Teen Suicide and the Outcomes of Surviving Peers

Emily Cuddy, Duke University

Janet Currie, Princeton University

Elisa Jácome, Northwestern University

Lucy Manly, Northwestern University

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Abstract

By the time they reach age 17, a quarter of U.S. students have experienced a peer suicide, making it a common adverse experience of childhood. We use rich administrative data from South Carolina and school matching models to examine the effect of a peer self-harm death on a wide range of teen outcomes. Specifically, among males, there is a 27.2% increase in the probability of having had a self-harm diagnosis by age 19, a 3.4% decrease in the probability of high school graduation, a 12.4% increase in felony arrests and a 27.7% increase in the probability of incarceration. Among females, there is a 4.9% increase in having any mental health diagnosis by age 19 and a 10% increase in the probability of having had any arrest. These effects appear to be mediated through an increase in externalizing behaviors rather than through an increase in internalizing behaviors such as depression and anxiety. The estimated effects are larger when there is gender, race, or grade-level concordance between the child who died and the index child, consistent with a peer effects interpretation. The estimated effects are also larger for self-harm deaths than for traffic deaths or assault deaths, suggesting that self-harm deaths are uniquely traumatizing.

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I. Introduction

Suicide is the second leading cause of death among 10-14-year-old children and the third leading cause of death among 15-19-year-olds in the United States (National Institutes of Mental Health, 2025). By the time they are 17 years old, 24 percent of teens report that they have experienced a schoolmate's suicide, and 20 percent report that they know a person who died by suicide (Swanson and Colman, 2013).

A large literature documents contagion effects of suicide, showing, for example, that suicides increase with the frequency of media reporting about suicide in a dose-response way, especially among males (National Research Council, 2013). Yet although clusters of suicides among teens receive a great deal of attention, they remain thankfully rare, accounting for only 1-5 percent of teen suicides (National Research Council, 2013).

In this paper, we show that even when it does not lead to a suicide cluster, a teen suicide has a wide range of negative effects on surviving peers. We use administrative data from seven South Carolina state agencies to track disadvantaged students from age 10 to 19. Comparing exposed children to children in matched control schools, we show that girls who were exposed to a suicide in their school are 4.9 percent more likely to have received a mental health diagnosis by age 19. Affected boys are 12.4 percent more likely to have been arrested for a felony, and 27.7 percent more likely to have ever been incarcerated. Consistent with the idea that these are peer effects, the estimated effects are largest when there is gender concordance, racial concordance, or when the deceased student is from the same or adjacent grade.

We interpret these findings through the lens of theories about the impact of adverse childhood experiences (ACEs). ACEs are thought to disrupt children's normal psychosocial development, leading to dysregulated behaviors that can provoke negative reactions and further

dysregulation (Toth and Cicchetti, 2013). Ultimately, regions of the brain that control emotional regulation and decision making may be affected (Teicher and Samson, 2016).

While there is a strong association between exposure to ACEs and later anti-social behavior, most studies are cross-sectional and it is possible that some children are both affected by ACEs and at risk of poor outcomes for other reasons (Wilson, Stover, & Berkowitz, 2009). Hence, one contribution of this study is to apply a strong causal design to the problem of measuring the impact of teen exposure to peer suicide.

A second contribution is to consider exposure to peer suicide as a significant adverse childhood event in itself. The original research on ACEs focused exclusively on traumatic experiences within the family, such as child abuse and domestic violence (Felitti et al., 1998). The concept has since been broadened to include witnessing violence and feeling unsafe in one's neighborhood (Cronholm et al., 2015), but peer suicide has not been previously considered as an ACE. It is important to remedy this gap in the literature since adolescents are known to be especially sensitive to the actions of their peers, and many of them are potentially affected by peer suicides.

More generally, there is a large literature in economics documenting the relationship between childhood experiences and later outcomes. However, much of this work focuses on events in early childhood (see Almond, Currie, and Duque, 2018), and the literature regarding adolescents is comparatively sparse (see Guryan et al., 2023 for an important exception). Hence, a third contribution is to focus on an event that primarily affects adolescents, and document both the shorter and longer-run consequences.

II. Background and Conceptual Framework

This section discusses the possible effects of a peer suicide on a child's psychosocial development, as well as an alternative potential mechanism through school or parent responses to the event.

Most of the literature about the effects of peer suicides on surviving teens focuses on the contagion effects of suicidal behaviors. Notwithstanding the existence of suicide clusters, it is difficult to document a causal relationship between the first suicide and subsequent suicides in a cluster—it is possible that children suffer similar risk factors and/or similar triggering events, causing the cluster (Crepeau-Hobson and Leech, 2014). Suicidal behaviors are much more frequent than suicides,[1] making it potentially more feasible to identify clustering in self-harming behaviors. Using data from the National Longitudinal Study of Adolescent Health (ADD Health), Cutler et al. (2001) found that teens with friends or family members who had attempted suicide were approximately three times more likely to attempt suicide themselves.

The main mechanisms underlying these relationships are thought to be imitation, and negative effects on peer mental health. Social learning theory suggests that exposure to a behavior like suicide erodes the barriers that a person perceives to adopting that behavior, thereby prompting imitation, especially among people with pre-existing risk factors (Mueller and Abrutyn, 2016). This theory is evidently most relevant to suicidal behaviors and does not speak to the possibility of broader effects on mental health or other child outcomes.

An additional factor underlying the impact of a traumatic event, is the extent to which it is expected or unexpected. Work examining the impact of lost loved ones, for example, distinguishes between the effects of expected and unexpected losses (Keyes et al., 2014). This emphasis suggests that deaths due to self-harm may be especially traumatic because they are often unexpected.

[1] Choi et al. (2025) document that there are approximately 900 Emergency Department visits per 100,000 youth 10-19 annually compared to 8 completed suicides.

In terms of peer mental health, most research has focused on the potential effects of peer suicide on depression and anxiety.[2] For example, Cerel et al. (2016) report that individuals exposed to suicide are two times more likely to be diagnosed with these conditions and that the probability of diagnosis was higher for people who were closer to the deceased individual.

However, a narrow focus on what are known as "internalizing" disorders may obscure broader negative effects on children's mental health that could include effects on their external behaviors (so called "externalizing" conditions). Kerker et al. (2015) find that each additional ACE increases a child's odds of having a behavior problem, as well as having negative effects on their social development. Looking specifically at adolescents, having three or more ACEs is associated with lower schooling engagement and higher reactivity—that is, difficulty staying calm and controlled in the face of stressors (Soleimanpour, Geierstanger, Brindis, 2017).

Children exposed to ACEs are also more likely to be diagnosed with Attention Deficit Hyper Activity Disorder (ADHD), with higher exposure linked to more severe cases (Brown et al., 2017). In turn, ADHD has been linked to a range of risky behaviors including substance abuse, teen pregnancy, and injury (Chorniy and Kitashima, 2016), as well as lower educational attainment (Currie et al., 2010). These negative impacts on children's behaviors could put children at risk for contact with the criminal justice system. Leban and Gibson (2020) find that conditional on a wide range of child and family characteristics, ACEs are a significant predictor of juvenile delinquency among boys, though not among girls.

Exposure to the death of a classmate through self-harm could also impact a child through the reactions of peers, parents, and school personnel. To the extent that some children are especially impacted by a peer suicide, their behavior could have negative spillovers onto other

[2] Individuals exposed to a traumatic event may suffer from post traumatic stress disorder, which is classified as an anxiety disorder in the 10th International Classification of Diseases.

students, as in Carrell et al. (2018), who study the spillover effects of an index student's exposure to domestic violence. As discussed above, the contagion effects of suicides increase with the intensity of reporting about them. Similarly, discussions about the event within the school, family, or community have the potential to amplify the effects of a teen suicide, depending on how that discussion takes place. Conversely, parents and schools might devote more resources to supporting children in the aftermath of a tragedy (e.g., by bringing in grief counselors or by taking a child to be evaluated by a mental health professional), with potentially offsetting beneficial effects.

Our work is most closely related to three previous studies. The first two examine the effects of school shootings on subsequent child outcomes. Using a similar matched school design, Rossin-Slater et al. (2020) show that school shootings are related to higher use of anti-depressants in affected schools compared to control schools, while Cabral et al. (forthcoming) find that affected students in Texas have worse educational and employment outcomes. The third study, by Fouché and Goodman (2025) uses data from Massachusetts to examine the effect of any death in the same school and grade on educational outcomes in models that include school and grade fixed effects.

We respond to the previous research in several ways. First, the richness of the administrative data that we have assembled allows us to look at a broad array of outcomes including self-harm, both internalizing and externalizing mental health disorders, criminal activity, educational attainment, teen pregnancy, use of welfare programs, and mortality. In view of the literature linking exposure to traumatic events to externalizing disorders, we believe it is especially useful to consider a broader array of possible impacts on mental health, delinquency, and crime, which impose large costs on society more generally.

Second, we try to provide insight into the effects of peer suicide on the children who may be most vulnerable to negative impacts.[3] Our sample is drawn in a way that focuses on children with Medicaid coverage in relatively disadvantaged South Carolina schools. In addition to examining the impact of exposure to a peer suicide on the probability that a child has any visit with a mental health diagnosis, we also examine the impact on the probability that a child has two or more visits with a mental health diagnosis in a month. This comparison helps us to assess the extent to which the effects are concentrated in children who may already be struggling with a pre-existing mental health condition at the time of a self-harm death and who subsequently experience a worsening of their symptoms, as reflected in increases in the number of medical visits.

Third, because additional screening of children in the aftermath of a tragedy might turn up pre-existing cases of mental illness rather than causing additional cases, we explicitly ask how the probability of any contact with the medical system, and with mental health providers, changes following a peer suicide. We show that opportunities to be diagnosed do not increase and do not account for the increase in the number of visits with mental health diagnoses that we observe.

In terms of our empirical approach, the matching model we employ helps to account for the fact that suicides may not be randomly distributed across schools. Because we have rich time-series data for each student, we can follow individual students before and after the event and include student (and match) specific fixed effects. We show that students are more impacted by suicides among peers who are the same gender, the same race, or in the same or adjacent grades.

Finally, we compare the estimated effects of suicides to those of deaths from assaults and transportation deaths. Because some deaths that kill the driver of a vehicle may actually be suicides, these deaths are excluded from the count of transportation deaths. These comparisons

[3] Fouché and Goodman (2025) report that their estimated effects are larger for Black and Hispanic students.

suggest that suicides have a greater negative impact on the students in our sample than assault deaths, while transport deaths also have some negative impact. These findings may reflect the extent to which different kinds of deaths are expected or unexpected.

III. Data

a. Student-level data

Our primary data sources are administrative records from South Carolina, linked across multiple state government agencies. These data enable us to track individuals over time, beginning at age ten and covering the years 2000 through 2018. These data come from various government agencies, allowing use to capture a broad range of individual characteristics and outcomes.

The sample consists of predominantly low-income individuals born between 1990 and 1999. Specifically, the South Carolina Revenue and Fiscal Affairs (RFA) Office identified high schools above the median in terms of the proportion of students receiving free or reduced-price lunch over the 2008-2013 period. Any student who was ever enrolled in one of these high schools was included in the sample.[4] We construct a panel dataset for each student at the year-month level with individual-level characteristics and outcomes. The data appendix provides further details on the sample and data construction.

Data related to mental health, come from South Carolina's Department of Health and Human Services' Medicaid records. Medicaid is the state-run health insurance program for low-income individuals. It covered 43.4% of children in South Carolina in 2023, about 92% of those eligible to participate (Center for Children and Families, 2025). These data include individual enrollment spells, as well as claim-level information pharmacies and inpatient and outpatient

[4] However, we exclude students and deaths that occurred in correctional schools, as these settings are atypical.

visits. Diagnosis codes in the claims records are used to construct measures of visits for self-harming behaviors and mental health. Throughout the paper, the term "mental health diagnosis" refers to diagnoses for a non-developmental mental health disorders (e.g., depression, conduct disorder, substance use disorder) or attention-deficit/hyperactivity disorder (ADHD).[5] More details on health outcomes are discussed in the data appendix.

Outcomes related to delinquency and criminal behavior are measured using data from three criminal justice agencies. Specifically, the Department of Juvenile Justice (DJJ) provided information about youth referrals to the agency, including the type of offense, and whether the individual was detained. The age of criminal majority in South Carolina is 17, so most contact with the criminal justice system before this age occurs through the DJJ unless an individual commits a serious crime. Data from the South Carolina Law Enforcement Division include information about arrests across the state, including the type of offense, and whether the individual was detained in a correctional facility. This information is supplemented with records from the Department of Corrections about spells in state prison.

Information from the Department of Education is used throughout the paper to see which school an individual is enrolled in during a given academic year and their grade level. Although the sample is conditioned on high school enrollment, the middle schools that these students are likely to have attended (their high school's "feeder schools") are identified using historical student flows. High school students in our sample could have been exposed to a peer's death in middle school. In terms of educational outcomes, the data include information about grade repetition and high school graduation, defined as having graduated within four years with a diploma.

[5] In particular, this definition excludes developmental conditions such as Autism Spectrum Disorder and intellectual disabilities.

Mortality is measured using data from death certificates. Teen pregnancy is measured using birth records. Enrollment in public assistance programs (i.e., the Supplemental Nutrition Assistance Program [SNAP] and the Temporary Assistance for Needy Families program (TANF)) is measured using enrollment records from the Department of Social Services. We use these latter two variables to measure low income, but do not consider them as outcomes because in most cases it would be the child's family and not the child who would determine participation in these programs.

b. Data on student deaths

RFA constructed a dataset of adolescent deaths in the state between 2000 and 2018 which includes the date and cause of death (i.e., International Classification of Disease 9 or ICD10 codes) as well as limited demographic information about the deceased individual. Crucially for the analysis, the file identifies the public school where the individual was last enrolled and the corresponding academic year of enrollment. This information allows us to identify the relevant peer group for each death.

We begin by identifying the schools in our sample where a student experienced a death from self-harm in grades 6–12. In the eight schools in which more than one self-harm death occurred within a four-year period, only the first death is considered.[6] Two deaths that happened too late in the sample period to allow for a two-year post-period are also excluded; one death was lost because it could not be matched to a high school, and one death was lost because it was in a school with no suitable control schools. In total, we consider 35 deaths from self-harm to be the

[6] We use a four-year window because most students are expected to be in high school four years. Of these 8 deaths, 5 schools experienced two deaths within a two-year period. These cases of two deaths relatively close together might be considered evidence of suicide clusters.

set of focal events. The schools where these self-harm deaths occurred are referred to as the "treated" schools. The first of these deaths occurred in 2004 and the last in 2016.

Thirty-two percent of these deaths occurred in grades 6-8 (middle school). Below we compare deaths due to self-harm to deaths due to assault and to transportation related deaths in which the decedent was not the driver of the vehicle (since some driver deaths may have been suicides even if they are not classified in that way). Twenty-four percent of assault deaths were among middle school students compared to 28% of transportation deaths. The gender composition is quite different across types of deaths with 80% of self-harm deaths and 90% of assault deaths affecting males, compared to 56% of the transportation deaths. Where it can be determined[7], the racial composition of the deaths is also strikingly different across causes of death. Non-Hispanic white students make up only about a third of the student body in these relatively low-income schools but account for 66% of the self-harm deaths, so that white students are strongly over-represented. In contrast, Black students are over-represented in the sample of assault deaths, accounting for 88% of these deaths. Transport deaths are distributed in accordance with racial shares, with Black students accounting for 69%.

Appendix Table A1 explores how sample schools that experience deaths from self-harm differ from schools that do not. On average, these schools have larger numbers of pupils and teachers, reflecting the concentration of self-harm deaths in high schools rather than middle schools. They are similar on average in terms of racial composition. Schools with a self-harm death have slightly lower fractions of students participating in free or reduced-price school lunch. They are drawn from similar areas in terms of the percentage of the population that is poor, and

[7] The RFA file listing student deaths does not include the race of the deceased individual. We therefore only know the race of deceased individuals whom we can match to their records in the micro-data, which necessarily requires them to have survived into high school.

the percentage without health insurance. But these areas may have slightly higher median incomes (p-value=0.12). While the differences between affected and unaffected schools appear to be small, aside from the differences in school size and middle vs. high schools, it is important to ensure that the treatment and control schools are as similar as possible to each other. Hence, we implement the school matching procedure as described below.

