

## Effects of State-Level Firearm Seller Accountability Policies on Firearm Trafficking

Daniel W. Webster, Jon S. Vernick, and Maria T. Bulzacchelli

---

**ABSTRACT** *Criminals illegally obtaining firearms represent a great risk to many urban residents. This cross-sectional study of 54 US cities uses data on state laws governing gun sales, a survey of law enforcement agencies' practices to promote compliance with gun sales laws, and crime gun trace data to examine associations between these policies and practices with gun trafficking indicators. Higher levels of local gun ownership were linked with greater intrastate gun trafficking. Regression models estimate that comprehensive regulation and oversight of gun dealers and state regulation of private sales of handguns were each associated with significantly lower levels of intrastate gun trafficking. Discretionary permit-to-purchase licensing laws' negative association with intrastate trafficking disappeared when local gun ownership is controlled. The effects of these relatively restrictive gun purchase laws on trafficking may be mediated by the laws' lowering of gun ownership. Relatively low prevalence of gun ownership may also be a prerequisite for passage of discretionary purchase. We observed no effect on intrastate trafficking of laws limiting handgun sales to a maximum of one per person per month.*

**KEYWORDS** *Gun policy, Violence prevention, Policy evaluation*

---

### INTRODUCTION

Gun violence is arguably the most significant threat to the safety of urban residents in the USA. In 2005 in the USA, firearms were used in more than 12,000 homicides, 84% of which occurred in large- or medium-sized metropolitan areas.<sup>1</sup> Firearm homicide rates in the USA are highest among young men in large urban centers and have been rapidly increasing in this population in recent years.<sup>2</sup> This disturbing trend has occurred despite a general decline in violent crime in most US cities.<sup>3</sup> The annual social costs from gun violence in the USA have been estimated at \$100 billion.<sup>4</sup>

Although perpetrators of gun violence are commonly proscribed from possessing a firearm,<sup>5</sup> many obtain firearms through an illicit market or theft.<sup>6</sup> Surveys of incarcerated offenders indicate that most armed criminals obtained their firearms directly from a friend, family member, or "on the street."<sup>6</sup>

Because deterring such transactions is difficult, it may be prudent to focus on how firearms initially become diverted from the legal to the illegal market. A national study of gun trafficking investigations found that corrupt retail gun dealers accounted for more guns diverted into the illegal market than any other single trafficking channel.<sup>7</sup> Although a very small proportion of gun dealers sell the

---

Webster and Vernick are with the Center for Gun Policy and Research, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA; Bulzacchelli is with the Department of Public Health, School of Public Health and Health Sciences, University of Massachusetts at Amherst, Amherst, MA, USA.

Correspondence: Daniel W. Webster, Center for Gun Policy and Research, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA. (E-mail: dwebster@jhsph.edu)

majority of guns traced to crime,<sup>8</sup> a national phone survey of retail gun dealers found that half of the gun dealers indicated a willingness to make a sale under circumstances of questionable legality.<sup>9</sup> But when retail sellers of firearms become vulnerable to undercover stings by law enforcement, lawsuits by city officials for making illegal sales, or even bad publicity, the flow of new guns into the illicit market often decreases significantly.<sup>10,11</sup>

Given the threat to public safety associated with illegal gun trafficking, some government regulation and oversight of retail firearm sellers is warranted. US federal law requires retail firearm dealers to obtain a license from the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) and to adhere to several regulations designed to ensure accountability. These include limiting sales to purchasers who pass a background check, mandatory record keeping of all acquisitions and sales of firearms, requirements to cooperate with ATF crime gun trace requests, and mandatory reporting of theft or loss of firearms.

Yet there are also important weaknesses in current federal laws regarding firearm dealers and in the enforcement of those laws. Federal laws require very high standards of evidence for license revocation or criminal prosecutions of dealers. In addition, only one compliance inspection per dealer per year is permitted<sup>12</sup> and penalties for some gun sale law violations are weak. As a result, license revocations and criminal prosecutions of firearm retailers are rare, though they have increased in recent years. The US Department of Justice's Inspector General issued a report in 2004 on the ATF's oversight of firearm retailers and concluded that "inspections are infrequent and of inconsistent quality, and follow-up inspections and adverse actions have been sporadic...[e]ven when firearm law violations have been numerous and serious."<sup>13</sup>

Another way in which federal laws provide limited accountability and enable gun trafficking is by limiting most firearm sales regulations to licensed dealers. Federal law permits private sellers to transfer their firearms with no background check or other paperwork. This is a crucial omission. Eighty-five percent of guns traced to crime were recovered from someone who was not the original retail purchaser.<sup>14</sup>

