THE EFFECTS OF CAMPUS SHOOTINGS ON SCHOOL FINANCE AND STUDENT COMPOSITION

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Abstract

Between 1999 and 2018, 210 shootings have occurred on public school campuses in the United States. The increased need for security and student support may crowd out instructional resources post-shooting. Shootings may also cause students, especially those from socioeconomically advantaged backgrounds, to move away, leading to declines in enrollment. Both changes in the budget allocation and the student composition could exert a negative impact on achievement. First, we examine the effects of campus shootings on public school districts' revenue, expenditure, debt, and staffing using a long panel of district-year data. Results from event study and difference-in-differences analyses indicate that shootings increase per-pupil spending by $248, which is funded primarily through increased federal transfers. Most spending increases occur in noninstructional functions, such as pupil support services, and capital projects, but they do not crowd out instructional spending. Using school-level data, we show that shootings are followed by a decline in enrollment, driven almost exclusively by reductions in students who do not receive free or reduced-price lunch. Private schools in the area also experience enrollment drop. In sum, despite the increased intergovernmental transfers, campus shootings reduce the desirability of the community and lead to the exit of relatively well-off families.

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1. INTRODUCTION

In 2018, the *Washington Post* reported that roughly 215,000 students had been exposed to gun violence in schools since the Columbine High School massacre in 1999 (Cox et al. 2018). School shootings, although still rare, have been brought to public attention by deadly events such as the Parkland school shooting in 2018 that led to the death of 17 people. High-profile campus shootings have triggered a call for multimillion-dollar investments in school security (Truong 2018), psychologists and mental health counselors (Fetters 2018), and large investments in "active shooter" insurances (Delgadillo 2018).

The very small literature on school shootings has focused on the impact of shootings on student outcomes, and rightly so, given the accumulating causal evidence on the negative impact of traumatic events (Beland and Kim 2016; Gershenson and Tekin 2018). It also shows that the negative effects concentrate in less affluent schools with large numbers of racial/ethnic minority and socioeconomically disadvantaged students. To inform policies that counter the negative impact on student outcomes requires understanding why shootings lead to declines in achievement. For example, the need to invest in security upgrades and student support services may crowd out instructional resources. That is, school resources may be a key mediating factor between campus shooting and academic performance. Additionally, the student composition may change after shootings due to the differential ability of families to relocate to other areas. As socioeconomic conditions are correlated with academic performance, the departure of better-off students could lead to a decline in school/district-level test scores. Yet, systematic research regarding the impact of shootings on school resources, spending, and student composition is virtually nonexistent, making targeting post-shooting responses difficult.

We contribute to the literature by providing the first causal estimates of campus shootings on district finance, staffing, and student composition on a national scale. The campus shooting database used in this study covers all shootings that occurred in public schools in the United States between 1999 and 2018, not just those incurring deaths. It includes detailed information regarding each incident, such as the precise date, the nature of the shooting (indiscriminate or targeted), and the number of casualties. The data show that the districts serving relatively well-off communities are less likely to have campus shootings. Therefore, we use a careful identification strategy to address the endogeneity of shootings by exploiting the variation in the timing of campus shootings across a long panel. More specifically, through event study designs, we compare changes in the outcomes before and after a shooting between districts (or schools) that experienced shooting and those that did not. Schools and districts plan out their financial and staffing strategies in phases that might last for multiple years. It also takes time for families to relocate and change schools. The event study analyses unpack the dynamic evolution of responses, allowing for flexible, nonlinear trends over time. The lack of pre-shooting effects also lends credibility to the conditional exogeneity assumption of shootings.

As a preview, we find that campus shootings lead to more spending on noninstructional activities, including student support services, but such increases do not crowd out instructional spending thanks to increased intergovernmental transfers. Therefore, declines in academic performance post-shooting cannot be attributed to changes in

instructional resources. Examining the fiscal impact of school shootings is important because it has direct policy implications for planning and budgeting purposes. Besides offering a baseline "cost" estimate of a school shooting on governments, the paper highlights that federal taxpayers bear the cost of recovering from localized campus shootings. Further, the federal transfers target districts serving high-poverty communities and are important at ensuring that noninstructional needs do not crowd out the already scarce instructional resources in those districts. Our results also draw the attention of policy makers to two spending issues. The short-term increase in the spending on student support services does not persist over time, in contrast to the persistent antidepressant use among youths in areas near shootings schools (Rossin-Slater et al. 2020). Districts also take on more debt to pay for increased capital spending; if intergovernmental transfers dry out in the long run, debt repayment could become a challenge if own-source revenue cannot be increased.

We contrast the changes in school- and district-level enrollment between students who are eligible for free or reduced-price lunch (FRPL) and those who are not, to examine whether campus shootings cause compositional shifts in the student body. Our results extend the existing literature on the negative impact of shootings on enrollment (Beland and Kim 2016) in a few ways. First, Beland and Kim (2016) focus on the years immediately following high school shootings. Our study suggests that composition effects that likely unfold over a long period post-shooting merit close attention. Specifically, we find that the enrollment declines are persistent over time and are almost entirely driven by non-FRPL students moving to schools outside of the shooting districts. The exiting effect is not confined to the public school system either. After shootings occur on public school campuses, enrollments drop among private schools located within the public school district boundary. Together, these findings on enrollment responses not only point to the previously untested student composition as a mechanism behind the negative impact of campus shootings on district- and school-level test scores, but also demonstrate how shootings further exacerbate socioeconomic segregation across schools. Policy makers and administrators must confront the difficult task of improving community perception of the safety and quality of schools post-shooting to avoid the pitfalls of yet another round of middle-class flight away from these schools (Massey and Denton 1993).

2. LITERATURE

Despite a large literature on the implication of community violence (e.g., Harding 2009; Sharkey et al. 2014) and school violence (e.g., Cornell and Mayer 2010) for students, the literature on the most extreme type of school violence, campus shooting, is scarce. Three papers have found negative impacts of school shootings on student achievement (Beland and Kim 2016; Gershenson and Tekin 2018; Poutvaara and Ropponen 2018), all pointing to the psychological stress that shootings impose. Poutvaara and Ropponen (2018) find that the news of a mass shooting in Finland led to a drop in male performance on matriculation exams not only in the region where the shooting occurred but throughout the country, suggesting that the psychological impact may go beyond those directly exposed to shootings. Gershenson and Tekin (2018) exploit the geographic variation in school's proximity to the "Beltway Sniper" attacks and find that exposure to those attacks reduced the proficiency rates by 2 to 5 percent in schools

that serve higher proportions of racial minority and socioeconomically disadvantaged students. Indeed, Rossin-Slater and colleagues (2020) find an increase in youth antidepressant use in areas close to school shootings, providing direct evidence of the mental health impacts.

The paper most relevant to our study is that of Beland and Kim (2016), who examine the impact of deadly high school shootings on student outcomes and enrollment. The paper shows that shootings reduce the school-level proficiency rates in Math and English Language Arts and decrease grade 9 enrollment within three years post-shooting. Further, the decline in proficiency rates among students consistently enrolled before and after a shooting shows that the decline may be attributed to the trauma of the shooting, instead of solely to the compositional shift of better-performing students leaving the school. The paper, however, does not empirically examine the compositional effect.

This study contributes to the literature by looking at two sets of outcomes unexamined in the literature that are potential mechanisms behind the decline in achievement: allocation between instructional and noninstructional spending and student composition. First, the literature on school-resource responses to shootings is descriptive and narrowly focuses on the increase in security efforts (Addington 2009; Curran, Fisher, and Viano 2020). Nevertheless, it points to important questions regarding budget allocation: How are districts able to pay for increased security and mental health needs post-shooting? Do those needs crowd out instructional spending, thus contributing to declines in academic performance? Faced with a shock, schools often have less flexibility in raising resources than other local governments (e.g., Roza 2013). The restricted revenue-raising power could negatively affect instructional spending when other spending needs, such as student support services, are prioritized following campus shootings. The crowd-out of instructional activities may be detrimental to student achievement.[1] We know surprisingly little about the budget allocation of school districts post-shooting.