IV. Empirical Strategy

a. Matching Procedure

In order to identify a control group, we look for similar schools that did not experience a death from self-harm. For each treatment school, the pool of eligible control schools is restricted to those with the same lowest and highest grades, and the same urban or rural classification. We llok for comparison schools outside the treatment school's school district in order to minimize the potential impact of spillovers of deaths in treatment schools onto other schools in the same district.[8] Then a nearest-neighbor matching procedure is implemented among the set of eligible control schools, using a parsimonious set of school-level characteristics from the National Center for Education Statistics (NCES), measured in the school year prior to the death. The matching characteristics include: (1) school enrollment; (2) the share of students who are Black; and (3) the share of students receiving free or reduced-price lunch. The three schools with the shortest calculated "distance" in terms of these characteristics are selected as control schools, and each is assigned a placebo treatment date which is the same as the self-harm death date in the corresponding treatment school.[9] Throughout the analysis, control schools are reweighted so that

[8] If no school can be found with these matching characteristics, then the pool of eligible control schools is expanded to those with similar lowest and highest grades, loosening the restriction on having the exact same lowest and highest grades.

[9] The same unaffected school can be used as a control for more than one treatment school.

schools that are more similar to the treatment school get higher weights. Specifically, for a given school, we use the ratio of the inverse distance to the sum of the inverse distances for the control schools in the relevant match; this weighting scheme ensures that within a match, the sum of the control schools' weights equal the treatment school's school weight of one. Section V shows the robustness of the main results to alternative ways of selecting matched control schools.

Once treatment and corresponding control schools have been selected, the set of students who attended these schools during the school year of the death can be identified. Because health outcomes—which are among the primary outcomes of interest—can only be measured for students enrolled in Medicaid, the main analysis is restricted to the subset of students who were enrolled in Medicaid for two years before and two years after the self-harm death. We also present alternative robustness analyses where we relax the restriction that the person must have been enrolled in Medicaid continuously for the two years after the event.

Figure 1 illustrates the locations of treated schools, potential control schools, and the control schools that were chosen. The fine grey lines show county subdivision boundaries. These figures show that control schools are usually close to the treatment school geographically but can also occasionally be located some distance away. Moreover, there are a significant number of potential control schools which are never selected, showing that the matching algorithm does have bite in terms of selecting only the "closest" schools in terms of characteristics.

Table 1 presents summary statistics for the treatment and control schools after implementing the matching procedure. The top panel of the table shows that treatment and control schools are balanced in terms of student demographic characteristics, socioeconomic status, enrollment size, and pupil-teacher ratio, despite many of these variables not being used in the matching protocol. The table confirms that the sample population is relatively low-income

(approximately two-thirds of students receive SNAP benefits), and heavily minority: 58% of students are Black and 37% are non-Hispanic white, while only about 3 to 4% are Hispanic.

The bottom panel of the table compares the characteristics of the baseline sample of students in the year before the event. Importantly, there is no significant difference between treatment and control schools in the frequency of self-harm diagnoses in the year before the event. With respect to other mental health measures, the treatment schools have slightly fewer mental health diagnoses or treatments, which would tend to bias the estimates towards finding null effects on mental health outcomes. Students in treatment schools are less likely to participate in TANF (6.1% vs. 6.8%) or SNAP (64.1% vs. 65.5%), suggesting that they are marginally better off compared to children in the control schools, which is also likely to work against finding netagive treatment effects.

V. Empirical Specification

a. Estimating average within-student effects in the 24-month period following the event

To quantify the peer effects of a death from self-harm, we estimate difference-in-differences regression of the form:

$$(1) \quad Y_{ismt} = \alpha + \beta(Treat_{is} \times Post_t) + \delta_{im} + \gamma_{tm} + \epsilon_{ismt},$$

where Y_{ismt} is an outcome variable for individual student *i*, in school *s*, in match *m*, at time *t*. $Treat_{is}$ is an indicator variable equal to one if the individual attended a school that experienced a death from self-harm in the year of the self-harm death. The terms δ_{im} and γ_{tm} correspond to individual (person-by-match) and match-by-time fixed effects, respectively.[10] The unit of

[10] Note that a given school may serve as a control for several treatment schools; therefore, the same student could be part of multiple matchs. This is why we include a person-by-match fixed effect rather than only a person fixed effect.

observation is at the person-month level and the regression models include 48 observations per person including 24 months before the event and 24 months after. The error term ϵ_{ismt} is clustered at the school level, where school is defined as the school the student was enrolled in at the time of the death or placebo death. Throughout the analysis, weights derived from the matching procedure are used. The coefficient of interest, β, captures the average monthly difference in outcome Y between treatment and control students in the two years following the self-harm death.

The main health outcomes at each time *t* are whether an individual had a Medicaid claim with a self-harm diagnosis, had any visit with a mental health diagnosis, and whether they had two or more visits with a mental health diagnosis in a month. The latter outcome is intended to capture changes in the severity of a condition that might result in an increase in the frequency with which a student is receiving mental health services in a given month. We are also able to examine specific diagnoses in order to see any differences between effects on internalizing and externalizing disorders, for example. And we also examine prescribing of psychiatric medications.

The main criminal offending outcomes that we focus on include whether an individual at time *t* was referred to the juvenile justice system or arrested by law enforcement, as well as a variant of this measure that focuses specifically on felony referrals and arrests. The latter is intended to capture changes in serious criminal offending. We also look at more disaggregated measures including whether there was any juvenile justice referral, any such referral at school, any detention, any arrest, any arrest for a felony, and any incarceration.

The key identifying assumption for interpreting the β estimate as the causal effect of the death from self-harm on student outcomes hinges on the existence of parallel trends. Specifically, it must be the case that individuals in treatment schools would have continued to trend similarly to individuals in control schools in the absence of the self-harm death. We consider the plausibility

of this assumption by comparing the raw data on the evolution of outcomes for treated and control schools (Figures A1-A5). Moreover, we estimate a fully dynamic version of the main specification:

$$(2) \quad Y_{ismt} = \alpha + \sum_{\tau=-4}^{\tau=3} \beta_\tau \text{Treat}_{is} + \delta_{im} + \gamma_{tm} + \epsilon_{ismt,}$$

where $\tau = 0$ denotes the first six-month period after a death from self-harm for each match. The coefficients of interest are the β_τ , which represent the average within-student change in outcomes at period τ among students in schools affected by self-harm, relative to students enrolled in matched control schools. Because we omit the six-month period before the focal death, each β_τ coefficient measures the difference in the outcomes relative to period $\tau = -1$. If the parallel trends assumption is valid, we would expect the coefficients in the pre-period—that is, before the occurrence of the self-harm event—to be statistically insignificant or very close to zero. If this condition is satisfied, then it indicates that there were no pre-existing differential trends between students in the treated and matched control schools.

b. Estimating cumulative impacts by age 19

Finally, to quantify differences in outcomes between students in treatment and control schools by late adolescence, we estimate models of the following form:

$$(3) \quad Y(19)_{ism} = \alpha + \Pi(\text{Treat}_{is}) + X_i + \gamma_m + \epsilon_{ism}$$

where $Y(19)_{ism}$ denotes whether an individual has ever experienced a specific outcome by age 19 (inclusive). This equation includes individual-level control variables X_i—birth cohort, race, sex, and school district at the time of the death—as well as match-specific fixed effects. The coefficient of interest Π captures the difference between treatment and control individuals by age 19. In this final specification, we consider cumulative outcomes related to mental health and criminal

behavior but also education (high school graduation and grade repetition) and proxies for risky behaviors (teen pregnancy and mortality).

c. Threats to Identification

Beyond the parallel trends assumption, there are two other notable threats to the identification of causal treatment effects. First, there might be other events that coincide with the timing and location of the self-harm death in a way that differentially affects students in treatment and control schools. The self-harm deaths we examine take place in 24 school districts across 12 years. For unobserved shocks to confound the estimates, it would have to be the case that these shocks only affect students in treatment schools and that the timing of these shocks coincided with the death from self-harm. Although the differences in timing and geography make such shocks unlikely, one plausible possible confounder is the presence of other types of deaths. Figure 2 shows the time-series pattern of deaths from causes other than self-harm in the treatment and control schools, before and after the index self-harm event. The figure suggests that there is no trend in these measures in either treatment or control schools, which suggests that self-harm deaths are not usually triggered by the presence of other deaths, for example. In Section VII, we also conduct a robustness check using only the 22 self-harm deaths in schools in which there were no other deaths of any sort in the two-year period preceding the focal self-harm death, and show that the estimates are very similar.

Second, in order to look at health outcomes, we constrain the sample so that a student must appear in the Medicaid data for at least two years before and two years after the event (or the placebo event in the case of the control schools). To the extent that students' mobility on and off Medicaid is affected by exposure to a peer's self-harm death, there could be differential attrition in the treatment and matched control schools. For example, if the students who are most affected

are also the most likely to remain enrolled in Medicaid, then the baseline estimates could overstate the effects of exposure to self-harm. To address these concerns, we estimate models on samples that relax this enrollment criteria either in the post-period only, or in both the pre- and post periods. These results are presented in Section VII.

VI. Results

a. Effects in the 24 months following an event

The estimated effects of a peer self-harm death in the 24 months after the death are shown in Table 2. All coefficients and standard errors in this and in subsequent tables are multiplied by 100 for ease of interpretation. The first row shows that there is an average overall within-student increase of 38.3% (0.023/0.060) in the probability of a self-harm diagnosis, an increase of 5.7% in the probability of any mental health contact, and an increase of 12.2% in the probability of two or more mental health contacts. The contrast between the last two numbers suggests that many children with a pre-existing mental health disorder may experience worsening symptoms following a peer death from self-harm.

The second and third rows of Table 2 split the sample by gender. The second row indicates that the increase in self-harm is concentrated among boys, with a 58% increase in diagnoses of self-harming behaviors following an event. There is also a 10.8% increase in boys having an average of two or more contacts with a mental health diagnosis in a month. Girls do not have any significant increase in self-harm but do have a 9.4% increase in the probability of having any visit with a mental health diagnosis in an average month and a 14.2% increase in the probability of having two or more visits.

Event studies for the probabilities of self-harm, any visits with a mental health diagnosis, and having two or more visits with two or more mental health visits are shown separately by gender in Figures 4, 5, and 6. The patterns are consistent with the estimates in Table 2 and also show that the parallel trends assumption appears to hold in the data.

Appendix Table A2 provides more detail about mental health outcomes. Mental health diagnoses are broken into those related to internalizing and externalizing disorders, trauma and stress related diagnoses, and substance abuse disorders. Externalizing disorders are further broken into ADHD and other behavioral diagnoses. Perhaps surprisingly, we find that there are statistically significant effects on externalizing disorders overall, with increases in ADHD diagnoses among girls, and increases in other behavioral disorders (such as conduct disorders) among boys, but no statistically significant effects on the other specific disorders. These findings suggest that in the immediate aftermath of a peer self-harm death, some teen's behavior worsens significantly, leading to increases in these diagnoses.

It is possible that the probability of having mental health diagnoses rises in part because students might have more contacts with mental health professionals following a traumatic event. To test for this possibility, we estimated models similar to equation (1) using any mental health evaluation, any visit to a mental health provider, any visit to a primary care provider, and any visit to other providers as outcome variables. Table 3 shows that there was no statistically significant effect on any of these outcomes. These results lend support to the idea that it is students' worsening mental health following a peer self-harm death, rather than increased opportunities for diagnosis, that drive the estimated mental health effects.

Appendix Table A3 provides further information about utilization patterns. This table confirms that there is no increase in overall contacts with the medical system. But, consistent with

the estimates in Table 2, there are increases in visits for a mental health service (as defined by procedure code), especially among girls, and increases in the probability of having more than two visits with a mental health service per month among both boys and girls. Among girls, there is also an increase in the probability of being prescribed ADHD drugs, consistent with the higher probability of an ADHD diagnosis in Appendix Table A2.

The estimated effects of a peer self-harm deaths on delinquency and criminal activity appear in Table 4. There is a significant effect on the probability that a teen experiences any arrest or referral to the juvenile justice system, as well as an increase in the probability of an arrest or referral for a felony (indicating a more serious offence). These effects are concentrated among males consistent with their much higher baseline probabilities of offending. The probability of any arrest or referral rises by 13.4% and the probability of a felony arrest or referral rises by 19.7% among males, which is a large increase. The event studies shown (by gender) in Figures 7 and 8 confirm these patterns and indicate that there is no evidence of pre-trends in either of these time-series prior to the self-harm event.

Appendix Table A4 provides more detail about effects on patterns of offending. The table shows that for males, there are increases in the probability of being detained as a juvenile (31.8%), any arrest (26.6), any arrest for a felony (45.0), and any incarceration (75.0%). In contrast, there are no statistically significant effects on being referred to the criminal justice system, or in being referred at school. These null results on referrals suggest that teens are committing more serious offenses following the peer self-harm event at their school.

b. Cumulative effects by age 19

The estimates discussed above refer to the average, within-student, monthly change in the

probability of an outcome over the 24 months following a peer self-harm death. In this section, we consider cumulative effects by age 19, that is, whether an outcome ever occurred by that age. Because there is only one outcome per student, we cannot include student fixed effects, though, as indicated in equation (3), match fixed effects are included.

Table 5 shows cumulative impacts on health, education, teen pregnancy, and mortality. For boys, there is a 27.2% increase in the probability of self-harm, which is half the size of the 24-month impact shown in Table 2, but still sizeable. There is also a 3.9% reduction in the probability that a male will graduate from high school (significant at the 10% level). Among females, there is 4.9% increase in the probability of having any mental health diagnosis, which is reduced from the 9.4% increase in this outcome in the 24-months following the event. We do not find evidence of effects on grade repetition, teen pregnancy, or mortality in this population.

Table 6 shows cumulative impacts on criminal justice involvement. Among males, there is an increase of 12.4% in the probability of ever being arrested for a felony by age 19, and an increase of 27.7% in the probability of ever having been incarcerated. These estimates are similar to those in the 24 months following the event, suggesting that much of the increase in deviant activity may occur during this interval. Interestingly, there is also an estimated 10.3% increase in the probability that a female has ever been arrested (for any offense), which is the only significant estimate for criminal activity among females, but this estimate is only significant at the 10% level.

c. Effects for same gender, same race, and same grade students

If the effects that we are estimating reflect student responses to the death of a peer, then one would expect the effects to be greater if the student is "closer" in terms of gender, race, or grade-level to the student who died. These concordance effects are explored in Appendix Tables A5, A6, and A7.

Appendix Table A5 shows that gender concordance is important. The effects on males appear to be accounted for entirely by peer male self-harm deaths. And although they account for most peer self-harm deaths, male deaths have little impact on female outcomes. Conversely, female self-harm deaths have large impacts on female outcomes, with effect sizes on any mental health diagnosis and two or more visits for a mental health diagnosis three times and two times larger than in Tables 2 and 4, respectively. However, males also appear to be affected by female self-harm deaths, showing elevated responses in terms of whether they have two or more visits with a mental health diagnosis and felony arrests.

Appendix Table A6 shows evidence regarding racial convergence.[11] The mental health outcomes of non-Hispanic white students are only affected by self-harm deaths among other white students. However, non-Hispanic white students are also affected by self-harm deaths of Black students in terms of their criminal justice outcomes. Black students do not appear to be much affected by either non-Hispanic white or Black self-harm deaths.

Appendix Table A7 shows that the estimated effects for males are accounted for by self-harm deaths of students in the same or adjacent grade. For females, though, we do not find statistically significant effects when we limit deaths to those in the same or adjacent grade. A possible interpretation is that females are more likely to look up to, or to know, older students in their schools.

Appendix Table A8 shows that females are more strongly affected by deaths in middle school, while also being affected by deaths in high school, while males are only affected by deaths in high school. This result may be consistent with greater social awareness at an earlier age among female students.

