Effects of Concealed-Carry Laws on Violent Crime

Summary: Evidence that shall-issue concealed-carry laws may increase violent crime is limited. Evidence for the effect of shall-issue laws on total homicides, firearm homicides, robberies, assaults, and rapes is inconclusive.

In its review of existing studies examining shall-issue concealed-carry (or right-to-carry) laws, Hahn et al. (2005) found insufficient evidence for determining the effect of such laws on violent crime. The National Research Council (NRC) (2004) reviewed much of the same literature and reanalyzed data that were common to many of these analyses: a panel data set originally spanning 1977–1992, then expanded through 2000. These data were originally analyzed in Lott and Mustard (1997) and used again by Lott (2000) in revised analyses. Lott (2000) found that shall-issue laws decreased homicides, rapes, and assaults. Other researchers (e.g., Duggan, 2001; Ayres and Donohue, 2003a, 2003b) and NRC reanalyzed the same data but found different results, as well as significant sensitivity of results to specification. With one member dissenting, the NRC (2004) panel concluded,

Key Findings

Shall-issue concealed-carry laws have **uncertain** effects on *total* homicides, *firearm* homicides, robberies, assaults, and rapes.

Evidence for this relationship is **inconclusive**.

Studies with comparable methodological strengths identified inconsistent evidence for the policy's effect on an outcome, or a single study found only uncertain or suggestive effects. Read more about how we determined the strength of gun policy analysis research.

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> Some studies find that right-to-carry laws reduce violent crime, others find that the effects are negligible, and still others find that such laws increase violent crime. The committee concludes that it is not possible to reach any scientifically supported conclusion because of (a) the sensitivity of the empirical results to seemingly minor changes in model specification, (b) a lack of robustness of the results to the inclusion of more recent years of data (during which there were many more law changes than in the earlier period), and (c) the statistical imprecision of the results. The evidence to date does not adequately indicate either the sign or the magnitude of a causal link between the passage of right-to-carry laws and crime rates. Furthermore, this uncertainty is not likely to be resolved with the existing data and methods. If further headway is to be made, in the committee's judgment, new analytical approaches and data are needed.

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Among the studies since 2003 meeting our inclusion criteria, all examined shall-issue laws; none examined permitless-carry laws. Two studies were included in the NRC review (Helland and Tabarrok, 2004; Plassman and Whitley, 2003). Their findings were subsumed into the overarching NRC finding as described earlier. Among studies from the period after the NRC review, several built on and extended analyses of the county-level panel data used in previous studies. These include Roberts (2009); Moody et al. (2014); Aneja, Donohue, and Zhang (2014); and Durlauf, Navarro, and Rivers (2016). Other studies relied on state-level data, either in addition to or instead of county-level analyses. These studies include Aneja, Donohue, and Zhang (2014); Lott (2010); Rosengart et al. (2005); Grambsch (2008); Webster, Crifasi, and Vernick, (2014); and Gius (2014). Several studies used city-level data, including Kovandzic, Marvell, and Vieraitis (2005); La Valle and Glover (2012); and La Valle (2013). We first describe studies that primarily focused on county-level data. We then turn to studies that focused on state-level data, then studies that employed city-level data.

County-Level Studies

Many of the earliest studies examining the effects of shall-issue laws relied on county-level data, usually county-level data constructed for the Lott and Mustard (1997) report. Subsequent evaluations identified problems with the data for estimating the effects of laws. These problems included:

- Lott and Mustard's data set used county population values that did not correspond to the crime statistics available for counties, especially those with weak reporting of crime statistics (Maltz and Targonski, 2002).
- Large numbers of counties must be dropped from analyses using, for instance, murder rates as a covariate because the counties reported no murders (Ayres and Donohue, 2003a).
- There were errors in the classification of shall-issue states that were only later corrected in this data set.

Lott and Whitley (2003) discounted these concerns, describing them as typical of the types of measurement error commonly encountered in statistical analyses. Moreover, they suggested that even when county-level data were restricted to just those with comparatively low underreporting (where many of the noted problems would have less of an effect), they still observed trends consistent with the view that shall-issue laws reduce crime. NRC (2004) and Hahn et al. (2005), however, disagreed with this claim.

Ayres and Donohue (2009a, 2009b), noting some of the weaknesses of the county-level analyses, reported that some of the significant effects from Lott and Mustard (1997) and Lott (2000) were no longer significant after correcting coding errors. Moreover, Ayres and Donohue (2009a, 2009b) argued that Lott's spline and dummy specifications of the effects of laws were unduly influenced by states that implemented the laws earlier and thus had longer post-implementation periods affecting the estimates. Instead, using county panel data from 1977 to 1997 and a hybrid model that estimated the joint effect that the laws could be shown to have on the levels and trends observed for several crimes, the authors concluded that shall-issue laws were associated with increases in all crime types (with the exception of rape, for which evidence was mixed) in the five years after the laws were passed.