Second, literature from urban sociology highlights that violent crimes and the spatial proximity to homicides are associated with population loss, especially among socioeconomically advantaged groups (Morenoff and Sampson 1997). This implies that if campus shootings lead to families relocating away from the school, the response may be stronger among those with better socioeconomic means. If true, changes in student composition may be another mechanism through which academic performance declines, given that students from advantaged backgrounds tend to have higher test scores. More importantly, such compositional shifts could exacerbate existing disparities across schools and intensify socioeconomic segregation. Policy responses would need to expand the focus beyond immediate relief and prevention, to counter the community stigma associated with the campus shootings.

3. DATA AND IDENTIFICATION STRATEGY

Data Sources

Reporters at the *Washington Post* have compiled a list of shootings that occurred on public K–12 campuses during or immediately before or after classes. The data cover

1. There is robust evidence that school resources play a key role in student achievement (see Jackson 2020 for a review).

indiscriminate shootings, homicides, and suicides, but exclude accidental discharges and suicides that caused no injury to others. Data sources include news articles, open-source databases, law enforcement reports, and direct contacts with school and police departments (Cox et al. 2018). The *Post*'s process of verifying details about each shooting, such as the number of casualties, lends credibility to the measure of shooting occurrence.[2] Overall, the data cover 210 public school shootings from academic year 1999 to 2018, including 48 indiscriminate shootings and 162 of other types.[3] Figure 1a shows the number of shootings over time. There is no discernible pattern, except for an unprecedented number of shootings during school year 2017–18. Figure 1b shows the geographic distribution of campus shootings in the contiguous U.S. states, where red dots denote indiscriminate shootings and black crosses denote accidents, suicides, and targeted homicides. The two figures demonstrate that there is substantial variation over space and time in campus shootings, which is essential for our identification strategy.

Data related to education institutions are from the Common Core of Data (CCD) system. Ideally, we would want to focus on the impact of shootings on school-level outcomes. This is the level of analysis for student composition outcomes, including total enrollment and FRPL enrollment, using the Public Elementary/Secondary School Universe Survey Data from 1994 through 2018. We also examine school-level enrollment data from the Private School Universe Survey, which covers all even-numbered years from 1994 through 2018. However, a nationwide, school-level long-panel dataset of finances and staffing is not available. Therefore, for these outcomes, the unit of analysis is district-year. The Local Education Agency Finance Survey, also known as the F-33 survey, provides information on revenue, expenditure, and debt from 1994 to 2017. Staffing variables come from the Local Education Agency Universe Survey Longitudinal Data Files. Given that changes to school resources often require a district-wide response, any district-level effects remain relevant to our research goals.

Research Design

The main objective of the study is to exploit the plausibly exogenous shocks generated by school shootings in the United States over the last two decades to identify their impact. Because shootings are isolated events initiated by individuals, the exact timing of shootings is unpredictable and highly random.[4] However, estimating their causal

2. Rossin-Slater et al. (2020) use the *Post* data to examine the impact of school shootings on youth antidepressant use. Only two other empirical studies examine nationwide school shootings: Beland and Kim (2016) and Anderson and Sabia (2018). Both papers use news-based data from the National School Safety Center, the Washington Ceasefire, and the National School Safety and Security Services. While trends over time in the number of shootings are similar between their and our data sources, there are noticeable differences. One reason for the difference is that Beland and Kim include shootings that occurred on the way to or from school but exclude those that did not lead to any deaths. Also, they focus only on high school shootings. Anderson and Sabia include shootings that involved deaths on school property (as an outcome variable to test the impact of gun control policies). An important advantage of the *Post* data is the detailed information regarding each incident, including the precise date, the nature of shooting (indiscriminate or targeted), and the number of casualties.
3. Throughout the paper, we use the year of the spring semester to indicate the school year. For instance, we refer to the 2001–02 school year as 2002. Because the *Post* data record school shootings since the Columbine High massacre on April 20, 1999, the 1999 data likely do not capture all school shootings in that academic year.
4. For instance, although their estimates are not precise, Anderson and Sabia (2018) show that school shootings are not statistically significantly associated with the adoption of a variety of state laws and gun-control policies.

Notes: Each red dot corresponds to the location of indiscriminate shooting, and each black X denotes the location of shooting of other types. Alaska and Hawaii are not shown on the map. One shooting has occurred during the period in Hawaii and no shooting in Alaska.

Figure 1. Temporal and Geographic Distribution of Public K-12 Campus Shooting

effects can be challenging in that schools and districts experiencing shootings may be places where school resources are poor or student enrollment is declining. We conduct event study analysis, which takes advantage of the temporal and geographic variations in the distribution of shootings. It allows us to test whether the timing of shooting is conditionally exogenous, by looking at the evolution of the outcome variables in the years before shooting. Further, while some responses may be immediate, it could take time for districts to change spending and staffing decisions and for student composition to alter, thereby showing lagged responses to the shooting event. The event study approach will help unpack these differences over time.

Specifically, a set of indicator variables h_{it}^{k} represent whether shootings occurred in district i for the district-level analysis or school i for the school-level analysis in state s at time $t - k$, for all integers k from $-k_{\circ}$ to $k_{\circ}$ representing the number of years since the shooting. For example, if a district (or school) had its first and only shooting in 2004,

h_{it}^1 takes the value 1 only when $t = 2005$, and h_{it}^2 takes the value 1 only when $t = 2006$.[5] Let the set K include all integers from $-k_o$ to k_o except for –1 (that is, we normalize the coefficient to the year before a shooting), then the regression model is:

$$Y_{it} = \sum_{k \in K} \gamma_k h_{it}^k + \theta_i + \delta_{st} + \epsilon_{it}, \tag{1}$$

where Y_{it} represents the various outcome variables. District (or school) fixed effects θ_i control for time-invariant, unit-specific factors. Further, the state-by-year fixed effects δ_{st} flexibly control for state-level changes and reforms that impact all entities in the state.[6] We cluster standard errors at the district (school) level for the district-level (school-level) analysis.[7] The coefficients γ_k indicate how the outcome variables change with respect to the year prior to shooting. In practice, k may represent a period of consecutive years as opposed to a single year to preserve statistical power in the analysis. This study examines the trends in outcome variables two, four, six, eight, and more years before a shooting, the year of shooting, as well as two, four, six, eight, and more years after a shooting. We later report event study graphs that visualize estimates of γ_k, with coefficients normalized to two years prior to the shooting year.

The event study analysis is a variation of the comparative interrupted time series approach known in some literature (e.g., Dee, Jacob, and Schwartz 2013) or difference-in-differences approach in others (e.g., Angrist and Pischke 2008). The event study analysis has two advantages in our setting. First, the assumption for causal identification is that the deviations from prior outcome trends within the comparison districts provide a valid counterfactual for what would have happened in the treatment districts if the treatment did not occur. This assumption would be violated if there are omitted time-varying factors unique to the treatment districts that are associated with the occurrence of shootings and at the same time affects the outcomes. For example, if the treatment districts experience a declining economy, which leads to more shootings and induces district funding and staffing changes, the estimated effect cannot be attributed to the shooting alone. If this is true, however, the pre-shooting indicator variables in the event study regression should pick up the effect of such confounding factors, unless

5. The vast majority of districts with shootings had exactly one shooting: about 88% of the districts with shootings had a single shooting, 9% had exactly two shootings, and less than 3% had more than two shootings. The event study analyses estimate the average effect of a shooting using the variation from all the shootings that happened in each district. That is, the pre- and post-shooting indicator variables will turn on for any shootings that have occurred. A robustness check that uses the variation in shootings from the first shooting in each district generates the same findings.
6. We prefer the state-by-year fixed effects over the district-specific time trends for two reasons. First, the sample consists of around 10,000 districts over two decades. Even a district-specific linear year trend would mean a larger loss in the degree of freedom than the state-by-year fixed effects. A district-specific quadratic trend may be more flexible than the district-specific linear trend but is more imprecise. Second, the nonparametric state-by-year fixed effects may be more appropriate than a parametric district-specific trend. The functional form of the trend is not clear a priori. Trends also tend to absorb time-varying treatment effects; if the effects are larger at the end of the panel, the trends are over controls.
7. In a robustness check, we control for district-level percentage of minority students and child poverty rate in the community from year 1993, the year before the period of analysis, interacted with a linear year trend. These covariates will control for the differing changes in finance and staffing across districts over time due to the original socioeconomic composition of students. Because missing values of the covariates lead to a reduction in sample size and because the event study largely shows no pre-trend even without the covariates, we do not include them in the baseline specification. With the covariates included, the results (unreported but available upon request) are similar to the baseline results reported later in the paper.

the onset of the confounding factors in the treatment districts perfectly coincides with shootings. Statistically insignificant coefficient estimates for all years prior to shooting ($k < 0$) will thus lend credibility to our identification strategy.