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[11] Recall that we only have information about a deceased student's race if we can identify them in the micro-data (i.e., if they are ever enrolled in high school). This table, therefore, only considers a subset of our treatment deaths.

Overall, we find some evidence that concordance between a student and the student who died in terms of gender, race, or grade level, has an impact on the magnitude of the estimated effects. However, these are imperfect proxies for social networks within schools, and these estimates suggest that networks are not perfectly captured by these observable traits.

d. Comparison with the estimated impacts of assault and transport-related deaths

This section reports the results of estimating models similar to equation (1) using assault or transport deaths as the event. In order to estimate these models, the treatment and control schools are redefined in a way analogous to what was done initially for self-harm deaths. This comparison addresses the question of whether there is something especially harmful about peer deaths due to self-harm compared to peer deaths for other reasons. As discussed above, one possibly important factor is how unexpected a death is. Self-harm deaths might be particularly impactful because they are often unexpected. Deaths of pedestrians or passengers in traffic accidents may also have this flavor. In contrast, deaths to assault may be either more foreseen, or more isolated to some groups of students within a school (that is, people who are not considered to be the student's peers).

Appendix Table A9 shows the estimated effects of transportation deaths involving pedestrians and car passengers. The estimated effects are much weaker than those for self-harm deaths, though there is still a significant effect on the probability that males are subject to any arrest are referral. Appendix Tables A10 and A11 show that there is a cumulative impact of traffic deaths on teen pregnancy and on mortality, two indicators of an increase in risky behaviors, as well as increases for males in the probability of any arrest and any incarceration. For females, there is also an increase in the probability of drug arrests.

Appendix Tables A12, A13, and A14 show corresponding tables for deaths due to assault. Perhaps surprisingly in view of the number of assault deaths in these schools (which exceeds the number of self-harm deaths), we find no statistically significant effects on any outcomes. Possibly, the deceased students were not strongly connected to schools or integrated into peer networks. It is also possible that some of these students were previously involved in delinquent or violent behavior, so that their death was relatively less unexpected. It may also be significant that most of the students who died from assaults were Black, and Black students showed weaker reactions to peer deaths overall.

VII. Robustness

Any causal interpretation of the estimates from our matched differences-in-differences specification relies upon a parallel trend assumption. That is, we must assume that student outcomes at treatment and control schools would have trended similarly in the absence of the self-harm death. Throughout the analysis, we use a matched control group comprised of students from three plausibly unaffected schools. Hence, it is useful to think about how robust our conclusions are to changes in the control group. Table A13 shows average school- and student-level characteristics across the first, second, and third closest controls as well as the unweighted and weighted averages. The control group for the baseline estimates is shown in the final column. The weights insure that students at more similar schools carry greater weight in the regressions. As a first test of the robustness of the results, we use the same set of control schools without weighting. These estimates are shown in Table A14, which continues to show increases in self-harming and criminal behavior among male students, though the mental health results are weaker.

Next, given that the choice of three control schools is arbitrary, we experiment with using a single school as control. For this exercise, only the closest match (i.e., the school with the smallest

Mahalanobis distance) is included. These results are reported in Table A15, which again yields similar findings to the baseline results.

As another substantive test of our control group, we relax one of our eligibility criteria for a school to qualify as a control school in the matching procedure. In the baseline estimates, control schools must be outside the treatment school's district. While this rule was imposed out of concern that a self-harm event could have spillover effects within the district, if there is a common shock in the district that leads not only to the student's suicide but also a general deterioration in the well-being of students, then the use of same-district controls could help account for such a correlated shock.

In practice, using only unaffected same-district schools as controls is not feasible. Half of the treatment schools are in school districts which have only one middle or high school, leaving no viable control schools. Even where there are multiple schools, the set of potential controls is very limited. Therefore, for the purposes of this exercise, we keep same-district schools in the matching procedure; but do not *force* them to be selected as controls. Of the initial 105 control schools in our baseline specification (35 events x 3 control schools), only 11 are replaced by relaxing the district eligibility criteria, and this change ultimately affects only nine (of 35) of the matches. The estimates using this revised set of controls are reported in Table A16 and are essentially unchanged relate to the baseline results.

Even if there are no correlated shocks occurring outside of the school, there could be correlated shocks *within* the affected schools. Among the 35 treatment schools, 13 experienced at least one death from other causes in the preceding two-year period, which could—in turn—have caused some of the effects that we attribute to the focal self-harm death. Given this possibility we

re-estimated the models excluding these schools, yielding 22 treatment events. These estimates are shown in Table A17. The estimates from this subsample are quite similar to the baseline findings.

As noted in Section V, the main analysis focuses on a sample of students who were continuously enrolled in Medicaid for two years before and two years after the focal (or placebo) event and there could be differential attrition from Medicaid between students at treatment and control schools. We have estimated models using estimating the probability that a teen is present in the Medicaid data as an outcome, and we do not see an effect of treatment.

We also estimate models including teens who were continuously enrolled in Medicaid prior to the focal event but who were not continuously enrolled in the two years afterwards. We assume that these teens did not re-enroll either because they were no longer eligible due to income changes or because they allowed their coverage to lapse because they did not need health care services.[12] It is assumed that eligible teens who needed health care would re-enroll and re-appear in the Medicaid claims data. We re-estimate models including students who were age-eligible for Medicaid but not continuously enrolled in the post period. We assume that if we do not observe them in the data, then they are not receiving mental health services. These estimates are shown in Table A18. When we include these additional students, the results on self-harm, mental health, and criminal outcomes are remarkably similar, suggesting that non-random attrition from Medicaid is unlikely to be driving our main results.

There are also students who are never continuously enrolled in Medicaid in the years surrounding the focal event. While relaxing the restriction on Medicaid eligibility prevents us from examining any health outcomes, we are still able to estimate the effects on criminal behavior. These

[12] In South Carolina, children with household incomes up to 208% of the federal poverty level (FPL) are insured through the Medicaid program (SCDHHS 2020). Low-income residents age out of eligibility upon reaching 19 years of age which is one reason that we follow students only to age 19.

results are shown in Table A19. As compared to the baseline sample in Table 4, it is clear that this larger sample is significantly less likely to engage in criminal behavior—the monthly rates of arrest/referrals and felonies are about two-thirds those of the baseline (i.e., continuously enrolled) sample. Even so, we find nearly identical effects on the probability of any arrest or referral. We do not find statistically significant effects on the rate of arrest or referral for felonies and the point estimates effects are roughly half the size of the baseline estimates. However, when we consider the cumulative impacts by age 19 among this sample (Table A20), we do see increases in the likelihood of serious criminal offending.

VIII. Conclusions

By the time they reach age 17, a quarter of U.S. students have experienced a peer suicide. We use rich administrative data from South Carolina and school matching models to examine the effect of a peer self-harm death on a wide range of outcomes. The effects differ by gender and domain. Focusing on the two years following a peer self-harm death, we see a 58% increase in the average monthly probability of a medical visit with a self-harm diagnosis, a 10.8% increase in the average monthly probability of having two or more visits with a mental health diagnosis. Because there is no increase in the probability of a visit with any mental health diagnosis, these results suggest boys who already have a mental illness may be experiencing a worsening in their condition. Among males, there is also a 13.4% increase in the average monthly probability of any arrest or referral and a 19.7% increase in the average monthly probability of a felony arrest. Among females, there is an increase of 9.4% in the average monthly probability of having a visit with any mental health diagnosis, and an increase of 12.4% in the average monthly probability of having two or more visits with a mental health diagnosis.

The cumulative mental health effects by age 19 are somewhat smaller, indicating that teens in the control schools tend to catch up by accumulating mental health diagnoses over time, though the controls do not completely catch up, and there is still a significant gap between treatment and controls in mental health at age 19. Specifically, there is a 27.2% increase in the probability of having had a self-harm diagnosis among males, and a 4.9% increase in having any mental health diagnosis among females.

Turning to other outcomes, there is a 3.4% decrease in the probability of high school graduation among males, as well as a 12.4% increase in felony arrests and a 27.7% increase in the probability of any incarceration by age 19. Among females, there is a 10% increase in the probability of having had any arrest by age 19 (though this is only significant at the 10% level of confidence.)

Consistent with the idea that these are peer effects, the effects tend to be stronger when there is gender, race, or grade-level concordance between the child who died and the index child. The effects are also generally larger for non-Hispanic white students, who account for a disproportionate share of self-harm deaths in this sample. The estimated effects are also larger for self-harm deaths than for traffic deaths, and both self-harm and traffic deaths have larger effects than assault deaths. A possible explanation for this pattern is that self-harm and to some extent traffic deaths are more likely to be unanticipated deaths, and are therefore more shocking than assault deaths.

We conclude that it is useful to think of experiencing a peer suicide as a common adverse experience of childhood that overwhelmingly affects adolescents, though some children are affected as young as middle school. These deaths have been short and longer-term effects on peers, affecting important outcomes such as mental health, schooling attainment, and criminal justice

involvement. The large effects of self-harm deaths relative to other types of peer deaths suggests that self-harm deaths may be uniquely traumatizing for peers. Moreover, the estimated effects on mental health suggest that much of the effect may be through increases in "externalizing" behaviors, rather than through internalizing disorders such as depression and anxiety. These results suggest that asking about such experiences and providing follow-up care should be an important part of standard preventive care.

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1 Tables & Figures

Table 1: Summary Statistics of Treatment and Comparison Groups

	(1) Treatment group	(2) Comparison group	(3) P-value
A. School characteristics (in year before matching)			
Percent male	50.7%	51.3%	0.298
Percent female	49.2%	48.6%	0.274
Percent non-Hispanic white	36.7%	36.9%	0.959
Percent non-Hispanic Black	58.1%	58.3%	0.973
Percent Hispanic	3.7%	3.1%	0.432
Percent FRL recipients	68.5%	69.8%	0.609
Pupil-teacher ratio	15	16	0.467
Total number of students	882	847	0.675
B. Student characteristics (in year before matching)			
Any inpatient or ER hospital visit	4.6%	4.2%	0.000
Any mental health diagnosis	8.0%	8.7%	0.000
2+ visits with mental health diagnosis	4.3%	5.1%	0.000
Any self-harm related diagnosis	0.1%	0.1%	0.529
Any ADHD diagnosis	3.8%	4.3%	0.000
Any non-development diagnosis	4.7%	5.0%	0.000
Any mental health treatment	10.5%	12.0%	0.000
Any mental health evaluation	2.2%	2.3%	0.016
Enrollment in TANF	6.1%	6.8%	0.000
Enrollment in SNAP	64.1%	65.5%	0.000
Any arrest or referral	1.0%	0.9%	0.106
Any arrest or referral for felony	0.2%	0.1%	0.125

NOTE: Panel A displays the weighted average outcomes of treatment and comparison schools in our baseline sample. Characteristics are measured in the school year before treatment using National Center of Education Statistics data. Panel B displays the weighted average outcomes of treatment and comparison individuals in our baseline sample, measured in the school year prior to treatment. 'Any' denotes the receipt of any such diagnosis or service in the year preceding treatment. Schools and individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Column 3 presents the p-value from a t-test comparing the means of the treatment and comparison groups.

Table 2: Difference-in-Differences Monthly Estimates of Impact of Self-Harm Death on Mental Health

	(1) Self-harm diagnosis	(2) Mental health diagnosis	(3) 2+ mental health diagnoses
A. All students (N = 37,772)			
Treat × Post	0.023***	0.441**	0.537**
	(0.008)	(0.209)	(0.206)
Mean	0.06	7.69	4.40
B. Male students (N = 17,543)			
Treat × Post	0.029***	0.275	0.603**
	(0.008)	(0.263)	(0.259)
Mean	0.05	9.73	5.56
C. Female students (N = 20,229)			
Treat × Post	0.018	0.557**	0.480**
	(0.012)	(0.242)	(0.206)
Mean	0.07	5.92	3.39

NOTE: This table reports difference-in-differences estimates using equation (1) and the baseline sample described in Section III considering 35 self-harm deaths. Outcomes are multiplied by 100 for ease of exposition (scale 0 to 100). Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

Table 3: Difference-in-Differences Monthly Estimates of Impact of Self-Harm Death on Medical Provider Utilization

	(1) Mental health evaluation	(2) Mental health provider	(3) Primary care provider	(4) Other type of provider
A. All students (N = 37,772)				
Treat × Post	0.040	0.194	0.171	0.767
	(0.089)	(0.214)	(0.356)	(0.656)
Mean	2.13	5.88	14.87	22.83
B. Male students (N = 17,543)				
Treat × Post	0.040	0.104	-0.040	0.741
	(0.124)	(0.263)	(0.313)	(0.672)
Mean	2.61	7.35	13.75	19.39
C. Female students (N = 20,229)				
Treat × Post	0.037	0.235	0.297	0.654
	(0.095)	(0.243)	(0.438)	(0.701)
Mean	1.72	4.60	15.85	25.82

NOTE: This table reports difference-in-differences estimates using equation (1) and the baseline sample described in Section III considering 35 self-harm deaths. Outcomes are multiplied by 100 for ease of exposition (scale 0 to 100). Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

Table 4: Difference-in-Differences Monthly Estimates of Impact of Self-Harm Death on Criminal Behavior

	(1) Any arrest or referral	(2) Arrest or referral for felony
A. All students (N = 37,772)		
Treat × Post	0.096*	0.030**
	(0.054)	(0.013)
Mean	0.95	0.18
B. Male students (N = 17,543)		
Treat × Post	0.179**	0.065**
	(0.069)	(0.026)
Mean	1.34	0.33
C. Female students (N = 20,229)		
Treat × Post	0.027	0.000
	(0.052)	(0.012)
Mean	0.61	0.05

NOTE: This table reports difference-in-differences estimates using equation (1) and the baseline sample described in Section III considering 35 self-harm deaths. Outcomes are multiplied by 100 for ease of exposition (scale 0 to 100). Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

Table 5: Cumulative Impact of Self-Harm Death (by Age 19) on Health and Education Outcomes

	(1) Self-harm diagnosis	(2) Mental health diagnosis	(3) High School graduation	(4) Repeat grade	(5) Teen pregnancy	(6) Mortality
A. All students (N = 37,719)						
By age 19	0.154	1.990**	-1.594	1.251	–	-0.024
	(0.301)	(0.908)	(1.183)	(1.009)	–	(0.035)
Mean	3.63	50.73	65.19	47.20	–	0.16
B. Male students (N = 17,507)						
By age 19	0.813***	1.721	-2.236*	0.907	–	0.002
	(0.288)	(1.562)	(1.127)	(1.006)	–	(0.062)
Mean	2.99	55.35	56.82	56.90	–	0.22
C. Female students (N = 20,212)						
By age 19	-0.357	2.283***	-0.886	1.606	-0.029	-0.027
	(0.403)	(0.808)	(1.414)	(1.130)	(0.686)	(0.034)
Mean	4.19	46.72	72.27	38.79	20.26	0.11

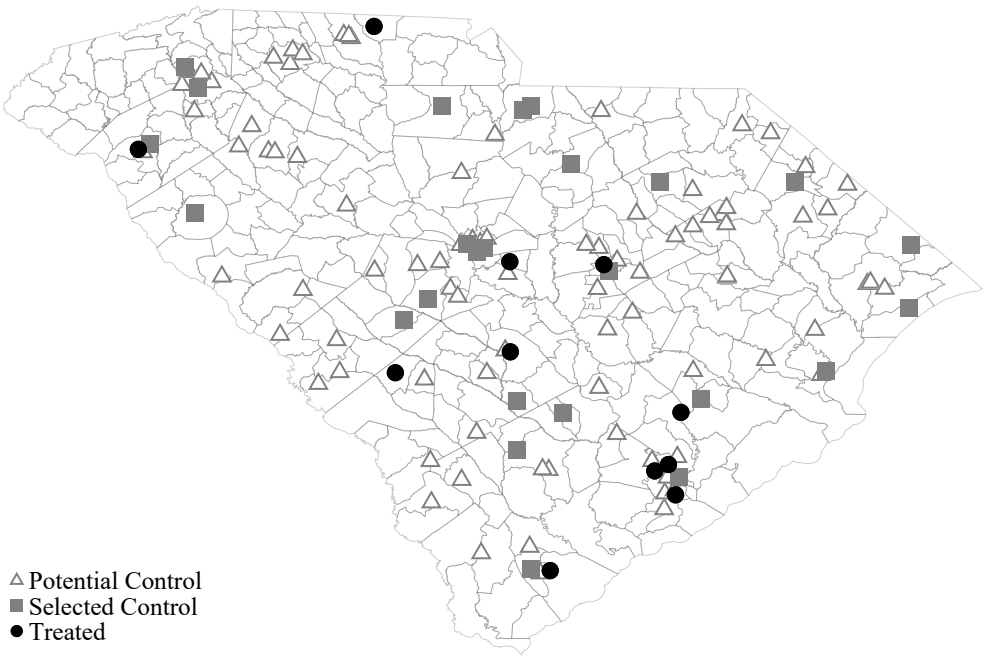
NOTE: This table reports treatment-comparison differences using equation (3) and the baseline sample described in Section III (conditional on observing the individual at age 19). Due to missing values, column 3 uses a reduced sample of 34,912 students (of which 15,995 are male and 18,917 are female students). Column 6 uses an extended sample incorporating a small number of individuals who passed away between the focal event and the age of 19. Outcomes are multiplied by 100 for ease of exposition (scale 0 to 100). Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

