NBER WORKING PAPER SERIES

CHILD ACCESS PREVENTION LAWS AND JUVENILE FIREARM-RELATED HOMICIDES

D. Mark Anderson
Joseph J. Sabia
Erdal Tekin

Working Paper 25209
http://www.nber.org/papers/w25209

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
November 2018

Partial support for this research came from a Eunice Kennedy Shriver National Institute of Child Health and Human Development research infrastructure grant, R24 HD04282, to the Center for Studies in Demography and Ecology at the University of Washington. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

At least one co-author has disclosed a financial relationship of potential relevance for this research. Further information is available online at http://www.nber.org/papers/w25209.ack

Child Access Prevention Laws and Juvenile Firearm-Related Homicides
D. Mark Anderson, Joseph J. Sabia, and Erdal Tekin
NBER Working Paper No. 25209
November 2018
JEL No. H7,K4

ABSTRACT

Debate over safe-storage gun regulations has captured public attention in the aftermath of several high-profile shootings committed by minors. Whether these laws actually decrease youth gun violence, however, is an unanswered question. Using data from the FBI's Supplementary Homicide Reports for the period 1985-2013, this study is the first to estimate the relationship between child access prevention (CAP) laws and firearm-related homicides committed by juveniles. Our results suggest that CAP laws are associated with a 19 percent reduction in juvenile firearm-related homicides. The estimated effect is stronger among whites than blacks and is driven by states enforcing the strictest safe-storage standard. We find no evidence that CAP laws are associated with firearm-related homicides committed by adults or with non-firearm-related homicides committed by juveniles, suggesting that the observed relationship between CAP laws and juvenile firearm-related homicides is causal.

D. Mark Anderson
Department of Agricultural Economics & Economics
Montana State University
P.O. Box 172920
Bozeman, MT 59717
and IZA
and also NBER
dwight.anderson@montana.edu

Erdal Tekin
School of Public Affairs
American University
4400 Massachusetts Avenue NW
Washington, DC 20016-8070
and IZA
and also NBER
tekin@american.edu

Joseph J. Sabia
San Diego State University
Department of Economics
Center for Health Economics & Policy Studies
5500 Campanile Drive
San Diego, CA 92182
and University of New Hampshire, IZA & ESSPRI
jsabia@mail.sdsu.edu

"Too often, minors have also used their families' unsecured firearms to intentionally perpetrate violence against others."

-Giffords Law Center to Prevent Gun Violence (2018a)

"This poorly thought out legislation is without any consideration for personal circumstances. It invades people's homes and forces them to render their firearms useless in a self-defense situation by locking them up."

-National Rifle Association-Institute for Legislative Action on Seattle's recently passed safe-storage ordinance (NRA-ILA 2018).

1. Introduction

The most recent mass school shooting in the United States has intensified the discourse over the safe storage of firearms after it was learned that the guns were taken from the shooter's home and belonged to his father (Coaston 2018, Mann 2018).[1] This comes at a time of rising youth gun violence and increasing public support for gun restrictions.[2] For instance, a 2017 U.S. survey found that approximately 60 percent of gun owners backed safe-storage requirements for guns in households with children (Barry et al. 2018).[3] As states grapple with decisions on gun control, many view child access prevention (CAP) laws as a preferred option compared to more divisive policies such as assault weapons and large-capacity magazine bans (Ingraham 2018).

CAP laws encourage the safe storage of firearms by imposing liability on adults who allow children unsupervised access to guns (Giffords Law Center to Prevent Gun Violence 2018a). Gun safety advocates support CAP laws as a way to limit firearm-related homicides, as well as a way to decrease suicides among minors and the number of children killed by

[1] On May 18, 2018, 17-year-old Dimitrios Pagourtzis used his father's shotgun and 0.38 revolver to kill 8 students and 2 teachers at Santa Fe High School in Santa Fe, Texas. Because Texas' safe-storage gun law applies only to children under the age of 17, Pagourtzis' family was not held liable (Platoff 2018, Sanchez 2018). Other recent high-profile school shootings committed by minors who obtained their guns from home (or the home of a relative) include the events in Chardon, Ohio (Crimesider Staff 2012); Sparks, Nevada (Associated Press 2013); Troutdale, Oregon (Bernstein 2014); and Benton, Kentucky (Markgraf 2018).

[2] Gun violence has surpassed vehicle accidents as a leading cause of death for 15- to 29-year-olds in the United States (Parsons et al. 2018). In 2015 alone, 2,824 individuals 19 years of age or younger died from gun violence (National Center for Injury Prevention and Control 2017). Firearm-related injuries are currently the third leading cause of death among American children aged 1 to 17 years (Fowler et al. 2017). Public support for gun restrictions recently reached its highest point in the last 25 years (Clement 2018).

[3] In the same survey, nearly 80 percent of non-gun owners supported safe-storage requirements (Clement 2018).

unintentional shootings (Jones 2017, Iannelli 2018). On the other hand, critics argue that safe-storage requirements impede a person's ability to defend their home and family during a violent intrusion, and that these laws may actually increase incidences of murders, rapes, robberies, and other forms of violent crime (Kopel et al. 2000).

As public calls for safe storage grow louder, it is likely that an increasing number of state legislatures will come under pressure to pass CAP laws or toughen their existing CAP requirements. In fact, one of the few municipal-level ordinances requiring the safe storage of firearms passed in Seattle, Washington on July 9, 2018 (Norimine 2018).[4] Yet, only 27 states and the District of Columbia currently have some form of CAP law in place. Recent estimates suggest that 7 percent of U.S. children (≈ 4.6 million) live in homes with an unlocked and loaded firearm (Azrael et al. 2018).

While a literature on CAP laws exists, its focus is almost entirely on unintentional shooting deaths among children (Cummings et al. 1997, Webster and Starnes 2000, Lott and Whitley 2001, Hepburn et al. 2006, DeSimone et al. 2013, Gius 2015) and youth suicides (Cummings et al. 1997, Lott and Whitley 2001, Webster et al. 2004, DeSimone et al. 2013, Gius 2015). With a few exceptions, which we discuss in detail below, little is known about how these laws affect violent crime and, more specifically, homicides.

[4] Soon after the ordinance passed, the Second Amendment Foundation and National Rifle Association (NRA) filed a lawsuit against the City of Seattle, claiming the safe-storage requirement violates the state's preemption statute (KOMO Staff 2018). See Legal Community Against Violence (2008) for a discussion on local child access prevention laws. At the state level, sponsors gathered enough signatures to put a gun safety initiative, which includes a safe-storage requirement, on the November 2018 ballot in Washington (Porter 2018). In Oregon, a petition calling for stricter gun storage laws failed to make the November 2018 ballot, after being challenged in court by the NRA and Oregon Firearms Federation. Petitioners announced they would refile for the November 2020 ballot while concurrently working with the state legislature to pass the initiative in the 2019 session (Grippo 2018). A child access prevention act was introduced into Congress on May 23, 2018 in Rhode Island (GovTrack.us 2018).

Using the FBI's *Supplementary Homicide Reports* (SHR), a data source unique to the literature, this study is the first to explore the relationship between CAP laws and firearm-related homicides committed by juveniles. We focus on homicides, rather than other forms of violent crime, because information on the offender's age is available and the laws generate predictions as to which age groups should be most affected, predictions that could not be tested without age-specific information. Examining the period 1985-2013, a span when 26 states and the District of Columbia adopted CAP legislation, our estimates suggest that CAP laws are associated with a 19 percent reduction in the expected number of firearm-related homicides committed by juveniles, and this effect is driven by states enforcing a "negligent storage" standard, the strictest form of CAP legislation. Furthermore, we find that CAP laws are not associated with firearm-related homicides committed by adults nor are they associated with non-firearm-related homicides committed by juveniles, providing evidence that the relationship between CAP laws and juvenile firearm-related homicides is causal.

2. Background

The storage of firearms within the home was unregulated in the United States until 1981, when Missouri became the first state to pass a CAP law. Under the Missouri law, it is illegal to recklessly provide firearm access to a person under the age of 18 (Giffords Law Center to Prevent Gun Violence 2017). Since 1981, 26 states and the District of Columbia have passed a CAP law (Table 1).[5] Appendix Figure 1 illustrates the evolution of CAP laws over time.

[5] The dates listed in Table 1 for Delaware and Nevada are different than those listed in Anderson and Sabia (forthcoming). Based on further research and additional sources, the effective CAP laws dates were updated from 1998 to 1994 and from 1995 to 1991 for Delaware and Nevada, respectively. It should be noted, however, that the results presented below change little when using the original dates from Anderson and Sabia (forthcoming).

CAP laws take a variety of forms. Fourteen states and the District of Columbia impose criminal liability on individuals who negligently store firearms. In these states, if a minor gains access to a firearm that was not properly stored, the gun owner faces potential fines, imprisonment, or some combination of both. For instance, violation of Minnesota's negligent storage CAP law is punishable by up to a $3,000 fine and one year in jail (Peters 2013). The remaining states listed in Table 1 levy a weaker standard for criminal liability and "impose penalties only in the event of reckless, knowing or intentional conduct by the adult" (Giffords Law Center to Prevent Gun Violence 2018a). In some cases, CAP laws have been used to punish dealers and manufacturers who failed to include the appropriate safety devices with the sale of their firearms (Shaffer 1999).

CAP laws vary across other margins as well. For example, some negligent storage states impose criminal liability if a minor could simply gain access to a firearm, while others require the minor to have carried or used the firearm to impose liability. CAP laws may apply to all firearms, loaded firearms, or handguns only, and some states require that stored firearms include a locking device. Lastly, the definition of a "minor" varies from state to state (Giffords Law Center to Prevent Gun Violence 2018a).[6] For anecdotal evidence on individuals being charged with unsafe gun storage in CAP law states, see Amaral (2014), Bell (2016), Boren (2017), Cutts and Majchrowicz (2016), "Father Charged" (2017), Harmacinski (2013), James (1996), Lopez and Goff (2014), Ly (2013), "Parents Charged" (2009, 2017), Spies (2016), and Young (2012). A recent review of cases in which children under the age of 12 either shot and killed themselves or were shot and killed by another child found that approximately half of the deaths resulted in a

[6] See Anderson and Sabia (forthcoming) for further details on CAP laws.

criminal charge. If the parent involved was a felon, the case almost always resulted in a criminal charge (Penzenstadler et al. 2017).

Due to the absence of state panel data on household gun storage, we know little about the effect of CAP laws, and more generally gun control, on the safe storage of firearms.[7] Recent research, however, suggests that CAP laws are indeed successful at keeping guns out of the hands of youths. Using data from the Youth Risk Behavior Surveys for the period 1993-2013, Anderson and Sabia (forthcoming) explored the relationship between CAP laws and gun carrying among high school students under the age of 18. Their results suggest that CAP laws are associated with an almost 20 percent decrease in the rate of past-month gun carrying, and these effects are driven by states that enforce a negligent storage standard.

