

Right-to-Carry Laws and Firearm Workplace Homicides: A Longitudinal Analysis (1992–2017)

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Objectives. To examine the impact of right-to-carry (RTC) firearm laws on firearm workplace homicides (WPHs) in the United States from 1992 to 2017.

Methods. We employed 2 longitudinal methods to examine the average effect (pooled, cross-sectional, time-series analysis) and the state-specific effect (random effects meta-analysis) of RTC laws on WPHs committed by firearms from 1992 to 2017 in a 50-state panel. Both methods utilized a generalized linear mixed model with a negative binomial distribution.

Results. From 1992 to 2017, the average effect of having an RTC law was significantly associated with 29% higher rates of firearm WPHs (95% confidence interval [CI] = 1.14, 1.45). No other state-level policies were associated with firearm WPHs. Sensitivity analyses suggest robust findings. State-specific estimates suggest that passing an RTC law during our study period was significantly associated with 24% increase in firearm WPH rates (95% CI = 1.09, 1.40).

Conclusions. This is the first study to our knowledge to examine the link between RTC firearm laws and firearm WPHs. Findings indicate that RTC laws likely pose a threat to worker safety and contribute to the recent body of literature that finds RTC laws are associated with increased incidence of violence. (*Am J Public Health.* 2019;109:1747–1753. doi:10.2105/AJPH.2019.305307)

In 2017, there were 458 workplace homicides (WPHs), defined as a homicide in which an employee or owner is killed while working, in the United States.¹ The majority (76.6%) of these homicides were committed by firearm (n = 351).¹ While greater than 80% of WPH decedents are male,^{2,3} WPHs have been either the first or second leading cause of death among female workers for many years.⁴ In 2015, 43% of female WPH victims were killed by intimate partners or relatives, compared with 2% of male WPH victims.⁵ A study of workplaces in North Carolina from 1994 to 1998 found that workplaces that allowed employee access to firearms had nearly 5-times-greater odds of having a WPH compared with workplaces that prohibited weapons.⁶

A recent national epidemiological investigation of firearm WPHs identified that the circumstances around these crimes have changed. Investigations of WPH etiology in the 1990s found that approximately 80% of these crimes were committed in the course of

robbery.^{7,8} New evidence from 2011 to 2015 found that robberies accounted for only 47% of WPHs, with the majority of firearm WPHs now being committed in the course of non-robbery events, chiefly as part of arguments and other forms of interpersonal violence.⁹ The authors hypothesized that changes in firearm exposure in workplaces may be contributing to the change in firearm WPH etiology.⁹ Importantly, research has found that workplace violence prevention measures aimed at preventing robbery-motivated WPHs do not easily translate into preventing non-robbery-motivated WPHs.¹⁰

Over the past 26 years, the adoption of shall-issue concealed carry laws, or right-to-

carry (RTC) laws, by the majority of US states has, by design, likely increased firearm exposure in the general population. States with RTC laws either issue permits to carry a concealed firearm on a “shall”-issue basis, giving no discretion to authorities over who can carry a concealed firearm, or do not require a permit to carry a concealed firearm.^{11,12} These laws effectively lower the barrier to entry for who can legally carry a concealed firearm in public.

Disagreement in the literature regarding the impact of RTC laws on violent crimes has existed for many years. Previous work from Lott and Mustard touting the protective effects of RTC laws on violent crimes progressed the “more guns, less crime” hypothesis.¹³ Although the statistical methods used to derive Lott and Mustard’s hypothesis were largely dismissed by the 2005 National Research Council’s Report on Firearms and Violence,¹⁴ their research was used as evidence to support the passing of new RTC laws in 25 states¹¹ from 1992 to 2017. Much of the evidence from the mid-2000s showed null findings regarding the relationship between RTC laws and various violent crime outcomes.^{15,16} However, recent examinations of the impact of RTC laws on violent crime suggest that these laws are associated with increased levels of violent crimes. These analyses have included various causal methodologies and additional years of data compared with analyses from the mid-2000s.^{11,12,17} Their findings all suggest a likely relationship between RTC laws and violent crimes and homicides in particular.