Table 6: Cumulative Impact of Self-Harm Death (by Age 19) on Criminal Behavior

	(1) Any arrest	(2) Any arrest for felony	(3) Any arrest for drugs	(4) Any incarceration
A. All students (N = 37,719)				
By age 19	0.750	0.683**	0.406	0.522***
	(0.614)	(0.325)	(0.339)	(0.155)
Mean	15.29	5.70	4.17	2.24
B. Male students (N = 17,507)				
By age 19	0.292	1.281**	0.673	1.218***
	(0.877)	(0.509)	(0.599)	(0.284)
Mean	22.37	10.32	7.54	4.40
C. Female students (N = 20,212)				
By age 19	0.941*	0.022	0.084	-0.142
	(0.529)	(0.284)	(0.142)	(0.107)
Mean	9.17	1.70	1.25	0.37

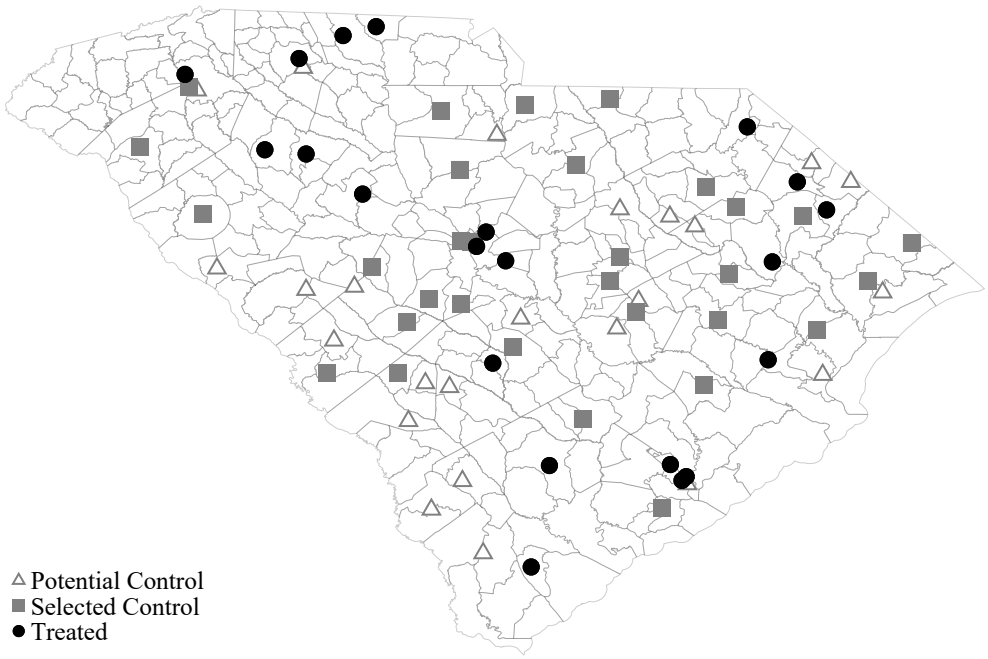
NOTE: This table reports treatment-comparison differences using equation (3) and the baseline sample described in Section III (conditional on observing the individual at age 19). Outcomes are multiplied by 100 for ease of exposition (scale 0 to 100). Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

Figure 1: Geographic Distribution of Treatment and Control Middle Schools



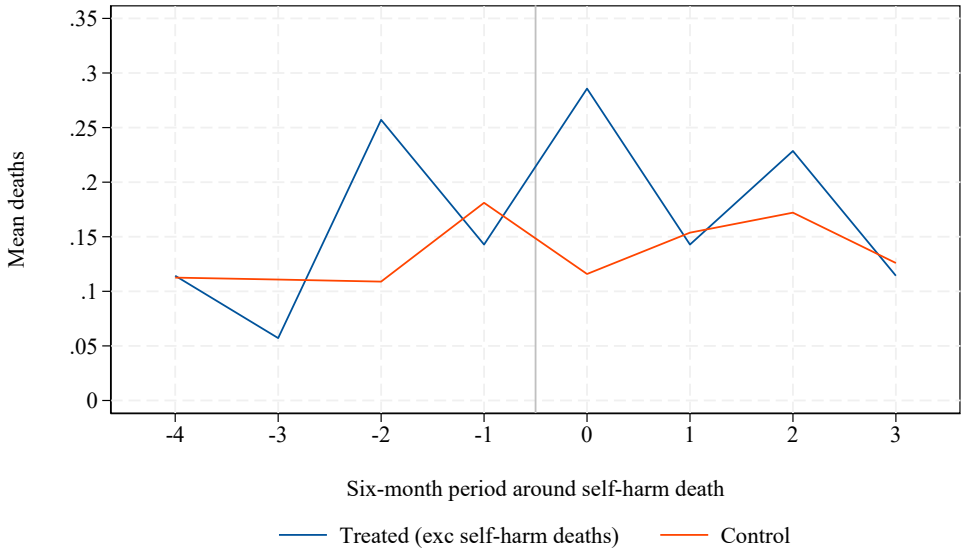
NOTE: This figure maps the distribution of middle schools in our sample. The sample consists of middle schools open in 2010 (since postcodes were sourced from the 2010 version of the NCES). Correctional schools operated by the Department of Juvenile Justice or the Department of Corrections are excluded. Gray triangles represent middle schools that did not experience a self-harm death between 2000 and 2018 among cohorts born between 1990 and 1999 and are not included in the comparison group. Gray squares denote middle schools that also did not experience a self-harm death but are included in the comparison group. Black circles indicate middle schools that experienced a focal self-harm death. Gray lines correspond to county subdivision boundaries in South Carolina.

Figure 2: Geographic Distribution of Treatment and Control High Schools



NOTE: This figure maps the distribution of high schools in our sample. The sample consists of high schools open in 2010 (since postcodes were sourced from the 2010 version of the NCES). As such, two schools that experienced a focal self-harm death are excluded. Additionally, correctional schools operated by the Department of Juvenile Justice or the Department of Corrections are not included in the analysis. The gray triangles represent high schools that did not experience a self-harm death between 2000 and 2018 among cohorts born between 1990 and 1999 and are not used as in the comparison group in our analysis. The squares filled in with gray represent high schools that did not experience a self-harm death in this period among this population and are used in the comparison group in our analysis. The circles filled in with black represent high schools that experience a focal self-harm death. Gray lines correspond to county subdivision boundaries in South Carolina.

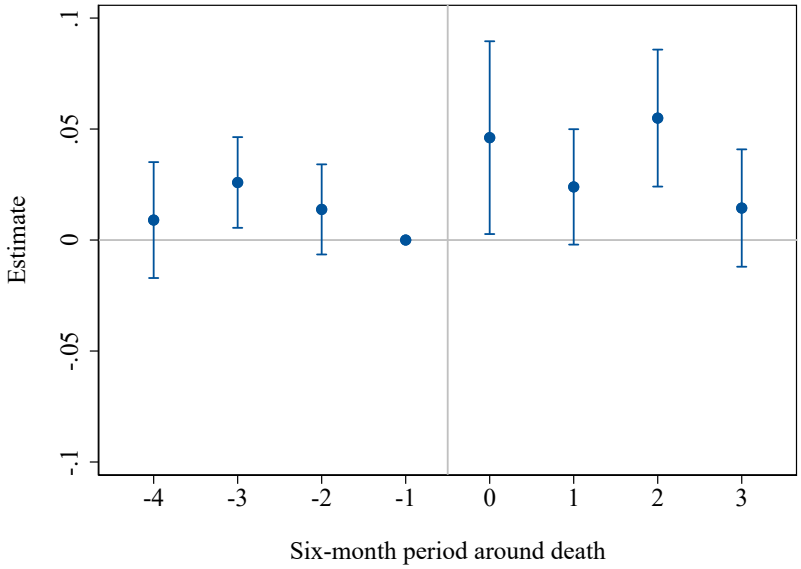
Figure 3: Average Number of Deaths from Causes Other than Self-Harm Around Treatment



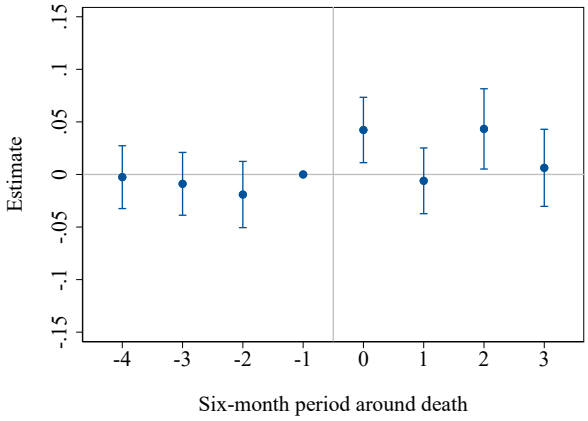
NOTE: This figure plots the weighted mean number of deaths at treatment and control schools in the 2 years before and after treatment. The solid blue line represents the mean number of deaths occurring at the treated schools, excluding all self-harm deaths. The orange line represents the weighted mean number of deaths at the control schools. Schools in the comparison group are weighted using the corresponding weights from the matching procedure.

Figure 4: Event-Time Monthly Estimates of Impact of Self-Harm Death on Any Self-Harm Diagnosis

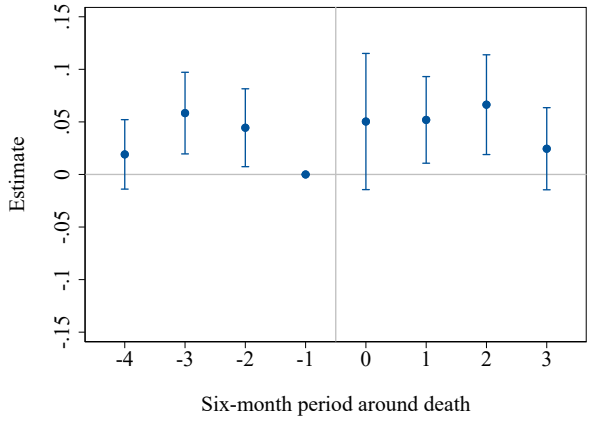
(a) All students



(b) Male students



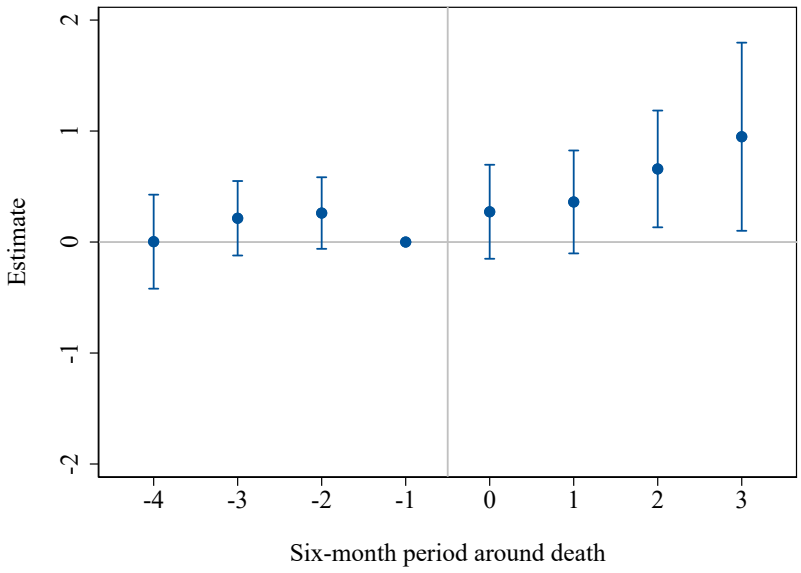
(c) Female students



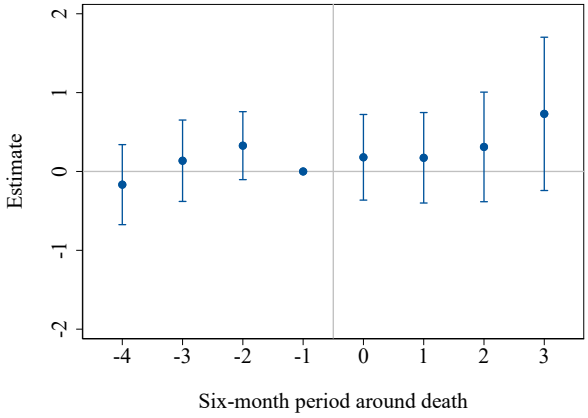
NOTE: This figure plots difference-in-differences estimates using equation (2) and the baseline sample described in Section III. The outcome is multiplied by 100 for ease of exposition. Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

Figure 5: Event-Time Monthly Estimates of Impact of Self-Harm Death on Any Mental Health Diagnosis

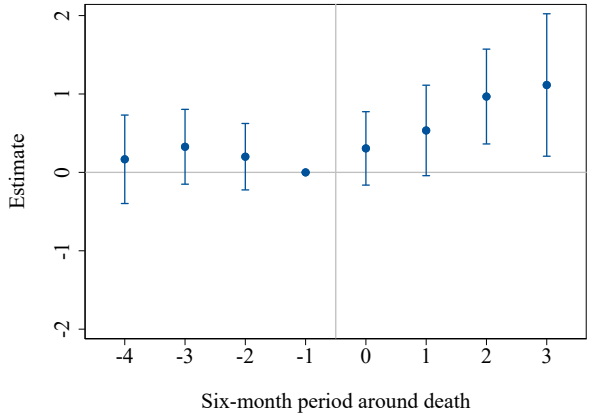
(a) All students



(b) Male students



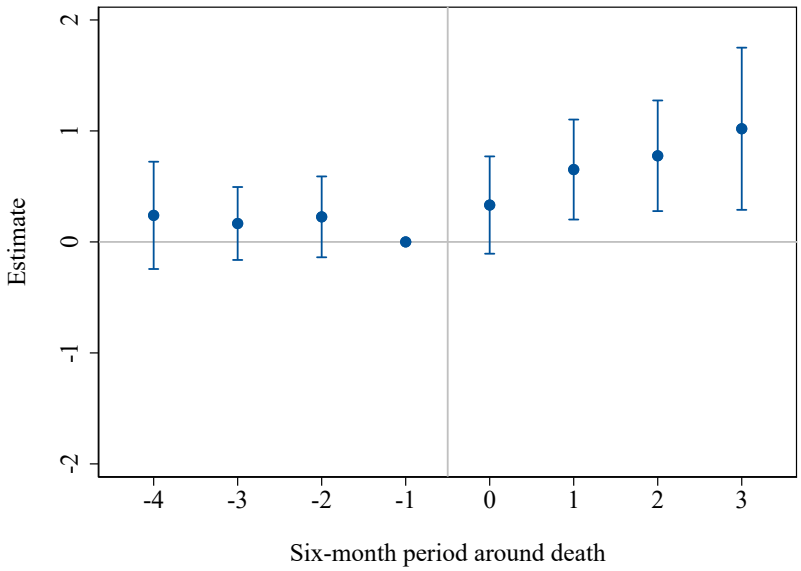
(c) Female students



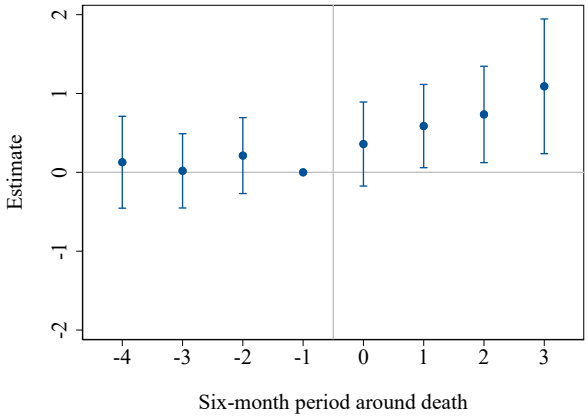
NOTE: This figure plots difference-in-differences estimates using equation (2) and the baseline sample described in Section III. The outcome is multiplied by 100 for ease of exposition. Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

