school system rather than cross-school switches. Taken together, our findings suggest that improvements to select dimensions of the school leadership and working environment can yield returns on teacher turnover.

This paper relates to multiple areas of research. First, our study contributes to causal

research on the determinants of teacher turnover, which can span external policy factors, teacher and administrator attributes, student body characteristics, and teacher working conditions. Policies that can influence turnover behaviors include school accountability (Dee & Wyckoff, 2015; Dizon-Ross, 2020; Elacqua, Hincapié, & Martínez, 2024; Feng, Figlio, & Sass, 2018), suspension policy (Pope & Zuo, 2023), and retention or bonus pay (Clotfelter, Glennie, Ladd, & Vigdor, 2008; Springer, Swain, & Rodriguez, 2016). Teacher turnover decisions are influenced by gender congruence with principals (Husain, Matsa, & Miller, 2023) and peer turnover decisions (Brown & Laschever, 2012). There is a correspondingly limited literature on the effects of student composition, with research showing a stronger relationship between teacher mobility and student race or achievement compared to salaries (Hanushek, Kain, & Rivkin, 2004). In line with this, Karbownik (2020) finds that a 10 p.p. increase in student credentials decreases the likelihood of job separation by up to 10 p.p.. There are similarly few studies on the causal effects of teacher working conditions, with the exception of studies on how teachers' labor supply decisions are shaped by compensation levels and structure (Biasi, 2021; Hendricks, 2014; Johnston, 2025; Rothstein, 2015).[3] Our paper contributes to understanding the causal effect of working conditions, with a particular focus on the role of student behavior.

The paper on this subject that is most closely related to our study is Feng (2010), which relies on Florida microdata and the Schools and Staffing Survey with its Teacher Follow-Up Survey to examine whether teacher mobility is affected by assignment to more challenging classrooms. Using a conditional logit hazard model with school fixed effects, the study finds that more disciplinary incidents are associated with higher attrition among untenured teachers, noting that coefficients could still reflect some endogeneity of classroom assignment. Our study more directly addresses nonrandom assignment of students into classrooms in estimating the impact of student behavior. Furthermore, we aim to study how effects are moderated across school-level attributes such as the quality of school leadership.

This study also contributes to research that aims to understand the spillover effects of disruptive student behavior. Existing work focuses on the influence of student disrup-

[3]In general, teacher working conditions have been shown to significantly influence teachers' job satisfaction and retention independent of other factors such as student socio-demographic composition (Boyd et al., 2011; Johnson, Kraft, & Papay, 2012; Kraft, Marinell, & Shen-Wei Yee, 2016; Ladd, 2011; Simon & Johnson, 2015). There is a range of approaches in quantifying and characterizing the nuanced and complex dimensions of a teacher's workplace environment. For example, Loeb, Darling-Hammond, and Luczak (2005) characterize working conditions as large class sizes, facilities problems, multi-track schools, and lack of text books. Ladd (2011) uses the same North Carolina working conditions survey that includes school leadership, teacher empowerment and agency, time use, professional development, and facilities and resources. Johnson et al. (2012) focus on elements of teacher working conditions including colleagues, community support, facilities, governance, professional expertise, resources, school culture, and time.

tions on peers. Exposure to disruptive students can increase peers' behavioral problems and lower test scores (Figlio, 2007), with adverse long-term consequences on labor market earnings (Carrell, Hoekstra, & Kuka, 2018). We build on existing work by examining the effects of student disruptions on the teacher labor force.

Lastly, this paper enhances our understanding of the roles that school leadership and institutional climate play in teacher retention. Prior research has shown that the quality of school leadership is an important predictor of teacher departures and satisfaction (Grissom & Loeb, 2011; Ladd, 2011). Johnston (2025) finds that the most important attribute to teachers' utility is whether the principal is "supportive" with handling disruptive students. The utility derived from a supportive, relative to a hands-off, principal is equivalent to a salary increase of $8,700. In line with this, Pope and Zuo (2023) find that a disciplinary policy that limited the capacity of teachers to manage student misbehavior led to higher teacher turnover. Our study complements this work in demonstrating that a supportive school environment helps mitigate the effects of student classroom disruptions on teacher turnover.

The remainder of this paper is organized as follows: Section 2 describes the background and data, and Section 3 introduces the empirical strategy to identify the effect of exposure to disruptive students. Section 4 presents findings on the relationship between disruptive student exposure and teacher turnover, as well as suggestive evidence of the moderating role of school leadership, student conduct policies, and teacher autonomy in school decision-making. Section 5 concludes the paper.

2 Data and descriptive statistics

2.1 Data

This study draws on administrative data from the North Carolina Education Research Data Center (NCERDC), which includes classroom rosters and linked teacher-student records for all traditional public and charter schools in the state. A key benefit of this dataset is that we observe detailed information on teachers, including gender, race, age, experience, and educational attainment. We focus on those who began teaching in North Carolina public schools between 2007 and 2015. Each cohort is followed for five years, so the last cohort who begin teaching in 2015 is observed through 2019. We bookend with 2019 as the last year given pandemic-related concerns about teacher behavior and data quality that render later years less comparable.

The main outcome of interest is teacher turnover. We define teacher turnover as

whether a teacher remains at the same school in the next year. Conditional on turning over, the statewide coverage of our data allows us to distinguish between whether a teacher moves to a different school in the North Carolina public school system or if they leave the school system altogether.[4]

Student-level data include socio-demographic information on gender, race and ethnicity, age, economic disadvantage status, and English language learner status. We link students to their respective teachers and classrooms using course membership data and then use this information to construct annual measures of student characteristics for those taught by a given teacher. This enables us to characterize multiple facets of a teacher's classroom characteristics.[5] One such characteristic is academic achievement, as this may be correlated with student behavior and also independently shape teachers' classroom experiences and subsequent turnover decisions. We rely on lagged scores to avoid potential contemporaneous shocks. Since End-of-Grade (EOG) test scores in math and reading are available for students in grades 3-8, our sample focuses on teachers who teach students currently in grades 4-9.

A salient feature of the student-level data is the level of coverage on disciplinary infractions. We observe incident reports at the office referral level, which do not necessarily result in formal disciplinary action. This ensures a more comprehensive dataset beyond those involving recorded consequences, whose appearance in the dataset may be more influenced by the changing policy environment governing exclusionary discipline. Detailed incident-level records describe the type of offense, student(s) involved, and any disciplinary consequences received by each individual (e.g., detention, in-school-suspension, out-of-school suspension). The resulting data capture a wide range of student behaviors spanning approximately 100 offense categories which we use to construct the teacher-year-level treatment variable. One important caveat is that we rely on *lagged* disciplinary data to address endogeneity concerns, as teachers who have a higher propensity to leave their job may differ in their classroom management or pedagogical approach from counterparts with a lower propensity of leaving in ways that also affect student behavior. Thus, a fourth-grade teacher's exposure to disruptive behavior would be the share of students in their class that had any infractions during third grade.

[4]For teachers who leave the school system, we are unable to determine whether they leave teaching, teach at a private school instead, or have relocated and are teaching out of state. Annual reports on teacher attrition published by the North Carolina State Board of Education suggest that most teachers who leave the school system leave teaching altogether. Of all departing teachers, only about 5-7% choose to relocate to another state, while only 1.4% move to private schools (NCDPI, 2015).

[5]Since our outcome variable is at the teacher-year level, when a teacher teaches multiple classes in a given year, we calculate a teacher's classroom characteristics as the class size-weighted mean across all the classes taught by the teacher.

Figure 1 shows the distribution of the share of disruptive students at the teacher-year level. There is a significant amount of variation in teachers' exposure, with a median of 16 percent of students in the class with a disciplinary infraction in the prior year and a mean of 19 percent.

