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CUTTING-EDGE RESEARCH IN POLICE POLICY AND PRACTICE

Effects of school resource officers on school crime and responses to school crime

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Research Summary: We examined the effects of an increase in school resource officer (SRO) staffing on schools in a sample of 33 public schools that enhanced SRO staffing through funding from the Department of Justice's Community Oriented Policing Services Hiring Program and a matched sample of 72 schools that did not increase SRO staffing at the same time. In longitudinal analyses of monthly school-level administrative data, we compared the treatment and comparison schools on disciplinary offenses and actions. We found that increased SROs increased the number of drug- and weapon-related offenses and exclusionary disciplinary actions for treatment schools relative to comparison schools. These negative effects were more frequently found for students without special needs.

Policy Implications: The study findings suggest that increasing SROs does not improve school safety and that by increasing exclusionary responses to school discipline incidents it increases the criminalization of school discipline. We recommend that educational decision-makers seeking to enhance school safety consider the many alternatives to programs that require regular police presence in schools.

KEYWORDS
police in schools, school resource officers, school safety

Concern over the safety of students, teachers, and administrators in our nation's schools continues to grow. In part, this is due to the widespread media coverage of mass school shootings, such as the events at Columbine High School in 1999, Sandy Hook Elementary School in 2012, and Stoneman Douglas High School in 2018. Another reason for concern is that a safe and positive school climate is essential for effective teaching and learning (U.S. Department of Education, 2014). Many initiatives have been established in the recent past to promote a positive learning environment by enhancing school safety and ensuring fair, nondiscriminatory, and effective discipline policies and practices (U.S. Department of Education, 2014), and the current administration continues to emphasize the importance of school safety.[1] These initiatives often involve partnerships between schools and law enforcement agencies to increase school security.

This study assesses the effects of placing school resource officers (SROs) in schools. Despite widespread use of SROs in U.S. schools, questions remain about their effect on discipline policies and practices or on school safety more generally. The findings of this study will contribute to the knowledge base on approaches designed to increase school safety and inform communities about the effectiveness of the common practice of placing SROs in schools.

1 | BACKGROUND

1.1 | Overview of school crime and safety

School crime includes rare school shootings, other more common acts of violence such as fighting and bullying, property damage, and the use of illegal drugs. Although school shootings are highly publicized, violent deaths at schools have, in fact, been rare events over the past two decades. Less than 3% of youth homicides occur at school (Musu-Gillette et al., 2018). Levels of other crime and victimization, such as bullying, remain unacceptably high. In 2015, for example, 21% of students between 12 and 18 years reported being bullied at school, and 22% of students in grades 9–12 reported they were offered, sold, or given an illegal drug (which excluded tobacco and alcohol) on school property in the past 12 months. Overall trends in victimizations between 1992 and 2016 among students 12 to 18 years are encouraging; however, in recent years, rates of violent victimizations have been consistently higher for students at school than away from school (Musu-Gillette et al., 2018). These estimates of crime and victimization in schools raise important questions about how schools should respond to crime and disorder in fair and nondiscriminatory ways that do not produce unintended negative consequences.

1.2 | School Resource Officers (SROs)

Schools have considered and adopted many approaches designed to increase safety and reduce crime. Non-security-related approaches include myriad prevention programs and efforts to improve the social climate to make it less conducive to crime. Security-related approaches include controlled access to school buildings, security cameras, and metal detectors, as well as the placement of SROs in schools. SROs are generally sworn law enforcement officers who are deployed in schools as part of a community policing initiative that encourages collaboration between law enforcement agencies and the surrounding communities to increase safety (James & McCallion, 2013).

The practice of placing police officers in schools has skyrocketed over the past 40 years. Data from the Safe School Study, a national study of school violence conducted in 1976 by Research

Triangle Institute for the National Institute of Education (NIE), showed that only 1% of the nation's schools had police stationed in them (National Institute of Education, 1978). By 2016, 48% of schools had sworn law enforcement officers present in the school at least once per week, and the percentage was much higher (65%) for secondary schools (Musu-Gillette et al., 2018). The percentage of students between the ages of 12 and 18 who reported the presence of security staff, including police officers, in their schools also rose, from 54% in 1999 to 70% in 2015. Most of the increase in rates occurred before 2003, with rates between 2003 and 2015 hovering between 68% and 70% (Musu-Gillette et al., 2018). SROs, who receive specialized training for their roles as school-based police officers, account for most of the law enforcement presence in schools. Forty-two percent of all public schools reported having an SRO present at least once a week during the 2015–2016 school year. Secondary schools (58%) were more likely than primary schools (30%) to report having one or more SROs present at least once a week, and schools with larger enrollments were more likely to report the presence of SROs. For example, 84% of secondary schools with enrollments of 1,000 or more reported SRO presence (Musu-Gillette et al., 2018).

1.3 | What is the role of law enforcement officers in schools?

The National Association of School Resource Officers (NASRO) developed the Triad Model of SRO responsibility, which specifies three main roles of SROs in schools: educator, informal counselor, and law enforcer (Canady, James, & Nease, 2012). SROs may educate students, faculty, and parents on a variety of topics such as alcohol and drug awareness and transportation safety (Raymond, 2010). SROs' role of "informal counselor" may include activities such as maintaining "open-door" policies towards students; engaging in counseling sessions; referring students to social services, legal aid, community services, and public health agencies; and establishing rapport with students (Canady et al., 2012). SROs' responsibilities as law enforcers may include patrolling the school, handling calls for police services, making arrests, issuing citations, and developing emergency response plans (Raymond, 2010).

Reviews of the extent to which SRO duties reflect this model suggest that there is great variation across schools and districts in terms of the actual roles and responsibilities taken on by SROs (Nolan, 2018). Many districts do not have formal agreements about the roles of SROs, increasing the potential for conflict and confusion. In particular, there has been much concern about lack of clear boundaries around what types of discipline matters should be handled by law enforcement officers and by school personnel. Concerns about increasing use of harsh responses to student behavior that result in exclusion of students from school and increased involvement with the criminal justice system have recently led many states and districts to institute reforms to soften their discipline practices (Hirschfield, 2018). Questions have also been raised about the potential for role conflict when police officers engage in dual roles as counselor/teacher and law enforcer (Devlin & Gottfredson, 2018a). Partly in response to these concerns, many school districts have recently begun to place limits on SRO discretion (Hirschfield, 2018).

1.4 | Funding allocated to placement of SROs in schools

Although the concept of SROs first emerged in the 1950s, as indicated earlier, the widespread adoption of this approach to school safety is relatively recent. The increased use of SROs in schools, beginning in the 1990s, can partially be attributed to the rising crime rates among juveniles

during the 1980s and 1990s. This resulted in a punitive transformation of school discipline policies that included zero-tolerance policies, use of exclusionary responses for minor transgressions, and increasing use of criminal justice personnel and technology in schools (Hirschfield, 2008). These efforts to harden school security were further fueled by a series of highly publicized school shootings in the 1990s. The widespread adoption of SROs as part of this more general trend was driven initially by increased federal funding (James & McCallion, 2013; Na & Gottfredson, 2013) and continues through both federal and state funding.

The U.S. Department of Justice's Office of Community Oriented Policing Services (COPS) initiated the "COPS in Schools" (CIS) grant program, which awarded a total of $753 million to 3,000 grantees to hire 6,500 SROs between 1999 and 2005. Beginning in 2005, law enforcement agencies could apply for grants to fund SROs under the broader COPS Hiring Program (CHP) (James & McCallion, 2013). Through 2017, the COPS Office identified the placement of SROs in schools as a priority funding area. Large numbers of officers were funded and placed in schools through this mechanism. For example, in 2013 (the first year in which SROs included in this study were funded), it awarded a total of $46 million to 144 law enforcement agencies for 370 SRO positions (U.S. Department of Justice, 2013). COPS program funding of SROs decreased in 2017, was unavailable in 2018 and 2019, and resumed in 2020. As federal funding for SROs has become less certain, state-level funding has increased. Several state legislatures have recently passed legislation enabling the funding of SROs. For example, South Carolina provided nearly $12 million in funding for 205 new SROs for 2019–2020. Virginia awarded 87 grants totaling more than $3.47 million for SROs in 2019. North Carolina appropriated $30 million for SROs for 2018–2019. Pennsylvania provided $2.4 million in funding for SROs for 2018–2019. Despite high levels of public funding for SROs, much remains unknown about the effects of this approach.

1.5 | Intended and unintended consequences

Much controversy surrounds the increased use of SROs in schools. Proponents argue it is an effective approach for increasing school safety that operates not only through surveillance and enforcement activities, but also through the development of strong bonds between SROs and students that encourage information sharing about threats to school safety (McDevitt & Panniello, 2005). The placement of SROs may provide a readily available first responder should an emergency, such as a school shooting, arise (Na & Gottfredson, 2013). Finally, those in favor argue SROs serve as a valuable resource for helping school administrators determine which offenses constitute law violations (Na & Gottfredson, 2013).

Critics suggest schools are relatively safe places, and little evidence supports the conclusion that placing SROs in schools increases safety (James & McCallion, 2013; Na & Gottfredson, 2013). In fact, critics note the downward trends in crime and victimization at school are consistent with trends in youth victimization overall, and that both declines began well before the placement of SROs in schools (Justice Policy Institute, 2011, 2012; The Sentencing Project, 2013). The presence of SROs has also been associated with some negative and unintended consequences. Recent reviews conclude that the use of

SROs in schools facilitates an emphasis on punitive responses to and formal processing of offenses. Students are more likely to be arrested and referred to the criminal justice system when SROs are present (Brown, 2018; Devlin & Gottfredson, 2018b). Some studies (e.g., Na & Gottfredson, 2013) suggest that SRO presence results in harsher responses to minor offenses that would otherwise be handled by school administrators.