Roberts (2009) analyzed the effect of shall-issue laws on intimate partner homicide rates using county-level data spanning 1985–2004. The author found that (the more-restrictive) may-issue laws significantly increased intimate partner total homicides by 71 percent compared with shall-issue laws, but may-issue (compared to shall-issue) laws had an uncertain effect on intimate partner firearm homicides. The author also found uncertain effects of concealed-carry bans compared with shall-issue laws on either overall or firearm-related intimate partner

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homicides. However, neither analysis clustered standard errors at the state level, so serial correlation that was unaccounted for in the panel data could have resulted in biased standard errors and confidence intervals (CIs).

More recently, Aneja, Donohue, and Zhang (2014) analyzed the county-level data set used in NRC (2004), extended through 2006, and state-level data through 2010. The authors corrected the NRC analyses for several errors that they identified, including data-coding errors related to the timing of shall-issue legislation, an endogenous control variable (arrest rate), and a failure to cluster standard errors at the state level. The authors argued that NRC (2004) was incorrect in its decision not to cluster the standard errors of the county-level analyses at the state level and showed that CIs were badly misestimated when clustering was not accounted for. In their preferred county-level specification including state trend effects, they found no statistically significant effects of shall-issue laws on either the level or trend of any of seven crime rates, and they found only one suggestive effect across the 14 effects they tested.

Moody et al. (2014), responding to an earlier version of the Aneja, Donohue, and Zhang (2014) paper, reestimated their models after adding many more demographic control variables, robbery and assault rates, and a lagged outcome as a predictor meant to capture unmeasured state differences associated with crime rates. Moody et al. (2014) offered statistical tests suggesting that the model with added covariates predicted the data significantly better, which the authors interpreted as evidence that estimates in Aneja, Donohue, and Zhang (2014) suffered from omitted-variable biases. The revised hybrid model results in Moody et al. (2014) suggested that shall-issue laws significantly reduced the trends in rape and murder rates. They found no significant association between shall-issue laws and either assault or robbery. The fact that their model predicted a given outcome better than the Aneja, Donohue, and Zhang (2014) model is not sufficient to demonstrate the claim that the latter's model suffered from omitted variable bias, nor that the model preferred by Moody et al. (2014) offered a less biased estimate. An overfit model can predict the data exceptionally well while producing biased and unreliable coefficient estimates.

Using county-level panel data spanning 1979–2000, Durlauf, Navarro, and Rivers (2016) examined the sensitivity of analyses that estimate the relationship between shall-issue laws and violent crime. They reported that use of population weights may lead to inefficient estimates and upward biases in estimates of the effect of shall-issue laws on crime. In addition, they found that hybrid or spline models are preferred to dummy models and that models that allow for heterogeneity in the effect of laws (including effects that vary with region, the level of gun prevalence, and the level of urbanization in an area) outperform models that do not allow for variation in effects. For the spline model specifications that the authors assessed to perform best for the outcome of violent crime, they estimated that shall-issue laws increase violent crime in the first year after law passage and that violent crime

continues to increase in subsequent years. The authors concluded that, overall, there was substantial variation in the estimated effects for each model across the model space analyzed and, thus, there was little evidence that shall-issue laws generate either an increase or a decrease in crime on average.

State-Level Studies

Rosengart et al. (2005) examined the effect of several state gun laws, including shall-issue laws, on firearm homicides and total homicides using state-level data. One limitation was that the data covered only 1979–1998, and other studies have shown the sensitivity of results to shorter periods, partly because shorter periods include observation of fewer states that have adopted shall-issue laws. The policy variable was specified as a dummy variable (indicating that a shall-issue law was or was not in place). The authors found suggestive effects that shall-issue laws increased firearm and total homicide rates. French and Heagerty (2008) tested the sensitivity of these results and similarly concluded that shall-issue laws had a suggestive effect consistent with the laws increasing firearm-related homicide rates, although estimates varied across specifications. However, the Rosengart et al. (2005) paper, and presumably the French and Heagerty (2008) paper, also had an unfavorable ratio of model covariates to observations (less than one to eight), suggesting that the model may have been overfit, and thus its estimates and their CIs may be unreliable.