Figure 1: Distribution of share of disruptive students in classroom

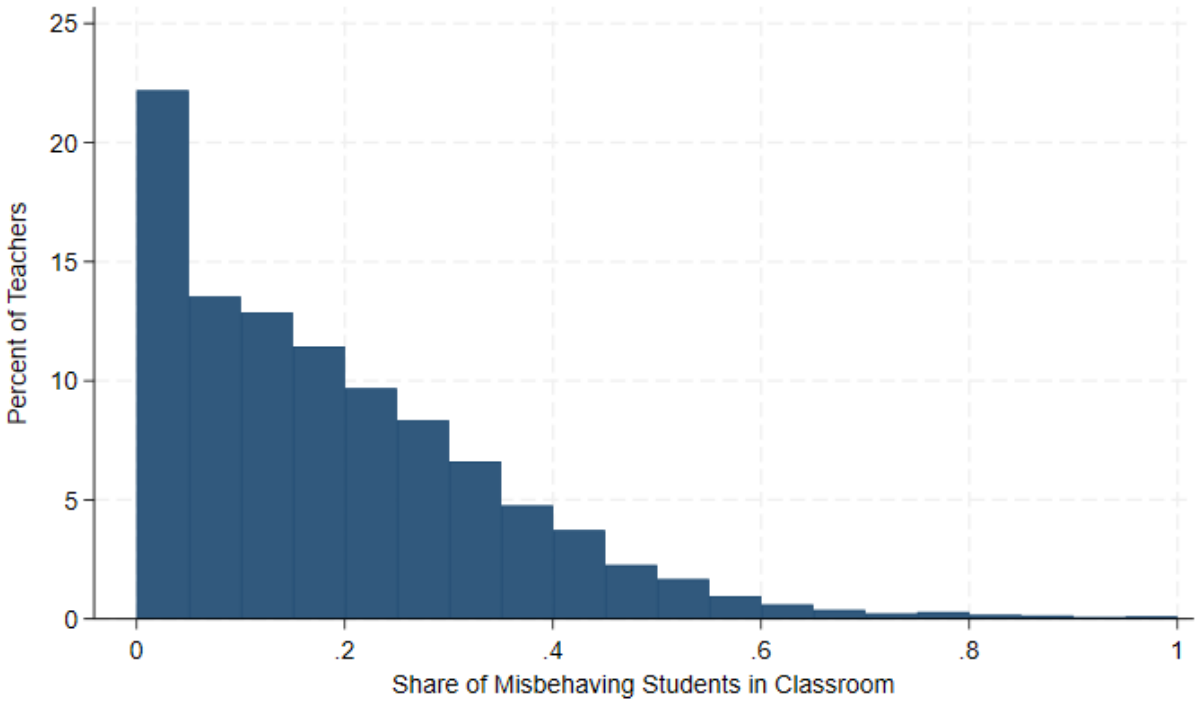


Figure 1 illustrates the distribution of the share of disruptive students over the 2007-2015 school years. Disruptive students are defined as having any type of infraction from the previous year. Since teachers may teach multiple classes during the year, it represents the average of all classroom-level measures.

Another advantage of NCERDC data is the Teacher Working Conditions Survey, a biennial survey of educators across the state that is used to determine strengths and improvement areas for schools and districts.[6] While the exact survey instrument has evolved over time, it has maintained focus on several issues, including the quality of school leadership, input of teachers into school decision-making, time allocation in schools, teacher professional development, and adequacy of school facilities and resources. We focus on survey questions involving school leadership, student conduct and discipline, and teacher input into school decision-making that are consistent over 2008-2018. Responses on Likert scales are aggregated to the school-year level, with odd years assigned lagged

[6]The original 2000 survey was the first of its kind in the nation. By 2008, four other states adopted similar surveys to understand teacher working conditions. Teacher responses are anonymous, while schools are identified and linkable to administrative data.

values.

2.2 Descriptive statistics

Table 1 summarizes the teachers in our sample alongside the classroom composition of students and characteristics of school leadership. Observations are at the teacher-year level. Average annual teacher turnover is 27 percent: 16 percent of teachers move to a different public school in the state and 11 percent leave the sample.

White teachers make up the majority of the sample at 83 percent, while 73 percent of teachers are female. This racial and gender skew towards more white female teachers is in line with national patterns (Schaeffer, 2024). Relative to the teacher pool, the gender composition of principals is more balanced and there is greater minority representation, with female and Black principals comprising 54 and 26 percent, respectively. 18 percent of teachers hold a Master's degree, and 10 percent graduated from a highly selective bachelor's degree institution.[7] The average age is 29 years and average experience is 2.6 years, reflecting the fact that we restricted the sample to teachers in their first five years of teaching.[8]

The middle panel of Table 1 shows substantial variation in the classroom-level treatment variable of share of disruptive students, which is supported by Figure 1. On average, teachers' classrooms are 47 percent White, 31 percent Black, and 15 percent Hispanic. The lagged reading z-score in the classrooms of teachers in the sample is -0.18 standard deviations in reading and -0.17 in math, indicating that these early-career teachers are placed with lower performing students relative to more experienced counterparts.

3 Empirical Approach

The empirical strategy relies on cross-cohort variation in exposure to disruptive student behavior within the same school to establish effects on teacher turnover. We begin with a specification that relates teachers' classroom exposure to turnover behavior:

$$Y_{igs,t+1} = \alpha + \beta D_{ict} + \mathbf{X}'_{ict}\delta + \mathbf{\Pi}'_{st}\rho + \theta_s + \rho_g + \tau_{dt} + \epsilon_{igst} \tag{1}$$

where $Y_{igs,t+1}$ is an indicator variable that takes a value of one if teacher i in grade g and school s is no longer observed in the same institution in the following year and

[7] Teachers are classified as graduating from a highly selective bachelor's institution if their institution is classified as "Most Competitive" or "Highly Competitive" in the Barron's Selectivity Index.

[8] We define an individual in their novice year as having one year of experience.

Table 1: Descriptive statistics

	Mean	Standard Deviation
Teacher characteristics		
Turnover	0.27	(0.44)
Move	0.16	(0.31)
Leave	0.11	(0.37)
Race/ethnicity		
White	0.83	(0.37)
Black	0.13	(0.34)
Hispanic	0.01	(0.11)
Asian	0.01	(0.08)
Other race	0.02	(0.13)
Female	0.73	(0.44)
Highly selective bachelor's	0.10	(0.30)
Master's degree	0.18	(0.39)
Age	29.41	(7.12)
Experience	2.59	(1.41)
Classroom characteristics		
Disruptive students	0.19	(0.16)
Number of students	32.13	(16.84)
Race/ethnicity composition		
White	0.47	(0.27)
Black	0.31	(0.24)
Hispanic	0.15	(0.14)
Asian	0.02	(0.05)
Other race	0.05	(0.08)
Female	0.48	(0.11)
Economically disdvantaged	0.56	(0.22)
Limited English proficiency	0.07	(0.11)
Lagged reading z-score	-0.18	(0.53)
Lagged math z-score	-0.17	(0.53)
School leadership characteristics		
Female principal	0.54	(0.50)
Race/ethnicity of principal		
White principal	0.72	(0.45)
Black principal	0.26	(0.44)
Other race principal	0.02	(0.13)
N	49,172	

Notes: Observations are at the teacher-year level for teachers who began teaching students in grades 4-9 in North Carolina public schools between 2007-2015. Each cohort of teachers is followed for up to five years in the data.

zero otherwise. We include a detailed set of observable and time-varying characteristics at the teacher/classroom and school levels ($\mathbf{X}_{ict}$ and $\mathbf{\Pi}_{st}$, respectively).[9] School fixed effects, θ_s, absorb differences in teacher turnover across schools, such as school climate or institution-specific retention policies that are stable over our time period. Grade fixed effects, ρ_g, capture any differences in working conditions that vary by grade level. District-by-year fixed effects, τ_{dt}, account for district-level shocks, including but not limited to changes in disciplinary and safety practices, teacher compensation, and local labor market conditions.

The variable of interest, D_{ict}, is the share of students in the teacher's classroom c during year t who had at least one disciplinary infraction in the *prior* year. A notable empirical challenge to capturing the effect of exposure to student disruption is that the proportion of students with disciplinary infractions may be endogenous with unobserved teacher attributes, even within schools. For example, administrators may base classroom assignment decisions on teachers' ability to manage student behavior and related factors that simultaneously shape turnover decisions. In response, we instrument for a teacher's classroom exposure using a school-by-grade measure of lagged student behavior:

$$Z_{gst} = \frac{\sum_{j\in(g,s,t)} \mathbb{1}\{\text{student } j \text{ committed} \geqslant 1 \text{ infraction in } t-1\}}{N_{gst}}. \tag{2}$$

where g, s, and t index the grade, school, and year in which the teacher taught, and N_{gst} is the total number of students in the cell. The following equations show the corresponding first stage and second stage equations, respectively:

$$D_{ict} = \rho + \lambda Z_{gst} + \mathbf{X}'_{ict}\pi + \mathbf{\Pi}'_{st}\delta + \sigma_s + \varsigma_g + \eta_{dt} + \upsilon_{igst} \tag{3}$$

$$Y_{igs,t+1} = \alpha + \beta \widehat{D}_{ict} + \mathbf{X}'_{ict}\delta + \mathbf{\Pi}'_{st}\rho + \theta_s + \rho_g + \tau_{dt} + \varepsilon_{igst} \tag{4}$$

The school-grade exposure level to disruptive students, Z_{gst}, addresses potential sorting across classrooms when there is more than one teacher per grade level. Table A3 shows that this instrument is highly predictive of individual teachers' own classroom exposure to disruptive students. The lagged nature of the instrument also ensures that

[9] Teacher attributes include race and ethnicity, gender, age, educational attainment, and selectivity of undergraduate alma mater. Classroom characteristics include class size, average lagged achievement scores, and shares of students by racial group, gender, economic disadvantage, and English language learner status. School attributes comprise principal race, gender, and the presence of a new principal to account for changing leadership practices at the school-year level. We furthermore include cohort fixed effects.

student behavior was measured prior to the teacher's arrival and is not confounded by contemporaneous classroom sorting effects.