To our knowledge, only four previous studies have explored the relationship between CAP laws and some form of violent crime. Using data from the Compressed Mortality Files of the National Center for Health Statistics for the period 1979-1994, Cummings et al. (1997) found no evidence that CAP laws deter gun-related homicides among victims under the age of 15. Using data from the FBI's Uniform Crime Reports (UCR) for the periods 1979-1996 and 1977-1998, Lott and Whitley (2001) and Lott (2003), respectively, found that CAP laws were associated with increases in homicides, rapes, robberies, and burglaries. However, Pepper (2005) showed that Lott's results were clearly sensitive to model specification and that some of his reported estimates were not replicable.[8] Finally, Anderson and Sabia (forthcoming) assembled the first comprehensive data set of school-associated shooting deaths in the United

[7] In a cross-sectional study, Prickett et al. (2014) found that families in states with both CAP laws and stronger firearm legislation were more likely to safely store their firearms.

[8] For a critical review of research on state gun laws, see National Research Council (2005).

States and estimated the relationship between CAP laws and these events. Given the imprecision of their estimates, they were unable to rule out substantially-sized effects in either direction.

Our research extends the literature in at least three important ways. This study is the first to estimate the effects of CAP laws on firearm-related homicides committed by juveniles. This important contribution is possible because the SHR data include information on the age of the offender and whether a firearm was used in the commission of the crime. Information on the age of the offender was unavailable in the data used by Cummings et al. (1997), Lott and Whitely (2001), and Lott (2003), preventing these authors from estimating the juvenile-gun-crime effects of a policy that targets households with minors. By using data on homicides committed by offenders of any age, one could fail to detect an effect that is concentrated among minors.[9]

Second, given the sample time frame under study, we exploit a considerable amount of CAP law variation relative to previous research. Cummings et al. (1997), Lott and Whitley (2001), and Lott (2003) observed pre- and post-treatment data for 12, 15, and 16 states, respectively. We observe pre- and post-treatment data for 26 states and the District of Columbia. Finally, because these studies predate the recent uptick in youth gun violence and wave of school shootings, a fresh investigation is needed.

3. Data and Empirical Framework

State-level homicide data come from the FBI's *Supplementary Homicide Reports* (SHR) for the period 1985-2013.[10] The SHR data are part of the Uniform Crime Reporting (UCR)

[9] Lott and Whitley (2001) and Lott (2003) did not discern between firearm- and non-firearm-related homicides.

[10] The data are made available by the U.S. Department of Justice's Office of Juvenile Justice and Delinquency Prevention at the following location: https://www.ojjdp.gov/ojstatbb/ezashr/. See this website for details regarding data collection procedures. See Iyengar (2009) and Raissian (2016) for other research that uses the SHR data.

program and are based on information from individual law enforcement agencies that are compiled by state authorities and forwarded to the FBI. Unlike the standard data made available by the UCR, the SHR data provide details on each incident, such as offender demographics and whether a firearm was used in the commission of the crime (U.S. Department of Justice 2014).[11]

To explore the relationship between CAP laws and juvenile firearm-related homicides, we estimate a Poisson regression that takes the following form:

$$(1) \qquad ln\ Juvenile\ Firearm\ Homicides_{st} = \beta_0 + \beta_1 CAP\ Law_{st} + \boldsymbol{X'_{st}\beta_2} + v_s + w_t + r_s \bullet w_t + \varepsilon_{st},$$

where *Juvenile Firearm Homicides*$_{st}$ represents the expected number of firearm-related homicides committed by 12- to 17-year-olds in state *s* and year *t*.[12] The independent variable of interest, *CAP Law*$_{st}$, is equal to 1 if state *s* was enforcing a CAP law during year *t*, and equal to 0 otherwise.[13] The vector $\boldsymbol{X_{st}}$ includes state-level controls for demographics (*% Nonwhite*, *% Under 18*, *% Male*), economic conditions (*Unemployment Rate*, *Per Capita Income*), policing resources (*Police Expenditures*), political preferences (*Democrat*), mental health coverage (*Mental Health Parity Law*), and other gun laws (*Shall Issue Law*, *Stand Your Ground Law*,

[11] The other source for homicide data in the United States is the National Vital Statistics System's (NVSS) Fatal Injury Reports. These data are compiled from the registration of deaths at the state and local level, but do not contain information on the offender. Despite the differences in coverage and scope across the SHR and NVSS, both sources show similar trends in homicide rates over time (U.S. Department of Justice 2014).

[12] The natural logarithm of the state population of 12- to 17-year-olds was used as an offset variable. Our empirical analysis follows a similar state-level differences-in-differences approach taken by previous researchers interested in the effects of gun control. For examples, see Ludwig (1998), Marvell (2001), Cheng and Hoekstra (2013), McClellan and Tekin (2017), and Edwards et al. (forthcoming). The results presented below change little if we include homicides committed by children under the age of 12 in our definition of juvenile firearm-related homicides. While most CAP law states define a "minor" as anyone under 18 years of age, some states use a lower age threshold (Giffords Law Center to Prevent Gun Violence 2018a). Unfortunately, the juvenile homicide data made available by the Office of Juvenile Justice and Delinquency Prevention are only available for the under-12 and 12-17 age bins. Consequently, we potentially capture a lower bound effect of the policy.

[13] This variable is equal to fractional values during the year in which a CAP law took effect.

Minimum Possession Age, *Background Check Law*, *Trigger Lock Law*).[14] Table 2 provides weighted means and definitions for the variables included in $\boldsymbol{X_{st}}$.[15] The vectors v_s and w_t represent state and year fixed effects, respectively.[16] Following Cheng and Hoekstra (2013), we also include Census region-by-year fixed effects, denoted by $r_s \bullet w_t$.[17] These allow us to control for differential shocks by region over time. Lastly, in most specifications, we include state-specific linear time trends to control for state-level unobservables that evolve smoothly over time, such as attitudes towards gun control. All regressions are weighted by state populations and standard errors are corrected for clustering at the state level (Bertrand et al. 2004).

4. Results

The baseline results of our analysis are presented in Table 3. The estimate of β_1 reported in column (1) comes from a model that does not control for any of the state-level covariates listed in Table 2. It suggests that CAP laws are associated with a 31 ($e^{-0.366} - 1 = -0.306$) percent reduction in firearm-related homicides committed by juveniles. Controlling for state-level demographic characteristics and economic conditions has only a small impact on this estimate. Likewise, including the political, mental health, and other gun law controls reduces the size of the estimated effect by only a small amount. Specifically, the estimate reported in column (4) suggests that CAP laws lead to a 25 percent reduction in juvenile firearm homicides. While we

[14] For research on concealed-handgun-carrying (or "shall issue") laws, see Ludwig (1998) and Grossman and Lee (2008). Cheng and Hoekstra (2013) and McClellan and Tekin (2017) studied the effects of Stand Your Ground laws, and Marvell (2001) explored the effects of juvenile gun possession bans.

[15] Appendix Table 1 lists data sources and Appendix Table 2 provides unweighted means.

[16] An advantage of the Poisson model is that including fixed effects does not lead to an incidental parameters problem (Cameron and Trivedi 1998).

[17] The four Census regions are the West, Midwest, South, and Northeast. Region of residence is a strong predictor of gun ownership and attitudes towards gun control (Pederson et al. 2015, Parker et al. 2017).

do not observe every policy or state-level characteristic that may be simultaneously correlated with our outcome of interest and CAP laws, the stability of the estimates in columns (1) through (4) is encouraging. In the last column of Table 3, we control for state-specific linear time trends. Their introduction decreases the magnitude of our estimate of β_1 by 0.075 log points, but the effect remains statistically significant at the 5 percent level and suggests that CAP laws lead to a 19 percent reduction in firearm-related homicides committed by juveniles.[18]

In column (1) of Table 4, we test the parallel trends assumption by adding a lead on *CAP Law* to the model, equal to 1 if a CAP law was passed in year $t + 1$, and equal to 0 otherwise. The estimated coefficient on the lead is small and nowhere near statistically significant. In columns (2) through (4) of Table 4, we add a series of leads to the model. They are, with one exception, statistically indistinguishable from zero. Importantly, we observe no clear systematic trend in juvenile firearm-related homicides leading up to the passage of CAP laws, providing further evidence that the parallel trends assumption is satisfied.

Next, in column (5) of Table 4, we replace *CAP Law* with an indicator that is equal to 1 the year in which a CAP law went into effect, 5 leads of this indicator, and 5 lags.[19] Again, there is no evidence that juvenile firearm-related homicides began trending prior to the adoption of CAP laws. In addition, we observe that the effect of CAP laws grows stronger over time. Specifically, CAP laws are associated with a (statistically insignificant) 6.5 percent decrease in the expected number of firearm-related homicides committed by juveniles during the year in which the law goes into effect (i.e., year 0); two years after implementation, CAP laws are

[18] We found little consistent evidence that any of the other gun laws were successful at reducing juvenile firearm-related homicides.

[19] The omitted category is 6 or more years before treatment.

associated with a 27 percent decrease; and, after 5 or more years, CAP laws are associated with a 31 percent decrease.[20] Figure 1 plots the estimates shown in column (5).

In the first two columns of Table 5, we replace juvenile firearm-related homicides with firearm-related homicides committed by adults. Specifically, in column (1), we consider the number of firearm-related homicides committed by 18+ year-olds. In the second column, we restrict this age range and consider the number of firearm-related homicides committed by 18- to 24-year-olds. Because these laws may have spillover effects across individuals (e.g., siblings) within households, we are hesitant to refer to these as true falsification tests. However, we do expect CAP laws to bind less for these older age groups. The estimated coefficients indeed suggest this is the case, as both are small in magnitude and statistically insignificant. Moreover, an event study analysis of adult firearm-related homicides (Appendix Figure 2) shows little evidence of pre-CAP law differences between treatment and control states, suggesting that CAP laws were not simply passed in the midst of a downward trend in firearm-related homicide rates or as a reactionary response to increasing gun violence.

In the third column of Table 5, we consider the relationship between juvenile non-firearm-related homicides and CAP laws. Again, we do not refer to this as a perfect falsification test, because the laws may affect the usage of other types of weapons.[21] Yet, if CAP laws were associated with large reductions in juvenile non-firearm-related homicides, we would be worried that the estimates in Table 3 simply reflect some unobserved and confounding factor. This turns

[20] Standard difference-in-differences estimates may be biased if treatment is not constant over time (Goodman-Bacon 2018). One way to assess the degree of bias is to compare the conventional difference-in-differences estimate with an average of event-study coefficients. In Figure 1, the average of the coefficients for years 0 through 5+ is -0.261. By comparison, the estimated effect of CAP laws in column (5) of Table 3 is -0.210.