Critics also suggest the presence of SROs in schools disproportionately affects minority youth and youth with disabilities. It is well-documented that the use of exclusionary disciplinary practices, such as suspensions and expulsions, and the intensification of school discipline disproportionately affects minority youth and youth with disabilities (Hirschfield, 2008; Skiba, Arredondo, Gray, & Raush, 2018; U.S. Department of Education, Office for Civil Rights, 2014; Welch & Payne, 2018). The increased use of suspensions and expulsions is of great concern, not only because it reduces academic success among those excluded from school (Noltemeyer, Ward, & Mcloughlin, 2015), but also because it triggers events that "push" youth into the justice system (Skiba et al., 2018; Welch & Payne, 2018). Indeed, recent research has demonstrated that students who are removed from school are more likely to become involved with the criminal justice system, both immediately (e.g., during the months when an adolescent is suspended or expelled from school; see Monahan, VanDerhei, Bechtold, & Cauffman, 2014) and later (e.g., during the subsequent four years; see Mowen & Brent, 2016). These studies support the conclusion that SROs, by increasing exclusionary responses to school discipline incidents, increase the criminalization of school discipline (Hirschfield, 2008) and in so doing contribute to a "school-to-prison pipeline," which disproportionately affects minority youth and students with disabilities and increases the likelihood that minority youth will end up in prison (Children's Defense Fund, 2007; Justice Policy Institute, 2011).

Beliefs about the pros and cons of placing SROs in schools are more often fueled by emotions than informed by research. In the following section, we summarize what research has found about the effects of placing SROs in schools.

1.6 | Prior research on SRO effectiveness

Research on the effects of placing SROs in schools on crime, disorder, and responses to these outcomes has become increasingly rigorous. The conclusions from the research conducted prior to 2010 are highly variable because the research designs employed in these early studies were not rigorous enough to detect the true effect of placing SROs. The results from these studies instead primarily summarized variation due to selection artifacts and temporal fluctuations in outcomes that co-occurred with SRO placement. Na and Gottfredson (2013) and Petrosino, Guckenburg, and Fronius (2012), reviewing SRO effectiveness research available through 2009, both concluded that there is a dearth of knowledge about the effectiveness of SRO programs for increasing school safety.

Here, we summarize research conducted between 2010 and 2019 to ascertain what has been learned through subsequent research about the effects of SRO placement on crime, disorder, or responses to these outcomes. We conducted a search of the following databases for studies published from 2010 through June 2018: Applied Social Sciences Index and Abstracts (ASSIA), Education Resources Information Center (ERIC), Google Scholar, National Criminal Justice Reference Service (NCJRS), PsycINFO, and PubMed. The keywords used in the search were: police in schools, school resource officers (SROs), SROs, and law enforcement in schools. We reviewed the abstracts and obtained full text articles for the 20 studies that appeared to contain results from an empirical study assessing the effect of SROs on measures of crime, disorder, or responses to these outcomes. We subsequently added four additional studies that were published after our search was completed. We read the articles and omitted from consideration (1) those that reported on a pre-SRO vs. post-SRO change for the treatment group only; (2) those that compared outcomes for SRO and non-SRO post-deployment, but did not control for any preexisting differences between

the two sets of schools; (3) those that did not measure SRO placement, or did not separate the effects of SROs from the effects of other law enforcement or security interventions; (4) those that studied student-level variation rather than school-level variation (e.g., relating student perceptions of SRO presence to student attitudes); and (5) those that did not include quantitative measurement of the outcomes of interest. This process yielded 13 studies.

Nine of the 13 reviewed studies relied on data from the School Survey on Crime and Safety (SSOCS), a survey of a representative cross section of approximately 3,500 schools conducted by the National Center for Education Statistics. SSOCS provides estimates of school crime, discipline, disorder, programs, and policies in the nation's public schools. It is administered to public school principals in the spring of even-numbered school years. It was first administered to principals in the spring of the 1999–2000 school year and has since been administered in the springs of the 2003–2004, 2005–2006, 2007–2008, 2009–2010, 2015–2016, and 2017–2018 school years.

1.6.1 | Effects on school crime

Crawford and Burns (2015), Jennings, Khey, Maskaly, and Donner (2011), and Pigott, Stearns, and Khey (2017) used one of the cross-sectional SSOCS datasets to examine the effect of SRO placement on school administrator reports of the number of crimes recorded in schools. These studies compared schools with SROs to schools without SROs on measures of school crime, and controlled for numerous school characteristics (e.g., gang crimes, bullying, racial tension, student perceptions of importance of school, location of school in high-crime area or a city) that might have confounded the relationship between SRO presence and the school crime outcomes. The results from these studies are inconsistent, with several reporting no significant effects of SROs on crime levels, and other reporting effects. Among those tests that suggested an effect, some suggested that SROs are associated with more and others that SROs are associated with fewer crimes recorded in schools. None of these studies, nor a study by Zhang (2018) of West Virginia schools, included a pretreatment measure of the outcome variable measured in the study. Contemporary standards for ruling out selection effects in comparison group studies suggest that at least one wave of a pretest measure of the study outcome must be used to rule out preexisting differences as an alternative explanation for observed group differences on the outcome (Gottfredson et al., 2015). The results from these studies are therefore inconclusive because observed differences in school crime level may be due to SRO effects or to decisions about where to place SROs.

A handful of studies either directly controlled for pre-SRO crime levels using a longitudinal sample from the SSOCS (Devlin, Santos, & Gottfredson, 2018; Na & Gottfredson, 2013) or used propensity score matching to equate schools with and without SROs on a wide array of variables that are likely to be correlated with prior crime levels (Swartz, Osborne, Dawson-Edwards, & Higgins, 2016). These studies provide more credible estimates of the effects of SROs on crime because they help to rule out the selection artifacts that arise from the reality that schools selected for police officer deployment likely have higher crime rates to begin with than schools that are not selected. These studies provided consistent evidence that SRO presence was related to increased recording of drug crimes, crimes involving weapons, and serious violent crimes. The findings related to less serious crime types are less clear.

Owens (2016) took a novel approach to ruling out selection threats. This study used national data on all awards made by the COPS office between 1994 and 2007 and examined the relationship between agency-level number of officers paid for through these grants and agency-level counts of arrests and charges, by crime type, location (in school/out of school) and age of arrestee. A

differences-in-differences analysis was conducted relating month-to-month within-agency variation in crime and arrests to the receipt of CIS grants. Owens (2016) reported that CIS grants are associated with statistically significant or marginally significant increases in the number of officially recorded violent, drug, and weapons crimes taking place in schools and that more arrests are made at schools, particularly of minors ages 7–14, as the number of CIS-funded officers increases.[2]

In summary, the more rigorous studies of SROs and CIS grant awards to date found that SRO presence was related to increased recording of drug crimes, crimes involving weapons, and serious violent crimes (Na & Gottfredson, 2013; Owens, 2016; Swartz et al., 2016), but not to bullying (Devlin et al., 2018).

1.6.2 | Effects on responses to crime

Six studies reported effects of SRO placement on school responses to student crime and disorderly behavior. All but one of these studies (Pigott et al., 2017) reported that responses to school crime are harsher in the presence of SROs. Four of the studies used cross-sectional data, applying statistical controls to attempt to rule out selection effects. Nance (2016) and Pigott et al. (2017) both used the 2009–2010 SSOCS survey and compared SRO schools with non-SRO schools, the former including all grade levels and the latter including only senior high schools. Nance (2016) modeled the likelihood that school officials would refer students to law enforcement for 11 different offenses as a function of whether or not an SRO was present at the school at least once a week. This study controlled for numerous demographic characteristics as well as for the rate of offenses as reported by the school administrator for the 2009–2010 school year. Nance (2016) reported that the likelihood that a student would be referred to law enforcement was higher in schools with SROs than in schools without SROs. Differences were statistically significant for all but one of the comparisons, and the magnitude of the effects tended to be higher for more serious crimes. For example, the odds ratio for the effect of SRO placement on robbery without a weapon was 3.54, compared with 1.35 for possessing a knife or a sharp object. Pigott et al. (2017), using a subset of the 2009–2010 cross-sectional SSOCS data and less extensive controls for school crime levels, found no significant effect for the number of SROs placed in the school on incidents reported to law enforcement or removals from school. Zhang (2018) examined effects of having an SRO present at school for at least one of the three years included in the study on out-of-school suspensions for violent crimes and drug crimes. The study found a statistically significant increase due to SRO placement in out-of-school suspensions for drug-related crimes, but not for violent crimes. Homer and Fisher (2020) analyzed 92,620 schools included in data available from the U.S. Department of Education's Office for Civil Rights. The study compared the association of police presence and total and group-specific arrest rates in a cross-sectional analysis that controlled for a variety of school characteristics. They reported that arrest rates were higher in schools with police presence, and that the association was stronger for Blacks than for Whites and Hispanics.

Two studies used longitudinal data that more effectively rule out selection effects. Na and Gottfredson (2013), in the longitudinal SSOCS study described earlier, reported on the effect of increasing SRO use on referrals to law enforcement for various crimes. They also reported effects on the percentage of crimes for which the offending student was removed, transferred, or suspended for five or more days. They found that for all crime types examined except serious violent crimes, as schools increased their use of police, they removed, transferred, or suspended more students and they reported a higher percentage of crimes to law enforcement. However, the effect was statistically significant only for nonserious violent crime.