Martin and Legault (2005) demonstrated that Lott (2000) used incorrect state crime rate estimates that differed substantially from official Federal Bureau of Investigation (FBI) state estimates. They replicated Lott (2000)'s model despite misgivings about its specification to demonstrate that the effects Lott reported were sensitive to this measurement error. In their replication exercise using state-level crime data from the FBI's Uniform Crime Reports spanning 1977–1992, Martin and Legault (2005)'s estimates showed that shall-issue laws significantly reduced total violent crime and, specifically, aggravated assault. They found only suggestive effects that the laws reduced rates of robbery and murder, and uncertain effects on rape (see the figure below). However, as with Lott (2000), their models did not statistically adjust for serial correlation in the panel data, and the model's ratio of estimated parameters to observations was less than one to ten, meaning the model may have been overfit, and thus its parameter estimates and their CIs may be unreliable.

Grambsch (2008) conducted a state-level analysis of (total) murder rates (relative to the U.S. murder rate) from 1976 to 2001 using the 25 states that passed shall-issue laws between 1981 and 1996. She found a selection effect among states adopting shall-issue laws—namely, that states that passed shall-issue laws in this period experienced an increasing trend in murder rates prior to adoption relative to other states. Her estimates showed that, after controlling for regression to the mean, there was either an uncertain effect or a significant positive effect

of shall-issue laws on relative murder rates (i.e., shall-issue laws increased murder rates) depending on the model used.

Two studies that focused on assessing the relationship between unmarried fertility or abortions and violent crime included shall-issue laws as a covariate in their models (Kendall and Tamura, 2010; Lott and Whitley, 2007). Analyzing data from 1976 to 1998 and using a Poisson model that controlled for state and year fixed effects, state-specific linear trends, and time-varying state covariates, Lott and Whitley (2007) found suggestive or significant effects (depending on specification) indicating that murder rates fell approximately 1 percent faster after the adoption of shall-issue laws relative to states without such policies. Employing a different model specification over a longer period (1957–2002), Kendall and Tamura (2010) estimated that shall-issue laws had a suggestive but small association with reduced rates of murder and uncertain relationships with rape, robbery, and assault.

Using a panel of state data, Lott (2010) provided an update of his earlier analyses examining the effect of shall-issue laws on violent crime. His preferred specification included a set of dummy variables that indicated different time intervals before and after shall-issue legislation was in effect for states that passed such legislation. Many of Lott's modeling results were presented as figures and did not indicate statistical significance. Detailed results were provided only for an analysis of homicide rates. These included information on the statistical significance of each coefficient in the model but not for a test comparing post-implementation time intervals with pre-implementation time intervals. Lott interpreted the pattern of effects as demonstrating that homicides declined significantly after implementation of shall-issue laws, but he did not provide test statistics or sufficient description to clarify what specific effect was observed. The author also included coefficients and their statistical significance from dummy and spline models similar to those from his earlier work, but he did not include standard errors or test statistics. All of the preferred models appear to have a ratio of estimated parameters to observations that is less than one to ten, meaning the model may have been overfit, and thus the reported estimates and their CIs may be unreliable.

Webster, Crifasi, and Vernick (2014) analyzed state-level data from 1999 to 2010, using generalized least-squares regression models to estimate the effect of shall-issue laws on age-adjusted homicide rates. They found suggestive effects indicating an association between the implementation of shall-issue laws and a 10-percent increase in rates of nonfirearm homicide, a 6-percent increase in rates of total homicide, and an 11-percent increase in rates of murder and nonnegligent manslaughter. However, their estimates showed an uncertain association between shall-issue laws and firearm homicide rates. The statistical model used to arrive at these results used a large number of estimated parameters relative to observations (a ratio of about one to eight), meaning the model may have been overfit, and thus its estimates and

their apparent statistical significance could provide little generalizable information about the true causal effects of shall-issue laws. In addition, the assumptions of least-squares regression models are typically violated when modeling rate data for which many observations have values close to zero. This too could cause this model's estimates to be unreliable.

Gius (2014) examined the effect of shall-issue laws on gun-related murder rates using state-level data from 1980 to 2009. He found that states with may-issue or more-restrictive policies had higher gun-related murder rates than shall-issue states. Relative to states with shall-issue laws, states with more-restrictive firearm-carry policies had rates of firearm homicide that were 11 percent higher (see the figure below). However, this model did not statistically adjust for the known serial correlation in this panel data, which has been shown to result in misleadingly small standard errors (Aneja, Donohue, and Zhang, 2014). For this reason, the apparently significant effect observed in this study could be invalid.