[21] It is possible that firearms and other types of weapons (e.g., knives) are substitutes or complements.

out to not be the case, as the estimated coefficient on *CAP Law* is small in magnitude and statistically indistinguishable from zero.

Approximately 30 percent of SHR cases have an unknown offender (U.S. Department of Justice 2014). To the extent that state-level rates of missing information on the offender are correlated with CAP laws, our results could be biased. To address this issue, we regress the number of firearm-related homicides where information on the offender is unknown in state *s* during year *t* on *CAP Law* and the full set of controls. The estimated coefficient in the final column of Table 5 suggests this type of measurement error is not systematic to CAP laws, as it is small in magnitude and nowhere near statistically significant. In sum, the Table 5 results support the notion that the observed relationship between CAP laws and juvenile firearm-related homicides is causal.

We explore heterogeneous effects in Table 6. In columns (1) and (2), we consider firearm-related homicides committed by white and nonwhite juveniles, respectively. The estimated effect for whites indicates that CAP laws are associated with a 27 percent decrease in firearm-related homicides, while the estimate for nonwhites indicates an 11 percent decrease. The latter estimate, however, is not statistically significant at conventional levels (p-value = 0.155).[22] Given that white Americans own guns at significantly higher rates than blacks, this pattern of results is perhaps not surprising (Parker et al. 2017). When we restrict our attention to male juvenile offenders (column (3)), the estimated coefficient suggests that CAP laws lead to an 18 percent decrease in firearm-related homicides.[23]

[22] Recent research shows that, in the cross-section, gun-storage behavior does not vary by race (Azrael et al. 2018, Crifasi et al. 2018). Support for gun control, however, is generally stronger among nonwhites than whites (Filindra and Kaplan 2017).

[23] Because firearm-related homicides committed by 12- to 17-year-old females are such rare events, Poisson models failed to converge. When we specified the dependent variable as equal to 1 if state *s* during year *t* experienced a

In column (4) of Table 6, we replace *CAP Law* with two mutually exclusive indicators, *Negligent Storage* and *Reckless Endangerment*. As mentioned above, negligent storage laws are the stricter form of CAP legislation and impose criminal liability on individuals who allow a minor access to a firearm that was not properly stored. On the other hand, reckless endangerment laws only impose criminal liability when an individual "intentionally, knowingly, and/or recklessly" provides a firearm to a minor (Giffords Law Center to Prevent Gun Violence 2018a). The estimated coefficients in column (4) suggest that the observed CAP law effects are driven by the stricter negligent storage form of legislation. These results are consistent with the results in Anderson and Sabia (forthcoming), who found that negligent storage laws were much more effective than reckless endangerment laws at reducing gun carrying among minors.[24]

We report the results of various robustness checks in Table 7. In the first column, we list our preferred estimate from column (5) in Table 3 for comparison. In the second and third columns, we drop states with 10 or more and 5 or more missing years of data, respectively.[25] Some states did not report any data to the SHR program in some years, while other state-year cells are so severely underreported that they have been made unavailable by the Office of Juvenile Justice and Delinquency Prevention.[26] When dropping states with missing years of data

---

firearm-related homicide committed by a female juvenile (and equal to 0 otherwise), the estimated coefficient on *CAP Law* was positive in sign but statistically indistinguishable from zero.

[24] Specifically, Anderson and Sabia (forthcoming) found that negligent storage laws were associated with a 25 percent decrease in the likelihood high school students reported past-month gun carrying. Reckless endangerment laws were associated with a (statistically insignificant) 9 percent decrease in the likelihood high school students reported past-month gun carrying.

[25] The states with 5 to 9 years of missing data are Kansas and Kentucky. The states with 10 or more years of missing data are Florida, Montana, and Nebraska. The District of Columbia has 13 years of missing data. A full list of data coverage by state is available at: https://www.ojjdp.gov/ojstatbb/ezashr/asp/methods.asp.

[26] If all states and the District of Columbia had data available for each of the 29 years in our panel, the sample size would be N = 1,479. Given our sample size of N = 1,382, this means that roughly 7 percent of state-year cells are unavailable due to reporting issues.

the estimated coefficient on *CAP Law* changes little in magnitude and remains statistically significant at the 5 percent level. In column (4), we restrict our attention to only those states that passed a CAP law during the period 1985-2013. With this restriction in place, the estimated coefficient on *CAP Law* again changes little in magnitude and remains statistically significant. Next, we report unweighted regression estimates, which are slightly smaller than those shown in Table 3 but nevertheless indicate that CAP laws are associated with a 16 percent reduction in firearm-related homicides committed by juveniles. In column (6), we drop the region-by-year fixed effects from the right-hand-side of the estimating equation. The estimated coefficient from this exercise suggests that CAP laws are associated with a 15 percent decrease in juvenile firearm-related homicides, and this estimate is statistically significant at the 10 percent level. Finally, we estimate equation (1) with OLS rather than modeling homicides as a count process. While the estimated coefficient on *CAP Law* is no longer statistically significant at conventional levels (p-value = 0.12), the magnitude of the effect is quite large, suggesting that CAP laws are associated with a 36 percent decrease in juvenile firearm-related homicides relative to the mean.

In Table 8, we repeat the robustness checks listed above to examine the sensitivity of the *Negligent Storage* estimated reported in Table 6. In general, the estimated coefficient on *Negligent Storage* is quite robust across the alternative specifications under consideration. Again, there is little evidence to suggest that the weaker reckless endangerment laws are effective at reducing gun violence among juveniles.

Finally, in Figure 2, we assess the robustness of the estimated coefficient on *CAP Law* to dropping one CAP law state at a time. The effect sizes range from -0.119 log points when we drop California to -0.256 log points when we drop Indiana. As indicated above, populous states enforcing a negligent storage standard (e.g., California, Illinois, and Texas) contribute important

weight to the estimated effect of CAP laws.[27] We repeat this exercise in Figure 3 to examine the robustness of the estimated coefficient on *Negligent Storage*. Here, the effects range from -0.226 log points when we drop Illinois to -0.399 log points when we drop New Jersey. In all cases, the estimated coefficient on *Negligent Storage* is statistically significant at the 5 percent level.

5. Conclusion

While the majority of gun owners in the United States do not safely store all of their firearms (Crifasi et al. 2018), we know very little about the causal effects of gun storage on gun violence. This policy question has taken on increased salience in the wake of several high-profile school shootings carried out by minors who obtained their gun from home (or the home of a relative). To better understand how safe-storage laws affect gun crime, the current study exploits state-level variation in safe-storage requirements. Specifically, using data from the FBI's *Supplementary Homicide Reports* for the period 1985-2013, we examine the relationship between child access prevention laws and firearm-related homicides committed by juveniles.

Our results suggest that CAP laws lead to a 19 percent reduction in the expected number of firearm-related homicides committed by juveniles (i.e., 12- to 17-year-olds). This effect is stronger for whites, as opposed to nonwhites, and is driven by states enforcing a negligent storage standard, the strictest form of CAP legislation. Negligent storage laws impose criminal liability on individuals who allow a minor access to a firearm that was not properly stored. Event-study analyses show that the effects of CAP laws grow stronger over time and our estimated coefficient of interest is robust to a range of specification checks and sample selection criteria.

[27] The estimated coefficient on *CAP Law* is no longer statistically significant at conventional levels when we drop California (p-value = 0.153), Illinois (p-value = 0.144), or Texas (p-value = 0.184).

We also find that CAP laws are not associated with firearm-related homicides committed by adults or with non-firearm-related homicides committed by juveniles, providing evidence that the observed relationship between CAP laws and juvenile firearm-related homicides is not simply being driven by confounding trends in gun crime or juvenile violence.[28]

From a policy perspective, understanding the effects of CAP laws is vital as youth gun violence rises alongside public support for gun restrictions (Parsons et al. 2018, Clement 2018). Because previous studies have relied on considerably less policy variation and homicide data without age-specific information on offenders, we view the results above as the most credible estimates of the relationship between CAP laws and youth gun violence.

[28] These results also suggest that increases in the time costs of accessing firearms for lawful gun owners during a home invasion does not lead to an increase in the firearm-related homicide rate. Opposition to CAP laws generally rests on this concern. It is possible that CAP laws promote important technological change that mitigates this tradeoff. Safe-storage innovations such as biometrically-enhanced "gun boxes" that safely store (and often GPS track) firearms, but also make guns quickly accessible via eye scan or thumb print, may deter gun crimes by juveniles as well as reduce incentives for home invasions. Retail prices for these products generally range between $150 and $300. For example, one popular product, "The Gun Box", retails for $259 at www.gunbox.com.

References

Amaral, Brian. 2014. "N.J. Law Punishes Adults Whose Unsecured Guns Get Into the Hands of Children." *NJ.com,* November 16. Available at: http://www.nj.com/essex/index.ssf/2014/11/child_access_to_firearms_in_new_jersey.html.

Anderson, D. Mark and Joseph Sabia. "Child Access Prevention Laws, Youth Gun Carrying, and School Shootings." Forthcoming at *Journal of Law and Economics*.

Aneja, Abhay, John Donohue, and Alexandria Zhang. 2012. "The Impact of Right to Carry Laws and the NRC Report: The Latest Lessons for the Empirical Evaluation of Law and Policy." NBER Working Paper No. 18294.

Arnold, Larry. 2015. "The History of Concealed Carry, 1976-2011." Available at: http://txcha.org/texas-ltc-information/a-history-of-concealed-carry/.

Associated Press. 2013. "Gun Used in Nevada Teacher Killing Wasn't Locked Away: Shooter's Parents." *NY Daily News*, November 7. Available at: http://www.nydailynews.com/news/national/gun-nevada-teacher-shooting-wasn-locked-article-1.1509274.

Azrael, Deborah, Joanna Cohen, Carmel Salhi, and Matthew Miller. 2018. "Firearm Storage in Gun-Owning Households with Children: Results of a 2015 National Survey." *Journal of Urban Health*, 95(3): 295-304.

Barry, Colleen, Daniel Webster, Elizabeth Stone, Cassandra Crifasi, Jon Vernick, and Emma McGinty. 2018. "Public Support for Gun Violence Prevention Policies Among Gun Owners and Non-Gun Owners in 2017." *American Journal of Public Health*, 108(7): 878-881.

Bell, Adam. 2016. "Toddler Shoots Himself. Now Dad Faces Felony Charges." *Charlotte Observer*, December 13. Available at: http://www.charlotteobserver.com/news/local/crime/article120565973.html.

Bernstein, Maxine. 2014. "Jared Padgett Wrote About Killing Classmates in Journal." *The Oregonian*, June 13. Available at: https://www.oregonlive.com/gresham/index.ssf/2014/06/oregon_school_shooting_gunman_1.html.

Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan. 2004. "How Much Should We Trust Differences-In-Differences Estimates?" *Quarterly Journal of Economics*, 119(1): 249-275.