Similar to Owens (2016), Weisburst (2019) related the receipt of federal CIS grants to whether a student received a disciplinary action using data on over 2.5 million students in Texas who were in 7th through 12th grade between 1998–1999 and 2007–2008. The study used panel data to compare disciplinary actions for years that a school district received grant funding to the same outcome in years that the district did not receive grant funding. It controlled for school district fixed effects to account for unobserved differences across school districts that are constant over time, for the nonrandom timing of school district decisions to apply for grants, for whether or not the district applied for a grant but did not accept it, as well as for the receipt of other grants. Weisburst (2019) reported that grant receipt increased disciplinary actions received by middle school students by 6%, but did not change disciplinary actions for high school students. The rise in disciplinary actions was driven by sanctions for low-level offenses or school code of conduct violations rather than for more serious offenses.

In summary, the studies that examined effects of SRO placement on school responses to student crime and disorder suggest that SROs increase the severity of responses to these behaviors. All significant effects were in this direction. Effects in some studies (e.g., Na & Gottfredson, 2013; Weisburst, 2019) appear stronger for less serious offenses, but in others (e.g., Nance, 2016) they are stronger for more serious offenses.

1.6.3 | Summary

As the scientific rigor of research on the crime prevention effects of placing SROs in schools has improved, a clearer picture of likely effects has emerged: SRO presence seems to increase the recording of drug crimes, crimes involving weapons, and serious violent crimes as well as the severity of responses to these crimes. Despite increased rigor in the more recent studies compared with earlier research, however, these studies still fall short of definitively demonstrating the effect of placing SROs on school crime and responses to school crime. As noted, most studies reviewed here used cross-sectional data. Although these studies attempted to statistically control for pre-existing differences between schools with and without SROs, in most cases the controls did not include a pretreatment measure of outcome (because the data were cross-sectional), making it impossible to rule out selection effects as an alternative explanation for observed differences in outcomes. More longitudinal studies are needed.

The most rigorous studies (Owens, 2016 and Weisburst, 2019) related receipt of CIS grants to increases in school crime outcomes, but could not connect the receipt of grants directly to the hiring of SROs in the schools included in the study. The current study complements these rigorous studies by relating month-to-month variation in school-level disciplinary outcomes to the timing of the placement of CIS grant-related SROs *in those same schools*. The School Safety Study, described in more detail in later sections, examined change over time in outcomes during a period when some schools were increasing their SRO staffing and others were not. It focused on public secondary schools that enhanced SRO staffing and on matched schools that did not, and used monthly data in an interrupted time series design (Cook, Shadish, & Wong, 2008; Shadish, Cook, & Campbell, 2002) with a comparison series to examine whether study outcomes changed in the two- or three-month period coinciding with the intervention. It also examined longer term effects of increased SRO staffing at 11 and 20 months post-intervention using aggregated monthly data in a pre- and posttest comparison group design.

2 | METHODS

2.1 | Overview

The study gathered and analyzed data on public middle and high schools in California that increased SRO staffing levels at a specific time (treatment schools) and on a set of matched schools that did not increase SRO staffing levels at the same time as the treatment schools (comparison schools). The increases in SRO staffing levels at the treatment schools resulted from the award of U.S. Department of Justice's Office of Community Oriented Policing Services (COPS) Hiring Program (CHP) grants to local law enforcement agencies in 2013 or 2014; the grants were intended to support the placement of SROs in schools. The study focused on schools in California because law enforcement agencies in that state received a large number of the CHP grants, and the state had administrative data on schools that could support the analyses planned.

The study used two approaches that primarily relied on monthly administrative data on outcomes for assessing the effects of increased SRO staffing levels or "intervention" on disciplinary offenses and actions. First, the study examined effects of increased SRO staffing levels at 11 and 20 months post-intervention using aggregated monthly data in a pre- and posttest comparison group design. The comparison group was selected through a matching procedure (described in the sample section below) that created sets of schools that were comparable in terms of prior disciplinary actions and demographic characteristics. Although this design achieved matching on several important observed characteristics, it cannot by itself rule out the possibility that the schools that increased SRO staffing levels as a result of the CHP grants differed in unmeasured ways that might influence the study outcomes, preventing the unambiguous attribution of observed effects solely to the intervention.

Second, to address that limitation, the study used monthly data in an interrupted time series (ITS) design (Cook et al., 2008; Shadish et al., 2002) with a comparison series to examine whether study outcomes changed in the two- or three-month period coinciding with the intervention. Time series designs utilize a large number of data points before and after the intervention point to rule out the possibility that a change at the intervention point is due to earlier trends, such as would be evident if the schools that received SROs differed systematically from those that did not. The addition of a comparison time series on the same outcome measures collected in a different geographic area that did not experience the same intervention provides a means by which confounding effects due to co-occurring events can be ruled out. Comparing effects for the treatment and comparison series can pinpoint the specific effect of increasing SRO staffing levels and other confounding events can be ruled out unless they occurred in the exact month that the SRO staffing levels increased, which is unlikely. Comparative time series designs produce unbiased estimates of treatment effects and have been recognized as one of the most rigorous research designs, especially for studying the effects of broad policy changes (Gottfredson et al., 2015).

2.2 | Sample

As mentioned in the overview section, California law enforcement agencies received a substantial number of CHP grants to place SROs. In 2013 and 2014, grants provided funding to 32 law enforcement agencies in that state, which placed SROs in 129 public schools. Using administrative data from the Common Core of Data (CCD) and information gathered from CHP grantees in

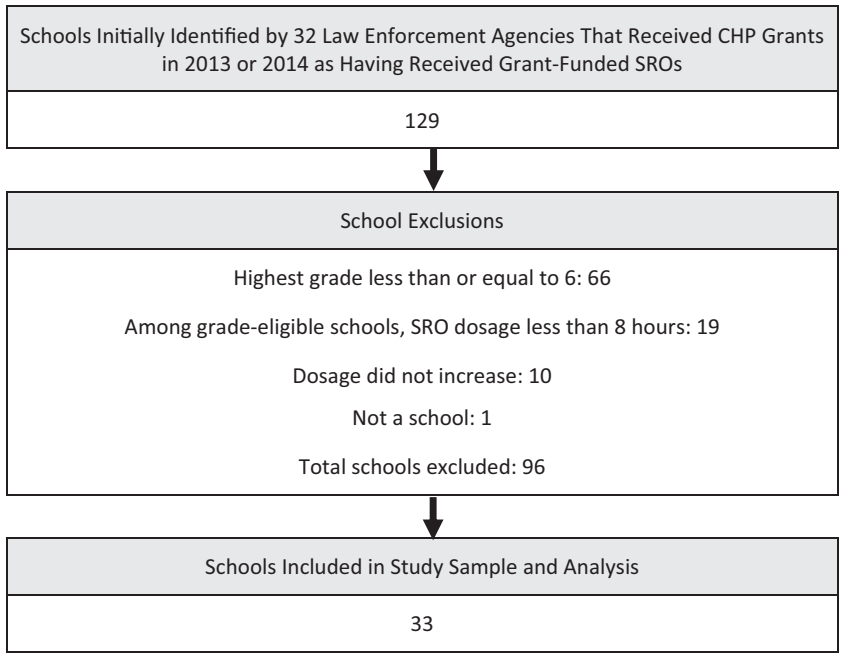

FIGURE 1 Flowchart of treatment school selection for participation in study

California, the study applied the following criteria to identify the sample of treatment schools: (1) highest grade was greater than 6th, (2) post-intervention SRO staffing level was at least eight hours per week, and (3) SRO hours increased as result of the CHP funding. As indicated in Figure 1, 33 schools met these criteria.[3]

The study selected one or more comparison schools for each treatment school. To ensure the treatment and comparison schools were as equivalent as possible prior to an increase in SRO staffing level in the treatment schools, the study used data from the CCD and the California Department of Education (CDE) to match schools within state on the following characteristics: (1) instructional level; (2) metropolitan status; (3) percentage of students eligible for the free and reduced-price lunch programs; (4) percentage of non-Hispanic Black, Hispanic, and non-Hispanic White students;[4] (5) school enrollment; rate of suspensions and expulsions for the year preceding the increase in SRO staffing levels; and geographic proximity (e.g., same part of the state, if not the same school district).

The matching process was based on a combination of quantitative analyses and qualitative assessments of the data available on matching variables from the CCD and CDE.[5] For categorical variables, we used exact matching whenever possible; for numeric variables, we computed standardized difference between each treatment school and candidate comparison school. We established cutoff values based on the distributions and iteratively revised them as needed to restrict or expand the pool of candidate comparison schools. Teams of study members reviewed quantitatively identified potential matched pairs, pair by pair. This review process also included reviewing maps of the treatment school locations and surrounding areas with an eye to maximizing the geographic proximity between the treatment schools and candidate comparison schools. The teams identified and ranked the three best candidate comparison schools for each treatment school. We selected up to three comparison schools per treatment school from among those candidates.

TABLE 1 Comparison of California treatment and comparison schools prior to increased SRO staffing levels

Characteristic	Treatment		Comparison		Overall	
	n	% (mean)	*n*	% (mean)	*n*	% (mean)
Instructional level						
Primary[a]	4	12.1	10	13.9	14	13.3
Middle	15	45.5	34	47.2	49	46.7
High	14	42.4	28	38.9	42	40.0
Metropolitan status						
Urban	4	12.1	19	26.4	23	21.9
Suburban	21	63.6	41	56.9	62	59.0
Rural	8	24.2	12	16.7	20	19.0
Free lunch (%)[b]	32	(67.0)	72	(66.3)	104	(66.5)
Race/ethnicity (%)[b]						
Black	33	(3.0)	72	(3.7)	105	(3.5)
Hispanic	33	(74.4)	72	(73.7)	105	(73.9)
White	33	(17.9)	72	(16.3)	105	(16.8)
Total enrollment	33	(898.1)	72	(991.6)	105	(962.2)
Disciplinary actions per 100 students, prior year[c]	31	(8.3)	72	(9.5)	103	(9.1)

Note. None of the differences between treatment and comparison conditions were statistically significant at $p < .05$.
[a]Highest grade was greater than 6th.
[b]The mean is the mean percent for schools in a given group. Data on free lunch program were missing for one treatment school.
[c]Data on disciplinary actions per 100 students were missing for two treatment schools.