Using their preferred specification with state-level data from 1979 to 2010 and a dummy, spline, or hybrid specification of shall-issue laws without state trends, Aneja, Donohue, and Zhang (2014) found suggestive evidence that shall-issue laws increase assault by 8 percent (see the figure below). In the dummy specification, shall-issue laws significantly increased rape by 12 percent, although estimates of this effect from the spline model were uncertain. The authors also found suggestive evidence that shall-issue laws increased rates of robbery, although estimates again became uncertain in other specifications. Effects of shall-issue laws on murder rates were uncertain. The authors tested the sensitivity of their results to less-parsimonious (including the Lott and Mustard [1997] specification) and more-parsimonious demographic specifications; the inclusion of state-specific time trends; the inclusion or exclusion of years that were likely to be influenced by the crack cocaine epidemic, which affected crime rates; and the specification of the policy variable (dummy, spline, hybrid). The authors noted that their results, which showed that the significance and sign of estimated effects varied substantially depending on the specification employed, underscored the sensitivity of gun-crime modeling estimates to modeling decisions.

Responding to an earlier version of the Aneja, Donohue, and Zhang (2014) paper, Moody et al. (2014) critiqued the decision to treat models without state-specific trends as the preferred ones. Thus, Moody et al. (2014) reestimated the hybrid models in Aneja, Donohue, and Zhang (2014) and incorporated the state-specific trends and their additional covariates into the corresponding county-level analyses. In doing so, the authors found, as they had with their county-level analyses, that their specification improved model fit over that of Aneja, Donohue, and Zhang (2014). These hybrid models found that shall-issue laws significantly increased assault rate trends and increased robbery rate levels, but they also significantly reduced murder rate trends. As noted earlier, Moody et al. (2014) did not demonstrate either that their model estimates were less biased than those in Aneja, Donohue, and Zhang (2014) or

that the latter's model suffered from omitted variable biases. Furthermore, the state-level - analyses of Moody et al. (2014) used a statistical model with a large number of estimated parameters relative to observations (close to one to five), meaning the model may have been overfit, and thus the estimates and inferential statistics may provide little generalizable information about the true causal effects of shall-issue laws.

City-Level Studies

Kovandzic, Marvell, and Vieraitis (2005) examined the effect of shall-issue laws on violent crime (homicide, robbery, assault, and rape) using panel data from 1980 to 2000 for 189 large U.S. cities. The authors clustered the standard errors at the state level, addressed coding errors in previous research, allowed for a time trend in the effect of shall-issue laws, allowed for city-specific time trends, and conducted analyses that allowed for heterogeneity in the effect of shall-issue laws across states. In their analysis that estimated the average effect of shall-issue laws for all included cities using a dummy model specification, Kovandzic, Marvell, and Vieraitis (2005) found uncertain effects for all of the violent crime outcomes analyzed. These findings were largely consistent when they instead modeled the effects of shall-issue laws as a trend variable, except that their preferred spline models showed effects consistent with shall-issue laws increasing assault rates (a significant effect) and increasing rape rates (a suggestive effect). Their estimates for the effect on assault suggest that shall-issue laws are associated with a 10-percent increase in aggravated assault rates after five years. In examining state-specific effects with their spline models, the authors further found that there were more states where shall-issue laws led to statistically significant increases in crime compared with decreases. However, this study had an unfavorable ratio of model covariates to observations (less than one to ten), meaning the model may have been overfit, and thus its estimates and CIs may be unreliable indicators of the true effects of the laws.

La Valle (2013) analyzed data from 56 cities spanning 1980–2010. The author noted that the analyses "include statistical corrections for variation in sample unit independence," but he did not explicitly mention clustering the standard errors at the state level. La Valle (2013) used a dummy variable specification for the shall-issue law. In his preferred specification (using interpolated control variables for inter-censal years, population weighted analysis, and a one-year lagged outcome as a covariate), he found that shall-issue laws significantly reduced gun homicides by 15 percent and total homicides by 13 percent (see the figure below). Results were sensitive to specification, however, and other authors (e.g., Kovandzic, Marvell, and Vieraitis, 2005; Durlauf, Navarro, and Rivers, 2016) have expressed concern that weighting gives undue influence to localities with large populations and worsens, rather than improves, standard error estimation. In unweighted analyses using inter-censal years, La Valle (2013) found that shall-issue laws reduced gun homicides but not total homicides. In La Valle and Glover (2012),

which used similar data (panel data on 57 cities from 1980 to 2006) and a similar approach, the authors included separate indicators for may-issue and shall-issue states. In the authors' preferred analysis (with interpolated data for controls for inter-censal years and weighting), shall-issue laws were associated with a significant 23-percent increase in the homicide rate, and may-issue laws were associated with a significant 19-percent decrease in the homicide rate (compared with cities that did not clearly have either a may-issue or shall-issue law). Similarly, shall-issue laws were associated with a significant 32-percent increase in the firearm homicide rate, while may-issue laws were associated with a significant 33-percent reduction in the firearm homicide rate. (No estimates for unweighted data with inter-censal years were provided.) The diametric findings from these two studies further highlight the sensitivity of results to model specification, as well as to how shall-issue laws are classified.