A crucial assumption for estimating causal effects is the exclusion restriction, which requires that the school-grade-level student misbehavior share instrument affects teacher turnover decisions solely via the teacher's classroom share of disruptive students. Violation entails that a cohort of more disruptive students results in schools changing policies or re-directing resources in a manner that independently affects teacher turnover decisions. Moreover, it would need to be a form of grade-level behavioral spillover not accounted for by the extensive set of time-varying school and classroom controls in our specification, including the average lagged student achievement, shares of disadvantaged students, and principal turnover. We conduct a number of exercises, including augmenting the model with additional time-varying controls and using a specification that uses school-year fixed effects. The latter, for example, accounts for any changes common to all grades in a school to estimate effects of student disruptions based on cross-grade variation.

4 Results

4.1 Main findings

Panel A of Table 2 examines the relationship between exposure to potentially disruptive students and whether teachers leave their current school the following year. We scale the treatment variable to a change of 10 percentage points (p.p.), which is about half of the average classroom-level share of disruptive students (and 63 percent of a standard deviation).[10] Our estimates indicate that a 10 p.p. increase in the share of disruptive students in a class is associated with a 1.7 p.p. increase in teacher turnover in the OLS specification in column 1. A concern with the naive OLS estimation is that it may overstate the impact of student disruption if teachers are systematically assigned to classrooms within a school-grade based on attributes that matter for retention. For example, teachers with poor classroom management skills who are also more likely to turn over may be assigned to classrooms with a higher share of disruptive students. We address this concern by implementing the instrumental variables estimation in column 2.

The IV estimate in column 2 indicates that a 10 p.p. increase in the share of disruptive students in a teacher's class increases the propensity for the teacher to leave the school in

[10]On average, 19 percent of students in a classroom were reported for a disciplinary infraction in the prior year.

Table 2: The Effects of Disruptive Students on Teacher Turnover

	OLS (1)	IV (2)
A. Any teacher turnover		
Share of disruptive students (10 p.p.)	0.017***	0.010***
	(0.002)	(0.004)
B. Move to different school		
Share of disruptive students (10 p.p.)	0.010***	0.006*
	(0.002)	(0.003)
C. Leave NC public system		
Share of disruptive students (10 p.p.)	0.007***	0.004*
	(0.002)	(0.002)
School FEs	Y	Y
Grade FEs	Y	Y
District-year FEs	Y	Y
N	48,943	48,943

Notes: Teacher turnover is an indicator variable that takes a value of one if the teacher is no longer at the same school in the following year. The treatment variable is calculated as the share of students in the teacher's classroom who had any disciplinary infractions in the prior year. Col. 2 instruments for this measure using the school-grade share of students with lagged disciplinary records. Covariates include teacher race, gender, age, educational attainment, whether undergraduate alma mater was a highly selective institution, class size, average lagged achievement scores, shares of students by race, gender, economic disadvantage, and English language learner status, principal race, gender, indicator for new principal, and cohort fixed effects. Standard errors are clustered at the school level. *** p<0.01, ** p<0.05, * p<0.1

the next year by 1.0 p.p., which is a 3.7 percent increase from the baseline mean turnover rate of 0.27.[11] For comparison, research on the causal impact of teacher pay on turnover suggests a 1% pay increase yields a 0.16 p.p. reduction in turnover (Hendricks, 2014), suggesting that a 6% pay increase is necessary to compensate for a 10 p.p. rise in the share of disruptive students. All estimation results in Table 2 account for average classroom lagged achievement scores and shares of students by race, economic disadvantage, and English language learner status, such that the effects derive from behavioral differences rather than academic or socioeconomic dimensions.

Teachers who do not remain at their current school may find employment in another school or leave the teaching profession. Panels B and C in Table 2 distinguish between types of turnover: 1) moving to a different public school in the North Carolina system, or

[11] We can also interpret the effects as a one standard deviation increase in the share of disruptive students in a classroom increases turnover by 1.6 percentage points (1.6=1.0*(.16/.10)). Another way to think about magnitudes is that this is the effect of approximately an increase of three students in a 30-person classroom (mean class sizes in the sample is 32 students).

2) leaving the system entirely. Our evidence indicates that disruptive students increase the propensity for both types of turnover. IV estimates in column 2 of Panels B and C show that an additional 10 p.p. of disruptive students leads to an increased likelihood of 0.6 and 0.4 p.p. of moving to a different school and leaving the North Carolina public school system, respectively. These effects correspond to similar magnitudes of 3.8 and 3.6 percent of baseline mean values.

Our results strongly suggest that teachers' career trajectories are responsive to student behavior. An increase in the share of disruptive students in a teacher's classroom significantly increases teachers' propensities to leave the school in the next year. We also provide analyses on whether there are nonlinearities in the effects of disruptive students on teacher turnover in Table A4. Turnover effects are driven by teachers with higher shares of disruptive students (those in quartiles 2 through 4 of the distribution), but we stop short of drawing strong conclusions because differences are not statistically significant at conventional levels.

We next assess whether effects vary by incident severity. Table 3 examines the nature of disciplinary incidents more closely, and measures severity using two different classifications. Column 1 categorizes incidents as serious if they involve one of the 17 infraction types whose reporting is mandated by the North Carolina Department of Education and non-serious otherwise. These incidents represent the infraction types that the state consider to be most serious.[12] Results indicate that exposure to students who were involved in serious incidents has a much larger effect on teacher turnover than exposure to students with non-serious incidents. A 10 p.p. increase in the share of students with a serious disruptive incident in a teacher's class increases the propensity for a teacher to leave the school by 5.6 p.p, compared to 0.9 p.p. for non-serious incidents.

Column 2 of Table 3 presents an alternative, data-driven measure of severity based on disciplinary consequences. For each type of infraction observed in the data, we calculate the average suspension rate statewide. We categorize more severe infractions as those with above-median suspension rates.[13] Results in column 2 indicate that the effects of disruptive students on teacher turnover are driven by students involved in more severe incidents. A 10 p.p. increase in this student share increases teacher turnover by 1.6 p.p. In contrast, exposure to students who were involved in incidents with below-median suspension rates does not affect teacher turnover.

Finally, we assess whether the number of incident reports for a student in the prior

[12] A list of the mandatory reporting infraction types can be found in Table A1 in the appendix.

[13] A list of the infraction types falling into above-median versus below-median suspension rate categories can be found in Table A2 in the appendix.

Table 3: The Effects of Disruptive Students by Incident Severity on Teacher Turnover

	(1)	(2)
Share of students with serious disruptive incidents (10 p.p.)	0.056*	
	(0.030)	
Share of students with non-serious disruptive incidents (10 p.p.)	0.009**	
	(0.004)	
Share of students with above-median suspension rate incidents (10 p.p.)		0.016***
		(0.006)
Share of students with below-median suspension rate incidents (10 p.p.)		-0.001
		(0.005)
N	48,941	48,941

Notes: Teacher turnover is an indicator variable that takes a value of one if the teacher is no longer at the same school in the following year. The treatment variable is calculated as the share of students in the teacher's classroom who had any disciplinary infractions in the prior year. Col. 2 instruments for this measure using the school-grade share of students with lagged disciplinary records. Covariates include teacher race, gender, age, educational attainment, whether undergraduate alma mater was a highly selective institution, class size, average lagged achievement scores, shares of students by race, gender, economic disadvantage, and English language learner status, principal race, gender, indicator for new principal, and cohort fixed effects. Standard errors are clustered at the school level. *** p<0.01, ** p<0.05, * p<0.1

year matters for teacher turnover. In our main specification, we focus on the share of students in a teacher's class with *any* incidents in the prior year. Column 1 of Table A5 uses an alternative measure - disciplinary incidents per capita - to capture disruptive student behavior.[14] A one standard deviation increase in disruptive incidents per capita increases turnover by 1.1 p.p. Column 2 distinguishes between students with any record of disciplinary infractions based on incident frequency, by separately considering the effects students with one disruptive incident versus those with two or more.[15] Effects corresponding to the shares of students with only one vs. two or more previous incidents are 0.8 and 1.1 p.p., respectively. While only the latter is significant, we cannot reject equivalence across these two coefficients.