Once the pool of matched comparison schools was selected, the study confirmed with the schools and, as appropriate, local law enforcement agencies that each school neither received 2013 or 2014 CHP-funded SROs nor had an increase in SRO hours at the same time as its corresponding treatment school. Of the schools that matched the treatment schools, 72 schools met these criteria. The characteristics of the treatment and comparison schools are presented in Table 1; tests of statistical significance indicated no differences between conditions on the characteristics at $p < .05$.[6] Geographic proximity was more difficult to achieve because the increases in SRO staffing levels tended to occur in small school districts with few schools available for matching; 18.2% of the treatment schools had at least one matched comparison school in the same school district.

2.3 | Data sources

The study used both administrative data and self-report data.

2.3.1 | Administrative data

For the selected treatment and comparison schools, the study drew upon monthly school-level administrative data from CDE on counts of disciplinary offenses and actions for the 2011–2012 to 2016–2017 school years. Differing definitions of reportable offenses for students with special needs (i.e., students with an individualized education plan) versus students without special needs required the study to report offenses separately for the two groups of students.[7] After the study

omitted data for one summer month each year (when schools were typically not in session) and retained the same number of months of data for all schools, available data spanned 44 months: 23 months pre-intervention, one month at intervention, and 20 months post-intervention.[8]

2.3.2 | Self-report data

The study augmented the administrative data with self-report data from the local law enforcement agencies (CHP grantees for treatment schools) responsible for SROs in the selected schools at the intervention point, and from school administrators and SROs at those schools. Interviews of law enforcement agency personnel entailed a telephone interview with the person most knowledgeable about the SROs placed by each agency; this data collection occurred between January and April 2017. The interviews focused on aspects of each agency's SRO program, including its goals, SRO time and activities, SRO training and supervision, and challenges. The overall law enforcement agency response rate was 71.4%; the response rates for grantee agencies and non-grantee agencies were 83.3% and 62.5%, respectively. (See Table 2.)

The survey of school administrators required obtaining school and school district approval. This data collection was web-based with mail and telephone follow up; it occurred between spring 2016 and spring 2017. To thank schools and help offset any administrative burden, the study offered $200 to each participating school and $25 to each individual completing a questionnaire on his/her own time. The study surveyed the administrator most knowledgeable about disciplinary incidents and actions within each school; these respondents were typically school principals or assistant principals. The survey gathered information on disciplinary philosophy, school security practices, prevention programs related to school safety, security personnel staffing, SRO activities, satisfaction with SROs, and recording of information on disciplinary incidents. The overall response rate was 80%; the response rates for treatment schools and comparison schools were 84.8% and 77.8%, respectively. (See Table 2.)

The survey of SROs required obtaining the approval of the local law enforcement agencies responsible for the SROs. This data collection was web-based with mail and telephone follow up; it occurred between spring 2016 and spring 2017. Each individual who completed a questionnaire on his/her own time was offered $25. The study surveyed all of the SROs serving at the treatment and comparison schools during the data collection timeframe. With reference to the study school to which they were assigned, the survey gathered information on SRO time and activities at the school, collaboration with school personnel, SRO training and supervision, and disciplinary philosophy. The overall response rate was 68.7%; the response rates for treatment school and comparison schools were 70.6% and 66.7%, respectively. (See Table 2.)

2.4 | Measures

In addition to the intervention measure, the study developed measures of how the intervention was implemented, outcome measures, and covariate measures.

TABLE 2 Summary of response level on primary data collections by grantee status or condition

	Grantee/treatment			Non-grantee/comparison			Total		
Data collection	**Complete (*n*)**	**Eligible (*n*)**	**Response rate (%)**	**Complete (n)**	**Eligible (*n*)**	**Response rate (%)**	**Complete (n)**	**Eligible (*n*)**	**Response rate (%)**
Law enforcement agency telephone interviews	15	18	83.3	15	24	62.5	30	42	71.4
School administrator Web survey	28	33	84.8	56	72	77.8	84	105	80.0
SRO Web survey	24	34	70.6	22	33	66.7	46	67	68.7

Note. For the law enforcement agency telephone interviews, the participants were associated with grantee or non-grantee agencies. For the school administrator Web survey and SRO Web survey, the participants were associated with treatment or comparison schools.

2.4.1 | Intervention measure

As described in the overview section, treatment schools increased SRO staffing levels at a specific time, while comparison schools did not increase SRO staffing levels at the same time as treatment schools. Treatment schools were coded "1"; matched comparison schools were coded "0."

2.4.2 | Implementation measures

To examine the extent to which intervention effects were sensitive to how the intervention was implemented, the study developed and used two implementation measures for the treatment schools: SRO approach and SRO hours. SRO approach, which was based on the survey of SROs and, as appropriate, interviews of law enforcement agency personnel,[9] was the percent time SROs spent in law enforcement and order maintenance activities (versus time spent in other activities that included teaching and counseling/mentoring activities). If multiple SROs responded to the survey for a school, the study averaged their responses to create a school-level SRO approach measure. Similarly, for schools without SRO survey data, the study used agency-level data collected in the law enforcement agency interviews (if available) as a proxy for the school-level SRO approach measure

SRO hours measured the level of effort associated with SRO assignment to the subject schools, or SRO "dose." This measure, which drew from administrative information gathered from contacts with law enforcement agency personnel, was the number of SRO hours per week per 100 students at the intervention point.

2.4.3 | Outcome measures

The outcome measures, based on administrative data, were monthly school-level counts of disciplinary offenses and actions. CDE established different reporting requirements for disciplinary offenses for students with and without special needs. For students with special needs, offenses are recorded if they resulted in any disciplinary action; however, for students without special needs, offenses are recorded only if they resulted in the removal of a student from their regular instructional setting for one or more days. Offense measures included (1) total offenses, (2) more and less severe offenses (based on a hierarchy of offenses suggested in CDE's CALPADS Data Guide Version 9.3 dated 5/18/2018), and (3) type of offense (weapon-related, drug-related, related to crime against persons, related to crime against property, and serious violent[10]). (See Appendix Table A1 for information on how offenses were coded.)

The disciplinary action measure consisted of exclusionary actions, which were removals of students from regular instructional setting (i.e., expulsions and out-of-school suspensions) for any duration. This was the case for students regardless of their special needs status.

2.4.4 | Covariate measures

The study measured additional school-level characteristics to permit examination of whether they potentially accounted for observed differences between treatment and comparison schools on the

outcomes. These measures, which were based on the survey of school administrators, were (1) number of security practices, (2) number of prevention program components related to school safety, (3) number of non-SRO law enforcement officer hours per week, and (4) number of security guard/other security personnel hours per week. Each measure captured information on conditions pre- and post-intervention; the measures drew on questions used in the 2015–2016 School Survey on Crime and Safety Principal Questionnaire. In addition, based on CDE data, the study measured the pre-intervention trajectory for total number of disciplinary incidents for the treatment and comparison schools.

2.5 | Analysis

The study set the intervention point for all treatment schools to the month in which SRO staffing levels increased, and used the same intervention point for the corresponding comparison school(s) at which SRO staffing did not increase. To examine the main effects of SROs, the study conducted generalized estimating equation (GEE; see Hardin & Hilbe, 2012; Liang & Zeger, 1986) analyses on the time (pre- vs. post-intervention) by condition (treatment vs. comparison) interactions for two sets of time periods: 23 months pre- and 20 months post-intervention, and 23 months pre- and 11 months post-intervention. The GEE analyses were based on mean counts per school per month for each outcome aggregated to the relevant time period (e.g., 23 months pre- or 11 months post-intervention). These analyses controlled for school enrollment.

For outcomes with statistically significant time by condition interactions at 20 or 11 months post-intervention based on the GEE analyses, the study conducted auto-regressive integrated moving average (ARIMA) analyses within the framework of an ITS (Box & Tiao, 1975; Glass, Willson, & Gottman, 1975; McCleary & McDowall, 2012). Following common practice for analyzing data like ours (e.g., Crosse, Grasso, & Kelly, 1998; Kisely et al., 2011; Mulford, Ledolter, & Fitzgerald, 1992), we used ARIMA to develop separate models for the treatment and comparison series. Besides accounting for data interdependence among repeated measures of an outcome, ARIMA is more effective than alternative techniques (e.g., joint modeling with shortened time series) in accounting for cyclical trends in time series, which can threaten the validity of ITS designs (Cook & Campbell, 1979).

The ARIMA analyses entailed fitting statistical models to series of monthly data and testing whether observed immediate post-intervention outcomes (two or three months post-intervention, depending on the outcome) differed from those projected in the modeled pre-intervention series.[11] Tests were conducted for a statistically significant change in the slope parameter (e.g., change in the rate of decrease or increase in the number of disciplinary offenses) for the two- or three-month period following the increase in SRO staffing levels in the treatment schools. An effect size was calculated for treatment and comparison series as the residual variance reduction by the final model with and without the time-specific term at the two- or three-month period. The study used the results of the ARIMA analyses on immediate SRO effects to corroborate the results of the GEE analyses on longer term effects (11 or 20 months post-intervention).

To examine the sensitivity of the intervention effects to how the intervention was implemented, the study conducted GEE analyses on the time (pre- vs. post-intervention) by implementation characteristic (e.g., for SRO approach, percent time SROs spent in law enforcement and order maintenance activities) interactions for both sets of time periods. Unlike the other outcome analyses conducted, these analyses included the treatment schools only. The analyses controlled for school enrollment. All analyses were conducted using SAS 9.4 software.