Given these limitations in federal laws and enforcement practices, efforts by states and local governments to hold gun sellers accountable may be necessary to curtail gun trafficking. Seventeen states have laws requiring retail firearm dealers to be licensed by state or local government; however, five of these states do not even require dealers to both maintain acquisition and sales records and make those records available for compliance inspections. Ten additional states require firearm dealers to maintain sales records and permit law enforcement inspections, but do not require a state or local license.<sup>15</sup> Twenty-two states require buyers of guns from private individuals to undergo a background check to ensure that the potential purchaser is legally eligible to possess a firearm.<sup>16</sup>

Rather than examine whether comprehensive regulatory schemes designed to deter illegal sales are effective, most prior studies of gun control laws attempt to estimate the independent effects of discrete laws<sup>17</sup> that, by themselves, may be inadequate for reducing gun availability to criminals.<sup>18</sup> Our prior research found that in states with more comprehensive gun sales regulations, including both handgun registration and a permit-to-purchase licensing system, the guns criminals used were much more likely to have been originally sold by out-of-state retail dealers, typically in states with much weaker firearm sales regulations.<sup>19</sup> Criminals' reliance on out-of-state sources for guns was negatively correlated with measures of

gun availability to criminals.<sup>19</sup> This prior study, however, examined a rather limited indicator of illegal gun trafficking and did not formally assess the effects of several laws that could deter illegal firearm sales. In addition, as is the case for virtually every other evaluation of firearm sales laws, our prior research did not consider enforcement practices.

The current study attempts to enhance our understanding of the effects of gun policies on gun trafficking by estimating the effects of key components—both individually and jointly—of a regulatory scheme designed to prevent diversion of firearms into the illicit market. These components include: (1) regulation and oversight of gun retailers, (2) private sales regulations requiring potential buyers to undergo a background check prior to purchasing a gun from private individuals, and (3) permit-to-purchase licensing laws that provide law enforcement agencies some discretion to deny purchase applications to those who might pose some risk.

## METHODS

### Study Design

We used a cross-sectional study design with city-level data to examine associations between firearm sales regulations, oversight of gun dealers, and indicators of the diversion of guns into the illegal market.

### Data and Measures

Data for our outcome measure were drawn from crime gun traces conducted by the ATF of guns recovered by police from 2000 through 2002 in 54 cities that were participating in the Youth Crime Gun Interdiction Initiative (YCGII; Washington, DC, which essentially banned all handgun sales from 1977 to June 2008, was excluded). Cities that participate in the YCGII agreed to submit information to the ATF for all crime guns recovered by local law enforcement agencies.<sup>20</sup>

Our primary outcome variable was the ratio of likely “trafficked” crime guns sold by an in-state firearm dealer to the number of older crime guns (firearms recovered in the city that had been recovered by police three or more years after retail sale or for which the ATF determined the gun was too old to trace) multiplied by 100. The denominator of this ratio is used to control for differences across cities in gun crime and proactive efforts by police to recover guns from criminals. We considered a crime gun likely to have been trafficked if the interval between retail sale and recovery by the police was less than 1 year, as long as the criminal possessor was not the legal purchaser of record. We also created a trafficking indicator with a cutoff of less than 2 years from retail sale to recovery in crime as a second measure of potential trafficking. Because there was a near-perfect correlation between two indicators ( $r=0.975$ ), we do not present data for the <2-year sale-to-crime dependent variable.

We focus primarily on likely trafficked guns originally sold by dealers located in the same state in which they were recovered by the police because the state-level gun sales regulations being examined can only directly affect such guns. For our secondary indicator of gun trafficking, we relax the precondition of the gun having been sold by an *in-state* dealer to examine the net effect of these measures on *any* diversion of guns into the illegal market, including guns sold by out-of-state dealers within 1 year of being recovered by the police. For 12 cities, we did not use data for all 3 years because large fluctuations in the number of trace requests per year

suggested that comprehensive crime gun traces practices had either never been instituted or had been discontinued during the study period.

Legal research was conducted to gather detailed data on state laws concerning the licensing and regulation of retail firearm dealers, private firearm sales regulations, and other key laws such as permit-to-purchase licensing of firearm buyers and laws limiting handgun purchases to one per month.<sup>14</sup> States were classified by their overall level of firearm dealer regulation. A state is classified as having relatively “strong” firearm dealer regulations if state law requires: (1) a state or local dealer license, (2) record keeping of firearm sales, (3) dealers’ records and premises to be available to law enforcement for inspections, and (4) prompt reporting of thefts of firearms from dealers. A state is classified as having relatively “moderate” firearm dealer regulation if state law requires a dealer license, but not all of the other requirements for strong oversight are met. Finally, a state is considered to have “weak” regulation if its law does not require a dealer license.