4.2 Robustness

We perform multiple additional analyses to test the robustness of our results. First, we augment our original estimation to include school-year fixed effects and shift the source of identifying variation to cross-grade variation. This addresses the concern that there may be unobserved time-varying school-specific shocks that affect both student behavior and teacher turnover, such as a new school policy for handling disciplinary incidents. While the addition of school-year fixed effects causes estimates to lose statistical significance, the magnitudes of these estimates are very similar to those in our main specification,

[14]This measure sums up the total number of disruptive incidents recorded for students in a teacher's class in the prior year and divides this value by the total number of students.

[15]Almost half of students with any disciplinary incidents in a year only have one disciplinary incident.

providing reassurance that results are not driven by school-specific shocks over time. Specifically, results in Table A6 indicate that a 10 p.p. increase in the share of disruptive students in a class increases the propensity for a teacher to leave the school by 0.9 p.p., with corresponding effects of 0.3 p.p. and 0.6 p.p. for moving to a different school and leaving the North Carolina public school system, respectively.[16]

Second, we include grade-year fixed effects instead of grade fixed effects to address the concern that there may be unobserved time-varying grade-specific shocks that affect both student behavior and teacher turnover. For example, a statewide curriculum change may influence the structure of the school day in a way that affects both teachers' propensities to leave the environment and student behavior. Table A7 shows our findings using this specification closely adhere to those from the main results in Table 2: A 10 p.p. increase in the share of disruptive students in a class increases the propensity for a teacher to leave the school by 1.1 p.p., to move to a different school by 0.6 p.p., and to leave the North Carolina public school system by 0.5 p.p.

Finally, we assess whether our results are robust to excluding teacher-classroom observations with outlier shares of disruptive student to ensure that our results are not being driven by a small number of idiosyncratic and unrepresentative classrooms. Column 1 of Table A8 excludes the top 1% of teacher-year observations in terms of disruptive student share, and column 2 presents results that exclude the top 5%. Reassuringly, results in both columns mirror our findings using the original specification.

4.3 Heterogeneity

4.3.1 Effect heterogeneity by teacher and school attributes

The main findings leave open the possibility that teacher turnover is more responsive to student behavior for particular teachers or schools. We probe for effect heterogeneity across a range of teacher and school attributes, beginning with teacher experience. Table A9 shows no evidence of significant effects with each additional year of experience.[17] The incremental effects of experience appear to go in opposite directions for moving within versus leaving the NC public school system, with the effect of disruptive students increasing with experience for moving while decreasing with experience for leaving NC public schools. The present analysis is constrained by data availability and timing to examining only the initial five years of teachers' careers, raising the question of whether significant

[16]The respective magnitudes in the main specification in Table 2 are 1.0 p.p., 0.6 p.p., and 0.4 p.p.

[17]Results using separate indicators for each year of experience, available upon request, arrive at the same conclusion.

differences arise across the experience gradient if we were able to follow teachers for longer periods.

Another teacher attribute that merits attention is classroom effectiveness. School districts may be more concerned if effective teachers are more likely to leave in response to student disruptions. We compute teacher value-added, with the caveats that these scores focus narrowly on student test score gains and that data constraints limit our sample.[18] Table A10 does not indicate any differential responses to student behavior by teacher value-added scores.

Next we examine effects by teacher gender and race. Figure 2 displays the effects of disruptive students separately for male, female, White, and Black teachers. There is no evidence of differential effects, although the relatively small samples of male and Black teachers render it more difficult to detect differences. Female and white teachers comprise nearly three-quarters and over four-fifths of the sample, respectively.

Similarly, Figure 3 shows minimal variation in the magnitude of estimated effects by school characteristics. We focus on schools who have above- or below-median shares of students who are economically disadvantaged or are members of an under-represented minority group. Effect magnitudes across the four sub-samples barely deviate from the 1 p.p. estimated using the full sample.[19]

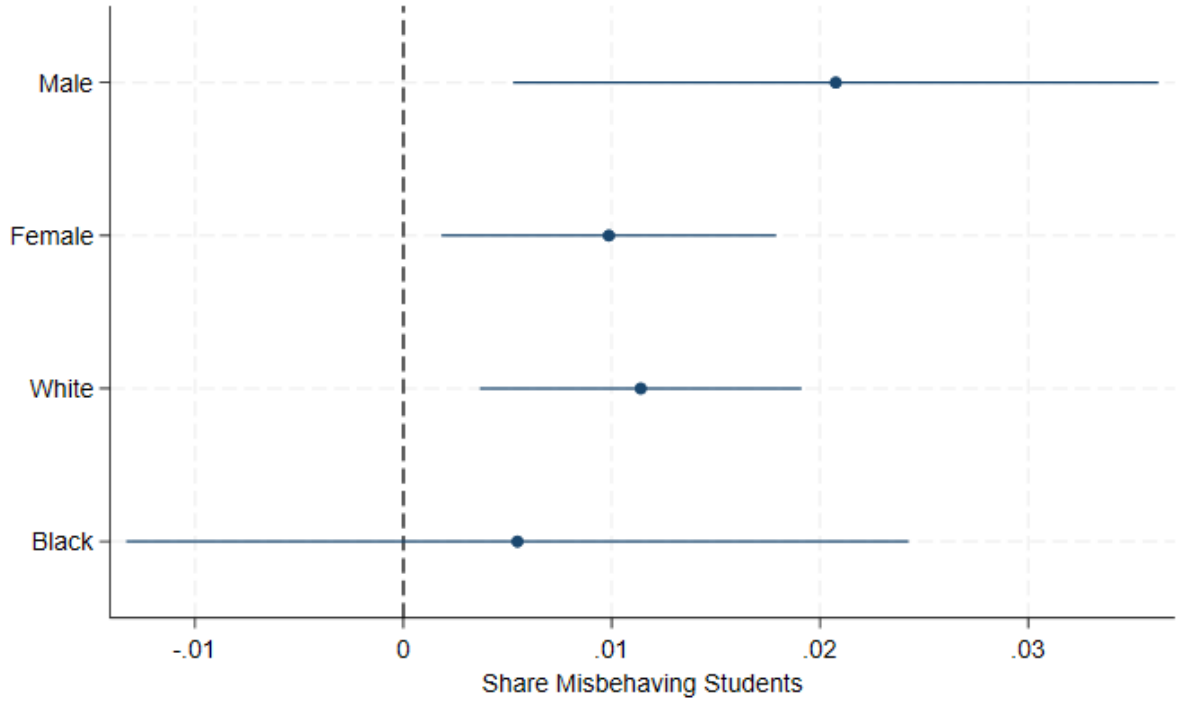
4.3.2 Effect heterogeneity by teacher working conditions

We expand to school attributes beyond school racial or socioeconomic composition to determine whether there are differential responses by the quality of teacher working conditions. In particular, we focus on school leadership, student conduct policies, and teachers' roles in school decision-making using data from the 2008-2018 Teacher Working Conditions Survey. Table 4 uses as input teachers' concurrence with five statements: 1) leadership supports teachers, 2) there is an atmosphere of trust and respect, 3) school takes steps to solve problems, 4) leadership enforces rules for student conduct, and 5) leadership supports teachers' efforts to maintain classroom discipline. Results show that the effect of disruptive students on teacher turnover is concentrated among schools ranking in the bottom half for supportive school leadership, respectful and trustful atmosphere, and the extent to which leadership help teachers manage student conduct and disciplinary issues. The reduced effect among teachers in schools with more supportive

[18]Sample size is constrained due to multiple factors, including restricting to grades 4-8 with available standardized test data and limiting to non-novice math and reading teachers. More details on the construction of the value-added measure is available in Appendix B.

[19]We also find no differences by grade levels, as Table A11 shows similar effect sizes across elementary and secondary schools.