Other Studies

Manski and Pepper (2015) investigated the sensitivity of shall-issue effect estimates to a range of assumptions by comparing property and violent crime rates in two states under progressively less-restrictive assumptions about how the laws' effects may vary over time or between states. This study compared outcomes in just two states, meaning causal effects were not well identified. Moreover, it treated Virginia's shall-issue law as having been implemented in 1989, when we believe the correct date is 1995. For these reasons, we do not review this paper's results. Applying Bayesian model comparison techniques, Strnad (2007) reanalyzed Donohue (2004) models of the effects of shall-issue laws. In contrast to the approach of Donohue (2004) and many others, Strnad (2007) did not assess the evidence for or against shall-issue laws in terms of how frequently estimates of the effect were statistically significant or were found to have positive (as opposed to negative) estimated effects under different model specifications. Instead, he used model comparison techniques to establish which models fit the data best and to evaluate whether evidence favored models with or without shall-issue effects. He concluded that Donohue (2004)'s models provided much stronger support for a conclusion that shall-issue laws had little or no effect on most outcomes than Donohue (2004) concluded after examining patterns in the direction and significance levels of these effects.

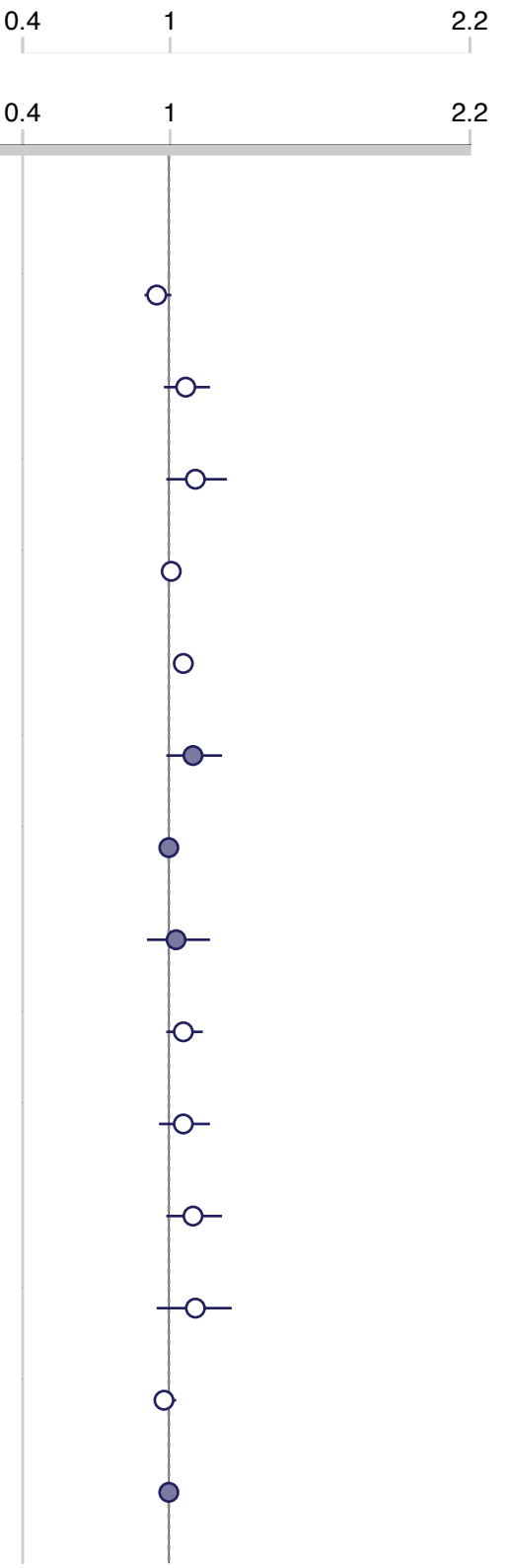
The figure below displays the incidence rate ratios (IRRs) and CIs associated with the concealed-carry laws examined in the studies published after the NRC (2004) review. In this figure, we highlight effect estimates based only on dummy-coded models, for reasons discussed in the methodology description and the essay on methodological challenges to identifying the effects of gun policies. Lott (2010) did not provide enough information for us to calculate IRRs and CIs for the effect size of interest, so we do not include these in the figure. In addition, the estimates in Durlauf, Navarro, and Rivers (2016) were available only for