We also conducted a survey of state and local law enforcement officials to identify policies and practices regarding oversight, inspection, and undercover enforcement efforts to encourage firearm dealers’ compliance with gun sales laws. For each state, we contacted a person responsible for oversight of gun dealers and/or investigating gun trafficking to participate in the survey. Where state gun dealer licenses are issued at the local level, city agencies were also surveyed. State surveys were conducted from July to September of 2003; city surveys were conducted from October to December of 2004. For this city-level analysis, enforcement activity was considered to be occurring in a city if indicated by either a local agency or a state agency. Two enforcement practices that we focus on in this study are whether the law enforcement agency conducted audits of licensed gun dealers at some regular interval (e.g., annually) and whether the agency ever do undercover “stings” of gun dealers to see whether the dealer would make an illegal sale.

Whether criminals in a city obtain new guns through trafficking may depend on the city’s proximity to states with relatively weak gun sales laws. We used two variables to control for a city’s proximity to states with weak gun laws: (1) the proportion of the population within a 50-mile radius of the city residing out-of-state in a state that did not have strong gun dealer sales regulations in 2000 and (2) the straight-line distance from the city center to the border of the nearest state without strong gun dealer regulations. All of the geographic population and distance data were obtained using ArcMap 9.1 software (ESRI, Inc. 1999–2005). State populations for 2000 were obtained from the US Census Bureau’s Census 2000 summary files.<sup>21</sup>

We also incorporated measures of the prevalence of gun ownership into some of the analyses. Conceptually, the prevalence of firearm ownership within an area may be related to both the key explanatory variables and outcomes of interest. Higher levels of gun ownership are likely to decrease the chance that firearm sales regulations are adopted. Firearm sales regulations may also depress firearm ownership within an area, thereby making it more difficult for criminals to obtain a firearm through a private sale or through theft. We measured local firearm ownership with a commonly used and validated proxy—the percentage of suicides committed with firearms within a jurisdiction—in this case, the county in which the city resides, during 2000 to 2002. Suicide data were obtained from CDC Wonder.<sup>22</sup>

### **Data Analysis**

The distribution of the outcome measures was approximately normal. Therefore, we used ordinary least-squares linear regression analysis to estimate the effects of

firearm sales policies and compliance efforts on the gun trafficking indicator while controlling for proximity to population in states with weak gun sales regulations. We assessed possible confounding of the prevalence of gun ownership by estimating models with and without the local gun ownership prevalence proxy in the model. Multicollinearity among explanatory variables was identified based on variance inflation factor scores. Cook's distance and standardized DfBetas were examined to identify observations with unusual combinations of values for the explanatory variables that exerted disproportionate influence on model coefficients.

There was a very high concordance between having strong state laws concerning the regulation of gun dealers and state and/or local law enforcement agencies having policies to inspect all gun dealers within some specified interval (e.g., every year, every other year). Furthermore, there was no difference in the intrastate gun trafficking indicator between states with laws rated as "moderate" strength or "weak." Therefore, in the regression analyses, we used an indicator variable set equal to 1 if the city was in a state that had both a strong dealer regulation law and also a state or local law enforcement agency that regularly inspected all gun dealers licensed by the state or local government, and set to 0 if otherwise.

We regressed the intrastate gun trafficking indicator on each of the policy indicator variables: (1) strong gun dealer regulation and oversight, (2) state or local law enforcement agency ever conducts undercover stings of gun dealers, (3) regulation of private handgun sales, (4) discretionary permit-to-purchase handgun licensing, and (5) limiting handgun purchases to one per customer per month. The one-gun-per-month variable was dropped from the model after it was found to have no independent effect on gun trafficking levels, and its inclusion in the model inflated the variance of other estimates. For statistically significant policy effects, we derived estimates of the effects of the policies on cities where the policies were in place by calculating the percentage difference between what the model predicted for the trafficking indicator with and without each policy's estimated effect on trafficking.

An examination of Cook's distance statistics for each model revealed that Gary, IN exerted an unusually high degree of influence on the model estimates, particularly estimates of the effects of the city's proximity to population in other states lacking comprehensive gun sales regulations. Analyses were run with and without Gary's data in the model and with and without the population covariate, with minimal effect on the point estimates for the effects of the policies of interest (data are available from the lead author upon request). The primary model estimates discussed below are based on data from 53 cities with Gary excluded.

## RESULTS

Table 1 displays the data for each of the 54 cities in ascending order on the intrastate gun trafficking indicator and the three primary regulatory measures hypothesized to affect gun trafficking. Across the 54 cities studied, the intrastate gun trafficking measure ranged from 0 (Santa Ana, CA) to 9.4 (Gary, IN), with a mean of 3.2 and a median of 2.9. Cities with values at the 10th percentile and lower included Santa Ana, Camden, Newark, New York, and Boston. Each of these five cities was in states that regulated private sales of handguns, four had strong gun dealer oversight, and four had discretionary handgun purchase licensing systems. Cities in the 90th percentile and higher were Gary, Tucson, Phoenix, Albuquerque, and Indianapolis. None of these cities had any of the gun sales accountability measures examined in this study.