Boren, Michael. "S. Jersey Officer Charged after Leaving Unsecured Gun that Killed Daughter, 8, on New Year's Eve." *Philadelphia Inquirer*, January 20. Available at: http://www.philly.com/philly/news/new_jersey/police-officer-sailor-lane-righter-kenneth-stratford-gun.html.

Cameron, A. Colin and Pravin K. Trivedi. 1998. *Regression Analysis of Count Data*. Cambridge, UK: Cambridge University Press.

Cheng, Cheng and Mark Hoekstra. 2013. "Does Strengthening Self-Defense Law Deter Crime or Escalate Violence? Evidence from Expansions to Castle Doctrine." *Journal of Human Resources*, 48(3): 821-854.

Clement, Scott. 2018. "Public Support for Gun Restrictions Has Grown to the Highest Level in 25 Years." *Washington Post*, March 14. Available at: https://www.washingtonpost.com/news/the-fix/wp/2018/03/14/public-support-for-gun-restrictions-has-grown-to-the-highest-level-in-25-years/?utm_term=.36aebd98908c.

Coaston, Jane. 2018. "The Santa Fe School Shooter Used His Father's Guns. Could His Father be Punished?" *Vox*, May 25. Available at: https://www.vox.com/2018/5/25/17379762/santa-fe-school-shooting-gun-control-rights.

Crifasi, Cassandra, Mitchell Doucette, Emma McGinty, Daniel Webster, and Colleen Barry. 2018. "Storage Practices of US Gun Owners in 2016." *American Journal of Public Health*, 108(4): 532-537.

Crimesider Staff. 2012. "Report: Chardon High School Shooting Suspect TJ Lane May Have Used Grandfather's Gun in Attack." *CBS News,* February 29. Available at: https://www.cbsnews.com/news/report-chardon-high-school-shooting-suspect-tj-lane-may-have-used-grandfathers-gun-in-attack/.

Cummings, Peter, David Grossman, Frederick Rivara, and Thomas Koepsell. 1997. "State Gun Safe Storage Laws and Child Mortality Due to Firearms." *JAMA*, 278(13): 1084-1086.

Cutts, Emily and Michael Majchrowicz. 2016. "Ex-Pelham Police Chief Acquitted of Firearm Charges." *Daily Hampshire Gazette*, October 28. Available at: http://www.gazettenet.com/Final-testimony-and-closing-statements-given-on-last-day-of-former-Pelham-Police-Chief-Edward-Fleury-s-trial-5680972.

DeSimone, Jeffrey, Sara Markowitz, and Jing Xu. 2013. "Child Access Prevention Laws and Nonfatal Gun Injuries." *Southern Economic Journal*, 80(1): 5-25.

Donohue, John and Ian Ayres. 2009. "More Guns, Less Crime Fails Again: The Latest Evidence from 1977-2006." *Faculty Scholarship Series*. Paper 47. Available at: https://digitalcommons.law.yale.edu/fss_papers/47/?utm_source=digitalcommons.law.yale%09.edu%2Ffss_papers%2F47&utm_medium=PDF&utm_campaign=PDFCoverPages.

Edwards, Griffin, Erik Nesson, Joshua Robinson, and Fredrick Vars. "Looking Down the Barrel of a Loaded Gun: The Effect of Mandatory Handgun Purchase Delays on Homicide and Suicide." Forthcoming at *Economic Journal*.

Father Charged with Improper Firearm Storage. 2017. *Wilkes Journal-Patriot*, March 17.

Available at: http://www.journalpatriot.com/news/father-charged-with-improper-firearm-storage/article_e504f95e-0b10-11e7-abfb-97e62795e565.html.

Filindra, Alexandra and Noah Kaplan. 2017. "Testing Theories of Gun Policy Preferences Among Blacks, Latinos, and Whites in America." *Social Science Quarterly*, 98(2): 413-428.

Fowler, Katherine, Linda L. Dahlberg, Tadesse Haileyesus, Carmen Gutierrez, and Sarah Bacon. 2017. "Childhood Firearm Injuries in the United States." *Pediatrics*, 140(1): e20163486.

Giffords Law Center to Prevent Gun Violence. 2017. "Child Access Prevention in Missouri." Available at: http://lawcenter.giffords.org/child-access-prevention-in-missouri/.

Giffords Law Center to Prevent Gun Violence. 2018a. "Child Access Prevention." Available at: http://lawcenter.giffords.org/gun-laws/policy-areas/child-consumer-safety/child-access-prevention/.

Giffords Law Center to Prevent Gun Violence. 2018b. "Universal Background Checks." Available at: https://lawcenter.giffords.org/gun-laws/policy-areas/background-checks/universal-background-checks/.

Giffords Law Center to Prevent Gun Violence. 2018c. "Safe Storage." Available at: https://lawcenter.giffords.org/gun-laws/policy-areas/child-consumer-safety/safe-storage/.

Gius, Mark. 2015. "The Impact of Minimum Age and Child Access Prevention Laws on Firearm-Related Youth Suicides and Unintentional Deaths." *Social Science Journal*, 52(2): 168-175.

Goodman-Bacon, Andrew. 2018. "Difference-in-Differences with Variation in Treatment Timing." NBER Working Paper No. 25018.

GovTrack.us. 2018. H.R. 5941–115th Congress: Child Gun Access Prevention Act. Available at: https://www.govtrack.us/congress/bills/115/hr5941.

Grippo, Genevieve. 2018. "Petition Requiring Safe Gun Storage Will Not Appear on November Ballot." *KTLV News*, June 21. Available at: https://ktvl.com/news/local/petition-requiring-safe-gun-storage-will-not-appear-on-november-ballot.

Grossman, Richard and Stephen Lee. 2008. "May Issue Versus Shall Issue: Explaining the Pattern of Concealed-Carry Handgun Laws, 1960-2001." *Contemporary Economic Policy*, 26(2): 198-206.

Harmacinski, Jill. 2013. "Arraigned on Gun Charges." *Eagle Tribune*, October 1. Available at: http://www.eagletribune.com/news/arraigned-on-gun-charges/article_88ea251e-68c3-5c67-9793-22dda607c5fc.html.

Hepburn, Lisa, Deborah Azrael, Matthew Miller, and David Hemenway. 2006. "The Effect of Child Access Prevention Laws on Unintentional Child Firearm Fatalities, 1979-2000." *Journal of Trauma: Injury, Infection, and Critical Care*, 61(2): 423-428.

Hinkston, Mark. 2012. "Wisconsin's Concealed Carry Law: Protecting Persons and Property." *Wisconsin Lawyer*, 85(7). Available at: https://www.wisbar.org/newspublications/wisconsinlawyer/pages/article.aspx?Volume=85%09&Issue=7&ArticleID=8710%20.

Iannelli, Vincent. 2018. "Child Access Prevention Laws and Gun Safety." *Keep Kids Healthy*, February 21. Available at: https://keepkidshealthy.com/2018/02/21/child-access-prevention-laws-and-gun-safety/.

Ingraham, Christopher. 2018. "Gun Owners Support a Wide Range of Gun Control Measures, Johns Hopkins Study Finds." *Washington Post*, May 17. Available at: https://www.washingtonpost.com/news/wonk/wp/2018/05/17/gun-owners-support-a-wide-range-of-gun-control-measures-johns-hopkins-study-finds/?utm_term=.9ec0fd73d12c.

Iyengar, Radha. 2009. "Does the Certainty of Arrest Reduce Domestic Violence? Evidence from Mandatory and Recommended Arrest Laws." *Journal of Public Economics*, 93(1-2): 85-98.

James, Michael. 1996. "Uncle of Boy Who Shot Self Charged with Gun Violations." *Baltimore Sun*, April 25. Available at: http://articles.baltimoresun.com/1996-04-25/news/1996116108_1_felon-handgun-violations-charged-with-gun.

Jones, Andrew. 2017. "Gun Safety and Children." *C.S. Mott Children's Hospital*, December. Available at: https://www.mottchildren.org/posts/your-child/gun-safety-and-children.

KOMO Staff. 2018. "NRA Sues Seattle Over Recently Passed 'Safe Storage' Gun Law." *KOMO News*, July 20. Available at: https://komonews.com/news/local/nra-sues-seattle-over-recently-passed-safe-storage-gun-law.

Kopel, Dave, Paul Gallant, and Joanne Eisen. 2000. "Not-So Safe-Storage Laws: The Only Ones 'Safe' are the Intruders." *National Review Online*, October 18. Available at: http://www.davekopel.com/NRO/2000/Not-so-Safe-Storage-Laws.htm.

Lang, Matthew. 2013. "The Impact of Mental Health Insurance Laws on State Suicide Rates." *Health Economics*, 22(1): 73-88.

Legal Community Against Violence. 2008. "Regulating Guns in America: An Evaluation and Comparative Analysis of Federal, State and Selected Local Gun Laws." Available at: http://lawcenter.giffords.org/wp-content/uploads/2008/01/RegGuns.entire.report.pdf.

Lopez, Lolita and Kelly Goff. 2014. "Dad Charged After Son Takes Unsecured Gun." *NBC Los Angeles*, December 5. Available at: http://www.nbclosangeles.com/news/local/Dad-Charged-After-Son-Takes-Unsecured-Gun-284922561.html.

Lott, John, Jr. 2003. *The Bias Against Guns: Why Almost Everything You've Heard About Gun Control is Wrong.* Washington, D.C.: Regnery Publishing.

Lott, John, Jr., and John Whitely. 2001. "Safe-Storage Gun Laws: Accidental Deaths, Suicides, and Crime." *Journal of Law and Economics*, 44(2): 659-689.

Ludwig, Jens. 1998. "Concealed-Gun-Carrying Laws and Violent Crime: Evidence from State Panel Data." *International Review of Law and Economics*, 18(3): 239-254.

Ly, Laura. 2013. "N. Hampshire Official: Police Chief Left Gun Unsecured, Teen Used it for Suicide." *CNN*, April 12. Available at: http://www.cnn.com/2013/04/12/us/new-hampshire-chief-gun/.

Mann, Brian. 2018. "Most States Don't Require Guns to be Locked Up." *NPR*, May 23. Available at: https://www.npr.org/2018/05/23/613826206/most-states-dont-require-guns-to-be-locked-up.

Markgraf, Matt. 2018. "Search Warrants Reveal Details About Accused Marshall Co. High School Shooter." *WKMS*, March 5. Available at: http://www.wkms.org/post/search-warrants-reveal-details-about-accused-marshall-co-high-school-shooter.

Marvell, Thomas. 2001. "The Impact of Banning Juvenile Gun Possession." *Journal of Law and Economics*, 44(S2): 691-713.

McClellan, Chandler and Erdal Tekin. 2017. "Stand Your Ground Laws, Homicides, and Injuries." *Journal of Human Resources*, 52(3): 621-653.

