Firearm Prevalence and Homicides of Law Enforcement Officers in the United States

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Objectives. In the United States, state firearm ownership has been correlated with homicide rates. More than 90% of homicides of law enforcement officers (LEOs) are committed with firearms. We examined the relationship between state firearm ownership rates and LEO occupational homicide rates.

Methods. We obtained the number LEOs killed from 1996 to 2010 from a Federal Bureau of Investigation (FBI) database. We calculated homicide rates per state as the number of officers killed per number of LEOs per state, obtained from another FBI database. We obtained the mean household firearm ownership for each state from the Behavioral Risk Factor Surveillance System.

Results. Using Poisson regression and controlling for factors known to affect homicide rates, we associated firearm ownership with the homicide rates for LEOs (incidence rate ratio = 1.044; $P = .005$); our results were supported by cross-sectional and longitudinal sensitivity analyses. LEO homicide rates were 3 times higher in states with high firearm ownership compared with states with low firearm ownership.

Conclusions. High public gun ownership is a risk for occupational mortality for LEOs in the United States. States could consider methods for reducing firearm ownership as a way to reduce occupational deaths of LEOs. (*Am J Public Health.* 2015;105:2042–2048. doi:10.2105/AJPH.2015.302749)

Homicide rates are higher in the United States than in other high-income countries.[1–3] Although the rate of nonfatal assaults in the United States is similar to its peer nations, the prevalence of firearms appears to be a reason for this increased homicide rate.[4,5] The homicide rate in the United States varies by region and by state. When controlling for demographic and economic factors within states, firearm ownership rates and homicide rates are positively correlated.[6,7]

For the majority of working Americans, being murdered on the job, known as occupational homicide, has never been a major concern. In addition, like homicide rates generally, occupational homicide rates have been declining nationwide for the past 2 decades.[8] However, although occupational homicides are rare, they do constitute a high percentage of fatal occupational injuries; in 2012, occupational homicides accounted for 17% of fatal occupational injuries.[9] Law enforcement officers (LEOs) have an occupational homicide rate 3 times the national average, and it is the second leading cause of occupational mortality for this group, behind motor vehicle collisions.[10,11]

It is possible that homicides of LEOs are driven by criminal offender theory: more frequent encounters with motivated violent offenders are the root cause of LEO homicide rates.[12] In a study of 190 agencies, Kaminski found that violent crime rate was associated with officer homicides.[13] However, LEOs are recruited, equipped, and trained to encounter such dangerous situations.[14] Agency-level policies are also designed to keep officers safe when encountering suspects. Their training also dictates how to avoid escalating hostile encounters into potentially life-threatening situations.[15] LEOs are often equipped with body armor, greatly increasing the likelihood that they will survive being shot.[16–18] Finally, LEOs in the United States carry firearms, usually a handgun.[19]

Despite the presence of specialized training and equipment, many LEOs are still murdered on the job. More than 90% of these homicides are committed using a firearm.[20] An assailant merely needs a firearm, rudimentary knowledge of how firearms work, and sufficient opportunity to fatally wound any superiorly trained and equipped officer.[5] A higher presence of guns, then, creates more opportunities for LEO deaths. Small-scale studies have found that gun density in cities is correlated with gun homicide and gun suicide of LEOs in the United States.[21] An international comparison of LEO mortality in New York City and London, United Kingdom, found that 20 times as many officers died from intentional gunshot wounds in New York compared with London, where personal firearm ownership is markedly lower.[22]

A previous study found that takeaway homicides, a type of homicide where officers are killed by their own service weapons, made up only 10% of LEO homicides, meaning that the majority of LEO homicides were committed with a privately owned gun.[20] We also know that state laws have the potential to increase or decrease firearm ownership by private citizens[23] and firearm homicides caused by privately owned weapons.[24–26] We examined the relationship between state firearm ownership rates and LEO occupational homicide rates, first controlling for the state violent crime rate, and then adding other state-level factors known to be associated with homicide rates in the general population. We hypothesized that firearm ownership would be positively correlated with homicide rates of LEOs.