the spline specification; Kovandzic, Marvell, and Vieraitis (2005) preferred their own spline model; Moody and Marvell (2009) and Moody et al. (2014) offered only a hybrid model; and Manski and Pepper (2015) and Strnad (2007) did not seek to produce a preferred estimate of the effect of shall-issue laws. Therefore, we do not include estimates from these studies in the figure below.

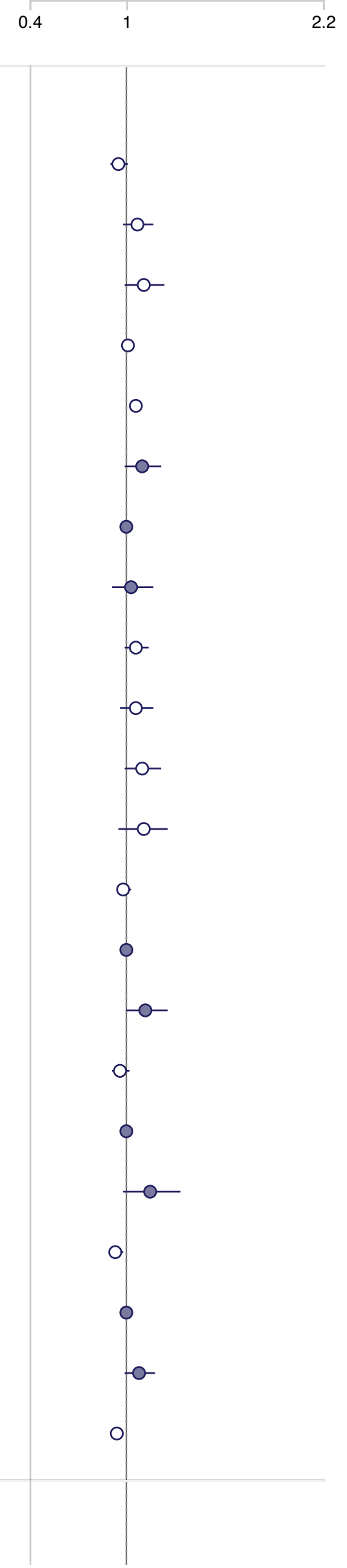
Incidence Rate Ratios Associated with the Effect of Concealed-Carry Laws on Violent Crime

HOW TO READ THIS CHART

Study, by Policy	Outcome Measure	Effect Size (IRR) [95% CI]
Shall issue (vs. may issue or no issue)	**Homicide**	
Martin & Legault (2005)	Murder rate	0.95 [0.90, 1.01]
Rosengart et al. (2005)	Total homicides	1.07 [0.98, 1.17]
Rosengart et al. (2005)	Firearm homicides	1.11 [0.99, 1.24]
Grambsch (2008)	Murder rate (random effects model)	1.01 [0.98, 1.03]
Grambsch (2008)	Murder rate (fixed effects model)	1.06 [1.03, 1.09]
French & Heagerty (2008)	Firearm homicides	1.10 [0.99, 1.22]
Kendall & Tamura (2010)	Murder rate	1.00 [0.99, 1.00]
Aneja, Donohue, & Zhang (2014)	Murder	1.03 [0.91, 1.17]
Webster, Crifasi, & Vernick (2014)	Total homicides	1.06 [0.99, 1.14]
Webster, Crifasi, & Vernick (2014)	Firearm homicides	1.06 [0.96, 1.17]
Webster, Crifasi, & Vernick (2014)	Nonfirearm homicides	1.10 [0.99, 1.22]
Webster, Crifasi, & Vernick (2014)	Murder and non-negligent manslaughter	1.11 [0.95, 1.26]
Martin & Legault (2005)	Rape rate	0.98 [0.94, 1.03]
Kendall & Tamura (2010)	Rape rate	1.00 [0.99, 1.00]