Figure 2: The Effects of Disruptive Students on Teacher Turnover: Heterogeneity by Teacher Characteristics

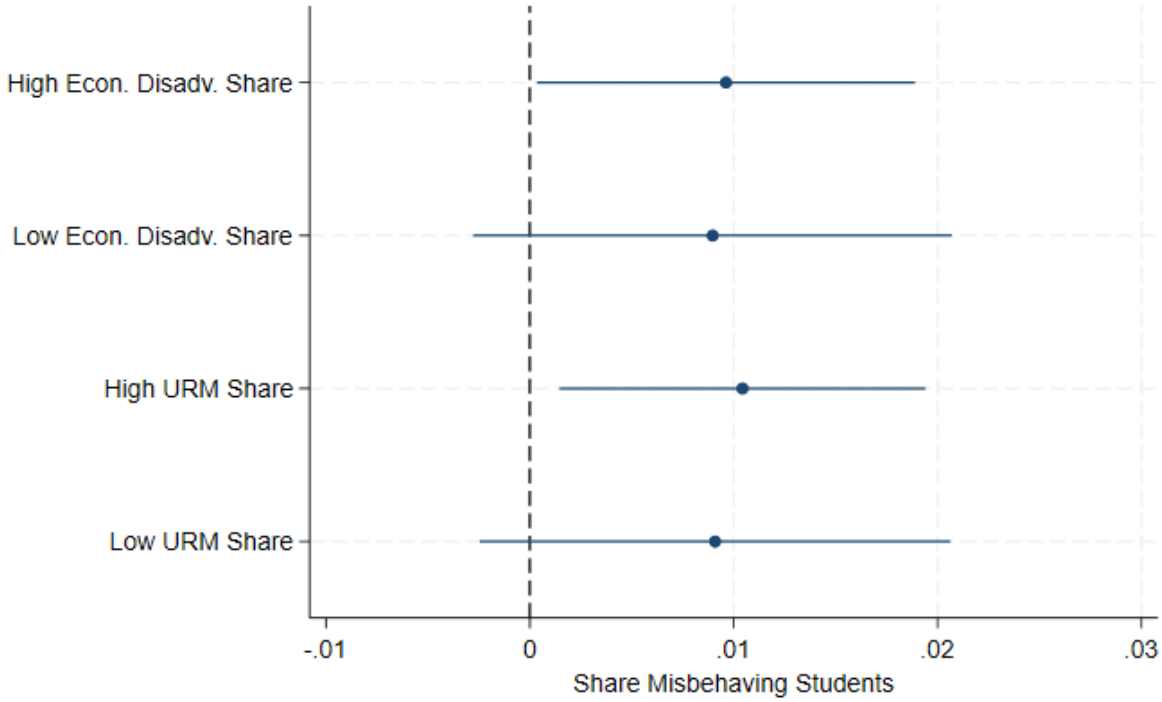


The figure displays coefficient estimates of the share of disruptive students on teacher turnover separately for male, female, White, and Black teachers. All estimates include controls for teacher characteristics (race, gender, indicator for master's degree, indicator for highly selective bachelor's institution, age, age squared, experience), classroom characteristics (number of students, share Black, share Hispanic, share Asian, share Other race, share female, share economically disadvantaged, share limited english proficient, lagged math and reading standardized test scores), and school characteristics (indicator for new principal, principal gender, principal race). Estimates also include school, grade, and district-year fixed effects. 95% confidence intervals are displayed, and standard errors are clustered at the school level.

leadership affirms the moderating role of leadership quality, itself a dominant predictor of teacher departure (Ladd, 2011).

When we further distinguish between types of turnover in Panels B and C, we find that differential responses to teacher working conditions are only present for the decision to leave the North Carolina public school system. Teachers in the bottom half of schools for supportive leadership – overall and regarding student conduct issues – are 0.8 to 1.1 p.p. more likely to exit our data. In comparison, Figure A1 shows that those in the top half of schools are no more likely to leave the NC public system in response to a 10 p.p. uptick in the share of disruptive students. Overall, our results indicate a potentially moderating role of supportive school leadership for teacher retention, particularly for those considering leaving the statewide public system or even the teaching profession.

Figure 3: The Effects of Disruptive Students on Teacher Turnover: Heterogeneity by School Characteristics



The figure displays coefficient estimates of the share of disruptive students on teacher turnover separately for male, female, White, and Black teachers. All estimates include controls for teacher characteristics (race, gender, indicator for master's degree, indicator for highly selective bachelor's institution, age, age squared, experience), classroom characteristics (number of students, share Black, share Hispanic, share Asian, share Other race, share female, share economically disadvantaged, share limited english proficient, lagged math and reading standardized test scores), and school characteristics (indicator for new principal, principal gender, principal race). Estimates also include school, grade, and district-year fixed effects. 95% confidence intervals are displayed, and standard errors are clustered at the school level.

The next set of survey questions we examine focuses on teachers' perceptions of their roles in school decision making (Table 5). Eight questions elicit responses on the extent of teacher involvement in dimensions of school operations ranging from student discipline procedures to the school budget and pedagogical techniques. We take the share of teachers who believe that they have no role in each facet and aggregate up to school-year cells. We find that teachers in schools with an above-median share who perceive no input into school improvement plans are more likely to turn over than those in schools with more input in this dimension.

Upon closer inspection, we find no differential effects of disruptive students by any of the eight dimensions on moving to a different public school. Once again, results are only salient for one form of attrition: teachers leaving the NC public system. Those in schools

Table 4: The Effects of Disruptive Students, by School Environment and Leadership

	(1)	(2)	(3)	(4)	(5)
A. Any teacher turnover					
Share of disruptive students (10 p.p.)	0.017***	0.016***	0.014***	0.021***	0.018***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
Share of disruptive students (10 p.p.) ×					
Above median share of teachers who strongly agree that:					
Leadership supports teachers	-0.014*				
	(0.008)				
There is atmosphere of trust and respect		-0.013*			
		(0.008)			
School takes steps to solve problems			-0.008		
			(0.007)		
Leadership enforces rules for student conduct				-0.019**	
				(0.008)	
Leadership supports teachers' efforts to maintain discipline					-0.016**
					(0.008)
B. Move to different school					
Share of disruptive students (10 p.p.)	0.008	0.007	0.006	0.013***	0.007
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Share of disruptive students (10 p.p.) ×					
Above median share of teachers who strongly agree that:					
Leadership supports teachers	-0.002				
	(0.007)				
There is atmosphere of trust and respect		-0.005			
		(0.007)			
School takes steps to solve problems			0.000		
			(0.007)		
Leadership enforces rules for student conduct				-0.009	
				(0.007)	
Leadership supports teachers' efforts to maintain discipline					-0.003
					(0.007)
C. Leave NC public system					
Share of disruptive students (10 p.p.)	0.009**	0.009**	0.009**	0.008**	0.011**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Share of disruptive students (10 p.p.) ×					
Above median share of teachers who strongly agree that:					
Leadership supports teachers	-0.012**				
	(0.005)				
There is atmosphere of trust and respect		-0.008			
		(0.005)			
School takes steps to solve problems			-0.008		
			(0.005)		
Leadership enforces rules for student conduct				-0.010*	
				(0.006)	
Leadership supports teachers' efforts to maintain discipline					-0.013**
					(0.006)
N	46776	46776	46776	46776	46776

Notes: Any teacher turnover defined as not remaining in the same school in the following year. Covariates include teacher race, gender, age, educational attainment, whether undergraduate alma mater was a highly selective institution, class size, average lagged achievement scores, shares of students by race, gender, economic disadvantage, and English language learner status, principal race, gender, and indicator for new principal. All models furthermore include separate school, grade, cohort, and district-year fixed effects. Standard errors are clustered at the school level. *** p<0.01, ** p<0.05, * p<0.1

with less perceived input into student discipline procedures are 1.2 p.p. more likely than their peers in other schools to leave the NC public system after increased exposure to disruptive students. There are similarly elevated propensities to leave when schools are perceived as limiting teachers' input into school improvement plans, school budgets, new teacher selection, and professional development programs. Notably, schools with fewer shares of teachers who believe they have little input into various dimensions of decision-making are relatively buffered against the adverse impacts of student disruptions. Teachers in these schools are no more likely to leave the statewide system after increased exposure (Figure A2).

These results underscore an intricate interaction between specific aspects of the school environment and the causal impact of student behavior. Notably, we also looked at whether there are differential turnover effects related to perceived teacher influence over other domains–such as the selection of instructional materials, the development of teaching techniques, and the determination of student assessment practices–and found no evidence that perceived influence in these domains matters for teacher turnover decisions. This suggests that targeted improvements, namely in school leadership support and teacher autonomy around student conduct policies, may yield more substantial benefits for teacher retention than broader or less focused reforms.

5 Conclusion

This paper studies the extent to which student behavior shapes turnover among early career teachers. Using linked teacher-student data from North Carolina and an instrument based on school-grade shares of previously disruptive students, we show that a one standard deviation increase in this share raises the probability a teacher leaves the school the following year by 1.6 percentage points. An alternative interpretation is that reducing this form of behavior in classrooms has effects comparable to a 10 percent increase in teacher compensation salary (Hendricks, 2014). The effect operates both through school moves and exits from the North Carolina public system and is especially pronounced when students' prior incidents are more serious.