Figure 6: Event-Time Monthly Estimates of Impact of Self-Harm Death on Two or More Mental Health Diagnoses

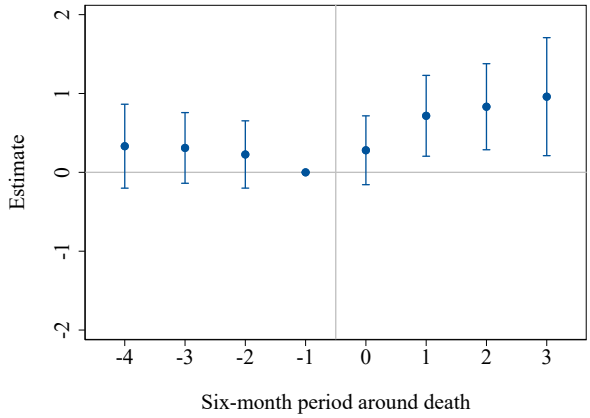
(a) All students



(b) Male students



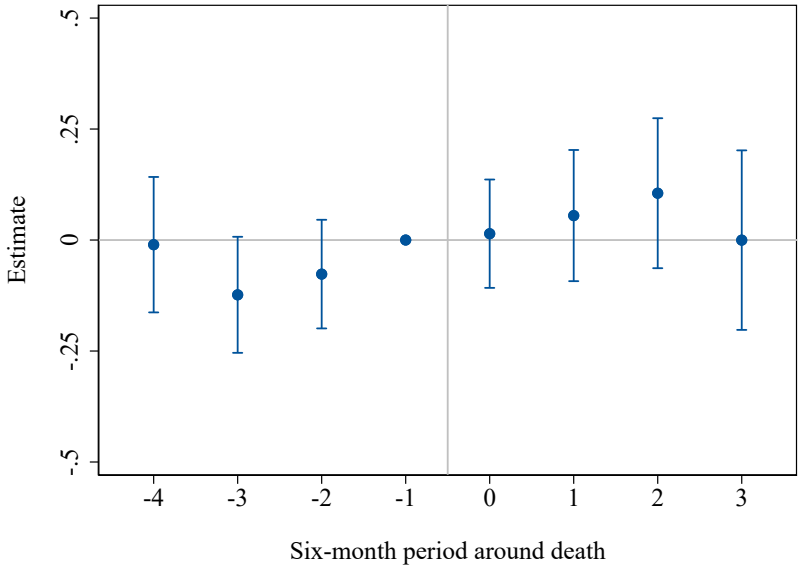
(c) Female students



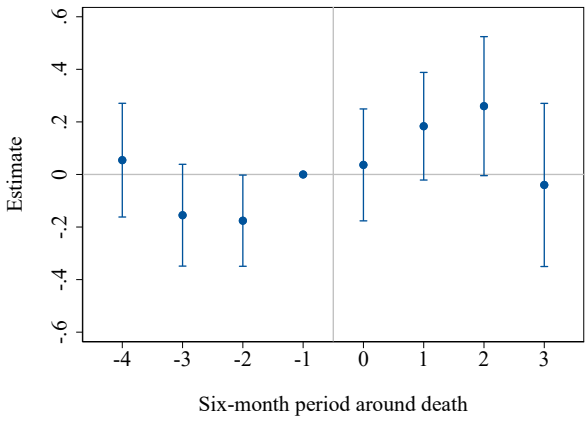
NOTE: This figure plots difference-in-differences estimates using equation (2) and the baseline sample described in Section III. The outcome is multiplied by 100 for ease of exposition. Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

Figure 7: Event-Time Monthly Estimates of Impact of Self-Harm Death on Any Arrest

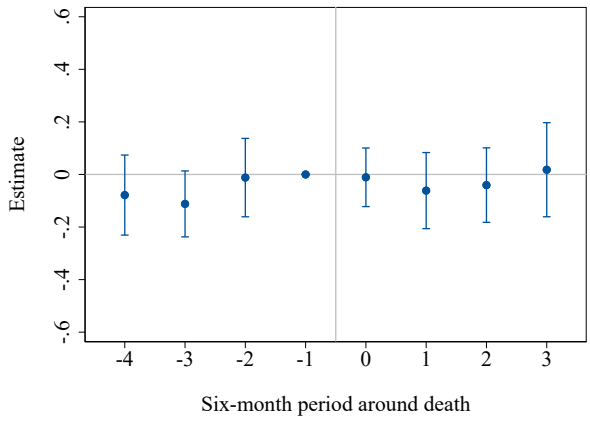
(a) All students



(b) Male students



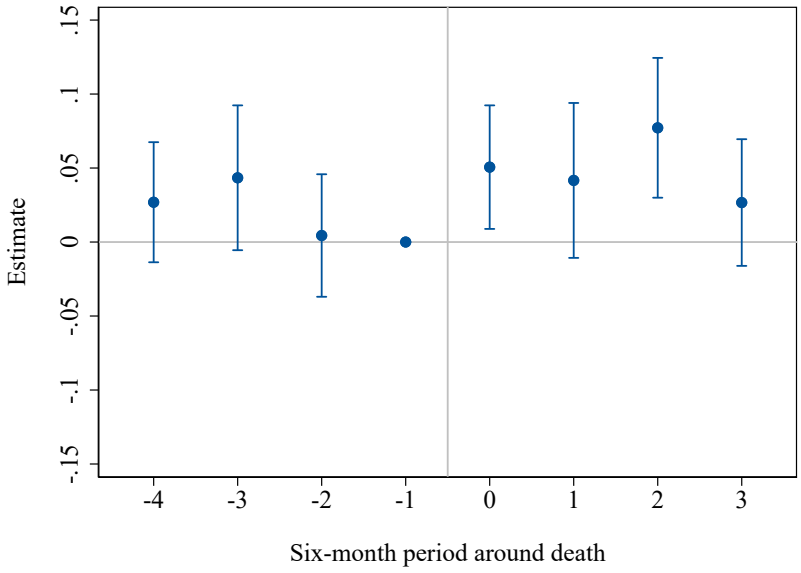
(c) Female students



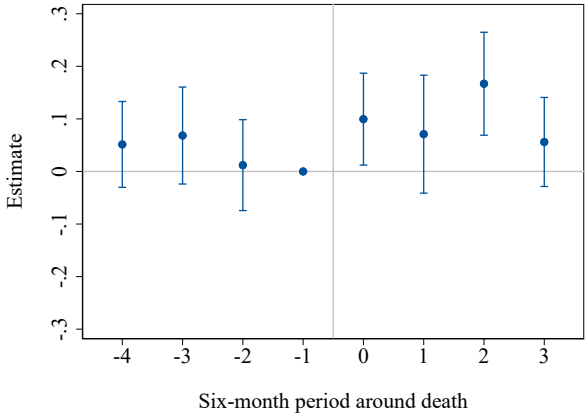
NOTE: This figure plots difference-in-differences estimates using equation (2) and the baseline sample described in Section III. The outcome is multiplied by 100 for ease of exposition. Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

Figure 8: Event-Time Monthly Estimates of Impact of Self-Harm Death on Felony Offense

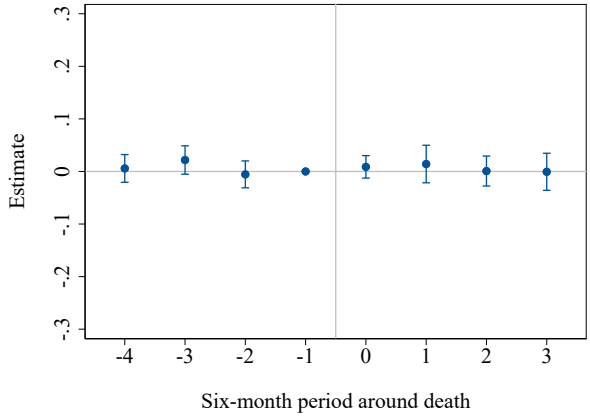
(a) All students



(b) Male students



(c) Female students



NOTE: This figure plots difference-in-differences estimates using equation (2) and the baseline sample described in Section III. The outcome is multiplied by 100 for ease of exposition. Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

A Appendix Tables & Figures

Table A.1: Comparing Schools in South Carolina With or Without a Self-harm Death

	(1) Experience self-harm death	(2) Never experience self-harm death	(3) P-value
A. School characteristics (in 2010)			
Total number of students	828	527	0.000
Total number of teachers (FTE)	54	36	0.000
Percent male	50.7%	51.7%	0.229
Percent female	49.1%	48.0%	0.179
Percent non-Hispanic white	35.3%	34.0%	0.735
Percent non-Hispanic Black	59.5%	60.7%	0.792
Percent Hispanic	3.8%	3.7%	0.904
Percent FRL recipients	67.8%	73.2%	0.036
B. Area characteristics (from 2009-2013)			
Percent without health insurance	18.1%	19.0%	0.452
Percent below federal poverty line	12.7%	13.9%	0.294
Median income (2010 prices)	39,174	35,809	0.120
Unemployment rate	13.6%	14.8%	0.270
Schools	36	203	—

NOTE: This table compares schools that experienced at least one self-harm death among students born between 1990 and 1999 to those that did not. Across the 36 affected schools, a total of 45 self-harm deaths occurred. The sample includes our feeder or high schools that were open in 2010 and excludes elementary schools and schools operated by the Department of Juvenile Justice or Department of Corrections. Panel A uses data from the National Center for Education Statistics from 2010. Panel B uses American Community Census data at the census tract level spanning 2009 to 2013. P-values reflect tests for differences between the two groups.

Table A.2: Difference-in-Differences Monthly Estimates of Impact of Self-Harm Death on Mental Health Diagnoses

	(1) Externalizing	(2) Internalizing	(3) ADHD	(4) Behavioral	(5) Trauma or stress	(6) Substance abuse
A. All students (N = 37,772)						
Treat × Post	0.504***	-0.109	0.265*	0.198*	0.062	0.068
	(0.179)	(0.108)	(0.150)	(0.105)	(0.064)	(0.052)
Mean	5.82	2.26	3.85	1.70	0.88	0.65
B. Male students (N = 17,543)						
Treat × Post	0.400	-0.173	0.085	0.262*	-0.055	0.086
	(0.251)	(0.159)	(0.231)	(0.142)	(0.071)	(0.081)
Mean	8.26	1.91	5.80	2.19	0.73	0.97
C. Female students (N = 20,229)						
Treat × Post	0.579***	-0.063	0.401***	0.144	0.161	0.053
	(0.176)	(0.140)	(0.122)	(0.112)	(0.100)	(0.054)
Mean	3.70	2.56	2.15	1.27	1.01	0.37

NOTE: This table reports difference-in-differences estimates using equation (1) and the baseline sample described in Section III considering 35 self-harm deaths. A mental health service excludes any mental health evaluation. For more details on diagnosis classifications, see Appendix B. Outcomes are multiplied by 100 for ease of exposition. Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

Table A.3: Difference-in-Differences Monthly Estimates of Impact of Self-Harm Death on Healthcare Utilization

	(1) Any claim	(2) Hospital or ER visit	(3) Mental health service	(4) 2+ Mental health service	(5) Mental health drug	(6) ADHD drug	(7) Mental health non-ADHD drug
A. All students (N = 37,772)							
Treat × Post	0.452	0.031	0.504**	0.387**	0.046	0.195	0.006
	(0.550)	(0.117)	(0.207)	(0.153)	(0.147)	(0.130)	(0.096)
Mean	41.65	4.36	5.59	3.42	7.24	5.35	3.52
B. Male students (N = 17,543)							
Treat × Post	0.142	-0.097	0.398	0.455**	-0.052	0.059	0.063
	(0.528)	(0.093)	(0.295)	(0.206)	(0.206)	(0.204)	(0.113)
Mean	38.86	3.60	7.04	4.35	9.81	7.98	4.25
C. Female students (N = 20,229)							
Treat × Post	0.546	0.106	0.562***	0.317*	0.107	0.292**	-0.046
	(0.670)	(0.162)	(0.203)	(0.161)	(0.186)	(0.142)	(0.171)
Mean	44.07	5.02	4.33	2.61	5.00	3.08	2.88

NOTE: This table reports difference-in-differences estimates using equation (1) and the baseline sample described in Section III considering 35 self-harm deaths. Outcomes are multiplied by 100 for ease of exposition. Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

Table A.4: Difference-in-Differences Monthly Estimates of Impact of Self-Harm Death on Criminal Behavior

	Juvenile			Adult			
	(1) Any referral	(2) Any referral at school	(3) Any detention	(4) Any arrest	(5) Any arrest for felony	(6) Any arrest for drugs	(7) Any incarceration
A. All students (N = 37,772)							
Treat × Post	0.052	-0.594	0.012	0.044**	0.022**	0.014*	0.039*
	(0.062)	(2.346)	(0.009)	(0.022)	(0.011)	(0.008)	(0.022)
Mean	0.73	13.12	0.07	0.22	0.06	0.04	0.05
B. Male students (N = 17,543)							
Treat × Post	0.092	-0.214	0.035**	0.088**	0.054**	0.032*	0.075*
	(0.087)	(2.504)	(0.014)	(0.037)	(0.022)	(0.016)	(0.044)
Mean	1.01	16.60	0.11	0.33	0.12	0.07	0.10
C. Female students (N = 20,229)							
Treat × Post	0.012	-1.247	-0.010	0.012	-0.001	0.001	0.013
	(0.051)	(2.664)	(0.008)	(0.016)	(0.005)	(0.004)	(0.010)
Mean	0.49	10.09	0.03	0.13	0.02	0.01	0.01

NOTE: This table reports difference-in-differences estimates using equation (1) and the baseline sample described in Section III considering 35 self-harm deaths. "Juvenile" refers to referrals to the Department of Juvenile Justice. "Adult" refers to arrest records from the South Carolina Law Enforcement Division and incarceration records from the Department of Corrections. For more details on offense classifications, see Appendix B. Outcomes are multiplied by 100 for ease of exposition. Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

Table A.5: Difference-in-Differences Monthly Estimates of Impact of Self-Harm Death, by Gender of the Affected Students and Deceased

	(1) Self-harm diagnosis	(2) Mental health diagnosis	(3) 2+ mental health diagnoses	(4) Any arrest or referral	(5) Arrest or referral for felony
1. Male deaths (N = 28)					
A. Male affected students (N = 13,991)					
Treat × Post	0.032***	0.201	0.524*	0.179**	0.055*
	(0.008)	(0.298)	(0.304)	(0.077)	(0.029)
Mean	0.05	9.73	5.52	1.35	0.33
B. Female affected students (N = 16,311)					
Treat × Post	0.007	0.307	0.337	0.007	-0.003
	(0.011)	(0.261)	(0.241)	(0.060)	(0.014)
Mean	0.07	5.93	3.37	0.64	0.05
2. Female deaths (N = 7)					
A. Male affected students (N = 3,552)					
Treat × Post	0.018	0.556	0.903**	0.181	0.105**
	(0.023)	(0.539)	(0.418)	(0.163)	(0.044)
Mean	0.06	9.75	5.72	1.27	0.33
B. Female affected students (N = 3,918)					
Treat × Post	0.061	1.580***	1.068***	0.107	0.013
	(0.046)	(0.473)	(0.288)	(0.084)	(0.011)
Mean	0.08	5.89	3.44	0.51	0.04