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Donohue et al. identified that RTC laws were associated with 13% to 15% greater rates of violent crimes 10 years after adoption by using synthetic control models.¹² Crifasi et al. found that RTC laws were associated with an increase (4%) in firearm homicides in large urban US counties by using a generalized linear mixed model, with random effects at the county level.¹⁷ Siegel et al. found that RTC laws were associated with 8.6% higher firearm homicide rates by using a fixed-effects panel analysis, modeling firearm homicides as counts and rates.¹¹

RTC laws, and consequent increased firearm carrying in the general population, could potentially have an impact on firearm WPH incidence. As studies suggest that gun carrying potentially emboldens aggressive behaviors,^{18,19} arguments between co-workers or ex-co-workers, customers—employees, and domestic partners may turn deadly as a result of access to lethal means. Furthermore, those carrying a concealed weapon may intervene in a well-intentioned way—to thwart crime, for example—only to unintentionally induce fatal violence.¹²

Given the potential ways RTC laws may have an impact on firearm WPH, we analyzed the relationship between these laws and firearm WPHs from 1992 to 2017 by using 2 longitudinal methodologies. We hypothesized that states removing barriers to civilian gun carrying would experience higher rates of WPH by firearm.

METHODS

We conducted a pooled, cross-sectional, time-series analysis across a 50-state panel to examine the average effect of RTC firearm laws on firearm WPHs from 1992 to 2017 in the United States. We also conducted a random-effect meta-analysis to produce state-specific effect sizes. We used a generalized linear mixed model with a negative binomial distribution for both estimations.

Variables and Data Sources

Our dependent variable was counts of firearm WPHs by state and year. We obtained these data via public data request from the Census of Fatal Occupational Injuries (CFOI), maintained by the Bureau of

Labor Statistics (BLS). CFOI is the most comprehensive database of workplace deaths within the United States. For inclusion in CFOI, the decedent must be an employee or employer killed in the act of working and each death must be verified with at least 2 independent source documents (e.g., medical examiner's report, police report, workplace injury report, media).²⁰ Of note, non-employees killed in workplaces are not considered WPHs.

In addition to the presence or absence of RTC laws, we included the following state-level statutes as predictors in our analysis: permit-to-purchase laws,²¹ parking-lot laws,²² stand-your-ground laws,¹⁷ firearm prohibition laws for those convicted of a violent misdemeanor,^{23,24} firearm prohibition laws that allow dating partners to petition for a domestic violence restraining order,²⁴ and firearm prohibition laws that allow ex-parte domestic violence restraining orders.²⁴ These laws were included in the analysis as they have either previously displayed significant relationships with firearm homicides in the general population or, in the case of parking lot laws, may directly affect firearm exposure in the workplace. Sixteen states passed laws specifically aimed at securing employee firearm access while at work via their motor vehicles, referred to as parking lot laws, from 2003 to 2013.²² As these laws have not been evaluated, their impact is unclear. However, these laws prohibit businesses from restricting employees from keeping guns in cars parked in company lots.²⁵

To analyze the effect of these laws over time, we coded each law as “0” in the years before the law took effect, as a fraction of months the law was in effect in its first year, and as “1” for all subsequent years. We ascertained effective dates for all laws through legal research and checked them against existing literature for accuracy^{22,24,26} (see Table A, available as a supplement to the online version of this article at <http://www.ajph.org>, for effective dates).