The second advantage is that we can estimate how the impact of a shooting changes over time without imposing functional form assumptions. The over-time impact is captured by a series of period indicators. Therefore, it is more flexible than a linear or quadratic measure of time trend interacted with post-treatment status. The coefficients for all years after a shooting ($k \geq 0$) tell us how the responses evolve. Econometrically, Goodman-Bacon (2018) suggests that, when not all units are treated at once and when the group of untreated units is large, event study is appropriate because it puts less weight on the "problematic" part of the sample that uses the already treated units as controls.[8]

The event study analysis does not, however, estimate a single average treatment effect. Therefore, we also estimate a compact version of the same evidence summarized by one parameter, that is, the standard difference-in-differences estimate. The regression specification is:

$$Y_{it} = \beta_{Post} S_{it} + \mu_i + \rho_{st} + e_{it}, \tag{2}$$

where S_{it} is an indicator variable representing whether a shooting has occurred. We control for unit fixed effects μ_i and state-by-year fixed effects ρ_{st}. Therefore, β_{Post} represents the average treatment effect of campus shootings on various outcomes.

4. FINANCIAL AND STAFFING ANALYSIS

Descriptive Statistics

To address extreme outliers in the F-33 survey data that likely reflect reporting or coding errors, we follow the approach of Dee, Jacob, and Schwartz (2013) to limit the district-level sample. First, we include observations from all regular and operational unified school districts for each school year between 1994 and 2017.[9] Second, we exclude outliers by dropping observations where the real total revenue or spending per-pupil was greater than 150 percent of the state-specific 95th percentile value or less than 50 percent of the state-specific 5th percentile value.[10] This effectively excludes Hawaii and the District of Columbia where the entire jurisdiction is combined into a single district. Overall, the exclusion rids roughly 1 percent of the district-year observations. Based on the remaining sample, we merge in the district staffing variables. The district sample

8. Sun and Abraham (2021) show that the consistency of the event study estimator rests on the important assumption that different cohorts (districts experiencing shooting in different years) experience the same paths of treatment effects (i.e., the effect of shooting at a given year after the shooting). Using Sun and Abraham's command *eventstudyweights* in Stata, our estimates of the underlying weights on the cohort-specific average treatment effects show that the degree of potential contamination from other periods is low.
9. That is, we exclude districts that are purely administrative in nature and agencies that operate only charters schools.
10. This implies that we exclude observations where enrollment, revenue, or spending information are missing. When total revenue and spending numbers are missing, data on subcategories of revenue and spending are not present. The concern that districts experiencing shootings are more likely to have missing or outlier values does not seem to be valid when we compare the percentage of missing values in the shooting and nonshooting districts.

Table 1. Descriptive Statistics

	All		Shooting	Non-shooting
	Mean	SD	Mean	Mean
Panel 1. District-Level Finance and Staffing				
Total revenue	8.639	2.813	8.005	8.649
Federal revenue	0.684	0.718	0.797	0.682
State revenue	4.271	1.878	4.039	4.275
Own-source revenue	3.683	2.668	3.169	3.692
Private contribution	0.019	0.089	0.016	0.020
Total expenditure	8.657	2.955	8.140	8.665
Instructional expenditure	4.517	1.488	4.177	4.522
Noninstructional expenditure	3.355	1.253	3.147	3.359
Pupil support expenditure	0.317	0.236	0.353	0.316
Capital spending	0.785	1.218	0.816	0.784
Long-term debt outstanding	4.150	5.237	4.336	4.147
Teacher per 100 students	7.079	1.787	6.087	7.095
Counselor per 100 students	0.229	0.115	0.216	0.229
Pupil support staff per 100 students	0.390	0.369	0.396	0.390
Panel 2. School-Level Enrollment				
Log total enrollment	5.871	1.066	6.796	5.870
Log FRPL enrollment	4.816	1.440	5.804	4.814
Log non-FRPL enrollment	5.150	1.224	5.957	5.148
Log private school enrollment	4.741	1.270	4.939	4.688

Notes: All district financial variables are per pupil and are reported in thousands of 2000 U.S. dollars. Staffing variables are express in full-time equivalent per 100 students. FRPL = free or reduced-price lunch eligible.

consists of 210,269 district-year observations, reflecting 10,748 school districts over the 24 years.

Panel 1 of table 1 presents the descriptive statistics on the district-level financial and staffing variables. We examine total revenue as well as revenue subcategories by source when possible (i.e., federal, state, local own-source, and private contribution).[11] On average, state funding represents the largest source of revenue to districts, closely followed by district own-source revenue. Total spending consists of mostly current spending on the day-to-day operation of the district and a smaller capital spending on physical assets.[12] Current spending is allocated either to instructional or noninstructional functions, with the latter including various support services. Of particular interest to us is the pupil support services, including attendance record keeping, social work, counseling, medical, psychological, and speech services.[13] Although we would ideally zoom in on support services that are likely to be impacted by shootings such as mental health

11. The F-33 survey started to report private contribution, defined as "gifts of cash or securities from private individuals or organizations" in academic year 2005–06.
12. Capital spending consists of four categories: construction, instructional equipment, other equipment (including security equipment), and purchase of land and existing structure.
13. Besides pupil support, other support functions are administration, facility operation and maintenance, transportation, business support, and a miscellaneous category.

and psychological services, such fine-grained data are not available.[14] Lastly, we examine total long-term debt outstanding, because districts could take on more debt for acquiring physical assets such as new facilities and equipment. All financial variables are measured on a per-pupil basis expressed in thousands of real 2000 dollars.[15]

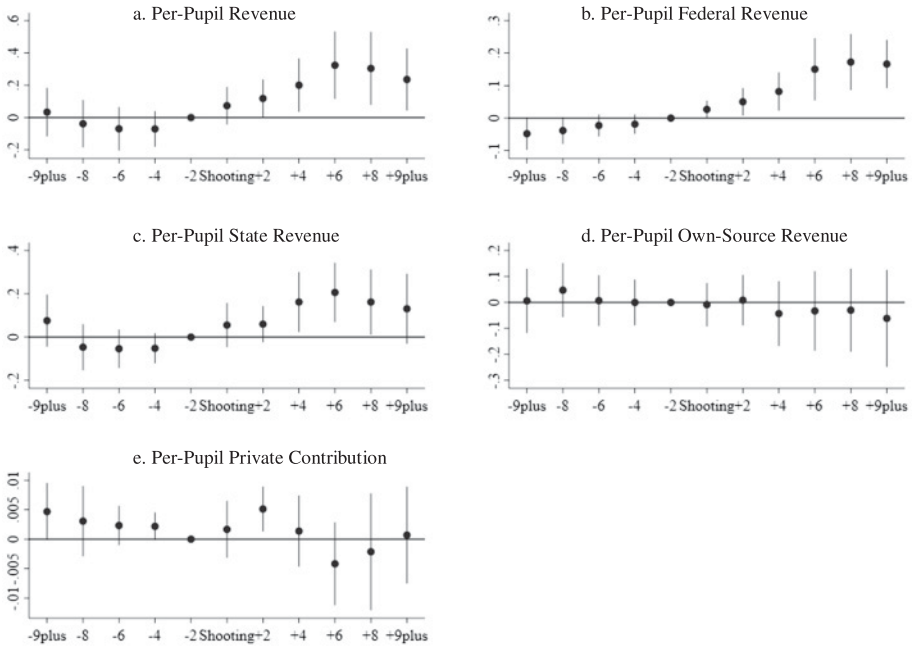
Analyses of staffing could supplement that of spending to answer the question of whether campus shootings shift the allocation of district resources from instruction to other functions, especially student support. Therefore, we examine the number of teachers, guidance counselors, and student support staff, measured on a per-100-student basis. According to CCD documentation, guidance counselors address learning problems, evaluate student abilities, and assist students in career and personal development. Over the past decades, the role of guidance counselors has evolved to focus more on student development comprehensively (Carey and Dimmitt 2012; American School Councilors Association 2014) beyond getting students to college, and counselors may provide assistance after a traumatic event like a campus shooting. Student support services staff include attendance officers, and staff providing health, psychology, or social services.[16] To deal with outliers in the staffing variables, we recode as missing where the variable was greater than 150 percent of the state-specific 95th percentile or less than 50 percent of the state-specific 5th percentile.[17] An average district has 7.08 teachers, 0.23 counselors, and 0.39 pupil support staff per 100 students.