The effects of potential student disruptions are broad-based across common teacher and school attributes such as gender, experience, value-added, and student composition. At the same time, select school contexts moderate these effects. Teachers in schools with higher leadership ratings exhibit attenuated turnover responses. Specifically, teachers who work in schools where leadership make them feel supported, enforce rules for student conduct, and support their efforts to maintain classroom discipline are less prone to

Table 5: The Effects of Disruptive Students, by Teacher Input into School Decisions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. Any teacher turnover								
Share of disruptive students (10 p.p.)	0.011**	0.016***	0.008	0.007	0.011**	0.009*	0.006	0.004
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Share of disruptive students (10 p.p.) ×								
Above median share of teachers who believe they have no role in:								
Selecting instructional materials and resources	0.002							
	(0.007)							
Devising teaching techniques		-0.011						
		(0.008)						
Setting student assessment practices			0.003					
			(0.008)					
Determining content of prof. dev. programs				0.011				
				(0.007)				
Selection of new teachers					0.002			
					(0.008)			
Establishing student discipline procedures						0.007		
						(0.008)		
Providing input on how school budget will be spent							0.012	
							(0.007)	
School improvement plans								0.017**
								(0.008)
B. Move to different school								
Share of disruptive students (10 p.p.)	0.010**	0.010**	0.003	0.007	0.011**	0.011**	0.006	0.004
	(0.005)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Share of disruptive students (10 p.p.) ×								
Above median share of teachers who believe they have no role in:								
Selecting instructional materials and resources	-0.004							
	(0.007)							
Devising teaching techniques		-0.005						
		(0.007)						
Setting student assessment practices			0.002					
			(0.007)					
Determining content of prof. dev. programs				0.002				
				(0.006)				
Selection of new teachers					-0.008			
					(0.007)			
Establishing student discipline procedures						-0.005		
						(0.007)		
Providing input on how school budget will be spent							0.003	
							(0.007)	
School improvement plans								0.007
								(0.007)
C. Leave NC public system								
Share of disruptive students (10 p.p.)	0.001	0.007*	0.005	0.000	-0.000	-0.001	-0.000	-0.001
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)
Share of disruptive students (10 p.p.) ×								
Above median share of teachers who believe they have no role in:								
Selecting instructional materials and resources	0.006							
	(0.005)							
Devising teaching techniques		-0.007						
		(0.005)						
Setting student assessment practices			0.001					
			(0.005)					
Determining content of prof. dev. programs				0.009*				
				(0.005)				
Selection of new teachers					0.010*			
					(0.005)			
Establishing student discipline procedures						0.012**		
						(0.005)		
Providing input on how school budget will be spent							0.009*	
							(0.005)	
School improvement plans								0.010*
								(0.005)
N	46776	46776	46776	46776	46776	46776	46776	46776

Notes: Any teacher turnover defined as not remaining in the same school in the following year. Covariates include teacher race, gender, age, educational attainment, whether undergraduate alma mater was a highly selective institution, class size, average lagged achievement scores, shares of students by race, gender, economic disadvantage, and English language learner status, principal race, gender, and indicator for new principal. All models furthermore include separate school, grade, cohort, and district-year fixed effects. Standard errors are clustered at the school level. *** p<0.01, ** p<0.05, * p<0.1

turnover as a result of student behavioral issues. We observe similarly muted responses to student disruptions for teachers employed by schools that assign them a relatively greater decision-making role. The buffer effects are most evident for exits from the state system. Taken together, this evidence suggests that the extent to which student disruptions shape teacher job attachment varies in responsive to the quality of leadership support, in particular with regards to enforcement of disciplinary procedures. This echoes previous findings that teachers take into account their agency in suspending students when making retention decisions (Pope & Zuo, 2023).

Our findings underscore student behavior as a key dimension of teachers' working conditions that influences early-career retention. They also point to mechanisms through which schools can strengthen teacher attachment even in challenging classroom environments—namely, by improving the capacity of school leadership to support teachers in managing student conduct and by expanding teachers' voice in school decision-making. These results highlight that teacher turnover is not solely a function of student characteristics, but also of the organizational context that shapes how teachers experience and respond to behavioral challenges. A promising direction for future research is to examine the impact of investments in leadership development and teacher empowerment as potentially cost-effective complements to financial incentives for improving teacher retention and, by extension, educational quality.

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A Appendix

A.1 Tables

Table A1: Mandatory Reporting Incidents

Assault Resulting in Serious Injury
Assault Involving Use of a Weapon
Assault on School Personnel
Bomb Threat
Burning of a School Building
Death by Other than Natural Causes
Kidnapping
Possession of Alcoholic Beverage
Possession of a Controlled Substance
Possession of a Firearm or Explosive
Possession of a Weapon
Rape
Robbery with a Dangerous Weapon
Robbery without a Dangerous Weapon
Sexual Assault (Not Rape or Sexual Offense)
Sexual Offense
Indecent Liberties with a Minor

Notes: The table lists the 17 infraction types whose reporting is mandated by the North Carolina Department of Education.

Table A2: Incidents by Suspension Rate

Above-median suspension rate	Aggressive behavior, Inappropriate language/disrespect, Fighting, Disrespect of faculty/staff, Skipping class, Other school defined offense, Skipping school, Theft, Disorderly conduct, Bullying, Leaving class without permission, Truancy, Communicating threats, Assault on student, Use of tobacco, Inappropriate items on school property, Property damage, Possession of tobacco, Harassment–verbal, Harassment–sexual, Possession of controlled substance–marijuana, Possession of a weapon (excluding firearms/explosives), Falsification of information, Repeat offender, Assault on school personnel not resulting in injury, Possession of a firearm or powerful explosive, Affray, Gang activity, Cutting class, Assault–other, Assault on student w/o weapon and not resulting in injury, Possession of chemical or drug paraphernalia, Use of controlled substances, Mutual sexual contact between two students, Possession of controlled substance–other, Alcohol possession, Use of alcoholic beverages, Possession of counterfeit items, Violent assault not resulting in serious injury, False fire alarm, hazing, Possession of another person's prescription drug, Sale of controlled substance–marijuana, Unlawfully setting a fire, Assault on non-student w/o weapon not resulting in injury, Sexual assault not involving rape or sexual offense, Distribution of a prescription drug, Possession of student's own prescription drug, Gambling, Physical exam, Bomb threat, Use of narcotics, Assault involving a serious injury, Sale of controlled substance–other, Sexual offense, Assault involving the use of a weapon, Extortion, Use of counterfeit items, Robbery without a dangerous weapon, Possession of controlled substance–cocaine, Possession of controlled substance–Ritalin, Burning of a school building
Below-median suspension rate	Disruptive behavior, Insubordination, Bus misbehavior, Excessive tardiness, Late to class, Other, Cell phone use, Dress code violation, Leaving school without permission, Being in an unauthorized area, Honor code violation, Misuse of school technology, Excessive display of affection, Immunization, Discrimination

Notes: The table categorizes incidents by whether they have an above-median or below-median suspension rate in the data. Within each category (above-median or below-median), infractions are listed by incident prevalence. We suppress infractions with fewer than 100 reported incidents in the data.

Table A3: IV First Stage Results

	Share disruptive students (10 p.p.) (1)
Share disruptive students in grade (10 p.p.)	0.981***
	(0.006)
School FEs	Y
Grade FEs	Y
District-year FEs	Y
N	48,943

Notes: The outcome variable is the share of students in the teacher's classroom who had any disciplinary infractions in the prior year. The independent variable is the share of students in the teacher's grade who had any disciplinary infractions in the prior year. Covariates include teacher race, gender, age, educational attainment, whether undergraduate alma mater was a highly selective institution, class size, average lagged achievement scores, shares of students by race, gender, economic disadvantage, and English language learner status, principal race, gender, indicator for new principal, and cohort fixed effects. Standard errors are clustered at the school level. *** p<0.01, ** p<0.05, * p<0.1

Table A4: The Effects of Disruptive Students on Teacher Turnover: Non-linearities analysis

	(1)
Share of disruptive students (10 p.p.)	-0.011
	(0.071)
Share of disruptive students (10 p.p.)×Q2 disruptive students	0.033
	(0.060)
Share of disruptive students (10 p.p.)×Q3 disruptive students	0.021
	(0.064)
Share of disruptive students (10 p.p.)×Q4 disruptive students	0.022
	(0.068)
N	48,941

Notes: Teacher turnover is an indicator variable that takes a value of one if the teacher is no longer at the same school in the following year. The treatment variable is calculated as the share of students in the teacher's classroom who had any disciplinary infractions in the prior year. "Qn disruptive students" is an indicator variable that takes a value of one if the share of disruptive students in the teacher's class is in the n-th quartile of the disruptive student share distribution and zero otherwise. Covariates include teacher race, gender, age, educational attainment, whether undergraduate alma mater was a highly selective institution, class size, average lagged achievement scores, shares of students by race, gender, economic disadvantage, and English language learner status, principal race, gender, indicator for new principal, and cohort fixed effects. Standard errors are clustered at the school level. *** p<0.01, ** p<0.05, * p<0.1