METHODS

As part of its Uniform Crime Reporting (UCR) program, the Federal Bureau of Investigation (FBI) annually reports all homicides of LEOs in the United States.[19] To be included as a fatality in the reporting, an individual must be a "duly sworn [officer] feloniously or accidentally killed or assaulted in the line of duty."[19(p109)] This "line of duty" designation describes on- or off-duty LEOs acting in an official capacity (i.e., acting as if they would in

their official duties as an LEO). This definition includes local, county, state, college or university, tribal, and federal agencies that are composed of police officers, sheriffs and deputies, highway patrol officers, marshals, and special agents; probation officers, correctional officers, jailers, and prison officials are excluded.[11,19]

We used the UCR because we focused on sworn officers who conduct policing activities in public spaces.[11] The UCR database is more conservative in estimating occupational fatalities and homicides compared with other national surveillance systems[11]; however, the UCR data are meant to serve as a census of all homicides of LEOs in the country, so every [illegible]an officer homicide is identified, it must be [illegible]orted to the UCR.[19] We downloaded the data as Supplemental Homicide Reports, which are made available through the National Archive of Criminal Justice Data.[27] We collected the homicide counts annually for each state and the District of Columbia from 1996 through 2010.

To calculate homicide rates, we obtained annual estimates of LEOs employed in each state from another FBI database. The Police Employee database collects information on all law enforcement agencies in the United States, including the number of officers employed each year.[27] We totaled the number of sworn officers employed in each agency in each state for each year. We calculated the homicide rates as the number of occupational homicides per 10 000 LEOs annually for each state. Because homicides were rare events at the individual state-year level, we combined homicides and number of officers per state across the study period. Using Poisson regression, our outcome of interest was the homicide count per state with the number of officers (per 10 000) as the offset term. In essence, the LEO homicide rate per 10 000 officers during the 15-year study period (1996–2010) was the dependent variable in the main analysis.

[illegible]e main independent variable was state [illegible]sehold firearm ownership rate. Although many factors affect the lethality of firearm assaults, such as intent, location of injury, and [illegible]er,[16,28,29] we did not consider the effects of [illegible]se factors on LEO homicides. A commonly used direct measure of public firearm ownership comes from the Behavioral Risk Factor Surveillance System (BRFSS).[30,31] This annual nationwide survey collects data over a wide range of health topics. Questions on household firearm ownership were only included in the BRFSS in 2001, 2002, and 2004. To calculate the state firearm ownership rate, we averaged the prevalence of firearm ownership from the BRFSS across the 3 surveys. Mean household firearm ownership rate (calculated from the rates in 2001, 2002, and 2004 BRFSS data) was the primary independent variable in the main regression analysis. Our second independent variable of interest was state violent crime rates. Violent crime rates for each state-year were obtained from the FBI's annual "Crime in the United States" reports.[32]

Because the BRFSS firearm data were only available for 3 years, we also collected a proxy of firearm ownership. The Web-based Injury Statistics Query and Reporting System reports data on completed suicides in the United States. Firearm suicides as a percent of all suicides has been used as an annual measure of firearm ownership rate.[6,31,33] This term is known as firearm suicides/suicides (FS/S). We used these annual data as sensitivity analyses, described in the following section, to examine the longitudinal effects of firearm ownership on LEO homicide rates during the study period.

Data Analysis

We calculated descriptive statistics for homicide counts and rates per 10 000 LEOs. We calculated homicide counts and rates for states over the entire 15-year study period and for individual state-years. We compared LEO homicides rates in the highest firearm prevalence states with those in the states with the lowest firearm prevalence. To do this comparison, we selected from the highest firearm prevalence states and the lowest firearm prevalence states until the number of LEO-years was approximately equal.[34,35] Because the low-prevalence states were typically more highly populated and had many more officers than the high-prevalence states, the final 2-by-2 analysis had 8 low-prevalence states and 23 high-prevalence states, covering approximately 2.75 million LEO-years per group.