The last two columns of table 1 suggest that shootings are more likely in districts with lower per-pupil revenue, higher reliance on federal transfer, and lower teacher ratios. In a separate online appendix that can be accessed on Education Finance and Policy's Web site at https://doi.org/10.1162/edfp_a_00350, table A.1 reports district-level estimates from negative binomial regressions on the number of campus shootings since 1999. District size is the only factor statistically significantly associated with the number of indiscriminate shootings, while targeted shootings are more often seen in bigger districts, districts with less per-pupil revenue, a higher share of black students, or located in higher poverty areas.

Results

Figure 2 presents the event study graphs for the effects of campus shootings on different types of district per-pupil revenue. Specifically, figure 2a shows the effect on total revenue. The coefficient estimates to the left of the shooting year are close to zero and fairly precisely estimated, suggesting that, prior to the shooting, the trend in revenue is similar in districts later affected and unaffected by shootings. The coefficients to the right of the shooting year are increasingly positive over time but slightly decrease in magnitude seven or more years after the shooting. The estimates are statistically significant in all post-shooting years. The coefficients in column 1 from table 2, panel A

14. Detailed data on security spending are not available either. Current security spending is likely absorbed in the support service spending for "operation and maintenance" category, while spending on security equipment and facility renovation is included in the capital spending.
15. Alternatively, taking the natural log does not change the findings significantly. Results from the alternative specifications are available upon request.
16. It is not to be confused with "other support staff" such as maintenance workers, bus drivers, security, and food service workers.
17. Staffing variables in the original Local Education Agency Universe Survey data also contain missing values, ranging from 2 to 5 percent of the district-year observations in our sample.



Notes: Each figure corresponds to a different ordinary least squares regression. The regressions include district fixed effects and state-by-year fixed effects. All outcome variables are expressed in thousands of 2000 U.S. dollars. Each bracket represents the 95 percent confidence interval constructed with standard errors clustered at the district level, and the center of the bracket represents the point estimate. The coefficient for the group "−2" (i.e., the two years prior to shooting) is normalized to zero.

Figure 2. Graphical Event Study Analysis of the Effects on District-Level Revenue

provide the compact estimate. Campus shootings on average are associated with an increase of $187 in per-pupil revenue. Given the hump-shaped event study graph, the magnitude of the average effect is smaller than that of the statistically significant peak effect from the event study analysis.

Examining the subcategories of revenue shows that federal revenue increases after shootings and plays an important role in stabilizing district financial resources. As shown in figure 2b, per capita federal revenue increases immediately after the shooting year and is statistically significant in all years post-shooting. The effect intensifies over the first eight years after a shooting and then stabilizes. Although there is no centralized data on federal grants to schools experiencing shootings, the increases are likely due to the various federal programs and resources targeted at assisting communities, including school districts, affected by violence. For example, the long-standing Community Oriented Policing Services (COPS) School Violence Prevention Program by the Department of Justice funds not only new positions in emergency management but also security equipment and technology, a point we return to later in the discussion. Moreover, the Department of Education offers various grants aimed at violence response and prevention.[18] Column 2 of table 2, panel A shows that, on average, campus shootings are

18. Such programs include the Trauma Recovery Demonstration Grant Program, Mental Health Service Professional Demonstration Grant Program, Project Prevent Grant Program, and School Climate Transformation Grant.

Table 2. Impact of Campus Shooting on District Finance and Staffing

A. Revenue

	(1) Total Revenue	(2) Federal Revenue	(3) State Revenue	(4) Own-Source Revenue	(5) Private Contribution
Shooting	0.1866*	0.1287***	0.0975	−0.0396	0.0005
	(0.0935)	(0.0306)	(0.0744)	(0.0634)	(0.0015)
Observations	209,985	209,985	209,985	209,985	95,454
R^2	0.8830	0.8555	0.8694	0.9233	0.4074

B. Expenditure and Debt

	(1) Total Expenditure	(2) Instructional Expenditure	(3) Noninstructional Expenditure	(4) Pupil Support Expenditure	(5) Capital Expenditure	(6) Debt Outstanding
Shooting	0.2478*	0.0552	0.0859	0.0221**	0.1066*	0.7515*
	(0.1060)	(0.0517)	(0.0520)	(0.0085)	(0.0517)	(0.3744)
Observations	209,985	209,985	209,985	209,985	209,985	209,985
R^2	0.7807	0.9192	0.8518	0.8575	0.1654	0.6135

C. Staffing

	(1) Teacher	(2) Counselor	(3) Student Support Service Staff
Shooting	0.0062	−0.0019	0.0380*
	(0.0464)	(0.0044)	(0.0177)
Observations	209,922	209,886	209,873
R^2	0.8414	0.5527	0.6529

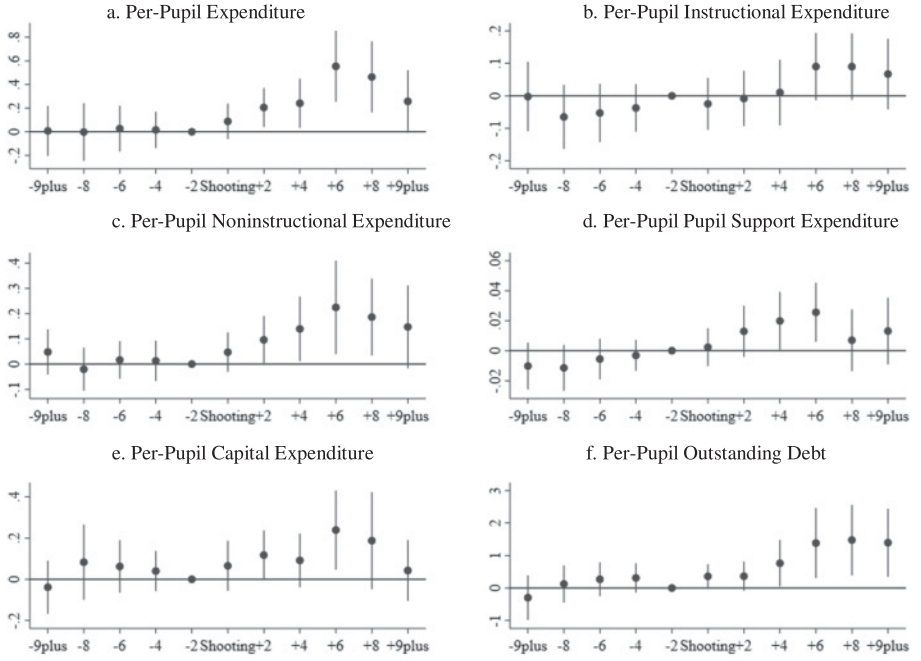
Notes: Each column of each panel corresponds to a different ordinary least squares regression. The regressions include district fixed effects and state-by-year fixed effects. Heteroscedasticity-robust standard errors in parentheses, clustered at the district level. $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

statistically significantly associated with a $129 increase in federal funding for school districts. Given the mean per-pupil federal revenue of $684, the effect represents a 19 percent increase.