**TABLE 1 Gun trafficking indicator and firearm sales regulations in 54 US cities**

City, state	Intrastate gun trafficking indicator	Strong dealer oversight <sup>1</sup>	Ever sting gun dealers	Private sales regulated	Discretionary purchase permits	1 gun a month limit
Santa Ana, CA	0.00	Yes	Yes	Yes		Yes
New York, NY	0.17			Yes	Yes	
Camden, NJ	0.17	Yes	Yes	Yes	Yes	
Newark, NJ	0.24	Yes	Yes	Yes	Yes	
Boston, MA	0.40	Yes		Yes	Yes	
Saint Louis, MO	0.67			Yes		
Jersey City, NJ	0.89	Yes	Yes	Yes	Yes	
Long Beach, CA	1.07	Yes	Yes	Yes		Yes
Detroit, MI	1.11			Yes		
Los Angeles, CA	1.20	Yes	Yes	Yes		Yes
San Jose, CA	1.21	Yes	Yes	Yes		Yes
Oakland, CA	1.30	Yes	Yes	Yes		Yes
Anaheim, CA	1.34	Yes	Yes	Yes		Yes
Winston-Salem, NC	1.54			Yes		
Seattle, WA	1.63					
Salinas, CA	1.69	Yes	Yes	Yes		Yes
Baltimore, MD	1.74			Yes		Yes
High Point, NC	1.81			Yes		
Stockton, CA	2.10	Yes	Yes	Yes		Yes
Miami, FL	2.16					
Chicago, IL	2.18			Yes		
Tampa, FL	2.19					
Cleveland, OH	2.22					
Las Vegas, NV	2.25					
Buffalo, NY	2.43			Yes	Yes	
Oklahoma City, OK	2.66					
Minneapolis, MN	2.81					
Portland, OR	2.97					
Houston, TX	3.01					
Louisville, KY	3.10					
San Antonio, TX	3.11					
Cincinnati, OH	3.63					
Jacksonville, FL	3.63					
Greensboro, NC	3.65			Yes		
Dallas, TX	3.83					
Austin, TX	4.25					
Memphis, TN	4.27					
Pittsburgh, PA	4.32			Yes		
Denver, CO	4.35		Yes			
Milwaukee, WI	4.50					
Birmingham, AL	4.68					
Nashville, TN	4.94					
Charlotte, NC	5.07			Yes		
Richmond, VA	5.56					Yes
New Orleans, LA	5.78					
Philadelphia, PA	5.79			Yes		
Atlanta, GA	5.83					
Aurora, CO	5.94					

**TABLE 1 (Continued)**

City, state	Intrastate gun trafficking indicator	Strong dealer oversight <sup>1</sup>	Ever sting gun dealers	Private sales regulated	Discretionary purchase permits	1 gun a month limit
Baton Rouge, LA	6.03					
Indianapolis, IN	6.21					
Albuquerque, NM	6.76					
Phoenix, AZ	7.08					
Tucson, AZ	7.83					
Gary, IN	9.44					
Totals		12	12	24	6	10

<sup>1</sup>State required: 1) state or local license for firearm dealers; 2) record keeping of firearm sales; 3) dealers records and premises to be available for law enforcement inspections; 4) state or local law enforcement report regular dealer inspections; and 5) prompt reporting of lost or stolen firearms

Bivariate comparisons of means for the intrastate gun trafficking indicator are shown in Table 2. Intrastate gun trafficking was significantly lower in the presence of each of the measures of gun sales accountability examined. Intrastate gun trafficking was two to four times higher in cities located in states without the gun sales regulations, with the greatest differences associated with strong gun dealer regulations and discretionary handgun purchase permit licensing.