National Center for Injury Prevention and Control. 2017. U.S. Centers for Disease Control and Prevention, Web-Based Injury Statistics Query and Reporting Systems (WISQARS) Injury Mortality Reports, 1999-2015, for National, Regional, and States. Available at: https://webappa.cdc.gov/sasweb/ncipc/dataRestriction_inj.html.

National Research Council. 2005. *Firearms and Violence: A Critical Review.* Washington, D.C.: The National Academies Press.

Norimine, Hayat. 2018. "New Seattle Law Requires Gun Owners to Lock Up Firearms." *Seattle Met*, July 10. Available at: https://www.seattlemet.com/articles/2018/7/10/new-seattle-law-requires-gun-owners-to-lock-up-firearms.

NRA-ILA. 2018. "Washington: NRA and SAF File Lawsuit Against City of Seattle." Available at: https://www.nraila.org/articles/20180720/washington-nra-and-saf-file-lawsuit-against-city-of-seattle.

Parents Charged in Toddler's Accidental Shooting Death. 2009, October 2. *WRAL.com*.

Available at: http://www.wral.com/parents-charged-in-toddler-s-accidental-shooting-death/6126208/.

Parents Charged with Improper Gun Storage in Girl's Shooting. 2017, January 3. *Boston.com.* Available at: https://www.boston.com/news/local-news/2017/01/03/parents-charged-with-improper-gun-storage-in-girls-shooting.

Parker, Kim, Juliana Menasce Horowitz, Ruth Igielnik, Baxter Oliphant, and Anna Brown. 2017. "America's Complex Relationship With Guns." Pew Research Center. Available at: http://www.pewsocialtrends.org/2017/06/22/americas-complex-relationship-with-guns/.

Parsons, Chelsea, Maggie Thompson, Eugenio Weigend Vargas, and Giovanni Rocco. 2018. "America's Youth Under Fire." Center for American Progress. Available at: https://www.americanprogress.org/issues/guns-crime/reports/2018/05/04/450343/americas-youth-fire/.

Pederson, JoEllen, Thomas Hall, Bradley Foster, and Jessie Coates. 2015. "Gun Ownership and Attitudes Toward Gun Control in Older Adults: Re-examining Self Interest Theory." *American Journal of Social Science Research*, 1(5): 273-281.

Penzenstadler, Nick, Ryan J. Foley, and Larry Fenn. 2017. "Added Agony: Justice is Haphazard After Kids' Gun Deaths." *USA Today*, May 24. Available at: https://www.usatoday.com/story/news/2017/05/24/justice-haphazard-when-kids-die-in-gun-accidents/101568654/.

Pepper, John. 2005. "Review of, *The Bias Against Guns: Why Almost Everything You've Heard About Gun Control is Wrong*, John Lott, Jr." *Journal of Applied Econometrics*, 20(7): 931-942.

Peters, Justin. 2013. "California's Strict New Access Prevention Law Won't Do Much to Stop Child Shooting Deaths." *Slate*, October 15. Available at: http://www.slate.com/blogs/crime/2013/10/15/firearm_safe_and_responsible_access_act_california_s_strict_new_access_prevention.html.

Platoff, Emma. 2018. "The Santa Fe Shooter Used His Father's Guns. But His Parent's Aren't Liable Under Texas Law." *Texas Tribune*, May 21. Available at: https://www.texastribune.org/2018/05/21/texas-has-law-aimed-keeping-parents-guns-out-kids-hands-its-reactive-n/.

Porter, Essex. 2018. "Debate Intensifies as Gun Safety Initiative Delivers Signatures for Ballot." *KIRO News*, July 6. Available at: https://www.kiro7.com/news/local/backers-of-statewide-gun-initiative-turn-in-enough-signatures-to-get-measure-on-november-ballot/784306984.

Prickett, Kate C., Alexa Martin-Storey, and Robert Crosnoe. 2014. "State Firearm Laws, Firearm Ownership, and Safety Practices Among Families of Preschool-Aged Children." *American Journal of Public Health*, 104(6): 1080-1086.

Raissian, Kerri. 2016. "Hold Your Fire: Did the 1996 Federal Gun Control Act Expansion Reduce Domestic Homicides?" *Journal of Policy Analysis and Management*, 35(1): 67-93.

Sanchez, Ray. 2018. "Texas School Shooter's Family Likely Not Liable Under Gun Access Law." *CNN*, May 22. Available at: https://www.cnn.com/2018/05/22/us/texas-school-shooting-safe-storage-law/index.html.

Shaffer, Rachel. 1999. "Child Access Prevention Laws: Keeping Gus Out of Our Children's Hands." *Fordham Urban Laws Journal*, 27(6): 1985-2024.

Spies, Mike. 2016. "When Kids Pull the Trigger, Who is Responsible? Not Gun Owners, the NRA says." *Newsweek*, October 10. Available at: https://www.newsweek.com/2016/10/21/when-kids-pull-trigger-who-responsible-507656.html.

United States Government Accountability Office. 2012. "States' Laws and Requirements for Concealed Carry Permits Vary across the Nation." Report to Congressional Requesters GAO-12-717. Available at: https://www.gao.gov/assets/600/592552.pdf.

U.S. Department of Justice. 2014. "The Nation's Two Measures of Homicide." Office of Justice Programs, *Bureau of Justice Statistics*. Available at: https://www.bjs.gov/content/pub/pdf/ntmh.pdf.

USA Carry. 2015. "Concealed Carry Permit Reciprocity Maps." Available at: https://www.usacarry.com/concealed_carry_permit_reciprocity_maps.html.

Vernick, Jon and Lisa Hepburn. 2003. "State and Federal Gun Laws: Trends for 1970-99." In *Evaluating Gun Policy: Effects on Crime and Violence* (eds. Jens Ludwig and Philip J. Cook). Washington, D.C.: Brookings Institution Press.

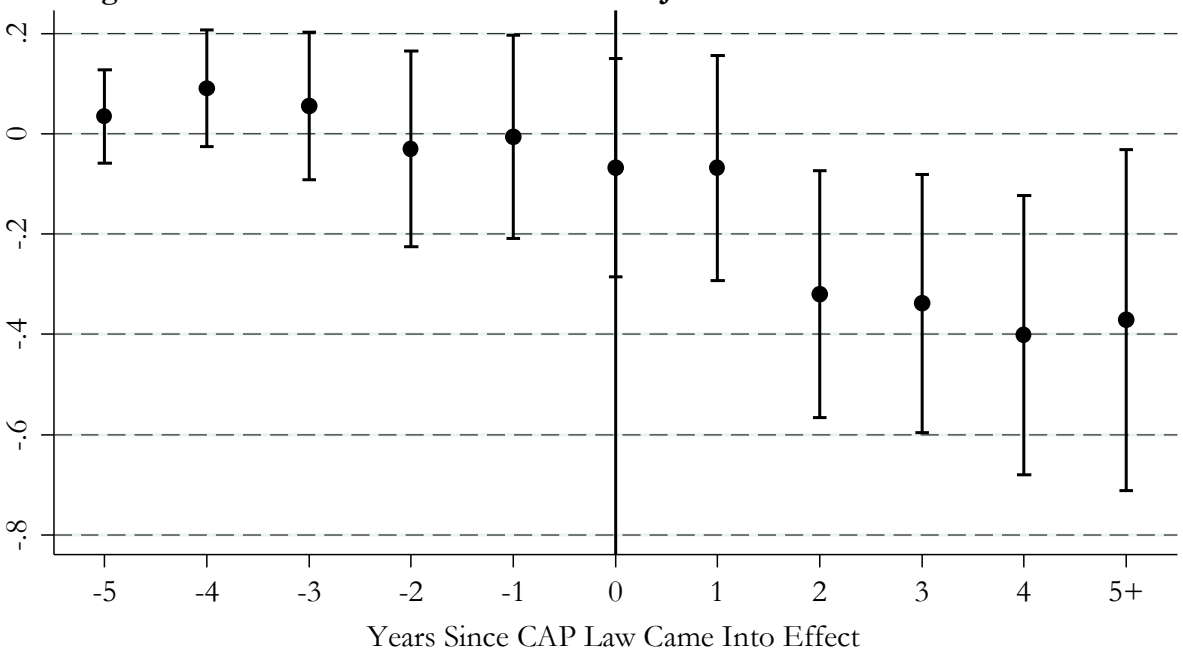
Webster, Daniel, Cassandra Crifasi, and John Vernick. 2014. "Effects of the Repeal of Missouri's Handgun Purchaser Licensing Law on Homicides." *Journal of Urban Health*, 91(2): 293-302.

Webster, Daniel and Marc Starnes. 2000. "Reexamining the Association Between Child Access Prevention Gun Laws and Unintentional Shooting Deaths of Children." *Pediatrics*, 106(6): 1466-1469.

Webster, Daniel, Jon Vernick, April Zeoli, and Jennifer Manganello. 2004. "Association Between Youth-Focused Firearm Laws and Youth Suicides." *JAMA*, 292(5): 594-601.

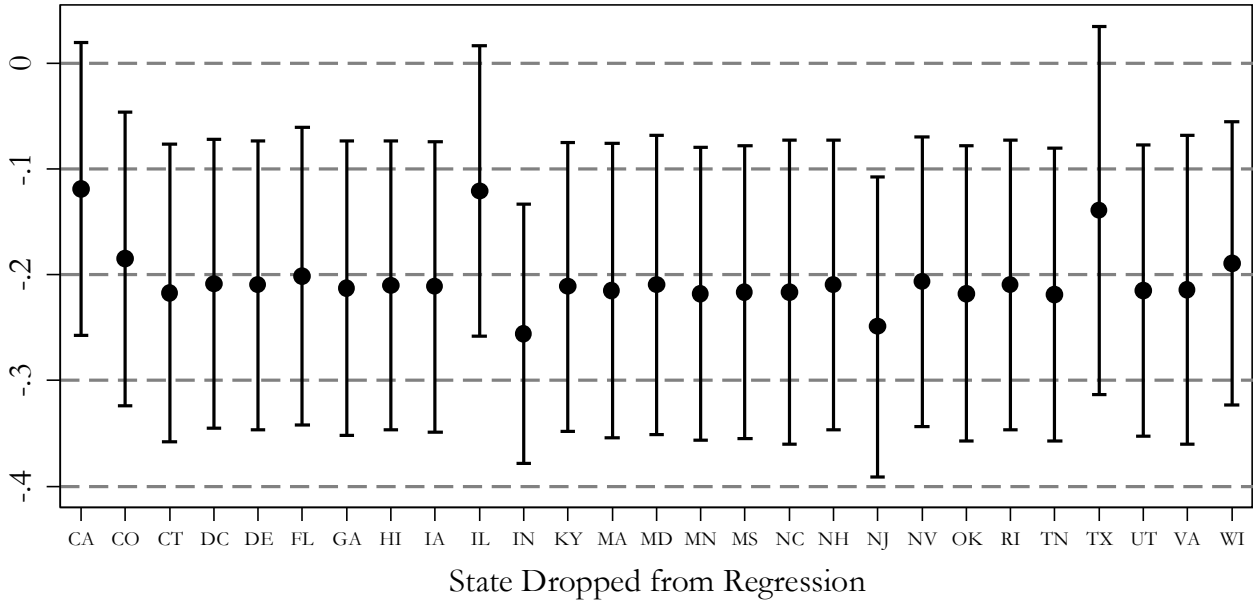
Young, Colin. 2012. "Dorchester Man Charged after Two Loaded Guns are found in his Apartment." *Boston.com*, November 8. Available at: http://www.boston.com/2012/11/08/tom/Y1OqFJxuaVWh87w63OlrEM/story.html.