NOTE: This table reports difference-in-differences estimates using equation (1) and the baseline sample described in Section III considering 35 self-harm deaths (of which 28 are male deaths and 7 are female deaths). Outcomes are multiplied by 100 for ease of exposition (scale 0 to 100). Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

Table A.6: Difference-in-Differences Monthly Estimates of Impact of Self-Harm Death, by Race of the Affected Students and Deceased

	(1) Self-harm diagnosis	(2) Mental health diagnosis	(3) 2+ mental health diagnoses	(4) Any arrest or referral	(5) Arrest or referral for felony
1. Death of White students (N = 14)					
A. White affected students (N = 5,050)					
Treat × Post	0.043**	1.097**	1.226**	0.214**	0.035
	(0.021)	(0.528)	(0.578)	(0.093)	(0.030)
Mean	0.11	11.20	5.76	0.77	0.13
B. Black affected students (N = 12,905)					
Treat × Post	0.011	0.356	0.467*	0.061	-0.016
	(0.008)	(0.274)	(0.246)	(0.076)	(0.025)
Mean	0.04	5.59	3.26	1.02	0.20
2. Death of Black students (N = 8)					
A. White affected students (N = 1,918)					
Treat × Post	0.046	-0.967	-1.062	0.247*	0.185**
	(0.067)	(0.597)	(0.735)	(0.134)	(0.075)
Mean	0.12	11.32	5.90	0.74	0.11
B. Black affected students (N = 7,262)					
Treat × Post	0.014	-0.413	0.085	-0.197	0.055*
	(0.013)	(0.414)	(0.348)	(0.120)	(0.027)
Mean	0.05	7.10	4.42	1.16	0.20

NOTE: This table reports difference-in-differences estimates using equation (1) and focuses on Black or White students experiencing the death of a Black or White student from the baseline sample described in Section III. To derive the race of the death, the deceased is identified in our sample using the sex, year-month, and underlying cause of death from the dataset of adolescent deaths in South Carolina. Since we only observe individuals who attend certain low-income High Schools, we can only identify the race of 23 self-harm deaths in these High Schools (of which 14 are white, 8 are Black, and 1 is another race). Hispanic students and those with missing race information are excluded. Outcomes are multiplied by 100 for ease of exposition (scale 0 to 100). Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

Table A.7: Difference-in-Differences Monthly Estimates of Impact of Self-Harm Death on Students in the Same or Adjacent Grades at the Time of Death

	(1) Self-harm diagnosis	(2) Mental health diagnosis	(3) 2+ mental health diagnoses	(4) Any arrest or referral	(5) Arrest or referral for felony
A. All students (N = 26,362)					
Treat × Post	0.021**	0.249	0.409**	0.156**	0.042***
	(0.009)	(0.235)	(0.188)	(0.062)	(0.015)
Mean	0.06	7.84	4.53	0.96	0.18
B. Male students (N = 12,334)					
Treat × Post	0.031***	0.266	0.611**	0.276***	0.080**
	(0.010)	(0.318)	(0.250)	(0.087)	(0.031)
Mean	0.05	9.86	5.70	1.35	0.33
C. Female students (N = 14,028)					
Treat × Post	0.012	0.203	0.240	0.053	0.009
	(0.013)	(0.283)	(0.212)	(0.057)	(0.014)
Mean	0.07	6.06	3.50	0.62	0.05

NOTE: This table reports difference-in-differences estimates using equation (1) and focuses on students in the same or adjacent grade at the time of the focal death from the baseline sample described in Section III, which includes 35 self-harm deaths. Outcomes are multiplied by 100 for ease of exposition (scale 0 to 100). Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

Table A.8: Difference-in-Differences Monthly Estimates of Impact of Self-Harm Death, by School Level

	(1) Self-harm diagnosis	(2) Mental health diagnosis	(3) 2+ mental health diagnoses	(4) Any arrest or referral	(5) Arrest or referral for felony
1. Middle school deaths (N = 11)					
A. Male middle school students (N = 3,310)					
Treat × Post	0.045*	0.166	0.412	0.250	-0.030
	(0.023)	(0.454)	(0.334)	(0.218)	(0.068)
Mean	0.04	12.07	7.14	1.21	0.29
B. Female middle school students (N = 3,091)					
Treat × Post	0.074	1.128*	1.000**	0.193*	0.051*
	(0.053)	(0.572)	(0.398)	(0.099)	(0.027)
Mean	0.06	6.82	4.13	0.52	0.05
2. High school deaths (N = 24)					
A. Male high school students (N = 14,233)					
Treat × Post	0.026***	0.298	0.644**	0.164**	0.086***
	(0.008)	(0.306)	(0.307)	(0.071)	(0.028)
Mean	0.05	9.19	5.20	1.36	0.34
B. Female high school students (N = 17,138)					
Treat × Post	0.009	0.463*	0.395*	-0.000	-0.008
	(0.010)	(0.264)	(0.230)	(0.057)	(0.013)
Mean	0.08	5.76	3.25	0.63	0.05

NOTE: This table reports difference-in-differences estimates using equation (1). Middle school refers to students or deaths in grades 6 to 8. High school refers to students or deaths in grades 9 to 12. Outcomes are multiplied by 100 for ease of exposition (scale 0 to 100). Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

Table A.9: Difference-in-Differences Monthly Estimates of Impact of Transport Death on Mental Health and Criminal Behavior

	(1) Self-harm diagnosis	(2) Mental health diagnosis	(3) 2+ mental health diagnoses	(4) Any arrest or referral	(5) Arrest or referral for felony
A. All students (N = 38,735)					
Treat × Post	-0.010	-0.261	-0.304	0.096***	-0.009
	(0.008)	(0.239)	(0.221)	(0.036)	(0.018)
Mean	0.07	7.19	4.13	0.94	0.20
B. Male students (N = 18,356)					
Treat × Post	0.000	-0.061	-0.381	0.208***	-0.003
	(0.010)	(0.362)	(0.325)	(0.060)	(0.037)
Mean	0.05	8.90	5.10	1.34	0.36
C. Female students (N = 20,378)					
Treat × Post	-0.021*	-0.427*	-0.220	-0.004	-0.015*
	(0.012)	(0.232)	(0.204)	(0.042)	(0.009)
Mean	0.08	5.65	3.26	0.59	0.06

NOTE: This table reports difference-in-differences estimates using equation (1) and the baseline sample described in Section III considering 39 passenger or pedestrian transportation deaths. Outcomes are multiplied by 100 for ease of exposition (scale 0 to 100). Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

Table A.10: Cumulative Impact (by Age 19) of Transport Death

	(1) Self-harm diagnosis	(2) Mental health diagnosis	(3) High School graduation	(4) Any arrest	(5) Any arrest for felony	(6) Any incarceration
A. All students (N = 38,677)						
Treat 4 years	0.274	1.384	-1.325	0.743*	0.360	0.311*
	(0.300)	(0.934)	(1.050)	(0.415)	(0.291)	(0.160)
Mean	3.41	48.58	64.12	14.97	5.91	2.43
B. Male students (N = 18,323)						
Treat 4 years	0.129	1.530	-1.438	1.226**	0.634	0.695**
	(0.217)	(1.242)	(1.084)	(0.542)	(0.544)	(0.331)
Mean	2.62	52.80	55.35	21.64	10.61	4.71
C. Female students (N = 20,354)						
Treat 4 years	0.440	1.150	-1.336	0.396	0.108	0.089
	(0.405)	(0.918)	(1.248)	(0.474)	(0.187)	(0.067)
Mean	4.11	44.78	71.75	8.97	1.68	0.37

NOTE: This table reports treatment-comparison differences using equation (3) and the baseline sample described in Section III (conditional on observing the individual at age 19). Due to missing values, column 3 uses a reduced sample of 34,510 students (of which 16,064 are male and 18,446 are female students). Outcomes are multiplied by 100 for ease of exposition (scale 0 to 100). Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

Table A.11: Difference-in-Differences Monthly Estimates of Impact of Assault Death on Mental Health and Criminal Behavior

	(1) Self-harm diagnosis	(2) Mental health diagnosis	(3) 2+ mental health diagnoses	(4) Any arrest or referral	(5) Arrest or referral for felony
A. All students (N = 47,223)					
Treat × Post	-0.002	0.067	-0.002	-0.012	-0.008
	(0.007)	(0.169)	(0.132)	(0.056)	(0.013)
Mean	0.06	7.09	4.12	0.98	0.20
B. Male students (N = 21,707)					
Treat × Post	0.009	0.205	0.143	-0.066	-0.028
	(0.008)	(0.239)	(0.188)	(0.071)	(0.023)
Mean	0.04	8.87	5.12	1.40	0.37
C. Female students (N = 25,516)					
Treat × Post	-0.012	-0.078	-0.124	0.047	0.014
	(0.011)	(0.193)	(0.138)	(0.054)	(0.009)
Mean	0.07	5.58	3.27	0.63	0.05

NOTE: This table reports difference-in-differences estimates using equation (1) and the baseline sample described in Section III considering 48 assault deaths. Outcomes are multiplied by 100 for ease of exposition (scale 0 to 100). Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

Table A.12: Cumulative Impact (by Age 19) of Assault Death

	(1) Self-harm diagnosis	(2) Mental health diagnosis	(3) High School graduation	(4) Any arrest	(5) Any arrest for felony	(6) Any incarceration
A. All students (N = 47,163)						
Treat 4 years	-0.322	0.624	0.094	0.011	0.251	0.262
	(0.254)	(0.706)	(1.585)	(0.702)	(0.355)	(0.169)
Mean	3.04	48.50	64.32	15.75	5.76	2.44
B. Male students (N = 21,670)						
Treat 4 years	-0.214	1.412	1.348	-0.141	0.601	0.416
	(0.275)	(1.047)	(1.577)	(0.919)	(0.587)	(0.335)
Mean	2.42	53.15	55.40	23.03	10.67	4.88
C. Female students (N = 25,493)						
Treat 4 years	-0.426	-0.093	-0.852	0.139	-0.070	0.115
	(0.320)	(0.846)	(1.636)	(0.631)	(0.189)	(0.085)
Mean	3.56	44.55	71.74	9.56	1.58	0.37

NOTE: This table reports treatment-comparison differences using equation (3) and the baseline sample described in Section III (conditional on observing the individual at age 19). Due to missing values, column 3 uses a reduced sample of 44,086 students (of which 20,020 are male and 24,066 are female students). Outcomes are multiplied by 100 for ease of exposition (scale 0 to 100). Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

Table A.13: Summary Statistics of Treatment and Comparison Groups, by Closeness within Comparison Group

	Treatment	Control schools				
	schools	1st	2nd	3rd	Unweighted	Weighted
A. School characteristics (in year before matching)						
Percent male	50.7%	51.4%	50.9%	51.0%	51.1%	51.3%
Percent female	49.2%	48.5%	49.0%	48.9%	48.8%	48.6%
Percent non-Hispanic white	36.7%	37.6%	37.9%	32.5%	36.0%	36.9%
Percent non-Hispanic Black	58.1%	58.0%	58.1%	60.4%	58.8%	58.3%
Percent Hispanic	3.7%	2.8%	2.2%	5.2%	3.4%	3.1%
Percent FRL recipients	68.5%	69.3%	69.8%	70.3%	69.8%	69.8%
Pupil-teacher ratio	15	16	15	15	15	15
Total number of students	882	876	819	813	836	836
B. Student characteristics (in year before matching)						
Any inpatient or ER hospital visit	4.6%	4.2%	4.4%	4.3%	4.3%	4.2%
Any mental health diagnosis	8.0%	8.4%	8.7%	7.9%	8.3%	8.7%
2+ visits with mental health diagnosis	4.3%	4.9%	5.3%	4.6%	4.9%	5.1%
Any self-harm related diagnosis	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Any ADHD diagnosis	3.8%	4.2%	4.1%	3.8%	4.1%	4.3%
Any non-development diagnosis	4.7%	4.8%	5.0%	4.6%	4.8%	5.0%
Any mental health treatment	10.5%	11.9%	12.2%	10.2%	11.5%	12.0%
Any mental health evaluation	2.2%	2.3%	2.2%	2.5%	2.3%	2.3%
Enrollment in TANF	6.1%	7.1%	6.7%	6.4%	6.8%	6.8%
Enrollment in SNAP	64.1%	65.8%	65.3%	65.0%	65.4%	65.5%
Any arrest or referral	1.0%	0.9%	1.0%	1.0%	1.0%	0.9%
Any arrest or referral for felony	0.2%	0.1%	0.2%	0.2%	0.2%	0.1%

NOTE: Panel A displays the weighted average outcomes of treatment and comparison schools in our baseline sample. Characteristics are measured in the school year before treatment using National Center of Education Statistics data. Panel B displays the weighted average outcomes of treatment and comparison individuals in our baseline sample, measured in the school year prior to treatment. 'Any' denotes the receipt of any such diagnosis or service in the year preceding treatment. The 1st control school represents the control school with the smallest Mahalanobis distance from the relevant treatment school calculated in the matching procedure, the 2nd control is the second closest, and the 3rd control is the third closest. The 'Unweighted' column presents the raw average of the characteristics across the first, second, and third closest matches. The 'Weighted' column presents the weighted average using the corresponding weights from the matching procedure.

Table A.14: Difference-in-Differences Monthly Estimates of Impact of Self-Harm Death Without Weighting Control Schools

	(1) Self-harm diagnosis	(2) Mental health diagnosis	(3) 2+ mental health diagnoses	(4) Any arrest or referral	(5) Arrest or referral for felony
A. All students (N = 37,772)					
Treat × Post	0.025***	0.336	0.380*	0.101*	0.033**
	(0.009)	(0.224)	(0.199)	(0.057)	(0.015)
Mean	0.06	7.69	4.40	0.95	0.18
B. Male students (N = 17,543)					
Treat × Post	0.027***	0.174	0.434*	0.165**	0.067**
	(0.009)	(0.273)	(0.250)	(0.080)	(0.029)
Mean	0.05	9.73	5.56	1.34	0.33
C. Female students (N = 20,229)					
Treat × Post	0.025*	0.460	0.332	0.047	0.005
	(0.013)	(0.277)	(0.217)	(0.054)	(0.012)
Mean	0.07	5.92	3.39	0.61	0.05

NOTE: This table reports difference-in-differences estimates using equation (1) and the baseline sample described in Section III considering 35 self-harm deaths. Outcomes are multiplied by 100 for ease of exposition (scale 0 to 100). Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

Table A.15: Difference-in-Differences Monthly Estimates of Impact of Self-Harm Death Only Using Closest Control School

	(1) Self-harm diagnosis	(2) Mental health diagnosis	(3) 2+ mental health diagnoses	(4) Any arrest or referral	(5) Arrest or referral for felony
A. All students (N = 19,463)					
Treat × Post	0.018*	0.475**	0.611***	0.041	0.020*
	(0.010)	(0.230)	(0.212)	(0.060)	(0.012)
Mean	0.07	7.63	4.24	0.93	0.17
B. Male students (N = 9,058)					
Treat × Post	0.028***	0.303	0.649**	0.137*	0.053*
	(0.008)	(0.299)	(0.280)	(0.081)	(0.027)
Mean	0.06	9.56	5.32	1.30	0.32
C. Female students (N = 10,405)					
Treat × Post	0.011	0.583**	0.579***	-0.040	-0.008
	(0.015)	(0.265)	(0.199)	(0.056)	(0.014)
Mean	0.07	5.94	3.29	0.60	0.05

NOTE: This table reports difference-in-differences estimates using equation (1) and considering 35 self-harm deaths. Relative to the baseline sample, this sample only includes the treated individuals and those attending the analogous control school with the smallest Mahalanobis distance. Outcomes are multiplied by 100 for ease of exposition (scale 0 to 100). Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

Table A.16: Difference-in-Differences Monthly Estimates of Impact of Self-Harm Death Using Control Schools from Any District

	(1) Self-harm diagnosis	(2) Mental health diagnosis	(3) 2+ mental health diagnoses	(4) Any arrest or referral	(5) Arrest or referral for felony
A. All students (N = 37,517)					
Treat × Post	0.023***	0.415**	0.493**	0.104*	0.033***
	(0.008)	(0.206)	(0.202)	(0.054)	(0.012)
Mean	0.06	7.68	4.40	0.96	0.18
B. Male students (N = 17,407)					
Treat × Post	0.029***	0.313	0.601**	0.195***	0.071***
	(0.009)	(0.267)	(0.262)	(0.070)	(0.025)
Mean	0.05	9.71	5.58	1.35	0.34
C. Female students (N = 20,110)					
Treat × Post	0.019	0.476**	0.399**	0.026	0.000
	(0.012)	(0.235)	(0.197)	(0.053)	(0.012)
Mean	0.07	5.91	3.38	0.62	0.05

NOTE: This table reports difference-in-differences estimates using equation (1) and a sample of 35 self-harm deaths. Compared to the baseline sample, the matching procedure was adjusted to allow schools in the same district to be a potential control (as well as schools outside the district), causing nine control schools to change. Outcomes are multiplied by 100 for ease of exposition (scale 0 to 100). Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the placebo death.