We included several state-level covariates potentially associated with the relationship between workplace homicides and RTC laws. A priori variables selected for inclusion were a proxy measure for household gun availability,^{27,28} state firearm homicide rate,^{11,12,17} state expenditure on law enforcement,^{17,21,29} the percentage of the population living in a metropolitan statistical

area (MSA),²¹ percentage of employees working in the retail industry,^{2,30} and number of employed persons. We obtained law enforcement expenditure, which was available from 1992 to 2015, via the US Census Bureau.³¹ As such, law enforcement expenditure was linearly interpolated for 2016 and 2017 by state. We obtained number of persons employed and the percentage of employees working in the retail industry from the Current Employment Survey through the BLS.³² We used the percentage employed persons working in retail to account for the difference in size of states' retail employment, as the retail industry is known to have higher rates of robbery-motivated WPH compared with other industries.^{2,30}

Household gun availability is the ratio of firearm suicides to overall suicides and was calculated with data from the Centers for Disease Control and Prevention's Web-based Injury Statistics Query and Reporting System (WISQARS).³³ This proxy measure is widely used in longitudinal firearm policy analysis for both homicide and suicide outcomes^{17,21,27–29,34–41} and was validated using Behavioral Risk Factor Surveillance System survey data from 2001, 2002, and 2004, years during which respondents were asked about firearm ownership. We obtained state firearm homicide rates from WISQARS.³³

Other included state-level demographics were the percentage of the state population who reported being Black,³ married, male,³ living in poverty,^{11,17} part of a union,⁴² and high-school graduates, and the household median income.¹¹ We obtained state-level demographics, including MSA, from the Current Population Survey microdata available through the Integrated Public Use Microdata Series.⁴³ We obtained census regions,³ stratified into Northeast, Midwest, West, and South, from the US Census Bureau.³¹ We tested but ultimately excluded percentage of the state reporting being White³ and percentage of the state reporting being aged 65 years or older³ because of lack of significant relationship with the outcome. (See Table B, available as a supplement to the online version of this article at <http://www.ajph.org>, for correlation matrix with state-level demographic covariates.)

Analysis

To evaluate the average effect of having an RTC law and the state-specific effect of

passing an RTC law on firearm WPHs, we used a generalized linear mixed model specifying a negative binomial distribution, clustered robust sandwich estimators of the variance within each state, and state and year fixed effects. We used the natural log of number of employed persons as our population offset, interpreting results as incidence rate ratios (IRRs). We included all variables and firearm laws in both the average effect and the state-specific effect model. We specified an independent correlation structure to model the intrastate correlation over time. French and Heagerty found a heterogeneous policy effect of RTC laws on population-level homicide rates.¹⁶ Thus, we included a random intercept term to account for variation in firearm WPHs within states and a random slope term for RTC laws to address the law's heterogeneous effect across states.¹⁶

We conducted several additional sensitivity analyses on the average effect model, which included the following:

1. We assessed the impact of RTC laws in the first full year they were in effect, modeling a delayed effect for the laws'

impact (Lott and Mustard model). We modeled the impact of RTC laws in this fashion to mirror Lott and Mustard's effect modeling from 1997.¹³

2. We restricted the average effect model to the years 1998 to 2017.^{11,44}
3. We modified the average effect model to exclude all variables related to violent crime that could potentially confound the outcome (Lean model).⁴⁴
4. We restricted the Lean model to the years 1998 to 2017. We chose to restrict the models from 1998 to 2017 to address confounding related to the crack cocaine epidemic. This period also coincides with the total number of WPHs leveling off after steep declines starting in 1994 (Figure 1).

As an additional sensitivity analysis, we included a placebo test of workplace deaths related to falls, which includes falls to the same level and falls to a lower level.

We evaluated the state-specific effect of passing an RTC law on firearm WPHs by fitting the generalized linear mixed model with (1) 50 state indicator variables and (2) interaction terms between RTC laws and each of the 25 states that passed an RTC law

during the study period.¹⁶ The IRRs produced by the interaction terms represented the ratio of incidence rates comparing after implementation to before implementation for a given state. We conducted all statistical analyses with Stata version 15.0 (StataCorp LP, College Station, TX).