Figure 1. Pre- and Post-CAP Law Trends in Juvenile Firearm-Related Homicides



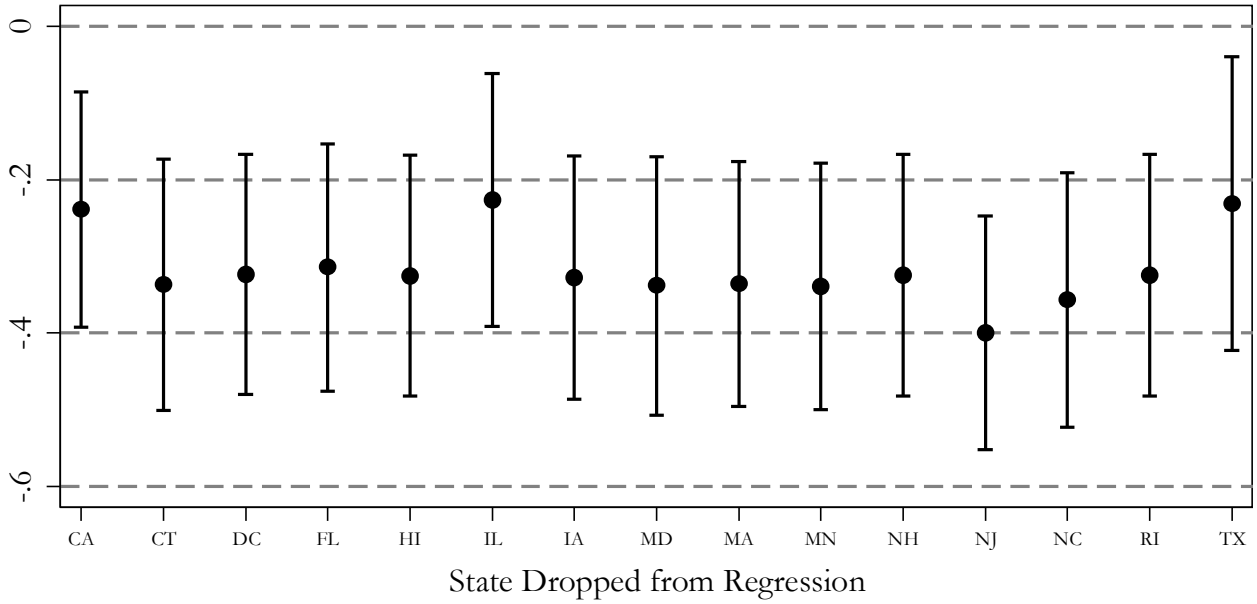
Notes: Poisson coefficient estimates (and their 90% confidence intervals) are reported. The dependent variable is equal to the number of firearm-related homicides committed by 12- to 17-year-olds in state *s* during year *t*. Controls include the covariates listed in Table 2, state fixed effects, year fixed effects, region-by-year fixed effects, and state-specific linear time trends. Regression is weighted by state populations of 12- to 17-year-olds. Standard errors are corrected for clustering at the state level.

Figure 2. Robustness of Estimated Coefficient on *CAP Law* to Dropping One CAP Law State at a Time



Notes: Poisson coefficient estimates (and their 90% confidence intervals) come from separate regressions where we drop one CAP law state at a time. The dependent variable is equal to the number of firearm-related homicides committed by 12- to 17-year-olds in state *s* during year *t*. Controls include the covariates listed in Table 2, state fixed effects, year fixed effects, region-by-year fixed effects, and state-specific linear time trends. Regressions are weighted by state populations of 12- to 17-year-olds. Standard errors are corrected for clustering at the state level.

Figure 3. Robustness of Estimated Coefficient on *Negligent Storage* to Dropping One Negligent Storage Law State at a Time



Notes: Poisson coefficient estimates (and their 90% confidence intervals) come from separate regressions where we drop one negligent storage state at a time. The dependent variable is equal to the number of firearm-related homicides committed by 12- to 17-year-olds in state *s* during year *t*. Controls include the covariates listed in Table 2, *Reckless Endangerment*, state fixed effects, year fixed effects, region-by-year fixed effects, and state-specific linear time trends. Regressions are weighted by state populations of 12- to 17-year-olds. Standard errors are corrected for clustering at the state level.

Table 1. Child Access Prevention Laws

	Effective Year	Type of CAP Law
California	1992	Negligent Storage
Colorado	2000	Reckless Endangerment
Connecticut	1990	Negligent Storage
Delaware	1994	Reckless Endangerment
D.C.	2009	Negligent Storage
Florida	1989	Negligent Storage
Georgia	1994	Reckless Endangerment
Hawaii	1992	Negligent Storage
Illinois	2000	Negligent Storage
Indiana	1994	Reckless Endangerment
Iowa	1990	Negligent Storage
Kentucky	1994	Reckless Endangerment
Maryland	1992	Negligent Storage
Massachusetts	1998	Negligent Storage
Minnesota	1993	Negligent Storage
Mississippi	1994	Reckless Endangerment
Missouri	1981	Reckless Endangerment
Nevada	1991	Reckless Endangerment
New Hampshire	2001	Negligent Storage
New Jersey	1992	Negligent Storage
North Carolina	1993	Negligent Storage
Oklahoma	1993	Reckless Endangerment
Rhode Island	1995	Negligent Storage
Tennessee	1994	Reckless Endangerment
Texas	1995	Negligent Storage
Utah	1993	Reckless Endangerment
Virginia	1992	Reckless Endangerment
Wisconsin	1992	Reckless Endangerment

Notes: Data on CAP laws were obtained from Lott and Whitley (2001), Webster et al. (2004), DeSimone et al. (2013), Giffords Law Center to Prevent Gun Violence (2018a), and our own searches of legislative codes.

Table 2. Descriptive Statistics for Juvenile Firearm-Homicides and CAP Law Analysis, 1985-2013

	CAP Law = 1[a]	*CAP Law* = 0	*Full Sample*	Description
Juvenile Firearm Homicides	55.3	47.7	51.3	Number of firearm-related homicides
	(73.7)	(67.5)	(70.6)	committed by 12- to 17-year-olds
Independent variables				
% Nonwhite	0.198	0.169	0.183	Percent of the state population that is nonwhite
	(0.090)	(0.084)	(0.088)	
% Under 18	0.256	0.254	0.255	Percent of the state population that is under 18
	(0.019)	(0.020)	(0.019)	years of age
% Male	0.492	0.488	0.490	Percent of the state population that is male
	(0.006)	(0.007)	(0.007)	
Unemployment Rate	0.130	0.129	0.130	State youth unemployment rate
	(0.037)	(0.031)	(0.034)	
Per Capita Income	39,315	34,619	36,854	State real income per capita (2010 dollars)
	(6,214)	(5,964)	(6,519)	
Police Expenditures	271	230	250	State police expenditures per capita (2010
	(74.4)	(80.3)	(80.1)	dollars)
Democrat	0.420	0.501	0.463	= 1 if state has a democratic governor, = 0
	(0.491)	(0.497)	(0.495)	otherwise
Mental Health Parity Law	0.556	0.189	0.364	= 1 if state has a mental health parity law, = 0
	(0.493)	(0.390)	(0.479)	otherwise
Shall Issue Law	0.506	0.384	0.442	= 1 if state has a shall issue gun law, = 0
	(0.500)	(0.487)	(0.497)	otherwise
Stand Your Ground Law	0.175	0.092	0.131	= 1 if state has a stand-your-ground gun law, =
	(0.373)	(0.283)	(0.332)	0 otherwise
Minimum Possession Age	0.960	0.604	0.773	State minimum age requirement to possess a
	(0.186)	(0.483)	(0.413)	handgun
Background Check Law	0.535	0.359	0.443	= 1 if state requires background checks for
	(0.499)	(0.480)	(0.497)	private sales on firearms, = 0 otherwise
Trigger Lock Law	0.235	0.000	0.112	= 1 if state requires trigger locks to accompany
	(0.424)	(0.000)	(0.315)	dealer and private firearm sales, = 0 otherwise
N	529	853	1,382	

[a] If a CAP law is in effect for any portion of the year, the observation is included in this column.

Notes: Means are weighted and standard deviations are in parentheses.

Table 3. Juvenile Firearm-Related Homicides and CAP Laws

	(1)	(2)	(3)	(4)	(5)
	Juvenile Firearm Homicides	*Juvenile Firearm Homicides*	*Juvenile Firearm Homicides*	*Juvenile Firearm Homicides*	*Juvenile Firearm Homicides*
CAP Law	-0.366***	-0.331**	-0.284**	-0.285**	-0.210**
	(0.139)	(0.132)	(0.131)	(0.122)	(0.082)
Mean	51.3	51.3	51.3	51.3	51.3
N	1,382	1,382	1,382	1,382	1,382
Demographic and economic controls	No	Yes	Yes	Yes	Yes
Political and mental health controls	No	No	Yes	Yes	Yes
Other gun laws	No	No	No	Yes	Yes
State-specific linear trends	No	No	No	No	Yes

* Statistically significant at 10% level; ** at 5% level; *** at 1% level.

Notes: Each column represents results from a separate Poisson regression based on data from the FBI's *Supplementary Homicide Reports* for the period 1985-2013. The dependent variable is equal to the number of firearm-related homicides committed by 12- to 17-year-olds in state *s* during year *t.* Weighted means for the dependent variable are reported. Demographic and economic controls: *% Nonwhite, % Under 18, % Male, Unemployment Rate,* and *Per Capita Income*. Mental health and political controls: *Police Expenditures, Democrat,* and *Mental Health Parity Law*. Other gun laws: *Shall Issue Law, Stand Your Ground Law, Minimum Possession Age, Background Check Law,* and *Trigger Lock Law*. All models control for state fixed effects, year fixed effects, and region-by-year fixed effects. Regressions are weighted by state populations of 12- to 17-year-olds. Standard errors, corrected for clustering at the state level, are in parentheses.