Table A5: The Effects of Disruptive Students by Intensity on Teacher Turnover

	(1)	(2)
Disruptive incidents per capita (z-score)	0.011*	
	(0.006)	
Share of students with one disruptive incident (10 p.p.)		0.008
		(0.008)
Share of disruptive students with 2+ disruptive incidents (10 p.p.)		0.011**
		(0.005)
N	48,941	48,941

Notes: Teacher turnover is an indicator variable that takes a value of one if the teacher is no longer at the same school in the following year. The treatment variable is calculated as the share of students in the teacher's classroom who had any disciplinary infractions in the prior year. Col. 2 instruments for this measure using the school-grade share of students with lagged disciplinary records. Covariates include teacher race, gender, age, educational attainment, whether undergraduate alma mater was a highly selective institution, class size, average lagged achievement scores, shares of students by race, gender, economic disadvantage, and English language learner status, principal race, gender, indicator for new principal, and cohort fixed effects. Standard errors are clustered at the school level. *** p<0.01, ** p<0.05, * p<0.1

Table A6: Robustness check: School-Year Fixed Effects

	(1)
A. Any teacher turnover	
Share of disruptive students (10 p.p.)	0.009
	(0.007)
B. Move to different school	
Share of disruptive students (10 p.p.)	0.003
	(0.006)
C. Leave NC public system	
Share of disruptive students (10 p.p.)	0.006
	(0.004)
School-year FEs	Y
Grade FEs	Y
N	41,901

Notes: Teacher turnover is an indicator variable that takes a value of one if the teacher is no longer at the same school in the following year. The treatment variable is calculated as the share of students in the teacher's classroom who had any disciplinary infractions in the prior year. Table displays IV results using the school-grade share of students with lagged disciplinary records. Covariates include teacher race, gender, age, educational attainment, whether undergraduate alma mater was a highly selective institution, class size, average lagged achievement scores, shares of students by race, gender, economic disadvantage, and English language learner status, principal race, gender, indicator for new principal, and cohort fixed effects. Standard errors are clustered at the school level. *** p<0.01, ** p<0.05, * p<0.1

Table A7: Robustness check: Grade-Year Fixed Effects

	(1)
A. Any teacher turnover	
Share of disruptive students (10 p.p.)	0.011***
	(0.004)
B. Move to different school	
Share of disruptive students (10 p.p.)	0.006*
	(0.003)
C. Leave NC public system	
Share of disruptive students (10 p.p.)	0.005*
	(0.003)
School FEs	Y
Grade-year FEs	Y
District-year FEs	Y
N	48,941

Notes: Teacher turnover is an indicator variable that takes a value of one if the teacher is no longer at the same school in the following year. The treatment variable is calculated as the share of students in the teacher's classroom who had any disciplinary infractions in the prior year. Table displays IV results using the school-grade share of students with lagged disciplinary records. Covariates include teacher race, gender, age, educational attainment, whether undergraduate alma mater was a highly selective institution, class size, average lagged achievement scores, shares of students by race, gender, economic disadvantage, and English language learner status, principal race, gender, indicator for new principal, and cohort fixed effects. Standard errors are clustered at the school level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table A8: Robustness check: Excluding Outlier Observations

	(1) Excl. Top 1%	(2) Excl. Top 5%
A. Any teacher turnover		
Share of disruptive students (10 p.p.)	0.011***	0.013***
	(0.004)	(0.004)
B. Move to different school		
Share of disruptive students (10 p.p.)	0.007**	0.011***
	(0.003)	(0.004)
C. Leave NC public system		
Share of disruptive students (10 p.p.)	0.003	0.002
	(0.002)	(0.003)
School FEs	Y	Y
Grade FEs	Y	Y
District-year FEs	Y	Y
N	48,453	46,472

Notes: Teacher turnover is an indicator variable that takes a value of one if the teacher is no longer at the same school in the following year. The treatment variable is calculated as the share of students in the teacher's classroom who had any disciplinary infractions in the prior year. Table displays IV results using the school-grade share of students with lagged disciplinary records. Column 1 excludes observations that are in the top 1$ of the disruptive student share distribution, and column 2 excludes observations that are in the top 5%. Covariates include teacher race, gender, age, educational attainment, whether undergraduate alma mater was a highly selective institution, class size, average lagged achievement scores, shares of students by race, gender, economic disadvantage, and English language learner status, principal race, gender, indicator for new principal, and cohort fixed effects. Standard errors are clustered at the school level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table A9: Effects by Teacher Experience

	(1)	(2)
A. Any turnover		
Share of disruptive students (10 p.p.)	0.010***	0.007
	(0.004)	(0.005)
Share of disruptive students (10 p.p.) × Years of Exp.		0.002
		(0.003)
B. Move to different school		
Share of disruptive students (10 p.p.)	0.006*	-0.000
	(0.003)	(0.005)
Share of disruptive students (10 p.p.) × Years of Exp.		0.003
		(0.002)
C. Leave NC public system		
Share of disruptive students (10 p.p.)	0.004*	0.008**
	(0.002)	(0.004)
Share of disruptive students (10 p.p.) × Years of Exp.		-0.001
		(0.002)
School FEs	Y	Y
Grade FEs	Y	Y
District-year FEs	Y	Y
N	48,943	48,943

Notes: Teacher turnover defined as not remaining in the same school in the following year. Covariates include teacher race, gender, age, educational attainment, whether undergraduate alma mater was a highly selective institution, class size, average lagged achievement scores, shares of students by race, gender, economic disadvantage, and English language learner status, principal race, gender, indicator for new principal, and cohort fixed effects. Standard errors are clustered at the school level. *** p<0.01, ** p<0.05, * p<0.1

Table A10: The Effects of Disruptive Students, by Teacher Value-Added

	(1)	(2)	(3)
A. Any turnover			
Share of disruptive students (10 p.p.)	0.017**	0.018	0.033*
	(0.007)	(0.012)	(0.017)
Share of disruptive students (10 p.p.) × Above median VAM		-0.005	
		(0.017)	
Share of disruptive students (10 p.p.) × Middle tercile VAM			-0.030
			(0.024)
Share of disruptive students (10 p.p.) × Top tercile VAM			-0.005
			(0.027)
B. Move to different school			
Share of disruptive students (10 p.p.)	0.014**	0.018*	0.031*
	(0.006)	(0.011)	(0.017)
Share of disruptive students (10 p.p.) × Above median VAM		0.000	
		(0.015)	
Share of disruptive students (10 p.p.) × Middle tercile VAM			-0.022
			(0.022)
Share of disruptive students (10 p.p.) × Top tercile VAM			-0.005
			(0.024)
C. Leave NC public system			
Share of disruptive students (10 p.p.)	0.004	0.000	0.002
	(0.005)	(0.008)	(0.013)
Share of disruptive students (10 p.p.) × Above median VAM		-0.005	
		(0.011)	
Share of disruptive students (10 p.p.) × Middle tercile VAM			-0.008
			(0.018)
Share of disruptive students (10 p.p.) × Top tercile VAM			0.000
			(0.018)
School FEs	Y	Y	Y
Grade FEs	Y	Y	Y
District-year FEs	Y	Y	Y
N	13,519	13,519	13,519

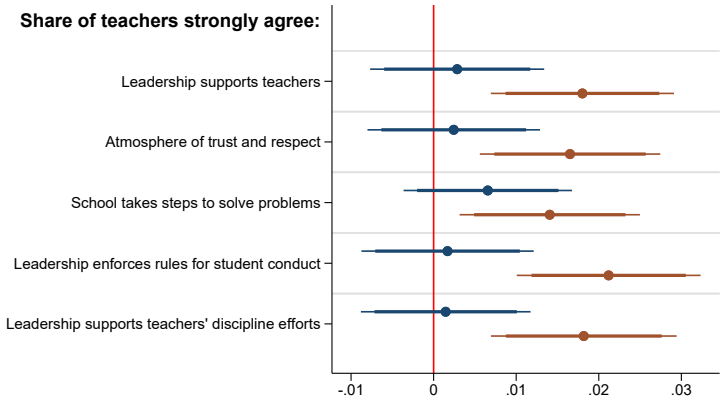
Notes: Teacher turnover defined as not remaining in the same school in the following year. Value-added measures are computed using procedure described in Appendix B. Covariates include teacher race, gender, age, educational attainment, whether undergraduate alma mater was a highly selective institution, class size, average lagged achievement scores, shares of students by race, gender, economic disadvantage, and English language learner status, principal race, gender, indicator for new principal, and cohort fixed effects. Standard errors are clustered at the school level. *** p<0.01, ** p<0.05, * p<0.1