State and year indexed public data requests from CFOI contain a potential limitation. In accordance with federal-state cooperative agreements with all 50 states, BLS releases aggregate data by state-year index when counts are 1 or greater unless the state-year index contains a single death and that death is not a matter of public record (i.e., CFOI confirmed the death through private documents only).⁴⁵ For this study, 13 502 of the 13 866 (97.4%) firearm WPHs from 1992 to 2017 were included in our data request. Those 13 502 deaths were presented across 900 of the possible 1300 state-year indices (26 years*50 states). To check whether the missing 2.6% of data affected our analysis, we ran the average effect analysis in 2 ways: (1) a complete case analysis, using only the positive integer counts provided in the data request, and (2) as a total population analysis, assuming all censored state

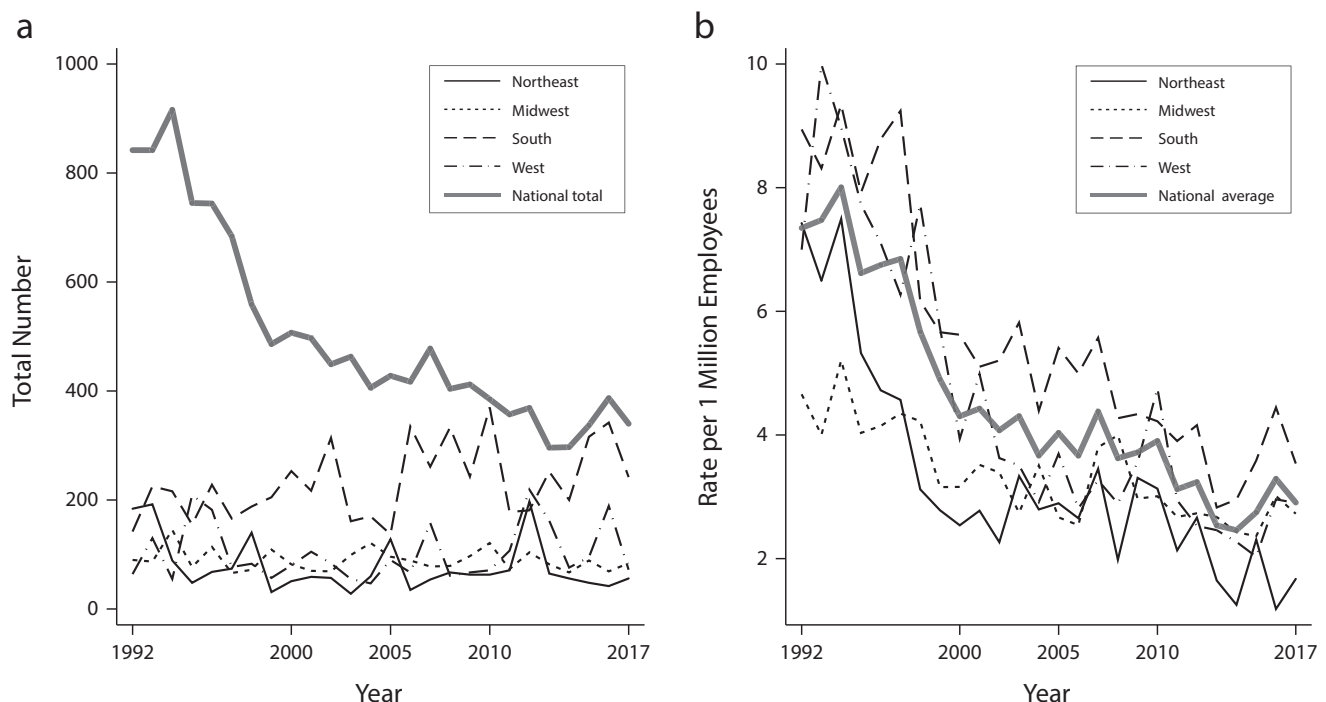


FIGURE 1—Firearm Workplace Homicide (a) Total Counts and (b) Average Rates: United States, 1992–2017

and year data points to be “0,” ignoring the censored 2.6% of data.

RESULTS

Figure 1 displays the national and regional trends of firearm WPH counts and rates per 1 million employees. The total number of firearm WPHs dropped precipitously from 1992 to 1998, and has been gradually declining over the past 20 years (Figure 1). Firearm WPH rates also sharply declined in the beginning years of this study, with a more gradual decline starting at the turn of the 21st century. Southern states accounted for the largest portion of firearm WPH counts in almost every year and were above the national average rate in every year. Table C (available as a supplement to the online version of this article at <http://www.ajph.org>) provides the counts and rates of firearm WPHs by state and year.