Homicide rates followed a count distribution. A likelihood ratio α test for both Poisson and negative binomial data confirmed that the data fit a Poisson distribution.[36] Firearm ownership rates and select covariates were regressed on the homicide rate using Poisson regression with the number of LEOs (per 10 000) as the offset term.[37] We fit the following Poisson model:

$$(1)\quad log\,(E(Y^s)) = log\,(n^s) + \beta x^s = [\text{covariates}],$$

where Y^s is the number of LEOs homicides within each state, n^s is the number of LEOs within each state, x^s is the dependent variable of interest (state-specific firearm ownership or the proxy), and β is the log relative rate of LEO homicide rate for a unit change in firearm ownership. For our initial regression, the violent crime rate was the only covariate included in the model with firearm ownership; we referred to this as model 1. We then ran a model including selected covariates in Table 1 using a method described in the following section; we referred to this as model 2.

We averaged the variables in Table 1 across the entire study period. We first analyzed the correlation of each covariate to LEO homicide rates with a Spearman ρ, listed in Table 1. We first selected any covariates with an absolute ρ of 0.300 or greater. Second, we excluded any covariates that were highly correlated with other included covariates from the final model. All of the covariate correlations can be found as a supplement to the online version of this article at http://www.ajph.org. All data were analyzed using Stata version 12.1 (Stata Corp, College Station, TX).

Selection of Covariates for Regression Analysis

Because little research has been conducted on state-level factors affecting homicides of LEOs, we looked to the general homicide literature for potential control variables. Siegel et al. have produced a series of studies examining the role of firearm ownership on different homicide outcomes at the state level.[6,38,39] From these previous studies, we selected the following state-level variables as potential confounders of the association between firearm ownership and the LEO homicide rate: property crime rates, percentage of the population aged 15 to 29 years, percentage of the population that is African American, percentage of the population that is Hispanic, poverty rate, median income, educational attainment level, alcohol consumption, divorce rate,; income [illegible]ality, and percentage of the population [illegible]an areas (urbanicity).

TABLE 1—Variables Considered as Possible Covariates for Regression Analysis: United States, 1996–2010

Covariate	Definition	Source	Spearman ρ for LEO Homicide Rate	Selected
Violent crime rate	Per 100 000 population	Federal Bureau of Investigation	0.390	Yes
Property crime rate	Per 100 000 population	Federal Bureau of Investigation	0.457	No
Population age 15–29 y	Percentage	Census Bureau	0.391	Yes
African American population	Percentage	Census Bureau	0.300	Yes
Hispanic population	Percentage	Census Bureau	−0.120	No
Poverty rate	Percentage of population living in poverty	Census Bureau	0.448	No
Median income	Tens of thousands 2012 US$	Census Bureau	−0.360	Yes
Education level	Percentage of adult population with college degree	Census Bureau	−0.278	No
Alcohol consumption	Per capita alcohol consumption, gallons of ethanol	National Institute on Alcohol Abuse and Alcoholism	−0.070	No
Divorce rate	Per 1000 population	National Center for Health Statistics	0.301	Yes
Income inequality	Gini coefficient (1999 only)	Census Bureau	0.136	No
Urbanicity	Percentage of state population in urban areas and urban centers (2000 only)	Statistical Abstract of the United States	−0.178	No

Note. LEO = law enforcement officer.

Table 1 lists the variables collected as potential controls in the regression analysis, the variable definitions, and the source for each variable. We collected all data for each state annually, aside from the income inequality and urbanicity data, which were only available for 1999 and 2000, respectively.

Sensitivity Analyses

We tested the robustness of our findings with various sensitivity tests. First, the FS/S proxy measure of firearm ownership rate was substituted as the independent variable of interest in a Poisson regression. Second, homicide rates were calculated as the number of LEO homicides per 1 000 000 state population, rather than per LEO-years. Third, although firearms were used in more than 90% of LEO homicides, we examined the association of state firearm ownership rates and firearm homicides of LEOs. These analyses were all cross sectional across the entire study period.

Because a cross-sectional analysis presents a lower level of evidence, we conducted a time-series sensitivity analysis by dividing the study period into three 5-year time blocks: 1996 to 2000, 2001 to 2005, and 2006 to 2010. These 5-year divisions in a time-series analysis allowed us to draw stronger conclusions concerning the relationship between firearm ownership and LEO homicides without inappropriately increasing the variance of FS/S. This longitudinal analysis also allowed us the chance to observe the relationship between firearm ownership rates and LEO homicides as they changed over time. The longitudinal multilevel Poisson model used fixed effects within states for firearm ownership rates and the selected covariates, as was used in previous analyses of the relationship between firearm ownership rates and general homicide rates.[6,38] We averaged each covariate across the respective 5-year blocks.