Table 3 provides the estimates from two models for regressions on intrastate gun trafficking, model 1 without the local gun ownership prevalence proxy covariate and model 2 with this covariate. When not controlling for local gun ownership levels, strong gun dealer regulation and oversight ( $\beta=-1.92, p=0.042$ ), regulation of private handgun sales ( $\beta=-1.60, p=0.006$ ), and discretionary permit-to-purchase licensing ( $\beta=-1.50, p=0.040$ ) were each associated with statistically significant lower levels of intrastate trafficking. We used the model estimates to calculate the percentage difference between predicted intrastate trafficking had a city not had each of the policies that were significantly associated with lower intrastate gun trafficking and the estimated trafficking levels with each of the policies. Using model

**TABLE 2 Comparison of means of intrastate gun trafficking indicator by state and local gun sales regulations**

Firearm seller accountability policy		Mean	SD	t	Signif.
Strong state/local regulation of gun dealers	Yes (n=14)	1.02	0.75	8.04	<0.001
	No (n=40)	4.01	1.99		
Minimum frequency of gun dealer audits	Yes (n=13)	1.33	1.10	5.60	<0.001
	No (n=41)	3.84	2.11		
Will conduct undercover stings of gun dealers	Yes (n=14)	1.85	1.77	2.95	0.005
	No (n=40)	3.72	2.13		
Private sales of handguns regulated	Yes (n=24)	1.76	1.54	5.70	<0.001
	No (n=30)	4.42	1.91		
Discretionary gun purchase permit licensing	Yes (n=6)	0.72	0.88	6.02	<0.001
	No (n=48)	3.55	2.10		
One handgun per customer per month	Yes (n=10)	1.72	1.46	3.28	0.004
	No (n=44)	3.58	2.20		



**TABLE 3** Model statistics for linear regressions on intrastate gun trafficking with and without controlling for local gun ownership levels

Model covariates	Model 1 $R^2=0.520$		Model 2 $R^2=0.565$	
	<i>B</i> (SE)	Signif.	<i>B</i> (SE)	Signif.
Constant	4.86 (0.47)	<0.001	1.57 (1.59)	0.329
Strong gun dealer regulation and oversight	-1.92 (0.91)	0.042	-1.76 (0.89)	0.053
Law enforcement ever does undercover stings of retail gun dealers	0.88 (0.78)	0.266	0.94 (0.75)	0.220
Private handgun sales regulated	-1.60 (0.56)	0.006	-1.27 (0.58)	0.027
Discretionary purchase permit licensing	-1.50 (0.71)	0.040	-0.23 (0.90)	0.803
% population in 50-mile radius of city in other states lacking comprehensive gun sales regulations	-0.07 (0.04)	0.079	-0.05 (0.04)	0.186
Distance (miles) to border of nearest state lacking strong gun dealer regulation	-0.005 (0.003)	0.158	0.004 (0.003)	0.235
Local gun ownership proxy			0.06 (0.03)	0.036

Excludes data for Gary, IN due to influential outlier

coefficients to estimate intrastate trafficking levels had these policies not been in place, we calculated that intrastate gun trafficking was 64% lower in places with strong gun dealer regulations and oversight than, 68% lower in cities where the state had discretionary permit-to-purchase licensing, and 48% lower in cities where the state regulated private handgun sales. Reports by state or local law enforcement that they ever undertake undercover stings of gun dealers were not independently associated with intrastate trafficking levels.

When the measure of local gun availability is included in the model, it is positively associated with intrastate gun trafficking ( $\beta=0.061$ ,  $p=0.036$ ). Controlling for the effects of the prevalence of local gun ownership reduced the strength of the estimated effects for regulating private sales of handguns ( $\beta=-1.27$ ,  $p=0.027$ ) and for strong gun dealer regulation and oversight and ( $\beta=-1.76$ ,  $p=0.053$ ) and eliminated the effects of discretionary purchase permit laws.

Data in Table 4 present the independent associations between the firearm sales accountability measures and likely trafficked crime guns regardless of whether the crime gun had originally been sold within the state in which it was recovered by the police. The model estimates are similar to those in Table 3 for trafficking of intrastate guns with some exceptions. In model 1 in Table 4, regulation of private handgun sales was associated with lower levels of gun trafficking ( $\beta=-1.66$ ,  $p=0.041$ ). The effects of strong gun dealer regulation and oversight within a state was linked with less overall gun trafficking ( $\beta=-1.79$ ,  $p=0.083$ ), but only at the 0.10 level of significance. Discretionary permit-to-purchase licensing was unrelated to gun trafficking from any state. Law enforcement reports that they ever conduct undercover stings of gun dealers were also unrelated to trafficking. In model 2 in Table 4, higher levels of gun availability in the county where the city was located were associated with more trafficked crime guns. Controlling for local gun ownership reduces the estimated effect of regulating private handgun sales ( $\beta=-1.37$ ,  $p=0.035$ ) and of strong gun dealer oversight ( $\beta=-1.64$ ,  $p=0.104$ ) such that the effects of the latter is no longer statistically significant. In a separate model (not displayed in the table) in which we examined the combined effects of having both strong gun dealer oversight and regulation of private handgun sales, we found that



**TABLE 4 Model statistics for linear regressions on all gun trafficking with and without controlling for local gun ownership levels**