Table 1 presents the average effect size of RTC laws and 6 other laws on firearm WPHs. In the complete case analysis (CCA), states with RTC laws had 1.29 times greater rates of firearm WPH when we controlled for all other confounders. In the total population analysis (TPA), RTC states had 1.34 times

greater rates compared with non-RTC states. The 95% confidence intervals (CIs) for the average effect for the CCA (1.14, 1.45) and the TPA (1.16, 1.54) were similar, suggesting comparable spreads around each model's effect size. No other firearm policies displayed significant associations with firearm WPH rates across both types of analyses.

The coefficients for region displayed large differences across analysis methods. For example, Southern states showed no significant differences in firearm WPH rates compared with Northeastern states in the CCA, yet were associated with 10.378 times greater rates of firearm WPH rates in the TPA. We elected to use the CCA to conduct our sensitivity analyses and to produce state-specific effects as it had a more conservative estimate of the relationship between RTC laws and firearm WPHs with a slightly smaller 95% CI compared with the TPA.

Sensitivity Analyses

The sensitivity analyses for the average effect model displayed similar, significant associations between RTC laws and firearm WPH incidence (Table 2). When the effect of state laws was modeled with the Lott and Mustard method, RTC laws were associated

with 26.6% higher firearm WPH rates compared with non-RTC states (95% CI = 1.12, 1.42). Restricting the average-effect model to 1998 to 2017 maintained a significant relationship between RTC laws and firearm WPHs (IRR = 1.21; 95% CI = 1.02, 1.43). When the model excluded variables that could potentially confound the relationship between firearm WPH and RTC laws (Lean model), we found RTC states had a 33.4% greater rate of firearm WPHs (95% CI = 1.11, 1.59). Restricting the Lean model from 1998 to 2017 displayed significant relationships between RTC states and increased firearm WPH rates (IRR = 1.26; 95% CI = 1.06, 1.49). Fall-related workplace deaths, used as a negative control, were not associated with any of the included state firearm laws (IRR = 1.02; 95% CI = 0.94, 1.10).

State-Specific Effects

Our examination of state-specific effects of passing an RTC law suggested similar findings to the average effect of having an RTC over the study period. Figure 2 displays the IRRs associated with passing an RTC law for the 25 states that did so between 1992 and 2017 (see

TABLE 1—Effect of State Firearm Policies on Firearm-Related Workplace Homicides, All 50 States: United States, 1992–2017

	Complete Case Analysis (State-Year Indices = 900), IRR (95% CI)	Total Population Analysis (State-Year Indices = 1300), ^a IRR (95% CI)
State firearm laws		
Right-to-carry	1.29 (1.14, 1.45)	1.34 (1.16, 1.54)
Permit-to-purchase	0.97 (0.77, 1.21)	0.98 (0.81, 1.18)
Parking lot laws	1.04 (0.87, 1.23)	0.96 (0.80, 1.15)
Stand your ground	0.94 (0.81, 1.08)	0.91 (0.76, 1.07)
Domestic violence restraining order—dating partners	1.00 (0.89, 1.12)	0.99 (0.87, 1.13)
Domestic violence restraining order—ex parte orders	0.91 (0.78, 1.05)	0.91 (0.78, 1.04)
Violent misdemeanor	1.10 (0.96, 1.24)	1.12 (0.96, 1.30)
Region (Ref: Northeast)		
Midwest	1.18 (0.46, 2.90)	10.38 (4.34, 24.82)
West	0.68 (1.03, 8.72)	5.80 (3.79, 8.87)
South	1.11 (0.83, 3.56)	0.39 (0.33, 0.44)