Figure 2c shows that states also increase transfers to districts after shootings, but the state revenue increases are only statistically significant for three to eight years after the shooting, and taper off in the long run. This explains why, when combining multiple post-shooting years, the average effect is relatively small and not statistically significant in column 3 of table 2, panel A. The contrast between federal and state transfers suggests that, although states are traditionally the main funding source for public school districts, federal monies are the primary driver behind the increased revenue after shootings. Federal policy makers seem to have decided that while shootings are localized events, it is a federal responsibility to provide financial assistance.[19]

Districts' own-source revenue does not increase after a shooting; in fact, the point estimates seem to decrease over time, although they are imprecisely estimated and statistically insignificant. This is not surprising given that many districts are institutionally and politically constrained to raise additional revenue, especially in situations when

19. An analogy may be federal disaster relief. Local communities generally could only qualify for federal emergency assistance during natural disasters when the casualty exceeds a certain threshold.



Notes: Each figure corresponds to a different ordinary least squares regression. The regressions include district fixed effects and state-by-year fixed effects. All outcome variables are expressed in thousands of 2000 U.S. dollars. Each bracket represents the 95 percent confidence interval constructed with standard errors clustered at the district level, and the center of the bracket represents the point estimate. The coefficient for the group "−2" (i.e., the two years prior to shooting) is normalized to zero.

Figure 3. Graphical Event Study Analysis of the Effects on District-Level Spending and Debt

intergovernmental transfers exist. Lastly, relying on a shorter panel with information on private contribution to school districts, figure 2e shows that donations experience a small but statistically significant increase one to two years after a shooting but the effect then disappears. This is in line with our expectation that social sympathy and support for groups experiencing traumatic events are at their highest immediately following those events.

Figure 3 represents the event study graphs for the effect of campus shootings on different types of district per-pupil expenditure. Increased revenue shown earlier has enabled more overall spending after a shooting occurs, as seen in figure 3a. The impact on total expenditure increases in magnitude one to six years after the shooting but tapers off after the seventh year. Column 1 in table 2, panel B reports a statistically significant spending increase of $248. This point estimate is larger than the revenue effect, suggesting that districts might have engaged in deficit financing to fund excess spending. Later analysis of outstanding debt explores this possibility.

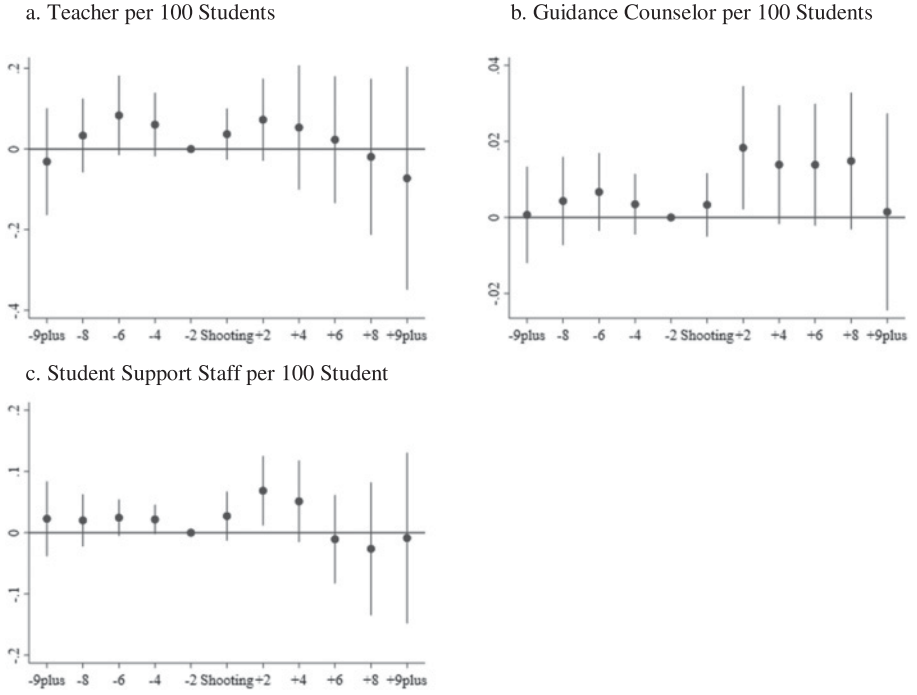
Total spending consists of three major components: current instructional, current noninstructional, and capital spending. Figure 3b and column 2 of table 2, panel B show that the impact on instructional spending is small in magnitude and statistically insignificant. In contrast, figure 3c shows an increasing trend in noninstructional spending after shooting until six years post-shooting; the increase is statistically significant between years three and eight. The compact coefficient estimate in column 3

of table 2, panel B shows an average increase of $86 in noninstructional spending ($p = 0.09$).

A subcategory of noninstructional spending that is particularly of interest is pupil support expenditure, because this spending could provide much-needed services to students experiencing emotional and psychological trauma. Specifically, pupil support spending increases by a statistically significant $22 per student after shootings, as shown in column 4 of table 2, panel B. With a mean pupil support spending of $317 per student, this translates into a 7 percent increase. The event study graph in figure 3c shows that pupil support spending increases up to six years after a shooting but declines thereafter, suggesting that the increase may not be permanent. While the data do not allow us to show how the increase is allocated between mental health support and other types of student support, the empirical finding provides some evidence that districts experiencing shootings have devoted financial resources to support students' nonacademic needs. The increased spending is likely supported by the additional transfers districts receive from state and federal governments and has not crowded out instructional resources.

Figure 3e shows that districts statistically significantly increase capital spending one to two years and five to six years after a shooting. The estimates for other years are positive but not statistically significant at the 5 percent level. The fluctuation in the coefficient estimates is unsurprising given that capital spending tends to be unsmooth because districts may pay for new construction or equipment in one year and wait for a couple of years for another capital project. Column 5 of table 2, panel B shows that capital spending increases statistically significantly by $107. Results focusing on subcategories of capital spending (available upon request) show that the increase in capital spending is mainly driven by additional construction costs, possibly because districts have to repair facilities damaged by shootings or upgrade existing buildings to higher security standards. School districts usually rely on borrowing to finance capital projects, and indeed, figure 3f shows that per-pupil debt outstanding has increased after the shooting. The increase is stable and statistically significant for three years or more thereafter. The average long-term impact on debt outstanding is $752 per student. While additional capital investment needs such as improved security measures may be justified, the additional debt will eventually have to be repaid and could exert financial constraints on the districts in the long run.

Figure 4 presents results on the staffing outcomes. Specifically, figure 4a shows no statistically significant change in the number of teachers per 100 students, although the estimates are not very precise. This confirms the previous finding that shootings do not lead to a crowd-out of instructional resources. Figure 4b shows a temporary increase in guidance counselors per 100 students one to two years after a shooting; however, the increase reverts to zero and is statistically insignificant in other post-shooting years. In line with the prior finding that districts spend more on pupil support after shootings, figure 4c shows a short-term increase in student support service staff and the increase is statistically significant for one to two years after shooting. The increase does not appear to be permanent as the coefficient estimates decline thereafter. Column 3 of table 2, panel C shows the short-term effect to be 0.038. With the average student support full-time equivalent of 0.39 per 100 students, this represents a 10 percent increase.



Notes: Each figure corresponds to a different ordinary least squares regression. The regressions include district fixed effects and state-by-year fixed effects. Each bracket represents the 95 percent confidence interval constructed with standard errors clustered at the district level, and the center of the bracket represents the point estimate. The coefficient for the group "−2" (i.e., the two years prior to shooting) is normalized to zero.