2.6 | Statistical power

The GEE and ARIMA analyses for the study achieved adequate statistical power (≥.80). For the main effects GEE analysis sample sizes (33 treatment and 72 comparison schools) and $p < .05$, power was greater than .8 for a two-group *t*-test with an effect size (*ES*) greater than or equal to .6; the *ES*s for the SRO intervention ranged from .88 to 1.45. Empirically, the GEE analyses detected SRO effects with an *ES* as small as .27, suggesting sufficient power. In addition, simulations (Li & McKeague, 2013) suggest that GEE analyses can achieve sufficient power (≥.9) with a cluster sample size of approximately 80 to 100 (for within correlations of approximately .5 to .8 and reasonably large *ES*), which is similar to what was observed for this study.

For the ARIMA models, power depends mainly on the *ES* to be detected and the number of data time points per outcome rather than on the number of schools in the treatment and comparison conditions. Generally, at least 50 time points ($Npre + Npost \geq 50$) are required to fit ARIMA models with adequate power (McCleary & McDowall, 2012), but fewer time points are acceptable if the intervention *ES* is reasonably large (Glass et al., 1975). The ARIMA models for this study have 44 time points: 23 pre-intervention time points, one time point at intervention, and 20 post-intervention time points. The *ES*s examined were relatively large for the time-specific predictors (>1).

3 | RESULTS

This section reports findings on the effects of the SRO intervention on disciplinary offenses and actions (main effects). It also reports on the extent to which those effects were sensitive to how the intervention was implemented (sensitivity of effects) and on potential alternative explanations for the main effects (covariates). First, this section presents descriptive findings on the SRO intervention.

3.1 | SRO intervention

As described in the methods section, the study compared treatment schools (public middle and high schools in CA that increased SRO staffing levels at a specific time) and matched comparison schools (schools that did not increase SRO staffing levels at the same time as the treatment schools) on outcomes measured before and after the staffing level increases for the treatment schools. The increase in SRO staffing levels for the treatment schools constitutes the SRO intervention.

Based on the survey of school administrators, treatment and comparison schools were equivalent on mean number of SRO hours per week pre-intervention (13.1 and 11.1 hours for treatment and comparison schools, respectively; $p > .05$), but differed on this measure post-intervention (20.4 and 10.9 hours for treatment and comparison schools, respectively; $p < .05$); the pre- to post-intervention change in SRO hours per week was significant for the treatment schools only ($p < .05$). Moreover, based on information provided during initial calls to the law enforcement agencies responsible for SROs in the selected schools, treatment schools post-intervention had more SROs than comparison schools (1.0 vs. 0.4 SROs; $p < .01$), more SRO hours per week (27.0 vs. 12.3 hours; $p < .01$), and more hours per week per 100 students (3.7 vs. 1.1 hours per week per 100 students; $p < .01$).

SRO survey data, augmented with law enforcement agency (LEA) interview responses for schools that were missing SRO survey data, provided information about SRO activities at the assigned treatment schools. On average, SROs in these schools spent about half their time (48%) in law enforcement and order maintenance activities. They spent 30% of their time on counseling and mentoring, another 20% of their time in teaching activities, and 2% of their time in other activities. Additional information about SRO activities can be gleaned from questions asked both of school administrators and SROs regarding the extent to which SROs were "part of a team effort" to improve school safety in the school. Although most respondents agreed that they were, the SROs stationed in treatment schools tended to see themselves as more integrated into school activities than did the administrators in these schools. The majority of school administrators regarded SROs as part of the team responsible for reviewing school safety, but many fewer administrators saw SROs as integrated into activities involving the development of programs to reduce school violence and reviewing school discipline strategies and procedures.

Interviews with LEAs provided information about the training provided to SROs and the availability of written documents describing the duties of SROs (e.g., manuals and memoranda of understanding, or MOUs, with participating schools). Among CHP grantees, 80% of respondents stated that some training was required, and 67% stated that the SROs received 40 hours or more of specialized SRO training at some point in time. However, only 25% stated that any follow-up training was regularly provided. More than 90% of respondents stated that the training covered terrorism issues, community-oriented policing, active shooter responses, school security assessments, legal issues related to juveniles (e.g., search and seizure, interrogation, privacy issues), and crisis/mental health intervention. More than 50% stated that school crisis planning or preparedness, counseling/mentoring or teaching skills, and working effectively with school staff or parents were also included. Only half of the respondents stated that adolescent child behavior or psychology and understanding the child's perspective were covered in training.

Only 20% of the LEA grantees stated that they had a written manual specifying SRO procedures. All of them, however, stated that a formal agreement governing the use of SROs existed between the LEA and the school district. Interestingly, less than 10% of these MOUs covered controversial topics such as the use of physical or chemical restraints on students and use of firearms. Only 13% covered making arrests on school grounds, and only a third of the agreements covered expectations for reporting criminal offenses to law enforcement or responding to student disciplinary infractions.

A final aspect of the SRO intervention worthy of comment is the level of concordance between treatment school administrators and their SROs on disciplinary philosophy. The study asked both SROs and school administrators a series of questions about their beliefs on school discipline. Responses were coded according to whether the philosophies captured a more prevention-oriented approach or a more punishment-oriented approach. Generally, SROs held more punishment-oriented philosophies, more often endorsing items such as "Schools cannot afford to tolerate students who disrupt the learning environment." Administrators were more likely to endorse prevention-oriented statements such as "Suspension is unnecessary if we provide a positive school climate and challenging instruction." When the philosophies of SROs and administrators were compared within school, 83% of school administrators were more prevention-oriented than the SROs stationed in their schools. This level of discordance in underlying philosophies of SROs and school administrators has the potential to create confusion, ambiguity, and tension surrounding discipline practices.

3.2 | Main effects

To examine the main effects of the SRO intervention, the study conducted GEE analyses of the 2-way interaction of time by condition. For the significant interactions at 20 or 11 months post-intervention, the study also conducted ARIMA analyses on the immediate effects of the intervention (i.e., two or three months post-intervention). The results are presented separately for disciplinary offenses and actions, and broken out by student special needs status.

3.2.1 | Disciplinary offenses

The study found SRO intervention effects on weapon-related and drug-related offenses for both follow-up time periods. For students without special needs, the analyses indicated the GEE interactions on weapon-related offenses at 20 months and 11 months post-intervention were significant ($p < .05$). (See Table 3.) For both time periods, the mean number of offenses increased for treatment schools, and it decreased for comparison schools. The ARIMA analyses indicated significant immediate increases in offenses for the treatment and comparison schools ($p < .01$).[12] (See Table 4.) The *ES* for the increase was 2.1 times larger for the treatment schools than the comparison schools.

For students without special needs, the analyses indicated the interactions on drug-related offenses at 20 months and 11 months post-intervention were significant ($p < .05$). (See Table 3.) For both time periods, the mean number of offenses increased for treatment schools, and it decreased for comparison schools. The ARIMA analyses found significant immediate post-intervention increases in offenses for both the treatment and comparison schools ($p < .01$ and $p < .05$, respectively). The *ES* for the treatment schools was 3.6 times larger than for the comparison schools. (See Table 4.)

For students with special needs, the study found no intervention effects on any of the offenses for either follow-up period. (See Table 5.)

3.2.2 | Disciplinary actions

The study also found SRO intervention effects on exclusionary actions for one follow-up time period. For students without special needs, the analyses indicated the interaction on exclusionary actions at 11 months post-intervention was significant ($p < .01$). (See Table 3.) At 11 months post-intervention, the mean number of actions decreased slightly for the treatment schools and more so for the comparison schools. The ARIMA analyses found significant immediate post-intervention increases in actions for both the treatment and comparison schools ($p < .01$). (See Table 4.) The *ES* for the increase was 2.1 times larger for the treatment schools than for the comparison schools.

For students with special needs, the study found no intervention effects on exclusionary actions for either follow-up period. (See Table 5.)

3.3 | Sensitivity of effects

To examine the sensitivity of SRO intervention effects to how the intervention was implemented, the study conducted GEE analyses of the 2-way interactions of time by SRO approach and SRO dose.