Aneja, Donohue, & Zhang (2014)	Rape	1.12 [1.00, 1.26]
Martin & Legault (2005)	Robbery rate	0.96 [0.91, 1.02]
Kendall & Tamura (2010)	Robbery rate	1.00 [1.00, 1.00]
Aneja, Donohue, & Zhang (2014)	Robbery	1.15 [0.98, 1.34]
Martin & Legault (2005)	Aggravated assault	0.93 [0.89, 0.98]
Kendall & Tamura (2010)	Assault rate	1.00 [1.00, 1.00]
Aneja, Donohue, & Zhang (2014)	Assault	1.08 [0.99, 1.18]
Martin & Legault (2005)	Violent crime	0.94 [0.91, 0.98]
May issue (vs. shall issue)	**Homicide**	
Roberts (2009)	Total intimate partner homicides	1.71 [1.29, 2.14]
Roberts (2009)	Firearm intimate partner homicides	1.12 [0.87, 1.37]
No concealed carry (vs. shall issue)	**Homicide**	
Roberts (2009)	Total intimate partner homicides	0.96 [0.55, 1.38]
Roberts (2009)	Firearm intimate partner homicides	0.86 [0.49, 1.23]
Shall issue or may issue (vs. no concealed carry)	**Homicide**	
La Valle (2013)	Total homicides	0.87 [0.77, 0.98]
La Valle (2013)	Firearm homicides	0.85 [0.73, 0.98]
Gius (2014)	Firearm homicides	1.11 [1.05, 1.16]
Shall issue (vs. no issue)	**Homicide**	
La Valle & Glover (2012)	Total homicides	1.23 [1.05, 1.44]
La Valle & Glover (2012)	Firearm homicides	1.32 [1.14, 1.52]
May issue (vs. no issue)	**Homicide**	
La Valle & Glover (2012)	Total homicides	0.81 [0.71, 0.92]
La Valle & Glover (2012)	Firearm homicides	0.77 [0.66, 0.90]



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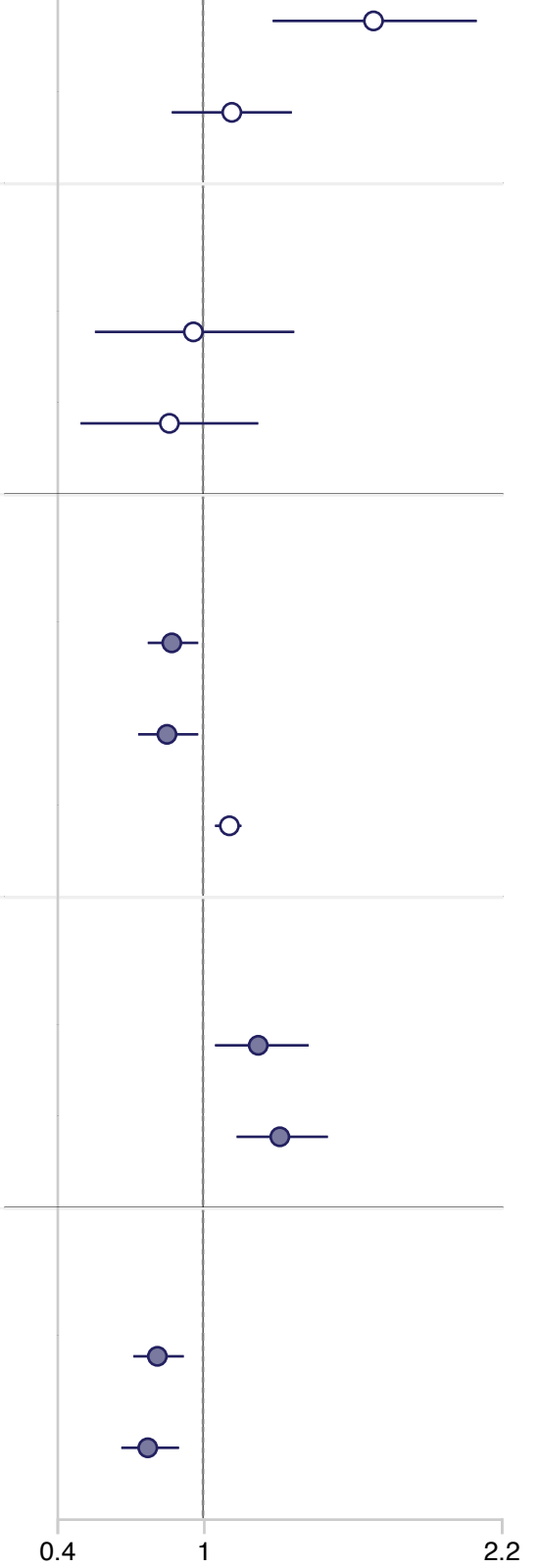
La Valle & Glover (2012)	Firearm homicides	0.77 [0.66, 0.90]



NOTE: IRR values marked with empty circles indicate that we identified concerns with the study's methodology, and these concerns are described in the text above. Filled circles indicate that we identified no significant methodological concerns.