Figure 4. Graphical Event Study Analysis of the Effects on District-Level Staffing

While the baseline regressions explore the differential outcomes between districts where at least one shooting has occurred and others, not all shootings are equal. We present estimates of the heterogeneous effects in the online appendices. First, we test if shootings causing a high number of casualties lead to differential changes in the outcomes, by adding to the indicator shooting variables the continuous measure of casualty.[20] Results in online table A.2 show that districts receive more donations after high-casualty shootings; however, the increase is small in magnitude and does not represent a major source of funding. High-casualty shootings seem to induce less capital spending. One reason behind this finding may be a substitution of capital spending with current spending given the strong, immediate needs following a mass shooting. Second, we revise the baseline specification by replacing each shooting indicator variable with two indicator variables, one representing whether indiscriminate shootings (type 1) have occurred, and one regarding other shootings (type 2).[21] Results in online table A.3 suggest that the increase in federal transfers and pupil support spending are larger after indiscriminate shootings, but the differences are not statistically

20. The average casualty across all shootings in the sample is two.
21. Mass shootings commonly referred to in the media likely belong to the former category, although not all indiscriminate shootings lead to mass casualties.

significant.[22] Lastly, we divide the sample into four subsamples based on the 1999 school-age children poverty rate and then run the baseline regression on each subsample separately.[23] Online table A.4 shows that the post-shooting increases in total revenue and federal transfer are largely driven by districts in the highest-poverty quartile, suggesting targeting of federal funding. As a result, the increase in total spending is the strongest in the highest-poverty quartile. Interestingly, the increase in pupil support service spending is not statistically significant for the highest-poverty group and is small in magnitude. In contrast, districts in the lowest-poverty quartile significantly increase pupil support spending after shootings, likely through cutting back on instruction spending.[24]

5. ENROLLMENT ANALYSES

Descriptive Statistics

Because enrollment data are available at the finer school level, the unit of observation for the enrollment analysis is school-year, with robustness checks aggregating the data to the district level. Panel 2 of table 1 presents the descriptive statistics on the school-level enrollment variables for schools in the 50 states and the District of Columbia. The public school enrollment data cover the years 1994 through 2018 while the available panel is shorter for the FRPL data covering 1999 through 2016. The last two columns compare the mean differences between nonshooting schools and schools where at least one shooting has occurred. Similar to what we have seen in the earlier district-level statistics, schools where shootings occurred are larger and have a higher percent of FRPL students. The school sample consists of 2,287,025 school-year observations, reflecting 132,073 schools over the 25 years.

We also examine private school enrollment within the public school district area and report the descriptive statistics in the bottom row of table 1. First, if shootings cause students, especially those with better financial means, to leave the public school district, they may be enrolled in private schools (Abouk and Adams 2013). On the other hand, if shootings lead to a perception that the community is not "safe" for kids, private schools located in the area may see a drop in enrollment. Based on private school location coordinates, we match each private school to public school districts by identifying which district's boundary the private school is located in through geospatial analysis.[25] We also exclude the eleven private schools where a campus shooting has occurred from the analysis. The sample includes 200,625 school-year observations and represents 6,916 private schools. As shown in table 1, private schools located within the boundary of shooting districts have on average a larger enrollment.

22. We also estimate the event study regressions on federal transfers for each type of shooting. Results are available upon request. Neither type exhibits statistically significant pre-trends.
23. Districts with missing 1999 poverty estimates will therefore be excluded from this analysis. Assigning poverty rate quartile for those districts based on earlier, nonmissing years generates similar findings (results available upon request).
24. Results regarding the lowest-poverty quartile should be interpreted with caution, because among this subsample, the number of districts experiencing shootings is small (fifteen), as reported at the end of the table.
25. It is possible that a private school is matched to a secondary school district and an elementary school district at the same time. Further, we use the 2015 geospatial data to conduct the matching. Private schools that were closed before 2015 and those that experienced location changes are excluded from the analysis. If campus shootings contribute to such closings and changes, our estimate of the impact on private school enrollment will likely be an underestimate.

Table 3. Impact of Campus Shooting on School Enrollment

	Comparison 1			Comparison 2		
	(1)	(2)	(3)	(4)	(5)	(6)
	All Enrollment	FRPL Enrollment	Non-FRPL Enrollment	All Enrollment	FRPL Enrollment	Non-FRPL Enrollment
Shooting	−0.0398*	0.0716	−0.1203**	−0.0500*	0.0458	−0.1344**
	(0.0203)	(0.0646)	(0.0458)	(0.0207)	(0.0659)	(0.0466)
Observations	2,281,294	1,485,629	1,485,629	2,008,231	1,315,657	1,315,657
R^2	0.9498	0.8518	0.8658	0.9519	0.8571	0.8780

Notes: Each column corresponds to a different ordinary least squares regression. All regressions include school fixed effects and state-by-year fixed effects. Heteroscedasticity-robust standard errors in parentheses, clustered at the school level. Comparison 1 includes all schools without any shooting, while comparison 2 includes only schools in districts that have not had any shooting. FRPL = free or reduced-price lunch eligible. $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

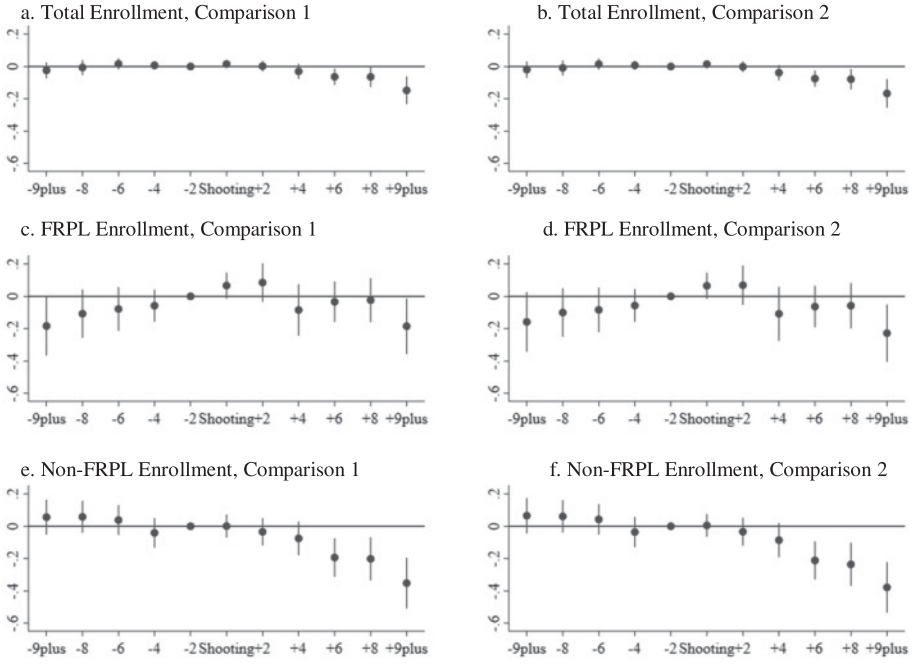
Public School Enrollment Results

To understand whether campus shootings lead to changes in enrollment decisions and which type of students are more likely to respond, we conduct event study analyses on the school level to estimate the impact of shootings on overall enrollment, FRPL enrollment, and non-FRPL enrollment, all entering in the natural logarithms form. The series of event study indicators now represent whether shootings occurred in a school in a given year. The coefficient estimates of the indicator variables will tell us whether enrollments in shooting schools trend differently prior to the shootings and the impact of shootings over time, relatively to that of the comparison schools.

Two choices of comparison schools are available. First, we include all nonshooting schools, including those located in the same district as the shooting school. Second, we include only schools in districts without any shootings. If students choose not to enroll at the shooting schools, both comparison groups will show a negative impact of shootings on enrollment. If such students are more likely to leave the district than to enter other schools within the same district, we will find a stronger negative impact using the latter comparison than the former comparison and thus reduced enrollment for the shooting district as a whole.

More importantly, school-level analyses on FRPL and non-FRPL enrollments enable us to understand which type of students are more likely to exit, if an "exiting effect" exists. Non-FRPL students and their families may be more capable of bearing the transactional costs associated with relocation comparing to their peers with less economic means. If so, not only must the school adjust its instructional and managerial decisions in response to the enrollment decline and student-composition shift, students who remain at the school face a loss of peer support and increasing income-based segregation. These changes could in turn impact achievement.