	Model 1 $R^2=0.381$		Model 2 $R^2=0.422$	
	<i>B</i> (SE)	Signif.	<i>B</i> (SE)	Signif.
Constant	5.47 (0.52)	<0.001	2.44 (1.78)	0.179
Strong gun dealer regulation and oversight	-1.79 (1.01)	0.083	-1.64 (0.99)	0.104
Law enforcement ever does undercover stings of retail gun dealers	0.99 (0.86)	0.258	1.04 (0.84)	0.215
Private handgun sales regulated	-1.66 (0.61)	0.009	-1.36 (0.62)	0.035
Discretionary purchase permit licensing	0.09 (0.78)	0.905	1.27 (1.01)	0.215
% population in 50-mile radius of city in other states lacking comprehensive gun sales regulations	-.05 (0.04)	0.199	-0.04 (0.04)	0.370
Distance (miles) to border of nearest state lacking strong gun dealer regulation	-0.006 (0.004)	0.109	-0.005 (0.004)	0.159
Local gun ownership proxy			0.05 (0.03)	0.082

Excludes data for Gary, IN due to influential outlier

these comprehensive measures were associated with significantly fewer trafficked guns ( $\beta=-2.60$ ,  $p=0.024$ ).

## DISCUSSION

This study is the first to gather and incorporate measures of the enforcement of gun sale laws into a study of the effectiveness of those laws in preventing the diversion of new guns into the illicit market. This enabled us to stratify cities in states that had strong laws regulating gun dealers based on whether or not state or local law enforcement regularly conducted compliance checks on all gun dealers. Prior research has documented how comprehensive enforcement of gun sale laws reduced gun trafficking to criminals in Boston.<sup>23</sup>

Laws restricting gun purchase to one per month per person have been touted as important deterrents to illegal gun trafficking. A study which focused on interstate gun trafficking of guns sold in Virginia before and after that state adopted a one-gun-a-month law found a reduction in the proportion of crime guns recovered in east coast cities with restrictive gun laws that had been initially purchased in Virginia following the law's implementation.<sup>24</sup> We suspect that the discrepancy between our findings and those of the prior study is due to bulk transactions being more common for individuals involved in interstate trafficking across hundreds of miles from states with weak gun laws to states with strict laws than is the case for intrastate efforts to arm criminals.

Our findings indicated that comprehensive regulation and regular compliance inspections of retail gun dealers as well as the regulation of private handgun sales were each associated with significantly lower levels of gun trafficking. As would be expected, these relationships were strongest for guns originally sold within the same state in which they were recovered from criminals. Although cities in states with the most comprehensive gun sale regulations attract some guns from states with weaker gun laws, the combination of strong gun dealer regulations and regulation of private handgun sales were still associated with fewer trafficked guns even after controlling for local levels of gun ownership. Consistent with our findings, a recent study found

that states which regulate private gun sales exported crime guns to other states at a rate that was half as high as that of states that did not regulate private guns sales.<sup>25</sup>

These findings have important implications for gun policy. Federal laws require retail firearm dealers to be licensed and place basic requirements on them in order to enhance accountability for the guns dealers acquire. Nevertheless, it is very difficult for the ATF to sanction gun dealers or to revoke the licenses of dealers who do not comply with firearm sale laws. Rather than examining a crude measure of whether or not a state required local or state licenses of gun dealers, we delved more closely into the nuances of the laws to determine which states' laws had provisions that should best enable law enforcement to hold gun dealers accountable for illegal or negligent sales practices. Only those cities located in states with comprehensive gun dealer regulations and oversight had significantly lower levels of gun trafficking. Weak dealer regulations appeared to have no effect on gun trafficking.

In the USA, it is rarely easy to enact legislation that enhances gun sales regulations, but laws regulating gun dealers may be easier to pass than other laws that more directly impact law-abiding purchasers. In addition, some states might reduce gun trafficking by better enforcing existing laws. For example, Georgia, which has a high prevalence of gun ownership and otherwise generally lax gun sale laws, has relatively strong laws that empower local and state officials to curtail illegal gun sales by retail gun dealers. Unfortunately, law enforcement officials in Atlanta reported that they had not conducted gun dealer law compliance inspections.

We found no relationship between law enforcement reporting to us that they ever do undercover stings of gun stores and gun trafficking. In contrast to this finding, previous research found that undercover stings and lawsuits against scofflaw gun dealers<sup>11,26</sup> were associated with fewer new guns subsequently diverted to criminals. There are at least two plausible reasons for these apparently discrepant findings. First, undercover stings of gun stores may only have broad impact on gun dealer business practices that enable guns to be diverted to criminals when the stings are done on a large scale, announced in a very public way, and accompanied by other deterrents such as litigation and prosecution. Recent US federal law now provides retail gun dealers extremely broad protections against lawsuits, thus limiting this deterrent against negligent business practices that help supply guns to criminals.<sup>27</sup> Another plausible reason for these discrepant findings is that our measure—law enforcement located in places where gun dealers are licensed by state or local governments reporting whether they “*ever* do undercover operations on gun dealers suspected of involvement in illegal sales...”—is a crude measure of this activity. Survey responses indicated that very few agencies undertake such operations with much frequency.