Note. CI = confidence interval; IRR = incidence rate ratio. The model also included state and year fixed effects; homicide rate; law enforcement expenditure linearly interpolated for 2016 and 2017; household firearm availability as a ratio of firearm suicides to total suicides; percentage population Black, married, living in a metropolitan statistical area, living in poverty, part of a union, and graduated high school; household median income; and percentage of workers in the retail sector. The model used the natural log of employment as its population offset, random intercepts for between-state workplace homicides, and random policy effect of right-to-carry laws. Within-state correlation was structured as independent, and robust standard errors were clustered by state. We generated estimates via a public data request from the Bureau of Labor Statistics' Census of Fatal Occupational Injury data. The views expressed here do not necessarily reflect the views of the Bureau of Labor Statistics. Included in the initial analysis, but ultimately not used because of lack of correlation was percentage of the population White and percentage of the population aged 65 years or older (see Table B, available as a supplement to the online version of this article at <http://www.ajph.org>, for correlation matrix).

^a50 states by 26 years.

TABLE 2—Sensitivity Analyses of Relationship Between Right-to-Carry Laws and Firearm-Related Workplace Homicides in the United States, Using Complete Case Analysis: 1992–2017

State Firearm Laws	Sensitivity Models				
	Lott and Mustard Model, ^a IRR (95% CI)	Average-Effect Model, 1998–2017, ^b IRR (95% CI)	Lean Model, ^c IRR (95% CI)	Lean Model, 1998–2017, IRR (95% CI)	Occupational Deaths by Falls, ^d IRR (95% CI)
Right-to-carry	1.27 (1.12, 1.42)	1.21 (1.02, 1.43)	1.33 (1.11, 1.59)	1.26 (1.06, 1.49)	1.02 (0.94, 1.10)
Permit-to-purchase	0.92 (0.72, 1.18)	1.03 (0.87, 1.21)	...	...	0.94 (0.68, 1.03)
Parking lot laws	1.07 (0.91, 1.26)	1.01 (0.84, 1.22)	...	...	0.94 (0.89, 1.26)
Stand your ground	0.93 (0.80, 1.06)	0.94 (0.80, 1.09)	...	...	0.98 (0.79, 1.07)
Domestic violence restraining order—dating partners	1.01 (0.91, 1.12)	0.95 (0.81, 1.10)	...	...	1.01 (0.91, 1.16)
Domestic violence restraining order—ex parte orders	0.91 (0.78, 1.04)	1.01 (0.90, 1.15)	...	...	1.00 (0.77, 1.04)
Violent misdemeanor	1.09 (0.96, 1.23)	1.07 (0.93, 1.24)	...	...	1.07 (0.92, 1.24)

Note. CI = confidence interval; IRR = incidence rate ratio. Where else noted, the models also include state and year fixed effects; homicide rate; law enforcement expenditure linearly interpolated for 2016 and 2017; household firearm availability as a ratio of firearm suicides to total suicides; percentage population Black, married, living in a metropolitan statistical area, living in poverty, part of a union, and graduated high school; household median income; and percentage of workers in the retail sector. The model used the natural log of employment as its population offset, random intercepts for between-state workplace homicides, and random policy effect of right-to-carry laws. Within-state correlation was structured as independent, and robust standard errors were clustered by state. Estimates were generated by authors via a data request from the Bureau of Labor Statistics' Census of Fatal Occupational Injury data. The views expressed here do not necessarily reflect the views of the Bureau of Labor Statistics.

^aAll laws coded 1 in the first full year of implementation.¹³ For law-effective date, see Table A, available as a supplement to the online version of this article at <http://www.ajph.org>.

^b1998 represents the first year that declines in firearm workplace homicides leveled off (Figure 1). It also represents a cut point to reduce bias from the violent crack cocaine epidemic.

^cOther gun policy variables, household gun availability, homicide rate, and law enforcement expenditure withheld because of potential confounding.

^dCensus of Fatal Occupational Injuries deaths related to falls include fall to same level and fall to lower level.