The left column of figure 5 presents event study graphs using all nonshooting schools as the comparison while the right panel is based on a comparison group of only schools in nonshooting districts. Figure 5a shows a steady decline in school enrollment after campus shootings, and the estimates are statistically significant five and more years after shooting. Table 3 shows that schools where campus shootings occurred experience a statistically significant 3.99 percent drop in enrollment compared with all other schools, or a statistically significant 5 percent drop compared with schools in



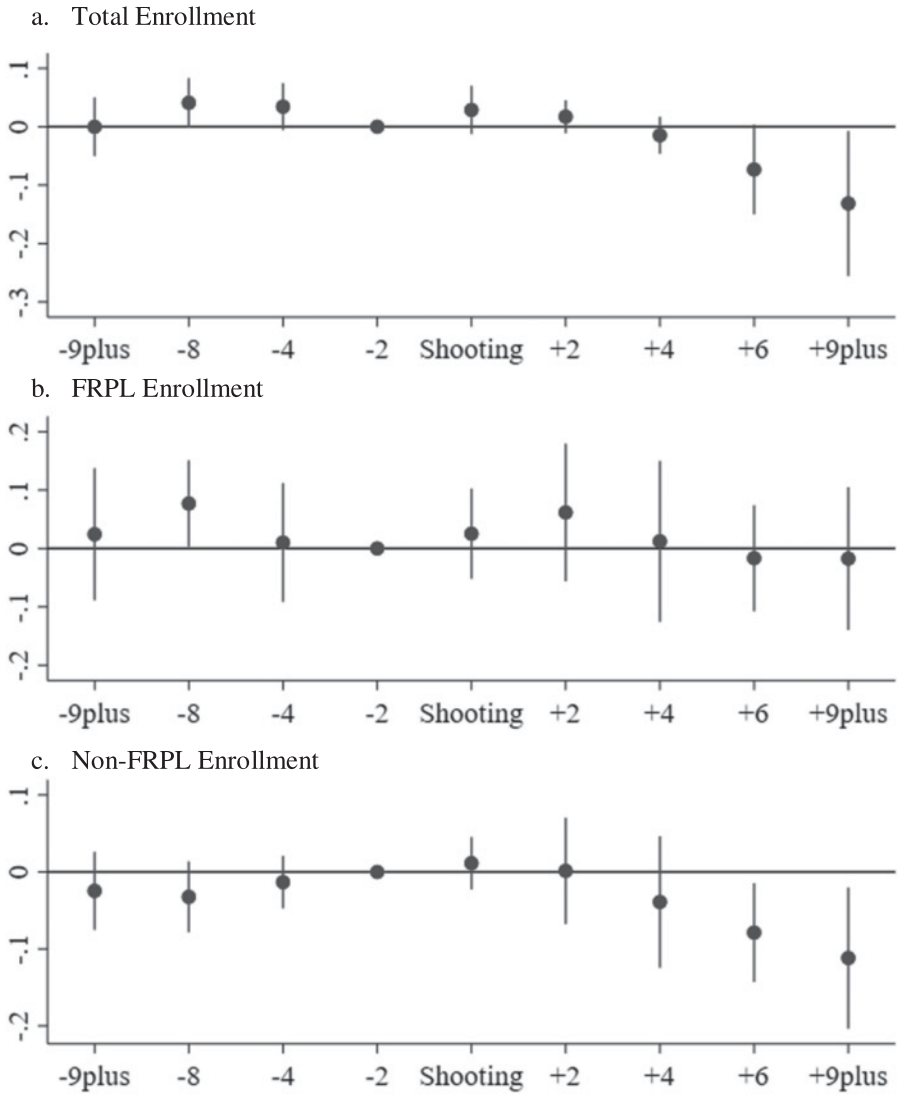
Notes: Each figure corresponds to a different ordinary least squares regression. The regressions include school fixed effects and state-by-year fixed effects. Each bracket represents the 95 percent confidence interval constructed with standard errors clustered at the school level, and the center of the bracket represents the point estimate. The coefficient for the group "−2" (i.e., the two years prior to shooting) is normalized to zero. Comparison 1 includes all schools without any shootings, while comparison 2 includes only schools in districts that have not had any shootings. FRPL = free or reduced-price lunch eligible.

Figure 5. Graphical Event Study Analysis of the Effects on Log School-Level Enrollment

nonshooting districts. The effects are similar to the 5.8 percent decline in grade 9 enrollment following high school shootings found in Beland and Kim (2016). While Beland and Kim do not report how the effect evolves, event study graphs in figure 5 show that the long-run decline is larger than the average effect. Online appendix table A.5 shows the grade-level enrollment results. The negative impact of shootings on enrollment is particularly pronounced among younger children in kindergarten through fifth grade.

The negative impact is larger in magnitude when we limit the comparison group to schools in districts without shootings, suggesting that on average students who leave due to shootings are more likely to leave the district than to enter into other schools in the same district. Indeed, in figure 6a, the event study graph on district-level enrollment shows a long-run drop in district enrollment and the effect is statistically significant nine and more years after shootings.

Figure 5c (5d using the second type of comparison) shows the event study results on school-level FRPL enrollment and figure 5e (5f) on non-FRPL enrollment. Contrasting the figures, it becomes clear that most of the decline in school enrollment is due to the exit of non-FRPL students. While the coefficient estimates for the event indicators for FRPL enrollment are largely indistinguishable from zero, the estimated impact on non-FRPL enrollment trends steadily downward, similar to what was shown earlier regarding the overall enrollment. Table 3 reports the average effect on FRPL enrollment to be positive, although statistically insignificant. In contrast, campus shootings lead to



Notes: Each figure corresponds to a different ordinary least squares regression. The regressions include district fixed effects and state-by-year fixed effects. Each bracket represents the 95 percent confidence interval constructed with standard errors clustered at the district level, and the center of the bracket represents the point estimate. The coefficient for the group "−2" (i.e., the two years prior to shooting) is normalized to zero. FRPL = free or reduced-price lunch eligible.

Figure 6. Graphical Event Study Analysis of the Effects on Log District-Level Enrollment

an average decline in non-FRPL enrollment by 12 percent when compared with all other schools, or by 13 percent when compared with schools in nonshooting districts. When aggregating to the district level, figure 6b shows that the exit of non-FRPL students drives district-enrollment declines while the number of FRPL students remains largely unchanged in the district.[26]

26. We implement the following procedure to aggregate school FRPL enrollment data to the district level. First, to address the issue of missing FRPL data on the school level, we interpolate the percentage of FRPL students

In the United States, black and Hispanic students are more likely than white and Asian students to come from families with lower income. Online appendix figure A.1 presents results on school enrollment by race and ethnicity. The rate of enrollment decline in white and Asian students is larger than that of the average effect shown in figure 5, suggesting that they are more likely than others to exit post-shooting. Indeed, the rates of decline among non-Hispanic black students and Hispanic students are smaller. However, If we compare the rates of decline between the white/Asian students and others, by examining the dependent variable of percent of white/Asian, the inference becomes imprecise and the estimate statistically insignificant.

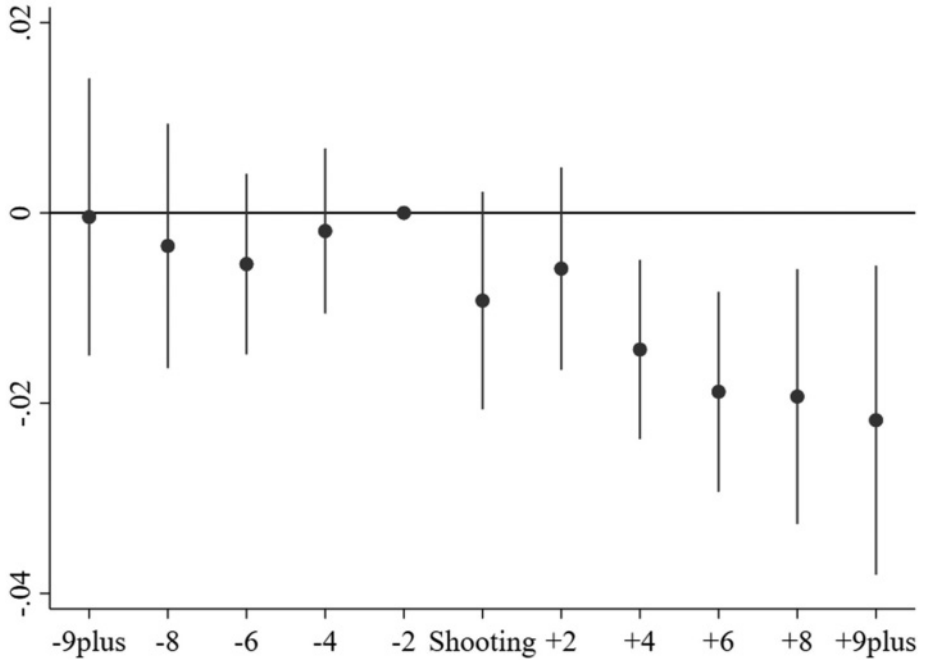
In sum, campus shootings not only lead to a decline in enrollment but also change the composition of students. Families with better economic means are more likely to respond to shootings, possibly because shootings carry a stronger stigma within this group or because they are more likely to be able to afford to move. Given that earlier descriptive statistics show campus shootings to be more likely in communities with higher poverty, this finding suggests that shootings could bring long-term socioeconomic changes to the community and further income-based segregation in schools.