RESULTS

There were 782 homicides of LEOs over the study period, 716 (92%) of which were committed with firearms. Handguns were used in 515 homicides (72% of firearm homicides, or 66% of all homicides). States averaged more than 15 LEO homicides over the study period, or approximately 1 per year. States averaged 15 861 LEOs employed per year, or 237 915 LEO-years over the whole study period. Per 10 000 LEOs, homicide rates were 0.76 and 0.85 for the entire study period and annually, respectively. Table 2 lists the mean, SD, and range for homicide counts and rates for the entire study period and for each year. California and Texas were the only states to experience at least 1 homicide in every year of the study. The states with the most homicides were California (n = 77), Texas (n = 70), Florida (n = 39), Georgia (n = 36), and North Carolina (n = 33). Iowa, Maine, Vermont, and Wyoming

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TABLE 2—Rates and Counts for Homicides and Firearm Homicides of Law Enforcement Officers per State for Total Study Period and Single Years: United States, 1996–2010

Variables	Counts		Rate per 10 000 LEOs	
	Mean (SD)	Range	Mean (SD)	Range
Total study period				
Homicide	15.1 (15.67)	0–74	0.78 (0.63)	0–4.3
Firearm homicide	14.0 (14.9)	0–72	0.68 (0.50)	0–3.0
Annual data				
Homicide	1.0 (1.5)	0–10	0.85 (1.7)	0–16.6
Firearm homicide	0.9 (1.4)	0–9	0.75 (1.5)	0–13.9

Note. LEO = law enforcement officer.

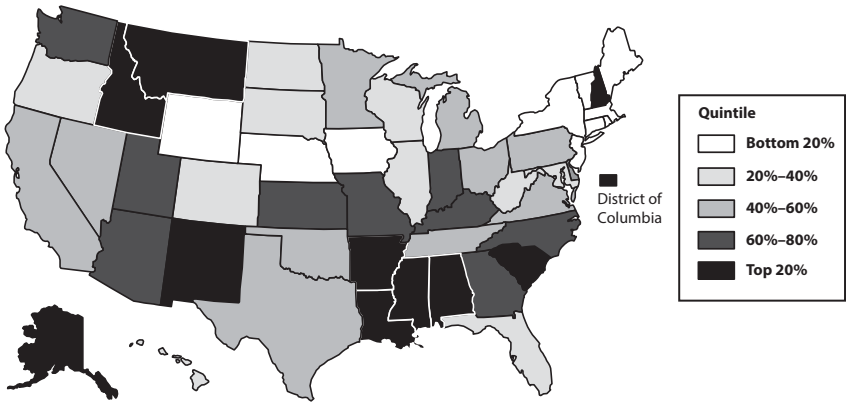

FIGURE 1—Quintiles of law enforcement officer homicide rates: United States, 1996–2010.

experienced zero homicides of LEOs during the study period. Figure 1 displays states by LEO homicide rate quintile.

Firearm Ownership

Using the average of the 2001, 2002, and 2004 BRFSS data as the source of firearm ownership, the mean firearm ownership rate was 38.3% (SD = 14.5%). Average ownership ranged from 4.8% (District of Columbia) to 62.0% (Wyoming). The estimate of mean firearm ownership rates from FS/S for these 3 years was highly correlated with the mean BRFSS estimate (Pearson correlation = 0.861). Figure 2 displays firearm ownership rates from the BRFSS by state quintiles. The state-level Pearson correlation between firearm ownership and violent crime rates was –0.368.

Table 3 compares states with the lowest firearm ownership rates with those states with the highest ownership rates. For the 15-year study period, both the low and high gun states covered approximately 2.75 million LEO-years. The incident rate for LEO homicides in the high gun states was 3.11 times greater (95% confidence interval = 2.42, 4.03) than in the low gun states.