Table A, available as a supplement to the online version of this article at <http://www.ajph.org>, for states and law passage dates). The overall IRR associated with passing an RTC law was 1.24 (95% CI = 1.09, 1.40). Thirteen of the 25 states that passed an RTC law had significantly higher incidence of firearm WPH after implementation (Arkansas, Illinois, Kansas, Kentucky, Louisiana, Minnesota, Missouri, New Mexico, Oklahoma, South Carolina, Tennessee, Virginia, and Wisconsin) while 4 states had significantly lower rates of firearm WPH (Alaska, Arizona, Iowa, and Nebraska) and 7 states did not have significant changes (Colorado, Michigan, Nevada, North Carolina, Ohio, Texas, and Utah). Wyoming did not have sufficient pre-post data to produce a state-specific estimate.

DISCUSSION

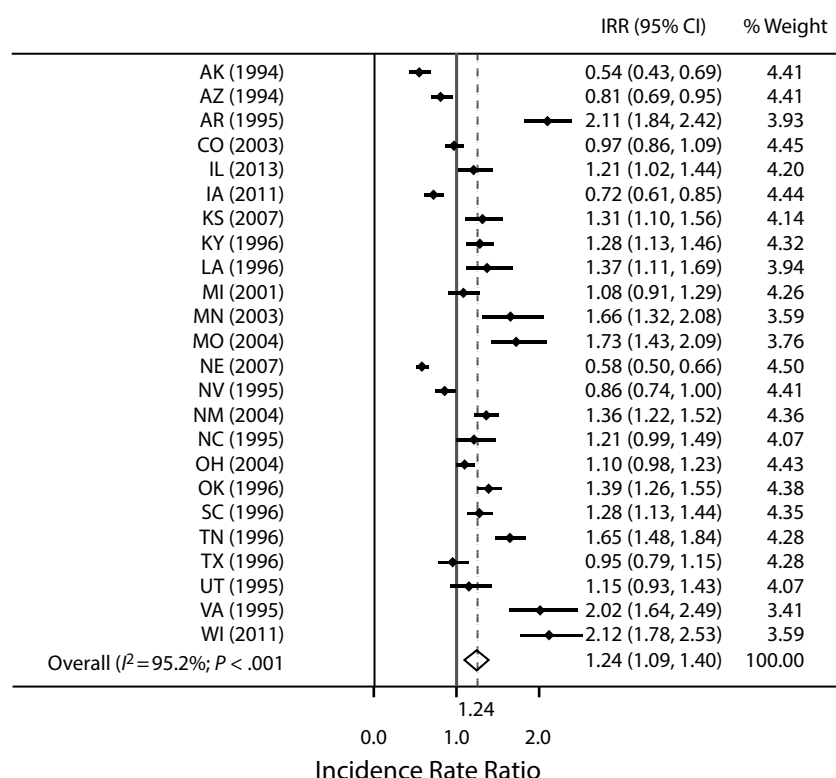
This study represents the first study, to our knowledge, to examine the relationship between RTC laws and firearm WPH incidence. Our results indicate that, regardless of longitudinal methodology, and when we controlled for a range of covariates and heterogeneous

policy effects, states with RTC laws experienced higher firearm WPH incidence rates than did non-RTC states. States that had an RTC law between 1992 and 2017 experienced 29% greater rates of firearm WPHs. The 25 states that passed an RTC law from 1992 to 2017, on average, experienced 24% greater rates in firearm WPH incidence after law implementation (Figure 2) despite the overall rate of firearm WPHs decreasing over the study period (Figure 1). That our findings of the association between RTC laws and greater incidence of firearm WPH remained over several sensitivity analyses adds greater plausibility to the observed relationship.

Our results are consistent with more recent and robust examinations of the impact of RTC laws, which suggest that these laws are associated with higher rates of violent crime.^{11,12,17} However, the strength of the relationship between RTC laws and our violent crime outcome is notably higher than that in previous studies. We hypothesize that the strong relationship is attributable in part to exposure of firearms in the workplace and the nature of WPH as a subset of homicides. In

their study conducted with North Carolina occupational death data from 1994 to 1998, Loomis et al. found that workplaces that allowed employee access to firearms had 5-fold greater WPH incidence.⁶ As 25 states have passed RTC laws over the past 26 years and as firearm WPHs have become primarily interpersonal crimes,⁹ the strength of relationship we found is plausible; it is more likely that conflicts in workplaces, whether between co-workers or ex-co-workers and customers—employees or those known to the employee, end fatally as access to lethal means has increased.