Table A.17: Difference-in-Differences Monthly Estimates of Impact of Self-Harm Excluding Deaths at Treated Schools Experiencing Another Type of Death in 2 Years Before Focal Death

	(1) Self-harm diagnosis	(2) Mental health diagnosis	(3) 2+ mental health diagnoses	(4) Any arrest or referral	(5) Arrest or referral for felony
A. All students (N = 19,156)					
Treat × Post	0.029**	0.435	0.514**	0.121	0.059***
	(0.013)	(0.272)	(0.245)	(0.076)	(0.019)
Mean	0.07	8.09	4.63	0.97	0.18
B. Male students (N = 9,065)					
Treat × Post	0.028**	0.044	0.328	0.188*	0.110***
	(0.011)	(0.303)	(0.259)	(0.095)	(0.038)
Mean	0.05	10.16	5.75	1.33	0.32
C. Female students (N = 10,091)					
Treat × Post	0.031	0.747**	0.678**	0.056	0.011
	(0.022)	(0.337)	(0.296)	(0.080)	(0.013)
Mean	0.08	6.23	3.62	0.65	0.05

NOTE: This table reports difference-in-differences estimates using equation (1) and a sample considering 22 self-harm deaths. Relative to the baseline sample, students experiencing 13 of the self-harm deaths are excluded because another death occurred at the treated schools in the two years prior to the suicide death. Note that although a death did not occur at the remaining 22 treated schools in the two years prior to treatment, the analogous control schools could experience a non-self-harm death in these two years. Outcomes are multiplied by 100 for ease of exposition (scale 0 to 100). Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

Table A.18: Difference-in-Differences Monthly Estimates of Impact of Self-Harm Death for Individuals Consistently Enrolled in Medicaid for 2 Years Before Treatment

	(1) Self-harm diagnosis	(2) Mental health diagnosis	(3) 2+ mental health diagnoses	(4) Any arrest or referral	(5) Arrest or referral for felony
A. All students (N = 38,972)					
Treat × Post	0.021***	0.444**	0.523**	0.087	0.026**
	(0.008)	(0.206)	(0.202)	(0.053)	(0.013)
Mean	0.06	7.56	4.36	0.94	0.18
B. Male students (N = 18,161)					
Treat × Post	0.028***	0.263	0.589**	0.166**	0.056**
	(0.008)	(0.257)	(0.252)	(0.068)	(0.026)
Mean	0.05	9.55	5.50	1.33	0.33
C. Female students (N = 20,811)					
Treat × Post	0.016	0.578**	0.467**	0.021	0.000
	(0.012)	(0.243)	(0.204)	(0.052)	(0.011)
Mean	0.07	5.82	3.36	0.61	0.05

NOTE: This table reports difference-in-differences estimates using equation (1). The sample consists of individuals who attended a treatment or control school at the time of the (placebo) death and were continuously enrolled in Medicaid before treatment. To prevent the inclusion of individuals no longer eligible for Medicaid, the sample is further restricted to those either a) younger than 19 for the entire analysis period or b) aged 19 or older and observed to be enrolled in Medicaid. In columns 1-2, the variable is 1 if received the relevant diagnosis in the given month and 0 otherwise. The outcomes are multiplied by 100 for ease of exposition (scale 0 to 100). Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

Table A.19: Difference-in-Differences Monthly Estimates of Impact of Self-Harm Death on Criminal Behavior for All Affected Individuals

	(1) Any arrest or referral	(2) Arrest or referral for felony
A. All students (N = 93,201)		
Treat × Post	0.066*	0.011
	(0.036)	(0.009)
Mean	0.67	0.13
B. Male students (N = 47,227)		
Treat × Post	0.114**	0.023
	(0.047)	(0.015)
Mean	0.92	0.23
C. Female students (N = 45,974)		
Treat × Post	0.017	-0.001
	(0.032)	(0.005)
Mean	0.42	0.03

NOTE: This table reports difference-in-differences estimates using equation (1). The sample includes all affected students regardless of their enrollment in Medicaid; this is the baseline sample plus individuals who are sometimes or never enrolled in Medicaid. Outcomes are multiplied by 100 for ease of exposition (scale 0 to 100). Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

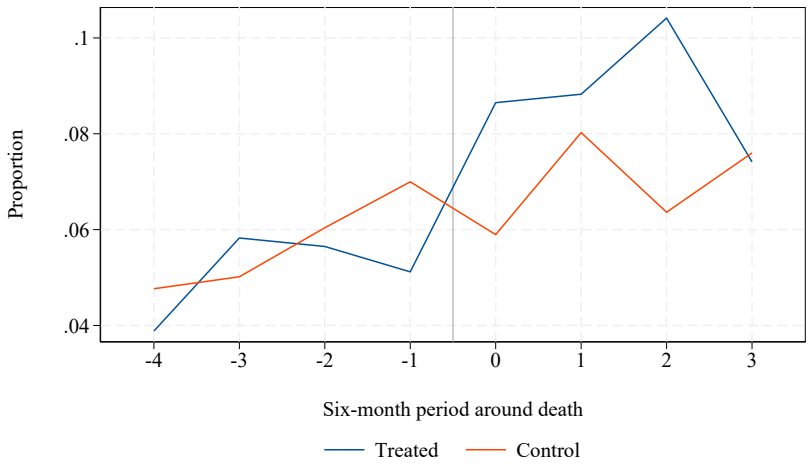
Table A.20: Cumulative Impact (by Age 19) of Self-Harm Death for All Affected Individuals

	(1) High School graduation	(2) Any arrest	(3) Any arrest for felony	(4) Any incarceration
A. All students (N = 94,063)				
Treat 4 years	-1.655	0.625	0.363	0.343***
	(1.306)	(0.446)	(0.268)	(0.122)
Mean	71.80	11.89	4.25	1.61
B. Male students (N = 47,622)				
Treat 4 years	-1.705	1.039	0.775*	0.836***
	(1.412)	(0.708)	(0.446)	(0.217)
Mean	66.08	16.84	7.23	2.94
C. Female students (N = 46,441)				
Treat 4 years	-1.604	0.236	-0.028	-0.160**
	(1.270)	(0.358)	(0.160)	(0.061)
Mean	77.61	6.80	1.18	0.24

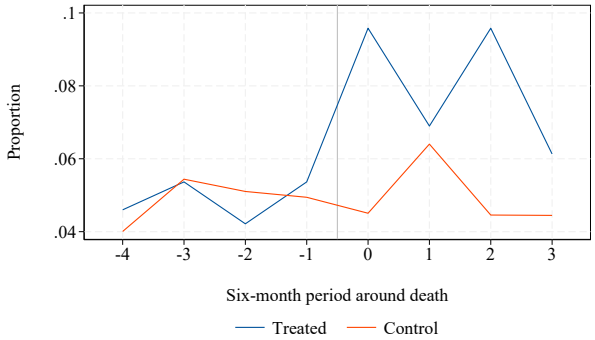
NOTE: This table reports treatment-comparison differences using equation (3). The sample includes all affected students who we observe at age 19 regardless of their enrollment in Medicaid; this is the baseline sample, plus individuals who are sometimes or never enrolled in Medicaid. Due to missing values, column 1 uses a reduced sample of 88,230 students (of which 44,463 are male and 43,767 are female students). Outcomes are multiplied by 100 for ease of exposition (scale 0 to 100). Individuals in the comparison group are weighted using the corresponding weights from the matching procedure. Standard errors are clustered by the school the student was enrolled in at the time of the (placebo) death.

Figure A.1: Average Instance of Any Self-Harm Diagnosis Around Treatment

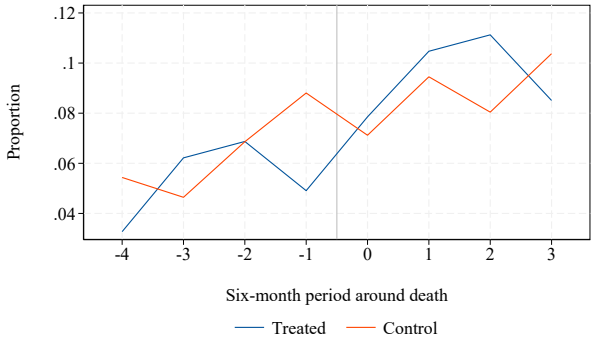
(a) All students



(b) Male students



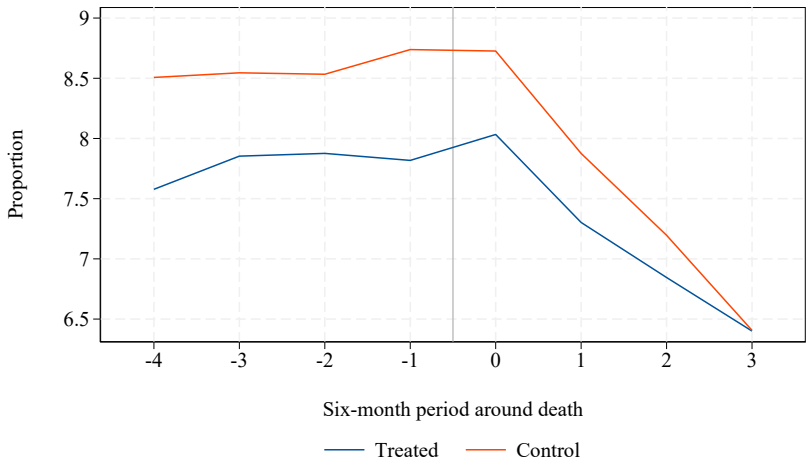
(c) Female students



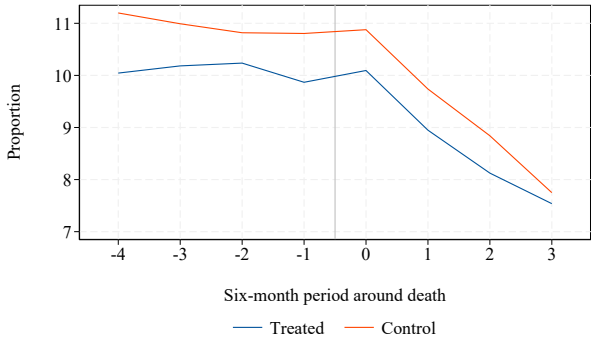
NOTE: This figure plots the weighted mean instance of any self-harm diagnoses in the 2 years before and after treatment, using treated and control individuals in the baseline sample described in Section III. The solid blue line represents the mean for treated individuals and the orange line represents the weighted mean for control individuals. Individuals in the comparison group are weighted using the corresponding weights from the matching procedure.

Figure A.2: Average Instance of Any Mental Health Diagnosis Around Treatment

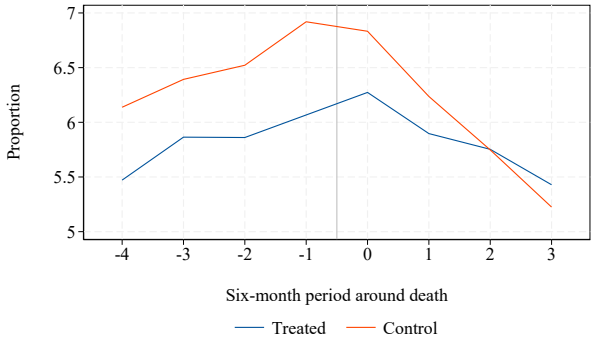
(a) All students



(b) Male students

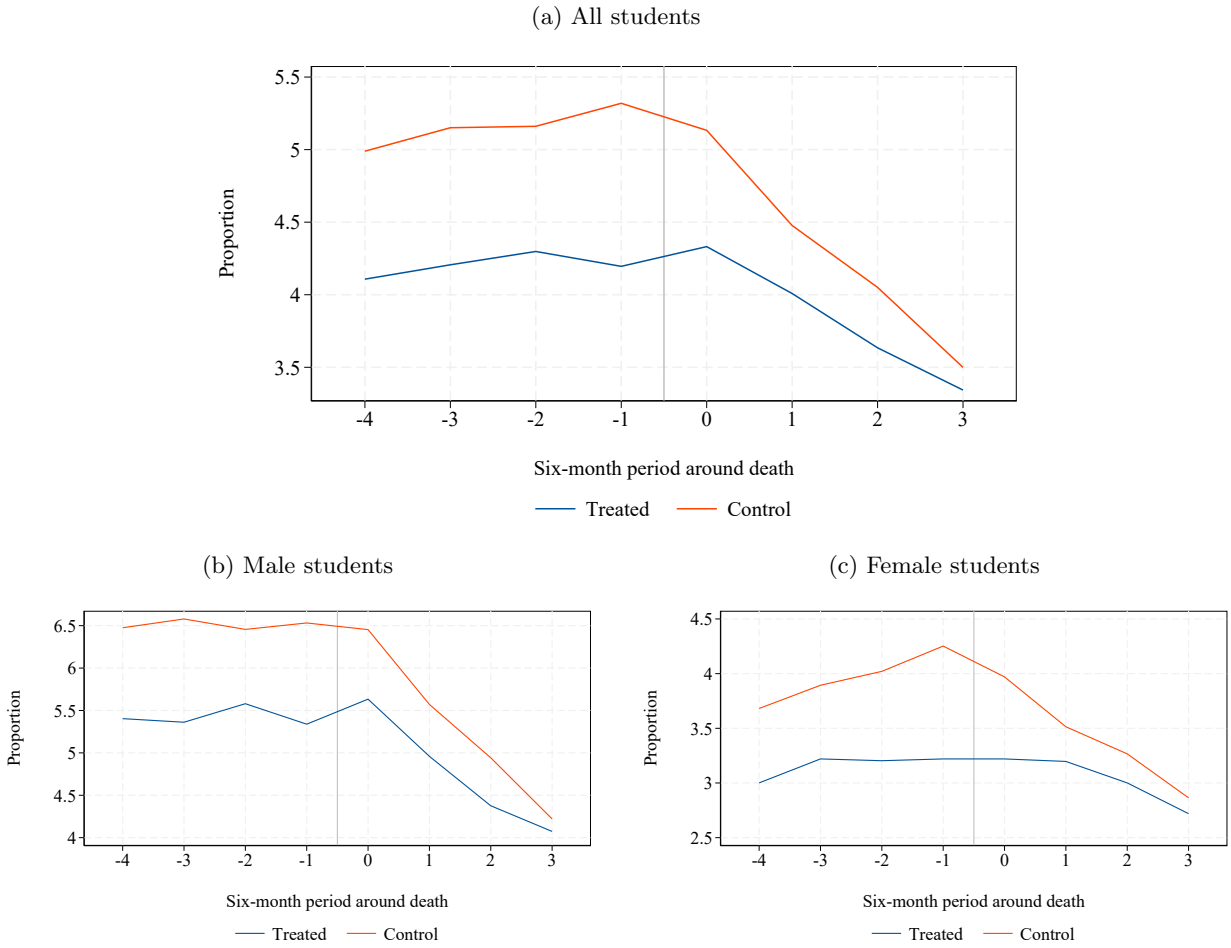


(c) Female students



NOTE: This figure plots the weighted mean instance of any mental health diagnoses in the 2 years before and after treatment, using treated and control individuals in the baseline sample described in Section III. The solid blue line represents the mean for treated individuals and the orange line represents the weighted mean for control individuals. Individuals in the comparison group are weighted using the corresponding weights from the matching procedure.