Firearm Ownership and Homicides of Law Enforcement Officers

Using Poisson regression for firearm ownership and violent crime rates on LEO homicide rates (model 1), the incidence rate ratio (IRR) for increasing firearm ownership rate by 1% was 1.035 (P = .011), and the IRR for the violent crime rate was 1.002 (P = .002). For model 2, in addition to firearm ownership and the violent crime rate, the variables entered into the regression model were the percentage of the population ages 15 to 29 years, median income, divorce rate, and the percent of the population that is African American. In multivariable regression with the 6 covariates selected in Table 1, the adjusted IRR for firearm ownership was 1.041 (P = .009), and the IRR for the violent crime rate was 1.002 (P = .073; Table 4). Putting this result into context, because states averaged 237 915 LEOs over the study period, a 10% increase in firearm ownership rate would result in 10 additional LEO homicides over 15 years. Table 4 displays the results for model 1 and for model 2, in which the firearm ownership rate was the only statistically significant covariate.

Sensitivity analyses supported this finding. The full results of the sensitivity analyses are presented as data available as a supplement to the online version of this article at http://www.ajph.org. The significant results of the respective model 2 are presented here. Using the FS/S firearm ownership proxy, the IRR for firearm ownership on LEO homicide rate was 1.050 (95% CI = 1.008, 1.095). A second sensitivity analysis considered LEO homicide rate as a function of state population. No covariates were significantly associated with LEO homicides rates per state population. Because firearms were used in 92% of homicides of LEOs, the effect of firearm ownership rate on firearm-only homicides of LEOs was similar to the main analysis (IRR = 1.036, 95% CI = 1.002, 1.071). Dividing the study period into 5-year blocks and conducting a longitudinal analysis resulted in a similar correlation for firearm ownership as seen in the cross-sectional analyses (adjusted IRR = 1.054; 95% CI = 1.030, 1.078) state violent crime rates were also significantly associated with LEO homicide rates in the time-series analysis (IRR = 1.002; 95% CI = 1.001, 1.003). In the sensitivity analyses, no other covariates were associated with LEO homicide rates with a single exception: median income was positively correlated with a higher homicide rate in the time-series analysis (IRR = 1.429; 95% CI = 1.112, 1.836).

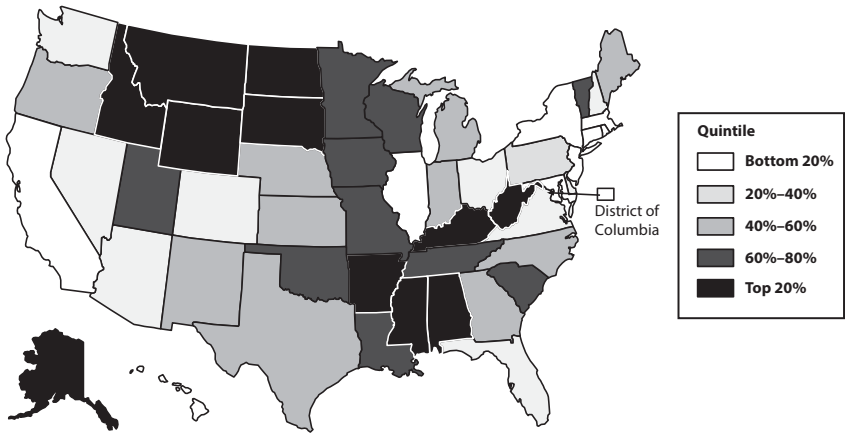

FIGURE 2—Quintiles of firearm ownership: United States, 1996–2010.

DISCUSSION

Our study found that the occupational homicide rate for LEOs was positively correlated with firearm ownership rate. We found clear differences in LEO homicide rates between states with low and high firearm ownership.

TABLE 3—Homicides of Law Enforcement Officers in the 8 States With the Lowest and the 23 States With the Highest Household Firearm Ownership Rates: United States, 1996–2010

Characteristics	Low Gun States	High Gun States
Average household firearm ownership levels, %	13.5	52.0
LEOs employed 1996–2010, no.	2 777 567	2 759 590
Total homicides 1996–2010, no.	85	263
Homicide rate per 10 000 LEOs	0.31	0.95

Note. LEO = law enforcement officer. Low gun states: CT, DC, HI, IL, MA, NJ, NY, RI. High gun states: AL, AK, AR, IA, ID, KS, KY, LA, MN, MO, MS, MT, NC, ND, OK, SC, SD, TN, UT, VT, WI, WV, WY.