Conclusions

We focused our review on studies examining the effects of concealed-carry laws on violent crime outcomes since NRC (2004) and Hahn et al. (2005) found that estimates of such effects were too sensitive to reasonable differences in methods to draw conclusions about the direction or magnitude of the laws' effects. Because so much more study has been done of this relationship than of any other gun policy and outcome, there is a much richer evidence base to draw on, including studies raising serious methodological concerns and several that did not raise as many concerns among our methodology review team. Therefore, to focus this review on the best available evidence, we draw our conclusions in this section based just on those

seven studies that did not raise serious methodological concerns.

Total homicides. Five of the seven studies examined the effects of shall-issue laws on total homicides. Two studies found only uncertain effects of these laws (Aneja, Donohue, and Zhang, 2014; Kendall and Tamura, 2010); Moody et al. (2014) found that shall-issue laws cause a downward trend in homicides; La Valle and Glover (2012) found that shall-issue laws increased homicides significantly relative to having no law for the legal carriage of a concealed firearm (*no-issue laws*); and La Valle (2013) found that shall-issue or may-issue laws reduce total homicides relative to no-issue laws. This result cannot be used to distinguish the effect of shall-issue laws per se, but it suggests that either shall-issue, may-issue, or both contribute to reducing total homicides. Because comparable studies reach inconsistent results, we conclude that the best available studies provide *inconclusive evidence for the effect of shall-issue laws on homicides*.

Firearm homicides. Three of the seven studies examined the effects of shall-issue laws on firearm homicides. Among these, there was one suggestive (French and Heagerty, 2008) and one significant (La Valle and Glover, 2012) effect, suggesting that these laws increase firearm homicides. La Valle (2013) found that shall-issue or may-issue laws cause decreases in firearm homicide rates relative to no-issue laws. This result cannot be used to distinguish the effect of shall-issue laws per se, but it suggests that either shall-issue, may-issue, or both contribute to reducing firearm homicides. With seemingly conflicting evidence, we conclude that the best available studies provide *inconclusive evidence for the effect of shall-issue laws on firearm homicides*.

Robberies. Aneja, Donohue, and Zhang (2014) found a suggestive effect that shall-issue laws may increase robbery rates. Moody et al. (2014) and Kendall and Tamura (2010) found only uncertain effects of shall-issue laws on robberies. Therefore, we conclude that the best available studies provide *inconclusive evidence for the effect of shall-issue laws on robberies*.

Assaults. Aneja, Donohue, and Zhang (2014) found a suggestive effect that shall-issue laws may increase assault rates. Moody et al. (2014) and Kendall and Tamura (2010) found only uncertain effects of shall-issue laws on assault. Therefore, we conclude that the best available studies provide *inconclusive evidence for the effect of shall-issue laws on assaults*.

Rapes. Aneja, Donohue, and Zhang (2014) found that shall-issue laws significantly increase rates of rape. Moody et al. (2014) found that shall-issue laws produce a significant downward trend on rates of rape. Kendall and Tamura (2010) found only uncertain evidence of an association between shall-issue laws and rape. Therefore, we conclude that the best available studies provide *inconclusive evidence for the effect of shall-issue laws on rapes*.

Violent crime. One study—Durlauf, Navarro, and Rivers (2016)—aggregated all violent crimes

into a single category and found that shall-issue laws significantly increase violent crime rates. Because evidence for the effect of shall-issue laws on each component of violent crime is inconclusive, it could be argued that this single study of the effect of these laws on all violent crimes should not suffice to suggest that there is more than inconclusive evidence for such an effect. However, because analyses on all violent crimes may have greater power to detect any such effects, and because our scoring criteria indicate it, we conclude that there is *limited evidence that shall-issue laws may increase violent crime*.

CONCEALED-CARRY LAWS VIOLENT CRIME

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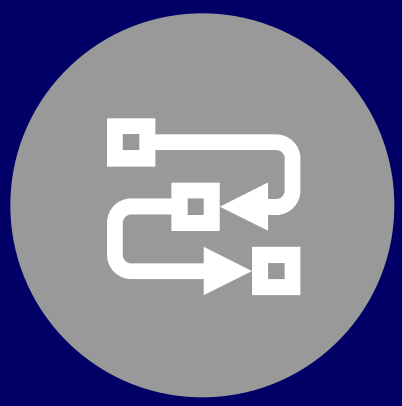

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