The lack of federal regulations for firearm sales by private owners is arguably the most important gap in existing laws that inhibit law enforcement's ability to prevent illegal gun sales. Straw purchasers and traffickers are likely to face far less risk in states that do not regulate private firearm sales. Our findings suggest that closing this gap would deter illegal gun trafficking. These findings are consistent with the results of an observational study of illegal sales at gun shows revealing far more illegal gun sales at gun shows in states where private gun sales were not regulated than in California where private sales can only be made after the potential buyer has undergone and passed a background check.<sup>28</sup>

Our estimates of the effects of state laws allowing local law enforcement discretion when issuing permits to purchase firearms were not robust; the laws' negative effects on within-state trafficking were negated when we control for local

gun ownership prevalence. There are several possible relationships between discretionary permit systems and gun trafficking. Discretionary permit systems could reduce gun trafficking by depressing the prevalence of gun ownership. This policy generally requires potential purchasers to have considerable interaction with and scrutiny by local law enforcement officials, longer wait times, and higher fees—each of which could discourage gun ownership. In such an environment, criminals seeking guns are likely to find it harder to identify private sellers. This is supported by the positive associations we find between local gun ownership proxies and gun trafficking even after controlling for the effects of gun sale regulations. Thus, the effects of discretionary permit-to-purchase laws on gun trafficking may be mediated, at least in part, by the laws lowering the prevalence of gun ownership. These laws may also serve as a deterrent for potential straw purchasers who must apply for the purchase permits directly with a local law enforcement agency. Finally, low levels of gun ownership are likely a political precondition for the passage of discretionary purchase permit laws. If this is true, at least some of the negative relationship between discretionary permit-to-purchase laws and gun trafficking is probably explained by the states' historically low levels of gun ownership. Lack of sufficient longitudinal data makes it difficult to know the degree to which low gun ownership is a cause or a precondition for discretionary permit-to-purchase systems or both.

Our inability to disentangle the temporal relationships between levels of gun ownership and the most restrictive gun sales policies is the primary limitation of this study. A longitudinal study was not possible because most of the policies of interest were adopted long before many cities began routinely submitting information on all of the guns they recover from criminals and crime scenes to ATF for tracing.

Another limitation of this study is that it focuses only on the trafficking of new guns—those that were recovered by police within a year of retail sale. By focusing solely on a trafficking indicator based on close temporal connection to a retail sale, we may exaggerate the importance of gun dealer regulations relative to the regulation of private sales. When we relaxed our sale-to-crime interval for the trafficking indicator from <1 to <2 years, the effects of gun dealer licensing and oversight were slightly reduced as would be expected.

Furthermore, gun sale regulations, of course, are intended not only to deter illegal gun trafficking but also seek to prevent potentially dangerous individuals from purchasing guns directly rather than through an intermediary. Discretionary permit-to-purchase systems are likely to result in far fewer potentially dangerous individuals lawfully purchasing guns and thus enhance public safety in ways unrelated to gun trafficking.

Further research is needed to examine the relationships between gun trafficking indicators and severe acts of violence including homicides and whether comprehensive regulation and enforcement of gun sales laws deter criminal gun use sufficiently to affect these outcomes. While much of the prior research on the effects of gun sale regulations on violent crime has examined relatively weak measures such as mandatory background checks and waiting periods for firearm sales by licensed dealers, future work should attempt to isolate the effects of more comprehensive systems of regulations.

## **ACKNOWLEDGMENTS**

This research was supported by grants from The John D. and Catherine T. MacArthur Foundation and The Joyce Foundation.