Table 4. Leads and Lags of *CAP Law*

	(1)	(2)	(3)	(4)	(5)
	Juvenile Firearm Homicides	*Juvenile Firearm Homicides*	*Juvenile Firearm Homicides*	*Juvenile Firearm Homicides*	*Juvenile Firearm Homicides*
5 Years Prior to CAP Law	...	...	...	...	.034
					(.057)
4 Years Prior to CAP Law	...	...	...	0.116**	.091
				(0.055)	(.071)
3 Years Prior to CAP Law	...	...	0.037	0.082	.056
			(0.050)	(0.055)	(.089)
2 Years Prior to CAP Law	...	-0.063	-0.048	-0.004	-.030
		(0.063)	(0.071)	(0.075)	(.119)
Year Prior to CAP Law	-0.009	-0.035	-0.021	0.029	-.006
	(0.042)	(0.057)	(0.069)	(0.070)	(.123)
CAP Law	-0.214**	-0.244***	-0.225**	-0.172**	...
	(0.083)	(0.082)	(0.083)	(0.080)	
Year of Law Change	...	...	...	...	-.068
					(.132)
1 Year After CAP Law	...	...	...	...	-.068
					(.137)
2 Years After CAP Law	...	...	...	...	-.320**
					(.150)
3 Years After CAP Law	...	...	...	...	-.338**
					(.156)
4 Years After CAP Law	...	...	...	...	-.401**
					(.169)
5+ Years After CAP Law	...	...	...	...	-.371*
					(.206)
Mean	51.3	51.3	51.3	51.3	51.3
N	1,382	1,382	1,382	1,382	1,382

* Statistically significant at 10% level; ** at 5% level; *** at 1% level.

Notes: Each column represents results from a separate Poisson regression based on data from the FBI's *Supplementary Homicide Reports* for the period 1985-2013. The dependent variable is equal to the number of firearm-related homicides committed by 12- to 17-year-olds in state *s* during year *t.* Weighted means for the dependent variable are reported. All models control for the covariates listed in Table 2, state fixed effects, year fixed effects, region-by-year fixed effects, and state-specific linear time trends. Regressions are weighted by state populations of 12- to 17-year-olds. Standard errors, corrected for clustering at the state level, are in parentheses.

Table 5. Adult Firearm-Related Homicides, Juvenile Non-Firearm-Related Homicides, and Firearm-Related Homicides where Offender is Unknown

	(1)	(2)	(3)	(4)
	Adult Firearm Homicides (18+ year-olds)	*Adult Firearm Homicides (18- to 24-year-olds)*	*Juvenile Non-Firearm Homicides*	*Firearm Homicides, Offender Unknown*
CAP Law	0.011	-0.040	0.043	-0.020
	(0.046)	(0.056)	(0.075)	(0.099)
Mean	352.0	170.9	18.5	222.2
N	1,382	1,382	1,382	1,382

* Statistically significant at 10% level; ** at 5% level; *** at 1% level.

Notes: Each column represents results from a separate Poisson regression based on data from the FBI's *Supplementary Homicide Reports* for the period 1985-2013. The dependent variable is equal to the number of specified homicides in state *s* during year *t*. Weighted means for the dependent variable are reported. All models control for the covariates listed in Table 2, state fixed effects, year fixed effects, region-by-year fixed effects, and state-specific linear time trends. Regressions are weighted by the relevant state populations. Standard errors, corrected for clustering at the state level, are in parentheses.

Table 6. Heterogeneity

	(1)	(2)	(3)	(4)
	White Juvenile Firearm Homicides	*Nonwhite Juvenile Firearm Homicides*	*Male Juvenile Firearm Homicides*	*Juvenile Firearm Homicides*
CAP Law	-0.318***	-0.111	-0.199**	...
	(0.119)	(0.078)	(0.077)	
Negligent Storage	...	...	...	-0.325***
				(0.095)
Reckless Endangerment	...	...	...	0.013
				(0.113)
Mean	22.1	29.9	49.0	51.3
N	1,382	1,382	1,382	1,382

* Statistically significant at 10% level; ** at 5% level; *** at 1% level.

Notes: Each column represents results from a separate Poisson regression based on data from the FBI's *Supplementary Homicide Reports* for the period 1985-2013. The dependent variable is equal to the number of specified homicides in state *s* during year *t*. Weighted means for the dependent variable are reported. All models control for the covariates listed in Table 2, state fixed effects, year fixed effects, region-by-year fixed effects, and state-specific linear time trends. Regressions are weighted by the relevant state populations of 12- to 17-year-olds. Standard errors, corrected for clustering at the state level, are in parentheses.

Table 7. Robustness of Relationship between Juvenile Firearm-Related Homicides and CAP Laws

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Estimate from column (5) of Table 3 for comparison	Drop states with 10+ years of missing data	Drop states with 5+ years of missing data	Drop states that never pass a CAP law	Unweighted	Drop region-by-year fixed effects	OLS
CAP Law	-0.210**	-0.199**	-0.202**	-0.208**	-0.173**	-0.160*	-1.63
	(0.082)	(0.085)	(0.085)	(0.081)	(0.081)	(0.084)	(1.04)
Mean	51.3	51.6	52.5	63.8	20.8	51.3	4.50
N	1,382	1,328	1,287	762	1,382	1,382	1,382

* Statistically significant at 10% level; ** at 5% level; *** at 1% level.

Notes: Each column represents results from a separate regression based on data from the FBI's *Supplementary Homicide Reports* for the period 1985-2013. In columns (1)-(6), the dependent variable is equal to the number of firearm-related homicides committed by 12- to 17-year-olds in state *s* during year *t.* In column (7), the dependent variable is equal to the number of firearm-related homicides committed by 12- to 17-year-olds per 100,000 population of this age group in state *s* during year *t*. In columns (1)-(4) and (6)-(7), weighted means for the dependent variable are reported. In column (5), the unweighted mean for the dependent variable is reported. Unless stated otherwise, all models control for the covariates listed in Table 2, state fixed effects, year fixed effects, region-by-year fixed effects, and state-specific linear time trends. Unless stated otherwise, regressions are weighted by state populations of 12- to 17-year-olds. Standard errors, corrected for clustering at the state level, are in parentheses.

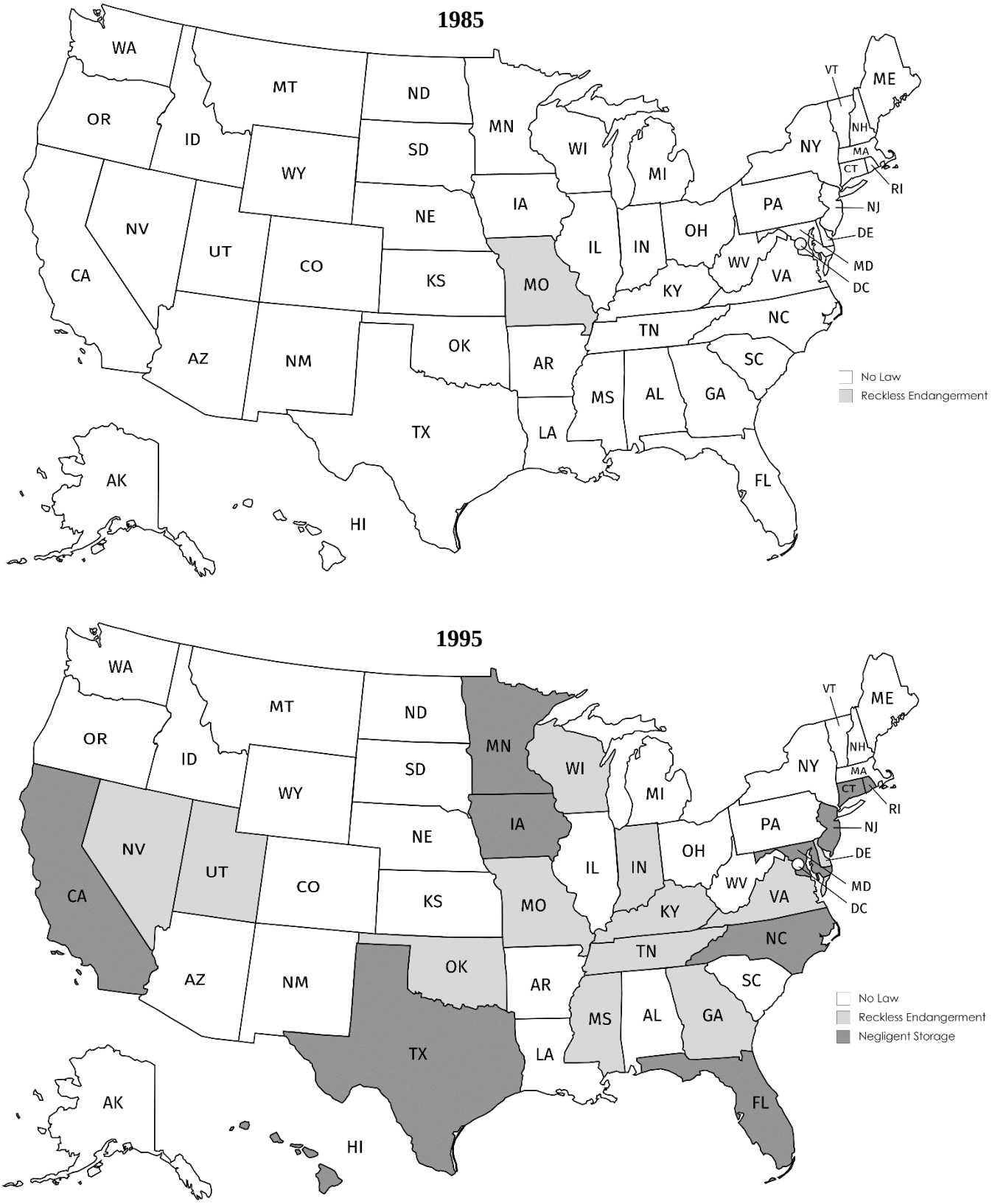
Table 8. Robustness of Relationship between Juvenile Firearm-Related Homicides and Negligent Storage Laws

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Estimates from column (4) of Table 6 for comparison	Drop states with 10+ years of missing data	Drop states with 5+ years of missing data	Drop states that never pass a CAP law	Unweighted	Drop region-by-year fixed effects	OLS
Negligent Storage	-0.325***	-0.312***	-0.306***	-0.280***	-0.284***	-0.196**	-2.50*
	(0.095)	(0.097)	(0.096)	(0.085)	(0.094)	(0.093)	(1.25)
Reckless Endangerment	0.013	0.019	0.002	-0.121	-0.004	-0.001	-0.027
	(0.113)	(0.117)	(0.117)	(0.134)	(0.111)	(0.120)	(0.946)
Mean	51.3	51.6	52.5	63.8	20.8	51.3	4.50
N	1,382	1,328	1,287	762	1,382	1,382	1,382