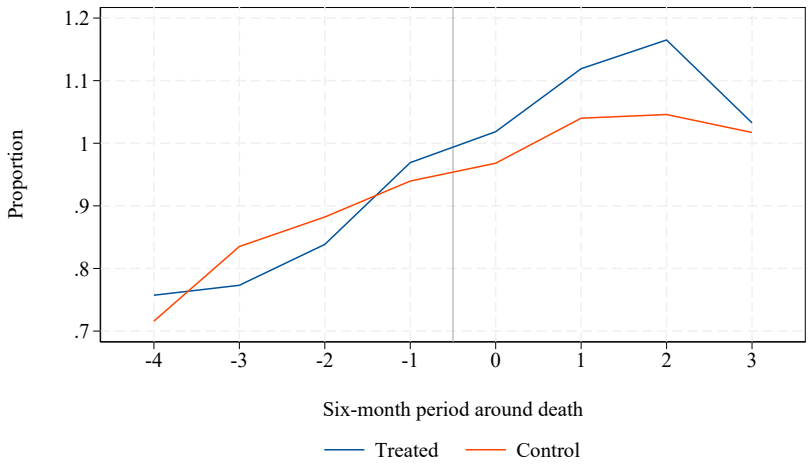
Figure A.3: Average Instance of Two or More Mental Health Diagnoses Around Treatment



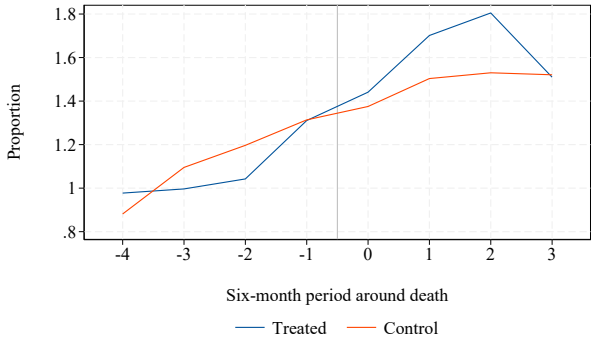
NOTE: This figure plots the weighted mean instance of two or more mental health diagnoses in the 2 years before and after treatment, using treated and control individuals in the baseline sample described in Section III. The solid blue line represents the mean for treated individuals and the orange line represents the weighted mean for control individuals. Individuals in the comparison group are weighted using the corresponding weights from the matching procedure.

Figure A.4: Average Instance of Any Arrest Around Treatment

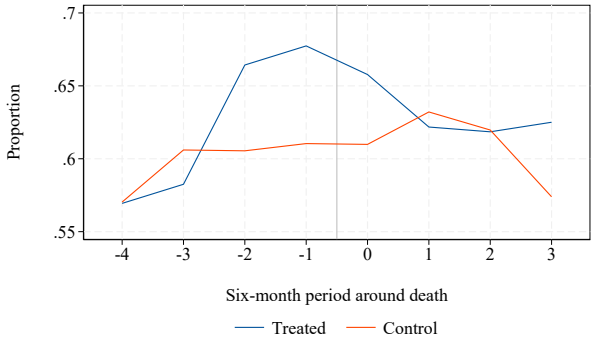
(a) All students



(b) Male students



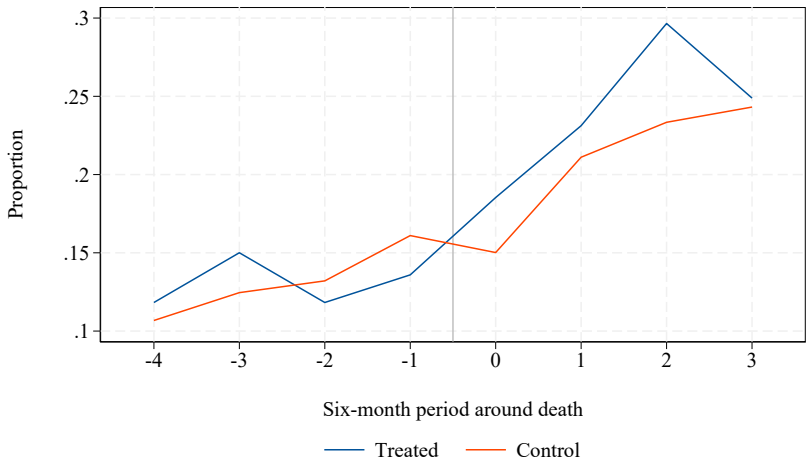
(c) Female students



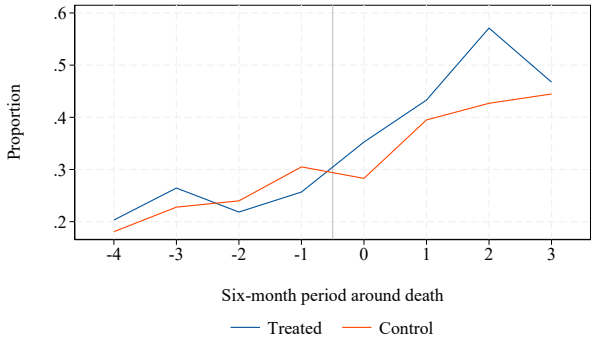
NOTE: This figure plots the weighted mean instance of any arrest in the 2 years before and after treatment, using treated and control individuals in the baseline sample described in Section III. The solid blue line represents the mean for treated individuals and the orange line represents the weighted mean for control individuals. Individuals in the comparison group are weighted using the corresponding weights from the matching procedure.

Figure A.5: Average Instance of Any Felony Offense Around Treatment

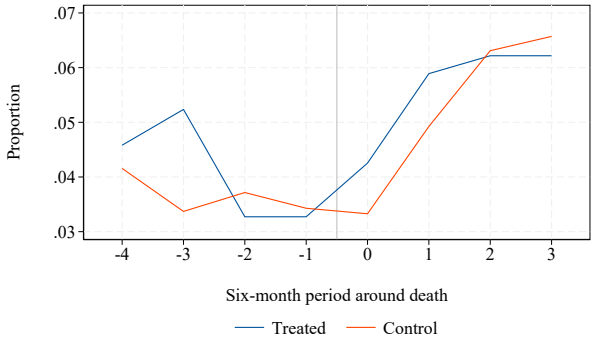
(a) All students



(b) Male students



(c) Female students



NOTE: This figure plots the weighted mean instance of any felony offense in the 2 years before and after treatment, using treated and control individuals in the baseline sample described in Section III. The solid blue line represents the mean for treated individuals and the orange line represents the weighted mean for control individuals. Individuals in the comparison group are weighted using the corresponding weights from the matching procedure.

B Data Appendix

In this appendix, we describe in greater detail the sample and variable construction.

B.1 Sample Construction for Self-harm Deaths

Selecting our sample of schools. Our sample of schools consists of the high schools identified by the School Carolina RFA Office and their feeder schools. These high schools had a higher-than-median proportion of students receiving free or reduced-price lunch between 2008 and 2013 (as identified by the RFA Office). We have data on any student born between 1990 and 1999 who was ever enrolled in one of these schools (henceforth referred to as 'our students').

We identify their feeder schools as schools that either (a) a large number of our students attended or (b) our students constitute a significant proportion of their student body. Specifically, we classify any school as a feeder school if, in the highest three years of attendance by our students, the school either (a) contains an average of 100 or more of our students or (b) our students represent at least 25% of all students in attendance (based on data from the NCES). This results in a total of 435 schools in our sample: 142 high schools and 293 feeder schools.

Identifying affected schools and students. The RFA constructed a dataset of adolescent deaths in South Carolina between 2000 and 2018, which includes the date, cause of death (ICD 9 or 10 code), sex, and the last observed school and grade attended by the deceased.

Based on this dataset, 47 self-harm deaths occurred between 2004 and 2018 among students in grades 6 to 12 at schools in our sample. To define the affected peer group for each death, we identify students attending the same school as the deceased at the time of their death. In 20 cases, we observe the deceased's school enrollment in the same academic year as their death, allowing us to directly select their peers from that school. For 24 deaths, we only observe the deceased's school enrollment in the prior academic year. In these cases, we assume they remained at the same school in the year they died and define their peers accordingly. Finally, for three deaths, the deceased is last observed in grade 8 at a middle school but dies in grade 9. In these cases, we assign treatment to students in grade 9 at the high school attended by the majority (over 50%) of the middle school's graduates.

Selecting our treatment deaths. Of the 47 self-harm deaths in our sample, we exclude 12 based on four criteria. First, one of the three grade 9 deaths is excluded due to an unclear high school assignment, as no single high school enrolled a majority of the middle school's graduates. Second, we exclude eight deaths that occurred at the same school within four years of a prior self-harm death, ensuring earlier events do not confound the treatment effect. Third, two deaths occurring in 2017 or 2018 are excluded due to an insufficient post-treatment observation period, as our data ends in 2018, preventing a full two-year follow-up. Finally, one death is excluded because no suitable matched control school could be identified. After these exclusions, our baseline analysis considers 35 self-harm deaths at 35 different schools as treatment events.

Matching treated schools to control schools. To construct the control group, we identified similar schools that did not experience a self-harm death in the two years before or after each treatment death. We first restricted the pool of eligible control schools to those in our sample that had the same lowest and highest grade levels, the same urban or rural classification, and were located in a different school district than the corresponding treatment school. If a school did not serve grades 6 to 8 or 9 to 12, we relaxed the grade-level restriction, allowing matches with schools that had similar grade structures.

Next, we calculated the Mahalanobis distance between each treatment school and potential controls using school-level characteristics from the NCES, measured in the year before the self-harm death. Mahalanobis distance is a scale-invariant metric that accounts for correlations between covariates, making it well-suited for our matching procedure. The characteristics used for matching include (1) total school enrollment, (2) the share of students who are Black, and (3) the share of students receiving free or reduced-price lunch.

For each treatment school, we selected the three control schools with the smallest Mahalanobis distance. Each control school was then assigned a placebo treatment date, corresponding to the self-harm death date in the matched treatment school.

Throughout the analysis, control schools are reweighted so that schools that are more similar to the treatment school get higher weights. Specifically, for a given school, we use the ratio of the inverse Mahalanobis distance to the sum of the inverse Mahalanobis distances for the control schools in the relevant match. This weighting scheme ensures that within a match, the sum of the control schools' weights equals the treatment school's school weight of one.

Restricting to individuals consistently enrolled in Medicaid. There are 24,342 treated and 68,859 control individuals affected by a self-harm (placebo) death who we observe every month in the two years before and after the (placebo) death. We have data on their education, criminal behavior, receipt of social security benefits, and vital records. Hence, we can explore the impact of a self-harm death on these outcomes without restricting the sample. However, we can only observe healthcare utilization and medical diagnoses for those enrolled in Medicaid. Out of the 93,201 treated or control individuals, 60,832 are enrolled in Medicaid for at least one month, and 37,772 individuals are enrolled consistently in the four years around a (placebo) death. Because health outcomes are among our primary outcomes of interest, our baseline sample is restricted to individuals who were consistently enrolled in Medicaid.

B.2 Outcomes of Interest

We have various outcomes of interest throughout the paper:

Health Outcomes. Our primary outcomes of interest measure an individual's mental health. To measure self-harm behavior, we use an outcome that corresponds to whether an individual had a Medicaid claim associated with suicide ideation, suicide attempt, or intentional self-harm. Specifically, we use ICD-9 codes V62.84 (for suicide ideation) and E950-E958 (for intentional self-inflicted injury) and ICD-10 codes R45.851 (for suicidal ideation), T19.91 (for suicide attempt) and T36.xx2-T50.xx2, T51.xx2-T65.xx2, T71.xx2, X70-X79, and X80-X83 if none of these codes ended in S (for intentional self-harm). To measure an individual's mental health more broadly, we use an outcome that corresponds to whether an individual had a Medicaid claim with an ICD-9 or ICD-10 code for a mental health diagnosis. Specifically, we classify a diagnosis as a "mental health diagnosis" if it falls within ICD-9 codes 290-319 or ICD-10 codes F01-F99, excluding intellectual disabilities, developmental disorders, tic disorders, and autism spectrum disorders.

We also create more granular classifications within the mental health diagnosis category. In particular, an externalizing diagnosis refers to a diagnosis for ADHD, conduct disorder, oppositional defiant disorder, substance abuse disorders, or adjustment disorders with conduct disturbance. An internalizing diagnosis refers to a diagnosis for anxiety disorders, depression, bipolar disorder, post-traumatic stress disorder (PTSD), or adjustment disorders without conduct disturbance. ADHD refers to ICD-9 code 314 or ICD-10 code F90. Behavioral is an indicator for a diagnosis of oppositional defiant or conduct disorders (ICD-9 codes 312 and 313.8 or ICD-10 code F91). Trauma or stress refers to PTSD and adjustment disorders (ICD-9 codes 308.9-308.29 or ICD-10 code F43). Substance abuse refers to alcohol, opioid, stimulant, sedative, cannabis, and other substance use disorders (ICD-9 codes 291, 292, and 303-305 and ICD-10 codes F10-F19).

With respect to healthcare utilization, we classify an individual as being enrolled in Medicaid in a given month if they are identified as enrolled in Medicaid or they submit a claim. When there are gaps in their Medicaid coverage, we infer Medicaid enrollment if the gap in their Medicaid enrollment is less than 2 years or the gap between their last Medicaid enrollment and turning 19 years old is less than 2 years. We classify a Medicaid claim as a hospital or ER visit if the claim location is classified as a hospital inpatient or the visit is identified as being to the Emergency Room. Mental health service refers to a claim associated with a mental health-related Healthcare Common Procedure Coding System (HCPCS) code, excluding mental health evaluations. Mental health evaluation refers to specific assessment-related HCPCS codes. We also consider the medical provider within a claim. Mental health provider refers to visits with providers specializing in psychiatry, psychology, therapy, counseling, or substance abuse treatment. Primary care provider refers to visits with

providers in general practice, family medicine, internal medicine, pediatrics, or clinics. Other provider refers to any provider not included in the two previous categories.

Finally, we use pharmacy claims data to identify prescriptions for mental health medications. In particular, drugs are classified as mental health medications if the therapeutic class or active ingredient corresponds to antianxiety, antidepressant, antipsychotic (including mood stabilizer), or ADHD medications.

Crime Outcomes. We measure criminal behavior using three datasets. To measure juvenile contact with the justice system, we use data on referrals to the Department of Juvenile Justice (DJJ). To measure adult contact with the justice system, we use arrest records from the South Carolina Law Enforcement Division (SLED) and the Department of Corrections (DOC).

To measure whether an individual has an arrest, we combine information on referrals from DJJ records and arrests from SLED records. We use these same records to classify arrests for felony offenses.

We also construct more granular categories of criminal behavior. Within the juvenile justice data, we use offense descriptions to classify school-related offenses. We also measure juvenile detentions if a referral culminates in a detention. Within the adult justice system records, we use offense descriptions to classify drug-related arrests. To classify incarcerations, we combine SLED records that culminated with an individual being taken into custody and DOC incarceration records.

Education Outcomes. We measure educational outcomes using two main outcomes. The first is high school graduation, which refers to the individual having graduated within four years with a diploma. During the period of investigation, the Department of Education changed its system of classifying graduation, so some individuals are missing observations for graduation. The second outcome is grade repetition, which refers to the individual repeating the same grade at the same school or another.

Mortality Outcomes. Mortality is measured using death certificates. A self-harm death refers to any death with an ICD 9 or 10 code between X60 and X84 (inclusive) or Y87. A passenger transportation death is a death associated with an ICD 9 or 10 code between V20 and 79 (inclusive) with a 1 or 6 decimal. A pedestrian transportation death refers to any death between V03 and V09 (excluding V05, which are pedestrian deaths due to a collision with a train and could plausibly be a suicide). An assault death refers to a death with the ICD 9 or 10 code between X85 and Y09 (inclusive).