## REFERENCES

1. Centers for Disease Control and Prevention, National Center for Health Statistics. Compressed Mortality File 1999-2005. CDC WONDER On-line Database, compiled from Compressed Mortality File 1999-2005 Series 20 No. 2K, 2008. <http://wonder.cdc.gov/cmfi-icd10.html>. Accessed on Aug 27, 2008.
2. Hu G, Webster DW, Baker SP. Hidden homicide trends in the U.S., 1999-2004. *J Urban Health*. 2008; 85: 597-603.
3. Butts JA. *Violent Crime Trends in 100 U. S. Cities*. Chicago: Chapin Hall Center for Children and the University of Chicago; 2008.
4. Cook PJ, Ludwig J. *The Real Cost of Gun Violence*. New York: Oxford University Press; 2000.
5. Cook PJ, Ludwig J, Braga AA. Criminal records of homicide offenders. *JAMA*. 2005; 294: 598-601.
6. Harlow CW. Firearm Use by Offenders: Survey of Inmates in State and Federal Correctional Facilities. Bureau of Justice Statistics Special Report. NCJ 189369. Washington, DC: U.S. Department of Justice, November 2001. Revised February 2002.
7. Bureau of Alcohol, Tobacco and Firearms. *Commerce in Firearms in the United States*. Washington, DC: U.S. Department of the Treasury; 2000.
8. Bureau of Alcohol, Tobacco and Firearms (ATF). *Crime Gun Trace Reports (2000): The Youth Gun Interdiction Initiative*. Washington, DC: U.S. Department of the Treasury; 2002.
9. Sorenson SB, Vittes KA. Buying a handgun for someone else: Firearm dealers' willingness to sell. *Inj Prev*. 2003; 9: 147-150.
10. Webster DW, Bulzacchelli MT, Zeoli AM, Vernick JS. Effects of undercover police stings of gun dealers on the supply of new guns to criminals. *Inj Prev*. 2006; 12: 225-230.
11. Webster DW, Vernick JS, Bulzacchelli MT. Effects of a gun dealer's change in sales practices on the supply of guns to criminals. *J Urban Health*. 2006; 83: 778-787.
12. Firearm Owners Protection Act, codified at 18 U.S.C. Section 923(g)(1)(B)(ii).
13. Inspector General of the United States Department of Justice. Inspections of Firearms Dealers by the Bureau of Alcohol, Tobacco, Firearms and Explosives. Report I-2004-2005. Washington, DC, July 2004.
14. Bureau of Alcohol, Tobacco and Firearms (ATF). *Crime Gun Trace Reports (2000): The Youth Gun Interdiction Initiative*. Washington, DC: U.S. Department of the Treasury; 2002.
15. Vernick JS, Webster DW, Bulzacchelli MT. Regulating firearms dealers in the United States: an analysis of state law and opportunities for improvement. *J Law Med Ethics*. 2006; 34: 765-775.
16. Bowling M, Hickman MJ, Adams DB. Background Checks for Firearm Transfers, 2004. *Bureau of Justice Statistics Bulletin*. NCJ 210117, U.S. Department of Justice, Washington, DC, October 2005.
17. Hahn RA, Bilhuka O, Crosby A. Firearms laws and the reduction of violence: a systematic review. *Am J Prev Med*. 2005; 28(2 Suppl 1): 40-71.
18. Cook PJ, Ludwig J. Principles for effective gun policy. *Fordham Law Rev*. 2004; LXXIII: 589-613.
19. Webster DW, Vernick JS, Hepburn LM. The relationship between licensing, registration and other state gun sales laws and the source state of crime guns. *Inj Prev*. 2001; 7: 184-189.
20. Department of the Treasury, Bureau of Alcohol, Tobacco and Firearms. *Crime Gun Trace Reports (2000) National Report*. July 2002. <http://www.atf.gov/firearms/ycgii/2000/index.htm>. Accessed October 15, 2008.
21. U.S. Census Bureau. Table GCT-PH1: Population, Housing Units, Area, Density. Census 2000 Summary File 1. <http://factfinder.census.gov>. Accessed May 18, 2006.

22. CDC Wonder Compressed Mortality File, Underlying Cause of Death. <http://wonder.cdc.gov/mortSQL.html>. Accessed on November 29, 2006.
23. Braga AA, Pierce GL. Disrupting illegal firearms markets in Boston: The effects Operation Ceasefire on the supply of new handguns to criminals. *Criminol Public Policy*. 2005; 4(4): 717–748.
24. Weil D, Knox R. Effects of limiting handgun purchases to interstate transfer of firearms. *JAMA*. 1996; 275: 1759–1761.
25. Mayors Against Illegal Guns. *The Movement of Illegal Guns in America: The Link Between Gun Laws and Interstate Gun Trafficking*. December 2008.
26. Webster DW. Supplemental expert report submitted for *City of New York V. A-1 Jewelry & Pawn, Inc. et al.*, 06 CV 2233, *City of New York V. Bob Moates' Sport Shop, INC., et al.*, 06 CV 6504, May 27, 2008.
27. Vernick JS, Rutkow L, Salmon DA. Availability of litigation as a public health tool for firearm injury prevention: A comparison of guns, vaccines, and motor vehicles. *Am J Public Health*. 2007; 97: 1991–1997.
28. Wintemute GJ. Gun shows across a multistate American gun market: observational evidence of the effects of regulatory policies. *Inj Prev* 2007; 13:150-155. Erratum in: *Inj Prev* 2007; 13: 286.