TABLE 3 Monthly mean number of disciplinary offenses and actions for students without special needs by condition and time periods

	Treatment schools[a]				Comparison schools[b]				Time by condition interaction[c]	
	Pre-intervention		Post-intervention		Pre-intervention		Post-intervention			
Outcome	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	Estimate	*95% CI*
23 Months pre- and 20 months post-intervention										
Offense										
Total	13.00	11.61	11.83	10.52	12.81	12.89	9.62	9.96	1.66	[−1.31, 4.63]
Less severe	8.57	9.41	6.91	7.22	8.39	9.54	5.44	7.39	1.09	[−1.44, 3.62]
More severe	4.43	3.16	4.92	4.32	4.43	3.89	4.18	3.53	0.57	[−0.42, 1.57]
Weapon-related	0.30	0.34	0.39	0.46	0.37	0.42	0.32	0.35	0.13	[0.02, 0.23]*
Drug-related	1.18	1.47	1.36	1.42	1.53	1.87	1.26	1.52	0.37	[0.03, 0.72]*
Crime against person	3.70	2.69	4.18	3.96	3.54	3.27	3.63	3.48	0.28	[−0.68, 1.24]
Crime against property	0.47	0.40	0.42	0.41	0.55	0.58	0.39	0.34	0.09	[−0.05, 0.24]
Serious violent	3.04	2.11	3.28	3.08	2.72	2.35	2.75	2.38	0.14	[−0.64, 0.93]
Exclusionary action	8.10	5.59	8.14	6.79	7.94	6.78	6.28	4.80	1.51	[−0.03, 3.05]
23 Months pre- and 11 months post-intervention										
Offense										
Total	13.00	11.61	11.71	11.24	12.81	12.89	9.55	10.70	1.67	[−1.02, 4.36]
Less severe	8.57	9.41	6.83	8.38	8.39	9.54	5.54	8.33	0.95	[−1.33, 3.23]
More severe	4.43	3.16	4.87	3.95	4.43	3.89	4.02	3.27	0.72	[−0.16, 1.60]
Weapon-related	0.30	0.34	0.38	0.51	0.37	0.42	0.29	0.34	0.15	[0.01, 0.28]*
Drug-related	1.18	1.47	1.42	1.47	1.53	1.87	1.26	1.53	0.45	[0.06, 0.84]*
Crime against person	3.70	2.69	4.00	3.51	3.54	3.27	3.47	3.22	0.28	[−0.47, 1.02]
Crime against property	0.47	0.40	0.39	0.41	0.55	0.58	0.40	0.39	0.07	[−0.07, 0.21]
Serious violent	3.04	2.11	3.20	2.76	2.72	2.35	2.63	2.23	0.19	[−0.44, 0.82]
Exclusionary action	8.10	5.59	8.08	6.34	7.94	6.78	6.05	4.67	1.72	[0.43, 3.02]**

[a]$n = 33$. [b]$n = 72$.

[c]GEE regression analyses were used to assess SRO intervention effects, controlling for disciplinary offenses (or actions, as applicable) during the 23-month pre-intervention period and for school enrollment during the pre- and post-intervention periods.

*$p < .05$. **$p < .01$.

TABLE 4 ARIMA analyses of monthly total number of disciplinary offenses and actions for students without special needs by condition

	Treatment schools[a]						Comparison schools[b]					
Outcome	Estimated mean of time series	Estimate of effect[c]	Standard error	*t* Value	Variance accounted for (%)	Effect size	Estimated mean of time series	Estimate of effect[c]	Standard error	*t* Value	Variance accounted for (%)	Effect size
Weapon-related offense	9.93	4.92	0.96	5.10**	84.2	0.46	22.04	7.19	2.37	3.03**	75.2	0.22
Drug-related offense	36.11	29.13	5.82	5.01**	73.8	0.40	91.39	21.25	9.39	2.26*	72.5	0.11
Exclusionary action	241.41	60.97	14.37	4.24**	88.8	0.31	472.33	143.24	48.80	2.94**	82.2	0.15

Note. Each outcome contained a time series of 44 data points including the intervention month, and 23 months pre- and 20 months post-intervention.

[a]$n = 33$. [b]$n = 72$.

[c]SRO main effect at two months post-intervention for the drug-related and exclusionary actions outcomes, and three months post-intervention for the weapon-related outcomes. A longer period was selected for the weapon-related outcome due to low counts.

*$p < .05$. **$p < .01$.

TABLE 5 Monthly mean number of disciplinary offenses and actions for students with special needs by condition and time periods

	Treatment schools[a]				Comparison schools[b]					
	Pre-intervention		Post-intervention		Pre-intervention		Post-interventio		Time by condition interaction[c]	
Outcome	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	Estimate	*95% CI*
23 Months pre- and 20 months post-intervention										
Offense										
Total	6.98	8.77	6.20	7.42	8.52	13.77	7.47	11.47	−0.08	[−3.75, 3.58]
Less severe	5.51	7.84	4.49	6.17	7.04	12.94	5.92	10.67	−0.16	[−3.61, 3.30]
More severe	1.48	1.30	1.70	1.67	1.48	1.50	1.55	1.41	0.07	[−0.40, 0.55]
Weapon-related	0.09	0.15	0.13	0.18	0.09	0.12	0.10	0.12	0.02	[−0.05, 0.09]
Drug-related	0.33	0.48	0.32	0.40	0.37	0.54	0.32	0.38	0.01	[−0.10, 0.12]
Crime against person	1.44	1.37	1.65	1.67	1.48	1.60	1.62	1.63	0.01	[−0.51, 0.53]
Crime against property	0.16	0.17	0.17	0.21	0.21	0.24	0.20	0.25	0.02	[−0.08, 0.11]
Serious violent	1.08	1.01	1.29	1.37	1.07	1.13	1.18	1.18	0.05	[−0.39, 0.48]
Exclusionary action	2.25	1.97	2.53	2.03	2.20	2.21	2.05	1.78	0.34	[−0.25, 0.93]
23 Months pre- and 11 months post-intervention										
Offense										
Total	6.98	8.77	6.14	7.72	8.52	13.77	7.60	11.71	−0.27	[−3.79, 3.26]
Less severe	5.51	7.84	4.55	6.76	7.04	12.94	6.11	10.90	−0.30	[−3.69, 3.09]
More severe	1.48	1.30	1.59	1.43	1.48	1.50	1.48	1.40	0.03	[−0.33, 0.39]
Weapon-related	0.09	0.15	0.12	0.21	0.09	0.12	0.09	0.13	0.02	[−0.06, 0.09]
Drug-related	0.33	0.48	0.35	0.47	0.37	0.54	0.33	0.41	0.03	[−0.08, 0.15]
Crime against person	1.44	1.37	1.52	1.43	1.48	1.60	1.50	1.59	0.00	[−0.40, 0.39]
Crime against property	0.16	0.17	0.17	0.28	0.21	0.24	0.19	0.26	0.02	[−0.09, 0.14]
Serious violent	1.08	1.01	1.16	1.06	1.07	1.13	1.11	1.17	0.00	[−0.32, 0.31]
Exclusionary action	2.25	1.97	2.46	2.10	2.20	2.21	1.95	1.88	0.37	[−0.12, 0.86]

[a] $n = 33$. [b] $n = 72$.

[c] GEE regression analyses were used to assess SRO intervention effects, controlling for disciplinary offenses (or actions, as applicable) during the 23-month pre-intervention period and for school enrollment during the pre- and post-intervention periods.

$^{*}p < .05$. $^{**}p < .01$.

The study found effects of SRO approach and dose on a limited number of outcomes, primarily at 20 months post-intervention. For students without special needs, the interaction of time by SRO approach on weapon-related offenses at 20 months post-intervention was significant (coefficient = .006, $p < .05$) as was the interaction on weapon-related offenses at 11 months post-intervention (coefficient = .007, $p < .05$). For students with special needs, the interaction on weapon-related offenses at 20 months post-intervention was significant (coefficient = .004, $p < .05$), and the interaction on less severe offenses at 20 months post-intervention also was significant (coefficient = -.105, $p < .05$). The significant interactions on weapon-related offenses indicate that as the percent of SRO time spent on law enforcement activities increases, the number of those offenses increases for students without special needs and students with special needs. The significant interaction on less severe offenses indicates that as the percent of SRO time spent on law enforcement activities increases, the number of those offenses decreases for students with special needs.

The effects of SRO dose differ from those of SRO approach. For students without special needs, the interaction of time by SRO dose on less severe offenses at 20 months post-intervention was significant (coefficient = 1.366, $p < .05$), and the interaction on crime against property offenses at 20 months post-intervention also was significant (coefficient = .054, $p < .05$). For students with special needs, the study found no significant interactions of time by SRO dose. The significant interactions on less severe offenses and crime against property offenses indicate that as the number of SRO hours per week per 100 students increases, the number of those offenses increases for students without special needs.

3.4 | Covariates

Because the intervention was an increase in SRO staffing, the study sought to assess whether it could rule out changes in other outcome-related variables occurring at the same time as the SRO staffing increase at treatment schools. On those variables or covariates, school administrators reported no significant ($p < .05$) pre- to post-intervention change in mean: (1) number of security practices for the treatment schools (2.8 and 2.8 practices pre- and post-intervention, respectively) or comparison schools (2.7 and 2.8 practices pre- and post-intervention, respectively), (2) number of prevention program components related to school safety for the treatment schools (2.7 and 2.8 components pre- and post-intervention, respectively) or comparison schools (3.2 and 3.1 components pre- and post-intervention, respectively), (3) number of non-SRO law enforcement officer hours per week for the treatment schools (.9 and 2.2 hours pre- and post-intervention, respectively) or comparison schools (.3 and .7 hours pre- and post-intervention, respectively), and (4) number of security guard/other security personnel hours per week for the treatment schools (27.1 and 27.0 hours pre- and post-intervention, respectively) or comparison schools (36.7 and 37.2 hours pre- and post-intervention, respectively). In addition, the study found no significant differences between the treatment and comparison schools in slopes (linear change) on the pre-intervention trajectory for total number of disciplinary incidents.

4 | CONCLUSION AND DISCUSSION

The design of the current study improved upon the previous designs used to study SRO effects. It used a longitudinal matched comparison group to contrast change in schools with increased

SRO staffing levels with change in schools that did not increase their SRO staffing levels at the same time point. It augmented these analyses with comparison interrupted time series analyses designed to further rule out trends and confounding events as alternative explanations for the study results. The study was sufficiently powered to detect the main effects under investigation.

Consistent with prior research on SRO effects summarized earlier, this study found that when SRO dosage increases, weapon- and drug-related offenses increase immediately following the dosage increase. These effects persist through 20 months following the dosage increase. The number of exclusionary disciplinary actions taken against students also increase immediately following the dosage increase, and this effect persists for 11 months post-intervention. These observed effects were statistically significant for students without special needs but not for students with special needs.