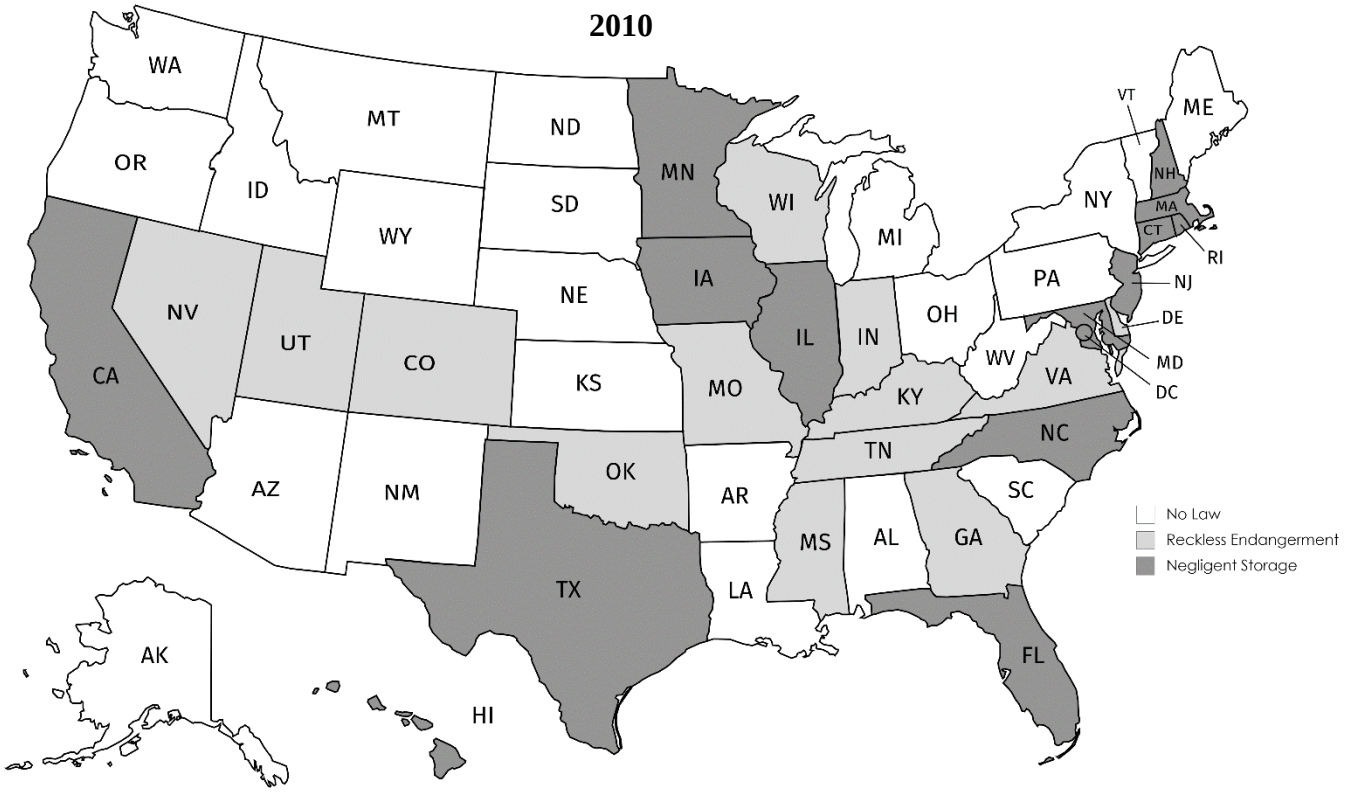
* Statistically significant at 10% level; ** at 5% level; *** at 1% level.

Notes: Each column represents results from a separate regression based on data from the FBI's *Supplementary Homicide Reports* for the period 1985-2013. In columns (1)-(6), the dependent variable is equal to the number of firearm-related homicides committed by 12- to 17-year-olds in state *s* during year *t.* In column (7), the dependent variable is equal to the number of firearm-related homicides committed by 12- to 17-year-olds per 100,000 population of this age group in state *s* during year *t*. In columns (1)-(4) and (6)-(7), weighted means for the dependent variable are reported. In column (5), the unweighted mean for the dependent variable is reported. Unless stated otherwise, all models control for the covariates listed in Table 2, state fixed effects, year fixed effects, region-by-year fixed effects, and state-specific linear time trends. Unless stated otherwise, regressions are weighted by state populations of 12- to 17-year-olds. Standard errors, corrected for clustering at the state level, are in parentheses.

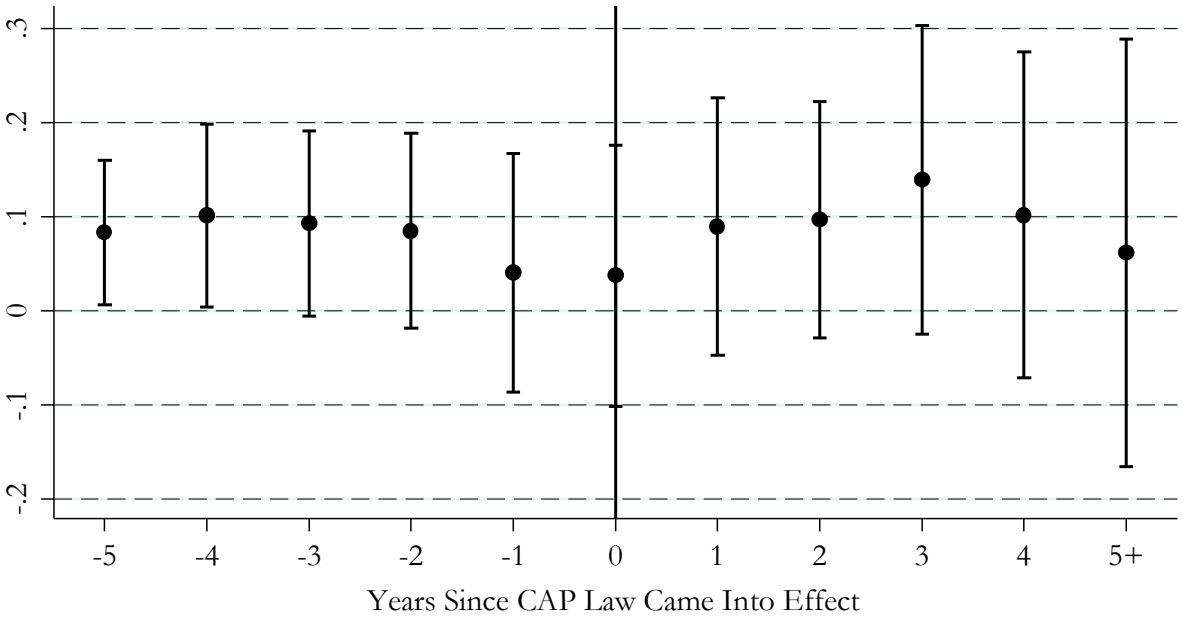
Appendix Figure 1. Child Access Prevention Laws Over Time



Appendix Figure 1. Child Access Prevention Laws Over Time (continued)



Appendix Figure 2. Pre- and Post-CAP Law Trends in Adult Firearm-Related Homicides



Notes: Poisson coefficient estimates (and their 90% confidence intervals) are reported. The dependent variable is equal to the number of firearm-related homicides committed by 18+ year-olds in state *s* during year *t*. Controls include the covariates listed in Table 2, state fixed effects, year fixed effects, region-by-year fixed effects, and state-specific linear time trends. Regression is weighted by state populations of 18+ year-olds. Standard errors are corrected for clustering at the state level.

Appendix Table 1. Data Sources for State-Level Covariates

	Data Source
% Nonwhite	National Cancer Institute's SEER population data
% Under 18	National Cancer Institute's SEER population data
% Male	National Cancer Institute's SEER population data
Unemployment Rate	Bureau of Labor Statistics
Per Capita Income	Bureau of Economic Analysis
Police Expenditures	Bureau of Justice Statistics
Democrat	Authors' own internet searches
Mental Health Parity Law	Lang (2013) and updates to Lang (2013) were provided via personal correspondence with the author
Shall Issue Law	Grossman and Lee (2008), Donohue and Ayers (2009), Aneja et al. (2012), Hinkston (2012), United States Government Accountability Office (2012), Arnold (2015), and USA Carry (2015)
Stand Your Ground Law	McClellan and Tekin (2017)
Minimum Possession Age	Marvell (2001) and Gius (2015)
Background Check Law	Vernick and Hepburn (2003), Webster et al. (2014), and Giffords Law Center to Prevent Gun Violence (2018b)
Trigger Lock Law	Giffords Law Center to Prevent Gun Violence (2018c) and authors' own searches of state legislative codes

Appendix Table 2. Unweighted Means

	CAP Law = 1[a]	*CAP Law* = 0	*Full Sample*	Description
Juvenile Firearm Homicides	23.0	19.5	20.8	Number of firearm-related homicides
	(40.8)	(38.4)	(39.4)	committed by 12- to 17-year-olds
Independent variables				
% Nonwhite	0.202	0.148	0.169	Percent of the state population that is nonwhite
	(0.150)	(0.124)	(0.137)	
% Under 18	0.250	0.257	0.254	Percent of the state population that is under 18
	(0.022)	(0.025)	(0.024)	years of age
% Male	0.491	0.491	0.491	Percent of the state population that is male
	(0.007)	(0.010)	(0.009)	
Unemployment Rate	0.122	0.125	0.124	State youth unemployment rate
	(0.037)	(0.036)	(0.037)	
Per Capita Income	39,086	33,405	35,580	State real income per capita (2010 dollars)
	(7,224)	(5,928)	(7,019)	
Police Expenditures	256	215	231	State police expenditures per capita (2010
	(87.3)	(91.9)	(92.2)	dollars)
Democrat	0.468	0.519	0.499	= 1 if state has a democratic governor, = 0
	(0.496)	(0.496)	(0.497)	otherwise
Mental Health Parity Law	0.489	0.241	0.336	= 1 if state has a mental health parity law, = 0
	(0.498)	(0.426)	(0.470)	otherwise
Shall Issue Law	0.548	0.498	0.517	= 1 if state has a shall issue gun law, = 0
	(0.498)	(0.500)	(0.500)	otherwise
Stand Your Ground Law	0.167	0.117	0.136	= 1 if state has a stand-your-ground gun law, =
	(0.367)	(0.315)	(0.336)	0 otherwise
Minimum Possession Age	0.934	0.601	0.729	State minimum age requirement to possess a
	(0.235)	(0.484)	(0.438)	handgun
Background Check Law	0.457	0.184	0.289	= 1 if state requires background checks for
	(0.499)	(0.388)	(0.453)	private sales on firearms, = 0 otherwise
Trigger Lock Law	0.117	0.000	0.045	= 1 if state requires trigger locks to accompany
	(0.322)	(0.000)	(0.207)	dealer and private firearm sales, = 0 otherwise
N	529	853	1,382	

[a] If a CAP law is in effect for any portion of the year, the observation is included in this column.

Notes: Means are unweighted and standard deviations are in parentheses.