Table A11: The Effects of Disruptive Students on Teacher Turnover by Grade Level

	Any turnover (1)	Any turnover (2)
Share of disruptive students (10 p.p.)	0.017***	0.016**
	(0.002)	(0.007)
Share of disruptive students (10 p.p.) × Middle/High school		-0.004
		(0.009)
School FEs	Y	Y
Grade FEs	Y	Y
District-year FEs	Y	Y
N	48,943	48,943

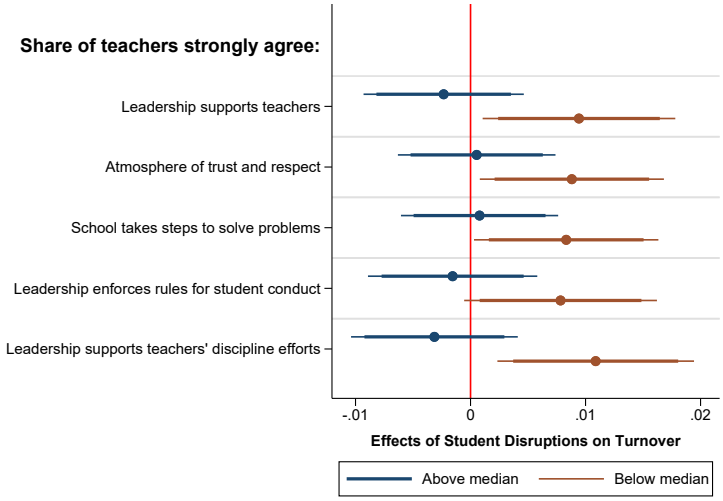
Notes: Teacher turnover defined as not remaining in the same school in the following year. Covariates include teacher race, gender, age, educational attainment, whether undergraduate alma mater was a highly selective institution, class size, average lagged achievement scores, shares of students by race, gender, economic disadvantage, and English language learner status, principal race, gender, indicator for new principal, and cohort fixed effects. Standard errors are clustered at the school level. *** p<0.01, ** p<0.05, * p<0.1

A.2 Figures



(a) Any teacher turnover

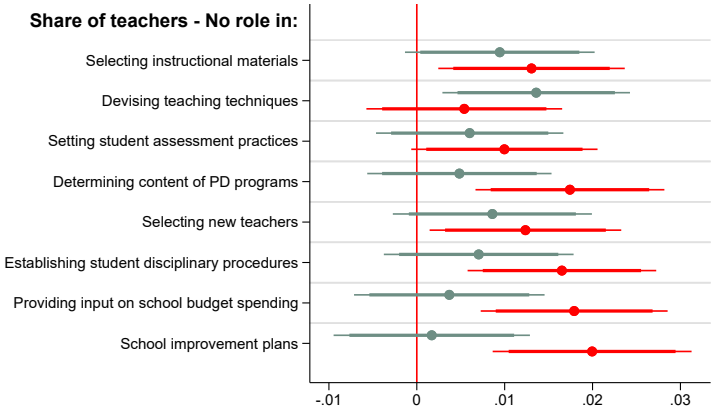
(b) Move to different school



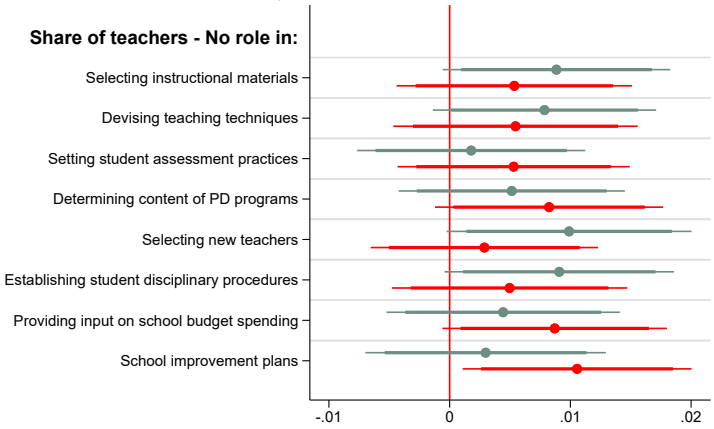
(c) Leave NC system

Figure A1: Effects of Student Disruptions on Turnover, by School Leadership Attributes

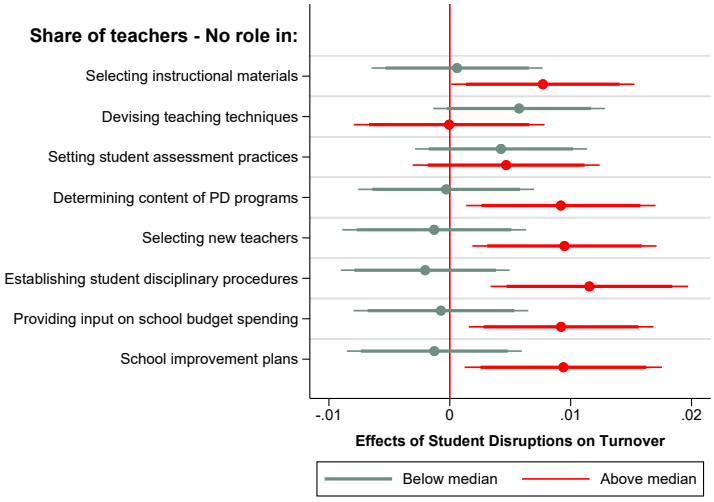
Notes: The figure displays coefficient estimates of the share of disruptive students on teacher turnover separately by subgroup. All specifications control for teacher race, gender, age, educational attainment, whether undergraduate alma mater was a highly selective institution, class size, average lagged achievement scores, shares of students by race, gender, economic disadvantage, and English language learner status, principal race, gender, and indicator for new principal. They furthermore include separate school, grade, cohort, and district-year fixed effects. The figure shows both 90% and 95% confidence intervals. Standard errors are clustered at the school level.



(a) Any teacher turnover



(b) Move to different school



(c) Leave NC system

Figure A2: Effects of Student Disruptions on Turnover, by Teacher Decision-making

Notes: The figure displays coefficient estimates of the share of disruptive students on teacher turnover separately by subgroup. All specifications control for teacher race, gender, age, educational attainment, whether undergraduate alma mater was a highly selective institution, class size, average lagged achievement scores, shares of students by race, gender, economic disadvantage, and English language learner status, principal race, gender, and indicator for new principal. They furthermore include separate school, grade, cohort, and district-year fixed effects. The figure shows both 90% and 95% confidence intervals. Standard errors are clustered at the school level.

B Derivation of Teacher Value-Added

We estimate teacher value-added using a two-step procedure, following Chetty et al (2014). We first regress student test scores on teacher fixed effects and a vector of student-, classroom-, and school-level controls:

$$A_{ijgst} = \alpha_j + \mathbf{P}'_{it}\pi + \mathbf{C}'_{jt}\omega + \mathbf{S}'_{st}\delta + \eta_{gt} + \epsilon_{ijgst} \tag{5}$$

where A_{ijgst} is the standardized test score for student i in teacher j's classroom in grade g of school s in year t. Our vector of controls include a cubic polynomial of prior test scores in a given subject, students' ethnicity and race, gender, English language learner status, class-level racial, gender, and English language learner composition, average peer lagged math and reading scores in class, corresponding school-year-level means of these attributes, and class size. The inclusion of teacher fixed effects (α_j) means that coefficients are identified off of cross-student variation in control variables within the same teacher. Next, we generate corresponding residuals with respect to controls only (not teacher fixed effects):

$$\widetilde{A_{ijgst}} = A_{ijgst} - (\mathbf{P}'_{it}\widehat{\pi} + \mathbf{C}'_{jt}\widehat{\omega} + \mathbf{S}'_{st}\widehat{\delta} + \widehat{\eta_{gt}}) \tag{6}$$

We construct average residualized scores at the teacher-year-level. Then we apply Empirical-Bayes shrinkage to minimize variation due to noise, in which the shrinkage factor for teacher j is calculated as:

$$\lambda_j = \frac{\widehat{\sigma}^2_\mu}{\widehat{\sigma}^2_\mu + \widehat{\sigma}^2_\epsilon / N_j}. \tag{7}$$

$\widehat{\sigma}^2_\mu$ is the variance across teachers, $\widehat{\sigma}^2_\epsilon$ is the variance of the idiosyncratic student effect, and N_j is the number of students in each teacher-year cell. This factor is thus the ratio of signal variance to signal plus noise variance.