Our review of prior research indicated that the more rigorous prior studies (Na & Gottfredson, 2013; Owens, 2016; Swartz et al., 2016; Weisburst, 2019) found that SRO presence or receipt of CIS grants were related to increased recording of drug crimes, crimes involving weapons, and serious violent crimes as well as increased severity in school responses to student crime and disorder. With one exception, our findings mirror these: Although the direction of effects on serious violent offenses was consistent with prior research, we found no statistically significant effects on these offenses. However, in a companion paper (Crosse et al., 2020) on moderating effects in this same study, we observed a significant increase in serious violent offenses following the SRO intervention for Black but not White students at 20 months post-intervention.

Our study largely replicated findings from prior research (Devlin & Gottfredson, 2018a; Fisher & Devlin, 2019) that found that schools whose SROs focused primarily on law enforcement recorded more crimes than non-SRO schools. For students without special needs in treatment schools, as the amount of time allocated to law enforcement activities increased, so did the counts of all types of offenses except property offenses. The association was statistically significant for weapon-related offenses for both students without special needs and those with special needs. One of our findings for students with special needs does not comport with prior research: For this subset of students, as time spent on law enforcement increased, counts of less severe offenses decreased. A possible explanation is that SROs focusing more on law enforcement are more successful at facilitating the redefinition of less severe into more severe offenses, but it is not clear why this would occur more for students with special needs than students without special needs. Our analysis of SRO approach effects was limited to the subset of 30 treatment schools that had an SRO and data available on time expenditure. As such, the study was likely underpowered to detect additional SRO approach effects.

Finally, our results are inconsistent with suggestions from the literature regarding differential effects by special needs status. Welch and Payne (2018) suggested that when zero tolerance policies are introduced in the absence of needed support services, special needs students might be at elevated risk for suspension and expulsion for behavior that could and should have been addressed through these alternative services. In a case study of one New Orleans high school, Tuzzolo and Hewitt (2006) documented that special needs students often do not receive the support and instruction they need, as required under the Individuals with Disabilities Education Act (IDEA), and that the combination of the under-resourced special education program and the large number of security and police personnel in the school resulted in high levels of suspension and expulsion of special needs students. Our finding that undesirable SRO effects are disproportionately experienced among students *without* special needs does not comport with this prior research. Several reasons are possible. First is the possibility that SROs have less discretion in dealing with students with special needs because federal law dictates the circumstances under which special

needs students may be excluded from public education. SROs may be able to exercise more discretion in dealing with students without special needs. We note that the Obama administration (which largely overlapped with the study's time frame) highlighted and sought to address the relationship between SRO behavior and higher rates of exclusionary actions for protected groups such as students with special needs (e.g., through Department of Education policy guidance to states and localities that discouraged the use of SROs for classroom discipline). In addition, the Tuzzolo and Hewitt (2006) study, one of the prior relevant studies with findings on students with special needs that differed from ours, was conducted in one locality under different circumstances: before the increased federal concern about SRO behavior and in a context (post-Katrina New Orleans) with a heavy presence of law enforcement officers in schools and very limited resources for special education (and protecting the rights of students with disabilities). A second possibility is that our analyses of SRO effects for special needs students are underpowered due to relatively low counts of offenses (and less variability as a result) for this subset of students. Although the disciplinary offense rates per 100 special needs students are higher in our data than the rates for non-special needs students, the raw counts of offenses during the pretreatment period for drug-related and weapon-related crimes were three to four times higher for students without special needs than for students with special needs.

4.1 | Alternative interpretations

What does the increase in offenses following the addition of SROs mean? Scholars have suggested that placing police in schools increases actual crime levels by weakening the informal social controls normally working in a school, a possible unintended consequence of shifting responsibility for maintaining order from the teachers and school administrators to police (Devine, 1996; Kupchik & Monahan, 2006). They also suggest that increased reliance on surveillance, unreasonable search and seizure, inappropriate sharing of confidential information, activities to develop student informants in the school, and an emphasis on formal controls may create an environment of fear and distrust, reduce perceived legitimacy of police, weaken the school's sense of community, and diminish students' willingness to confide in school staff when they are experiencing problems (e.g., Brotherton, 1996; Kupchik, 2010; Noguera, 1995; Theriot & Cuellar, 2016). This would tend to lower compliance with the law because people are more likely to obey laws when they believe in the legitimacy of the authorities charged with enforcing them (Tyler, 2003, 2006). Research has documented a general mistrust of police among adolescent minority group members (Taylor, Turner, Esbensen, & Winfree, 2001) and that lower levels of perceived police legitimacy increase offending behavior in school-aged children (Fagan & Tyler, 2005). Also, Theriot (2016) found that higher levels of interaction with SRO officers is related to lower levels of student self-reported connection to school, lending some support to the possibility that informal social controls may weaken when police are present. Although these studies strongly suggest that increased police presence in schools might increase criminal offending behavior, these ideas have not been rigorously tested. An equally likely interpretation is that recorded crime may increase simply because more crime is detected and recorded when police are present. That is, SRO presence may not influence actual levels of student behavior, but rather may increase the likelihood that such behavior, already present, will be formally recorded. Our study did not investigate the mechanisms responsible for the observed increase in crime outcomes. We did, however, ask SROs and school administrators about the extent to which they believed that SROs influenced the recording of school crimes. Most SROs (75%) reported that their presence increases the likelihood

that a disciplinary incident would be recorded in school records. Most administrators reported that SROs participated in recording or reporting discipline problems to school authorities (71%), and that SROs provided legal definitions of behaviors to school authorities for recording/reporting purposes (61%).

To further investigate the mechanisms through which SRO presence might influence the reporting and recording offenses in school records, we interviewed school staff knowledgeable about school discipline practices in 10 study schools in which an increase in offending was observed following the increase in SRO staffing levels. The interviewees articulated a number of mechanisms that might link SRO presence to an increase in the reporting and recording of school crime. They noted an increase in vigilance due to the SROs, and also that SROs "see things in a different light than a classroom teacher," lending credibility to the observation that minor offenses can be interpreted differently by police than by teachers and administrators (Hirschfield, 2008; Theriot & Cuellar, 2016). Another mechanism that might link SRO presence to increased incident reporting, according to those interviewed, is that SROs monitor students while they are off campus and during the before and after school hours. Incidents discovered through this process are reported as school-based incidents. One respondent also mentioned that SROs give special attention to students who appear to be "under the influence" and, when appropriate, report controlled substance violations to school administrators and the police department.

Taken together, the survey and interview data suggest that the increase in school disciplinary offenses due to increased SRO staffing levels observed in our study is probably due at least in part to increased surveillance. This interpretation supports the view that SRO presence may contribute to a "school-to-prison pipeline" by increasing formal responses to behaviors that otherwise would have been undetected or handled informally. More definitive research is needed, however, to uncover the exact mechanisms through which SROs increase the level of school crime and the severity of responses to school crime.

4.2 | Limitations

Despite the study strengths, several limitations remain. First, as already discussed, the outcome measures used in this study might have been influenced by the increase in SRO staffing levels in the school. This limitation creates ambiguity around the interpretation of the mechanism through which SROs increase recorded school crime, but does not call into question the basic finding that SRO presence increases the number of recorded crimes. A second limitation is that the study used a non-probability sample of schools in one state, limiting generalizability. It is encouraging, however, that the results from our sample for the most part replicate results from prior studies that used national probability samples. Third, the CDE data for students without special needs included only those infractions that resulted in removal of a student from the regular instructional setting for one or more days. This likely omitted many lower level offenses and therefore reduced variability in several study outcomes. Finally, the definitions of reportable offenses differed for students with and without special needs, requiring separate analyses of these groups.

4.3 | Implications

The National Association of School Resource Officers (NASRO) states that the primary goal of SROs is making schools and children safer.[13] Our study suggests, to the contrary, that increasing

SRO dosage in schools does not reduce school records of any form of school crime, and results in higher counts of recorded weapon- and drug-related school crimes, effects that persist for at least 20 months after the increase in SROs. NASRO also denies that SROs contribute to the "school-to-prison pipeline" because SRO officers are discouraged from arresting students for disciplinary issues that would be handled by teachers or administrators if the SROs were not there.[13] As summarized earlier, the most rigorous prior research indicates instead that SRO presence is related to higher levels of referral of students to law enforcement (Na & Gottfredson, 2013; Nance, 2016) as well as arrest (Owens, 2016). Our study did not measure SRO effects on these outcomes, but did demonstrate that increasing SRO dosage in schools increases the number of exclusionary responses to disciplinary infractions. Exclusionary responses to discipline have serious consequences for students. Aside from their damaging effects on academic success (Noltemeyer et al., 2015), exclusionary responses to discipline increase the likelihood that youth will become involved with the criminal justice system, as research summarized earlier demonstrates (Monahan et al., 2014; Mowen & Brent, 2016. SROs, by increasing exclusionary responses to school discipline incidents, increase the criminalization of school discipline (Hirschfield, 2008) and in so doing contribute to a "school-to-prison-pipeline."

Of course, some might consider these costs a reasonable price to pay for making schools safer and more conducive to learning for the majority of students who are not excluded. According to this perspective, the seemingly contradictory evidence that school records of crime increase after SROs are placed is due to a temporary spike in recorded disciplinary incidents as police respond to law violations and as students responsible for criminal activity in the school are removed. This "crack down" on problem behavior may then deter subsequent law violating behavior among the remaining students as they adjust to the increased likelihood of being caught and punished. In this scenario, after an initial spike in recorded incidents, offenses would be expected to decline as the most problematic students are removed from the school setting. We would also expect to observe longer term improvements in academic performance indicators among the students who remain in the school as the environment becomes more conducive to learning.