Private School Enrollment Results

We conduct event study analysis similar to equation 1, where the outcome variable is logged private school enrollment. School fixed effects are included, as well as state-by-year fixed effects. Standard errors are clustered at the public school district level, that is, the level where the treatment takes effect in this analysis. The event study indicators represent periods before and after shootings that occurred in the public school district within whose boundary the private school is located. For the indicator variables representing years after shooting, positive estimates will suggest that more students enter nearby private schools post-shooting. On the other hand, negative estimates indicate that shootings may have caused families to leave the community and thus lead to a drop in private school enrollment.

Figure 7 presents the results. Prior to shootings, enrollment levels are statistically similar between the "treated" and comparison private schools. Within two years after a shooting on a public school campus, the private school enrollment seems to be unaffected. However, starting in year three post-shooting, we observe a growing and statistically significant decline in private school enrollment, reaching around 2 percent nine or more years after shooting. The finding suggests that private schools do not stand to gain students who left public schools due to campus shootings, which is in contrast to earlier findings (Abouk and Adams 2013). Using the school-level as opposed to state-level data as seen in Abouk and Adams (2013), we show that shootings seem to reduce the desirability of the community and carry negative implications beyond the public schools where shootings occur. The departure of better-off families could shape the socioeconomic profile of the local community in the long run. In a separate analysis reported in online appendix B, we analyze income data from the 2000 Census and 2005–18 American Community Survey and find that campus shootings are associated

within each school and use the interpolated percentage to calculate the number of FRPL students when it is missing. Second, we calculate the non-FRPL enrollment in each school by taking the difference between total school enrollment and FRPL enrollment. Lastly, we aggregate the school-level numbers to the district level.



Notes: The unit of analysis is private school-year. The regressions include school fixed effects and state-by-year fixed effects. Each bracket represents the 95 percent confidence interval constructed with standard errors clustered at the public school district level, and the center of the bracket represents the point estimate. Shooting indicates the year of shooting in a public school district within whose boundary a private school falls. The coefficient for the group "−2" (i.e., the two years prior to shooting) is normalized to zero.

Figure 7. Graphical Event Study Analysis of the Effects on Log Private School Enrollment

with a decline in the median household income among all families with children within the district area. The decline is the strongest among those attending the public school district where shootings have occurred.

6. DISCUSSION AND POLICY IMPLICATIONS

This study provides new evidence on the short- and long-term impact of campus shootings on school district finance, staffing, and enrollment composition. We find that districts exposed to shootings experience an increase in per-pupil total revenue, largely from increased federal transfers post-shooting. Federal transfers seem to target districts located in communities with high levels of poverty and those experiencing indiscriminate shootings. State transfers increase just temporarily, and by a smaller magnitude as compared to the federal transfers. Similarly, we find no sustained increases in either district's own-source revenue or private donations post-shootings. Our finding of increased intergovernmental transfers, which enable districts to spend more, is noteworthy. It shows that while campus shootings are localized events, the costs are shared by all taxpayers as federal transfers provide the main source of funding increases. As a result, taxpayers around the nation may have a vested interest in the policy discussions around school violence and gun violence.

In all, the empirical evidence suggests that the cost of campus shootings for taxpayers is $248 per pupil, as district total spending increases by this amount on average

after a shooting. Given that the gap in per-pupil spending between nonshooting and shooting schools is around $500, the increase offsets roughly half of the gap. The increased spending largely accrues to noninstructional spending and does not affect instructional spending, indicating that the decline in achievement post-shooting is not caused by the suspected crowd-out of instructional resources. It also highlights the importance of intergovernmental transfers. As the transfers target districts in high-poverty areas, these districts can incur the largest increase in spending and sustain instructional investments.

The results highlight a few district resource-related challenges. First, although we find that spending on pupil support services goes up and districts hire more student support staff after shootings, its temporary nature may be concerning, given that Rossin-Slater et al. (2020) show the mental health effect of shootings to likely persist over time. Moreover, the increase represents how much more districts actually spent after a shooting, not how much they would like to spend.[27] Despite the increased financial resources, the literature shows that shootings lead to achievement declines and thus additional resources are likely needed.

Second, districts increase capital spending, potentially funded through increased debt. Debt repayment may become a challenge when intergovernmental transfers discontinue and own-source revenue fails to improve. Lastly, all reported changes in revenue and expenditure in this study are relative to districts that did not experience any shooting. To the extent that shootings lead to a nationwide response in increasing security and support spending, the overall cost of campus shooting is likely higher and our estimates provide a lower bound.[28]

Although there is no centralized data on federal grants to schools experiencing shootings, the main source of funding during our data period is likely the COPS School Violence Prevention Program. In 2019, over 80 percent of the COPS grants went directly to school districts.[29] Among the recipients are four districts that have suffered from campus shootings in the prior two years, providing anecdotal examples for our finding on the increased federal transfers post-shooting.[30] The findings of this study may inform federal grant-making. Although budgets are often fungible, the COPS grants aim at enhancing school safety efforts. Our findings not only support the importance of federal grants but also point to the need for sustained funding toward pupil support and other noninstructional expenses instead of a narrow focus on violence

27. It is extremely difficult, if not impossible, to assert how much spending is desirable to mitigate the harms caused by shootings. However, to ground the magnitude of our estimates, consider this: an additional full-time counselor would cost a school about $114 per 500 students per year. This is based on the nationwide median annual wage of $57,040 for school counselors in 2019 as reported by the U.S. Bureau of Labor Statistics (https://www.bls.gov/ooh/community-and-social-service/school-and-career-counselors.htm#tab-5; 1 April 2021).
28. For example, anecdotal media reports suggest that districts that did not see shootings have responded to the news of campus shootings elsewhere by proposing bond referendums for security-related capital projects (Keierleber 2018; Cano 2020).
29. However, prior to 2007, the COPS grants were not made to school districts directly.
30. Guilford County Schools (High Point Central High School shooting in December 2017) received $500,000. St. Mary County Public Schools (Great Mills High School shooting in March 2018) received $60,729. Fulton County Board of Education (Benjamin Banneker High School shooting in November 2017) received $456,901. Broward County Board of Education (Marjory Stoneman Douglas High School shooting in Parkland, Florida, in February 2018) received $500,000.

prevention.[31] The Student, Teachers, and Officers Preventing School Violence Act enacted in 2018, which funds activities ranging from safety training to mental health programs, may prove to be a step in the right direction.

The findings on enrollment and student composition point to the "composition effects" that shootings lead to the exit of students from relatively well-off families, often to schools outside the districts in which shootings have occurred. The shift in the socioeconomic (and to a lesser extent racial/ethnic) composition of the student body in the medium- to the long-run merits further attention. The findings contribute to the literature that violence transforms the sociodemographic composition of neighborhoods (Morenoff and Sampson 1997), even in the context of rare events such as campus shootings. It carries important policy implications. As shootings are already more likely in districts with higher poverty, gun violence on campus may exacerbate socioeconomic and racial segregation in schools. Given that additional resources have flown to districts post-shooting, why are these efforts not sufficient in assuring families of the future safety and quality of the school? Further research may shed light on which policy responses—such as community outreach, increased transparency in school spending, and informed allocation between security and support—best counter the stigma associated with past campus shootings. The finding also necessitates a broader policy vision, including the sustained need for equitable school funding as well as desegregation programs, which are not limited just to schools experiencing violence.

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