Exposure to guns is an occupational risk factor for LEOs. In our analysis, we controlled for state violent crime rates, which indicated that the higher risk of LEO homicide victimization in high gun states was not simply because these officers more frequently encountered violent situations. Siegel et al. found that the violent crime rate was associated with the homicide rate of the general population[6]; we also found that the violent crime rate was associated with homicides of LEOs, but this lost statistical significance when we included these covariates in the regression models.

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High rates of LEO homicide victimization appeared to be caused by more frequent encounters with violent criminals and by more frequently encountering situations where privately owned firearms were present. For example, we know that officers were often killed upon arriving at a residence for a domestic disturbance call.[40,41] Encountering more domestic disturbance calls along with an increased likelihood that the household would contain firearms undoubtedly increased the homicide risk for LEOs. Thus, domestic disturbance calls in states with higher household firearm ownership rates present increased opportunities where LEOs would encounter a potentially deadly situation. Previous research indicated that the rate of private gun ownership[23,42] and homicides committed with privately owned weapons were modifiable through changes to state laws.[24,25,43] Our research suggests that there is the potential to reduce LEO homicide rates through changes to state laws.

When selecting variables for inclusion in multivariate regression, we referenced previous literature investigating the relationship between state-level gun ownership rates and overall state homicide rates. We did this because we could not locate any studies that examined state-level risks for LEO homicides specifically. Covington et al. analyzed the risks for officer assaults using logistic regression; however, this analysis was restricted to a single agency and only covered offender, officer, and situational variables.[44] Kaminski et al. conducted a series of analyses using methods similar to our study; however, their level of analysis was census blocks or law enforcement agencies, not states.[13,45] In determining the appropriate parsimonious model, some variables that had previously been associated with homicide rates were excluded. For example, level of urbanization within a state was previously found to be a confounding variable when assessing state firearm ownership and gun homicides.[38] However, this predictor had very low correlation with the outcome in our study (Spearman $\rho = -0.178$). Our findings indicate the need for further research into state-level risk factors for LEO homicides.

When we examined geographic variation of LEO homicide rates and firearm ownership rates in Figures 1 and 2, respectively, some states fell in the same quintiles in both graphs, but the relationships were not perfect. Alabama, Alaska, Arkansas, Mississippi, and Montana were in the top quintile for LEO homicides and firearm ownership, whereas Connecticut, Massachusetts, New Jersey, New York, and Rhode Island were in the lowest quintile in both figures. These correlations within the top and bottom quintiles of firearm ownership supported the findings of Table 3. However, not all states supported a positive correlation between the 2 variables. For example, Wyoming had the highest firearm ownership rate and zero LEO homicides, whereas the District of Columbia had the lowest firearm ownership rate and was in the highest quintile for homicide rates. It appeared that both the state levels of firearm prevalence and violent crimes affected the LEO homicide rate; however, further research is necessary to identify other state-level predictors of LEO homicide rates.

TABLE 4—Multivariate Poisson Regression of Firearm Ownership and Law Enforcement Homicide Rates: United States, 1996–2010

Variable	Model 1, IRR (95% CI)	Model 2, IRR (95% CI)
Firearm ownership	1.035 (1.008, 1.063)	1.041 (1.001, 1.072)
Violent crime rate	1.002 (1.001, 1.003)	1.002 (1.000, 1.004)
% population aged 15–29 y		
Median income		1.374 (0.876, 2.155)
Divorce rate		1.070 (0.717, 1.599)
% population African American		1.008 (0.968, 1.049)

Note. CI = confidence interval; IRR = incidence rate ratio. Model 1 includes only firearm ownership rate and violent crime rates. Model 2 adds in select covariates.