As we consider the impact of RTC laws and the consequences of increased firearm exposure in general, we must consider the impact on worker safety. Lawmakers considering the issue of state reciprocity for RTC laws should consider information provided here. We demonstrated that RTC laws are associated with increased firearm WPH rates. Thus, mandating state reciprocity for RTC laws could have a negative impact on worker safety. Mandating that states with stringent concealed carry permitting laws



Note. CI = confidence interval; IRR = incidence rate ratio. Weights are from random effects analyses. Wyoming was not included because of no pre-post law implementation data.¹⁴

FIGURE 2—Impact of a Passing a Right-to-Carry Law on Firearm Workplace Homicides: United States, 1992–2017

allow individuals from states with less stringent or nonexistent concealed carry permitting laws to carry a concealed weapon likely places employees at increased risk of death.

Future research should further the understanding of firearm exposure in the workplace. In general, RTC laws allow private employers to prohibit customer and employee firearms from their premises.²⁵ The penetration of these prohibitions and whether businesses that prohibit gun carrying succeed in enforcing this option is not known. Answers to these questions will further the knowledge base around the impact of firearm exposure on violent workplace deaths.

Limitations

This study is not without limitations. The nature of CFOI data request created the need to perform the analysis as a CCA, using only

the available data, and as a TPA, setting the censored data equal to “0.” Thus, the TPA likely underestimates the true incidence of firearm WPHs. However, the coefficient estimates for the relationship between RTC laws and firearm deaths were similar across both analysis types, with the TPA displaying a larger coefficient compared with the CCA. Therefore, we are confident that the estimates produced by the CCA model are unaffected by the 2.6% of censored data and are likely conservative estimates of the relationship between RTC laws and firearm WPHs.

While CFOI provides the most comprehensive accounting of fatal occupational injuries, it contains reporting limitations. CFOI does not contain information on potential confounding factors such as life-style or work conditions.⁴⁶ Although CFOI uses at least 2 documents to verify death characteristics, homicides that occur in the

workplace can be prone to misclassification, underestimating the true count. As with most studies of the effect of state laws, there is potential for selection bias and omitted variable bias. Controlling for state-level factors across time that may have prompted the enactment of state laws reduces the potential influence of selection bias. To address omitted variable bias, we used state and year fixed effects to account for unaccounted time-invariant factors and state-invariant factors.

It is also important to note that CFOI only presents data on workers, meaning non-employees could have been killed during a WPH event and are not accounted for in these data. As such, our results likely underestimate the true effect of these policies as it does not fully account for the total number of deaths related to violent crime in the workplace.

Historical bias is always a potential threat to internal validity within panel data analysis. However, several of our sensitivity analyses excluded data before 1998, avoiding potential confounding with the crack cocaine epidemic, with the relationship between RTC laws and firearm WPH holding significant.

We were unable to include an important sensitivity analysis that used nonfirearm workplace homicides as an outcome. This is because of data availability. As firearms are the mechanism of death in around 80% of WPH, there were not enough accessible data under CFOI data publishability rules to conduct this type of sensitivity analysis.

Conclusions

This study fills an important knowledge gap by producing the first estimates, to our knowledge, of the effect of state firearm laws on firearm WPH incidence. We found, overall, that RTC laws were associated with approximately a 29% increase in the risk of firearm WPH. The ongoing conversation over RTC laws’ impact on safety does not consider workers. As our study shows, states with RTC laws have greater expected firearm WPHs. There is reason to introduce worker safety into the conversation. **AJPH**

CONTRIBUTORS

All authors contributed equally to the submitted article.

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CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this article.

HUMAN PARTICIPANT PROTECTION

This work was deemed to not be human participant research and was thus exempt from protocol review.

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