Our results do not support this explanation, as they show an immediate increase in offenses and exclusionary actions for treatment schools relative to comparison schools concurrent with the addition of SROs, and they show that this effect persists for 20 months. It is difficult to argue that schools are becoming safer when recorded crimes and exclusionary responses persist for so long after the introduction of SROs. Research also fails to support the contention that schools become more conducive to learning for the general school population after SROs are introduced. The one study that has examined effects of increased police in schools on academic outcomes (Weisburst, 2019) reported that exposure to a CIS grant to increase police in schools was related to subsequent *reductions* in graduation and college enrollment rates. This study examined graduation and college enrollment rates within eight years (when students were 20 years old) of CIS grant receipt for several entire cohorts of seventh graders. It is the first study to demonstrate negative SRO effects on academic outcomes, and for entire student cohorts. Weisburst's findings are the opposite of what would be expected if schools were becoming safer and more conducive to learning for the general student population following increases in SROs

The study has implications for both research and practice. First, more studies along the lines of Weisburst (2019) are needed to broaden understanding of the range of effects, both short- and long-term, that can be expected as a result of increasing SRO use. These additional outcome measures should include a wider range of academic outcomes as well as social climate measures. Also, as noted earlier, more research is needed to understand the mechanism through which SRO presence increases the number of recorded student offenses. Such research cannot depend upon school

records of student offending behavior. An alternative or additional measure of student offending that cannot be influenced by SRO presence, such as self-reports of offending or victimization, is required. This research should also test the mechanisms (discussed earlier) through which SRO presence is thought to increase actual offending behavior. That research is needed to increase understanding about how SROs influence crime reporting and to provide guidance about how to minimize the observed increases in crime due to SRO placement.

Educational decision-makers should carefully weigh the benefits of placing SROs in schools against the knowledge that this practice increases recorded school crime and exclusion of students from school. A popular belief supporting the continued deployment of SROs in schools is that their presence will prevent mass shootings from occurring. No empirical evidence supports this claim, and the recent school shooting incident in Parkland, Florida, demonstrated clearly that the presence of police officers in schools does not fully protect schools from experiencing school shootings, as the law enforcement officer stationed at the school failed to intervene to stop the shooter.[14]

While rooting out student behaviors that have the potential to reduce student safety is desirable, unnecessarily harsh responses to behaviors that could be handled informally have the potential to harm students. In response to this concern, many school districts have recently adopted reforms to limit the use of exclusionary discipline (Hirschfield, 2018). NASRO as well has adopted guidelines that "prohibit SROs from becoming involved in formal school discipline situations that are the responsibility of school administrators" (2015) and has recently developed clearer standards to guide SRO practices (2018). Nevertheless, data from the 2017–2018 School Survey on Crime and Safety show that principals in 51% of public schools with a sworn law enforcement officer present at least once per week report that the officers *do* participate in maintaining school discipline. Fewer than half of these schools have a formal policy defining the role of officers in maintaining school discipline (NCES, 2020). Further, a recent study documented that although most SROs stated that disciplining students is not part of their job description, and although they were not formally involved in writing disciplinary referrals or in determining disciplinary outcomes, most were in fact involved in disciplining students in less formal ways (Curran, Fisher, Viano, & Kupchik, 2019). It is hard to imagine how the ubiquitous presence of police with unregulated involvement in maintaining student discipline would not result in increased criminalization of student behavior. We concur with Kupchik's (2010, p. 116) recommendation that police be assigned on a regular basis only to those schools that are clearly in need of a formal law enforcement intervention, such as schools experiencing extremely high levels of violence. Most schools can reap the benefits that police can offer by having an SRO attached to the school and ready to respond in times of need, but not stationed at the school on a regular basis.

Educational decision-makers wishing to enhance school safety would be wise to consider the many alternatives to programs that require regular police presence in schools. Several school-based strategies have been demonstrated in rigorous research to enhance school safety (Cook, Gottfredson, & Na, 2010; Flannery et al., 2019). Some of these options increase safety by promoting a more cohesive school environment in which expectations for behavior are clear and "normal" sanctions are consistently applied in response to rule breaking. Until SRO programs can be reworked in such a way that they increase school safety without harming students, these alternatives are a wiser choice.

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CONFLICT OF INTEREST STATEMENT

The authors confirm that they have no conflict of interest to declare.

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ENDNOTES

[1] See https://www.whitehouse.gov/briefings-statements/president-donald-j-trump-taking-immediate-actions-secure-schools/

[2] Owens also reported an analysis using SSOCS data that related the number of officers subsidized by CIS in the *county* where the SSOCS school was located to school administrator reports of the number of crimes recorded. Because receipt of CIS grants at the county level was not highly related to SRO presence at SSOCS schools, this portion of the study focused on use of security guards rather than SROs. This portion of the study, therefore, did not meet our inclusion criteria.

[3] Of the original 32 law enforcement agency grantees, 18 remained in the study for the law enforcement agency-level data collection.

[4] Hereafter referred to as "Black," "Hispanic," and "White" students.

[5] Although we planned to develop and rely primarily on propensity scores for matching (Shadish, Cook, & Campbell, 2002; Guo & Fraser, 2010), this approach proved unsatisfactory because: (1) the propensity scores failed to capture information on key matching variables (e.g., geographic proximity); and (2) given we had only 33 treatment schools, the propensity score process could not accommodate all of the desired matching variables and interaction terms needed to build an adequate propensity model through the balancing process. Nonetheless, we used the propensity scores in matching, though they played a smaller role than expected; in addition, we used three matching variables that were identified as significant predictors in the propensity score process: school location longitude and latitude, and percent Hispanic.

[6] Data on free lunch program were missing for one treatment school. Data on disciplinary actions per 100 students were missing for two treatment schools.

[7] Because of differing definitions of reportable offenses for students with special needs and students without special needs, the study also reported disciplinary actions separately for the two groups of students.

[8] The administrative data provided by CDE suppressed records for months with no disciplinary offenses and actions (i.e., zero values). To address this, the study imputed zero values and disentangled "missing" values from "zero" values in the data.

[9] If SRO survey data were missing for a school with an SRO, the study used data from the interviews of law enforcement agency personnel.

[10] The serious violent category is the combination of the more severe and the crime against person categories.

[11] The study first identified, estimated, and fitted models to the treatment schools, then applied the final model for the treatment schools to the comparison schools, adjusting it as needed to also achieve an acceptable fit. Each final model met the criteria established by best practices for ARIMA (e.g., as indicated in the SAS/ETS® 13.2 User's Guide The ARIMA Procedure [https://support.sas.com/documentation/onlinedoc/ets/132/arima.pdf]), including having uncorrelated residuals with a normal-like distribution and no influential outliers left uncontrolled. We also required each final model to explain at least 60% of the variance in the outcome variable (to avoid under-fitting) but no more than 90% of the variance (to avoid over-fitting). Finally, the comparison series model had to be similar to the treatment series model on the percentage of variance explained.

[12] The finding that increases in offenses were observed in the comparison series as well as the treatment series is not surprising, as disciplinary offenses generally rise and fall in a cyclical manner. These expected fluctuations underscore the need to include an untreated comparison series in the analysis. The *difference* between the treatment and comparison series around the intervention point is of primary interest.

[13] See https://nasro.org/frequently-asked-questions/ accessed November 24, 2019.

[14] See https://www.sun-sentinel.com/local/broward/parkland/florida-school-shooting/fl-florida-shooting-sro-20180222-story.html

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APPENDIX

TABLE A1 Crosswalk of CDE offenses to severity and type of offense measures

CDE offense code	CDE offense	Severity of offense[a]		Type of offense					
		Less severe	More severe	Weapon-related	Drug-related	Against persons	Against property	Serious violent	Other
100	Possession, sale, furnishing a firearm		X	X					
101	Possession, sale, furnishing a firearm, knife, explosive, or other dangerous object		X	X					
102	Possession of an imitation firearm	X							X
103	Brandishing a knife at another person		X	X					
104	Possession of a knife or dangerous object		X	X					
105	Possession of an explosive		X	X					

(Continues)

TABLE A1 (Continued)

CDE offense code	CDE offense	Severity of offense[a]		Type of offense					
		Less severe	More severe	Weapon-related	Drug-related	Against persons	Against property	Serious violent	Other
200	Sale of controlled substance		X		X				
201	Possession of controlled substance		X		X				
202	Possession, use, sale, or furnishing a controlled substance, alcohol, intoxicant		X		X				
203	Offering, arranging, or negotiating sale of controlled substances, alcohol, intoxicants		X		X				
204	Offering, arranging, or negotiating sale of drug paraphernalia		X		X				
205	Offering, arranging, or negotiating sale of soma	X			X				
300	Possession or use of tobacco products	X			X				
400	Sexual battery		X			X		X	
401	Sexual assault		X			X		X	
403	Sexual harassment	X				X			

(Continues)

TABLE A1 (Continued)

CDE offense code	CDE offense	Severity of offense[a]		Type of offense					
		Less severe	More severe	Weapon-related	Drug-related	Against persons	Against property	Serious violent	Other
500	Caused physical injury		X			X		X	
501	Caused, attempted, or threatened physical injury		X			X		X	
502	Aided or abetted physical injury	X				X			
503	Committed assault or battery on a school employee		X			X		X	
504	Used force or violence		X			X		X	
505	Committed an act of hate violence	X				X			
506	Harassment or intimidation	X				X			
507	Harassment, intimidation of a witness	X				X			
508	Made terrorist threats	X				X			
509	Hazing	X				X			
510	Obscene acts, profanity, and vulgarity	X							X
511	Disruption, defiance	X							X
512	Property damage	X					X		
513	Bullying	X				X			
600	Robbery or extortion		X			X		X	
601	Property theft	X					X		
602	Received stolen property	X					X		

[a]This measure is based on a hierarchy of offenses suggested in CDE's CALPADS Data Guide Version 9.3 dated 5/18/2018.