Limitations

Our study had various limitations. The main statistical analysis used cross-sectional data. Although a single cross-sectional analysis could not produce a conclusive link between firearm ownership and the LEO homicide rate, the fact that multiple sensitivity analyses produced similar findings supported this link. The time-series analysis allowed us to test for the presence of reverse causality in our findings. For example, if a state experienced a high number of LEO homicides early in the study period, which then led state residents to obtain

firearms for personal protection, the time-series analysis might not reflect the findings of the cross-sectional analyses. However, the time-series analysis did support the relationship between firearm ownership rates and LEO homicide rates throughout the study period; we did not believe that LEO homicide rates were the cause of the increase in privately owned firearms. No study of the reasons for private firearm ownership cited police deaths as an important cause for private individuals obtaining firearms.

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There was no gold standard for annual firearm ownership rates. Although the BRFSS survey is viewed as the best available measure, and as a reasonably accurate measure of firearm ownership,[30,31] questions concerning household firearm ownership were only included for 3 years on the survey. Although using FS/S estimates from the Centers for Disease Control and Prevention allowed for an annual estimate, the data were heteroscedastic: states with lower population had more year-to-year variation in the FS/S estimate compared with larger states. Despite the increased variance for FS/S in smaller states, we found good correlation between the Centers for Disease Control and Prevention and BRFSS estimates of firearm ownership (Pearson correlation = 0.86). Although neither the BRFSS nor FS/S was a perfect measure of firearm prevalence, the consistent results using either measure and their close correlation added validity to their use in our study.

The FBI uses a very strict definition of LEOs for inclusion in its UCR reports.[19] Other data sources, such as the Bureau of Labor Statistics' Census of Fatal Occupational Injuries and the National Law Enforcement Memorial Fund include a broader definition of LEOs.[11] However, the FBI data best fit the purpose of our study, which was to assess the risk of homicide to sworn officers in the line of duty. The general validity of the UCR system was assessed by Lynch and Jarvis[46] and Pizzaro and Zeoli.[47] Although these reviews found overreporting in larger cities and some missing data for general homicides, there was no direct assessment of the validity of homicides of LEOs. As of the late 1980s, UCR reporting relied on what is called the National Incident-Based Reporting System.[19] Because occupational homicides of LEOs are important events, it was not likely that a local law enforcement agency would fail to report the murder of one of its own officers to the FBI.

Conclusions

The occupational homicide rate of law enforcement officers in the United States was positively associated with the state firearm ownership rate, with a 10% increase in firearm ownership correlated to 10 additional officer homicides over the 15-year study period. Our results controlled for the main factor likely to affect the LEO homicide rate (i.e., the state violent crime rate) and other factors expected to affect homicide rates in the general population. Higher levels of private firearm ownership likely increased the frequency with which officers faced potentially life-threatening situations on the job.

LEOs working in states with higher levels of gun ownership faced a greater likelihood of being shot and killed on the job compared with their peers in states with lower gun ownership. The differences were large. Officers in the high-gun states had 3 times the likelihood of being killed compared with low-gun states. Higher levels of civilian gun ownership appeared to be a significant risk factor for the homicide of LEOs. ■

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This article was accepted April 29, 2015.

Contributors

D. I. Swedler and D. Hemenway conceptualized the study. D. Swedler, F. Dominici, and D. Hemenway designed the analysis. D. I. Swedler and M. M. Simmons collected and analyzed the data and wrote the article. All authors contributed to editing and approved the final draft of the article.

Acknowledgments

Portions of these data will be presented at the American Public Health Association's Annual Meeting; October 31–November 4, 2015; Chicago, IL.

Human Participant Protection

All data were publicly available and free to download; thus, the Harvard School of Public Health institutional review board deemed this study to be non–human participant research.

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Firearm prevalence and homicides of law enforcement officers in the United States

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02 Alex John Quijano Page 1

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This paper was publiished 10/2015 where they used the data ranging from 1996 to 2010.

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Multuple linear regression with the assumption that the response variable follows a Poisson distribution. This method is used also by Kivisto2017.

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06 Alex John Quijano Page 1

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This is a strong statement given current events (e.g. mass shootings, gun legislations, etc). Can we make an argument about gun violence and police deaths/brutality in this context? It looks like they are making a case where fewer gun owenership means fewer police deaths.

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This way less than the number people who died from mass shootings since 2009.

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Again, the data they are using is from 1996 to 2010. I wonder what has changed or what has not since 2010.