The Effect of Child Access Prevention Laws on Unintentional Child Firearm Fatalities, 1979–2000

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Objective: **Unintentional firearm deaths among children have been declining steadily in the United States. This study investigates whether Child Access Prevention (CAP) laws are associated with this decline.**

Methods: **Pooled cross-sectional time-series data (1979–2000) for 50 states and negative binomial regression methods were used to estimate the effect of Child Access Prevention laws on unintentional firearm deaths among children.**

Results: **Most states that enacted CAP laws experienced greater subsequent declines in the rate of unintentional firearm deaths for children age 0 to 14 compared with states not enacting the laws; however when adjusted for firearm prevalence and state and national effects the laws were associated with statistically significant declines only in Florida and California. In a comparison group of adults age 55 to 74, a group less likely to have young children in the home and thus less likely to be influenced by CAP laws, there was no indication that CAP laws affected unintentional firearm death rates.**

Conclusions: **Unintentional firearm deaths are declining in the United States, with the rate for children under age 15 declining faster than adults. States that allowed felony prosecution of offenders experienced a greater effect of CAP laws than states that did not. CAP laws may have had some influence on the continued reduction in national death rates.**

Key Words: **Firearm, Children, Child, Guns.**

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In 2002, 762 people died from unintentional firearm injuries.[1] Eight percent (n = 60) of these unintentional firearm deaths occurred among children under age 15. Fatal injuries, however, reflect only a fraction of the total number of unintentional injuries caused by firearms. Children under age 15 suffered 823 nonfatal unintentional firearm injuries serious enough to require an emergency department visit, a ratio of 14 nonfatal firearm injuries for every fatality.[1]

Although the number of deaths and injuries remain unacceptably high, and higher than in any other developed nation, unintentional firearm deaths among children in the United States have been declining over time. In 1981, there were 298 unintentional firearm deaths among children under 15, a rate of 0.57 per 100,000. By 2002, that number was 60, a rate of 0.10 per 100,000.[1] Although many factors have been suggested as the reason for this decline, during this period there has been a decline in the number of households with children present that contain firearms and a decline in the number of households with a man present.[2] These may be contributing to children experiencing a lower exposure to firearms.

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A recent study by Miller et al.[3] explored the association between the availability of firearms and rates of unintentional firearm deaths among children age 5 to 14. The authors used several validated measures for household firearm ownership and found that higher rates of household gun ownership at the state level were associated with higher rates of unintentional firearm deaths among children. When they compared the five highest and lowest firearm prevalence states, the mortality ratio for unintentional deaths among children was 16 to 1.

Legislation may have contributed to children's decreased exposure and access to firearms in the home. Several states have enacted laws designed to encourage adults to store their firearms in a manner that makes them inaccessible to children, generally known as Child Access Prevention or CAP laws.[4,5] Florida passed the first of these laws in 1989 and by January 1, 2003, 18 states had enacted laws that allow the owner of a firearm to be held criminally liable if a child gains access to a firearm and uses or displays it in a dangerous manner.

We, therefore, chose to explore the effects of CAP laws enacted between 1979 and 2000 on unintentional firearm deaths among children while adjusting for state levels of firearm prevalence. National longitudinal data on firearm storage patterns are not available to directly test whether these laws have affected firearm storage behavior, the primary purpose of CAP laws. Therefore, we evaluate the secondary outcome of these laws, changes in the rates of unintentional shooting deaths among children.

Three previous studies have attempted to determine the effect of CAP laws on unintentional firearm deaths among children.[4–6] Cummings and colleagues[4] looked at data from

1979 through 1994 and found that the 12 state CAP laws were associated with a 23% average decrease in rates of unintentional firearm deaths among children under 15 but that this effect was primarily attributable to the three states that allowed felony prosecution of offenders. A second study by Webster and Starnes,[5] evaluated 15 CAP laws through 1997 and reported a 17% decline in unintentional firearm deaths to children under 15; however, this effect was not significant when Florida, a felony prosecution state, was removed. Lott and Whitley,[6] reviewing the effect of CAP laws through 1996, found no reduction in unintentional firearm deaths. None of these prior studies included a control variable specifically for household firearm prevalence.

Three additional years of data are available and two laws have been enacted since the last published study looking at CAP laws and unintentional firearm deaths. In our study we first investigate trends in unintentional firearm deaths in individual states to see if there are consistent patterns of effect in CAP law states. The additional years of data provide 15 CAP law states with at least five years of follow-up time.

We then use a multivariate model to test the hypotheses that the enactment of CAP laws are associated with greater than expected reductions in unintentional firearm deaths among children 0 to 14, while controlling for state-level firearm prevalence. Because the events surrounding unintentional firearm deaths among children and older adults, in general, differ we chose to use a comparison group of adults age 55 to 74 in all of our analyses. We hypothesize that persons in this age group are less likely to have young children in the home and therefore less likely to be influenced by safe storage laws. Utilizing this unique comparison group allows us to directly compare trends in CAP laws states among two groups that are both experiencing declining rates of unintentional firearm death at the national level.

MATERIALS AND METHODS

We created a panel dataset including the unintentional firearm deaths for all ages for 50 states from 1979 through 2000. The injury and state population data come from the National Center for Health Statistics (NCHS) mortality files available from CDC Wonder.[7] The deaths are coded according to International Classification of Diseases, Ninth Revision (ICD-9), E922.0-E922.9, and Tenth Edition W32-W34.[8,9] The data represent victims as there are no reliable longitudinal data on offenders for unintentional firearm events.

In 1999, the NCHS began using the International Classification of Disease, Tenth Revision (ICD-10) to codify deaths.[9] This version contains classification changes from the previously used ICD-9.[8] Early comparison studies indicate that the classification of unintentional firearm deaths has not changed dramatically; nevertheless, we control for the different classification schemes in our multivariate model.[10]

During our study period, 1979 to 2000, 17 states enacted Child Access Prevention laws. One additional state, NH, passed a law in 2000 and is not included in the analyses. In general, the laws are very similar, clearly stating that the owner of a firearm can be held responsible if a child gains access to an unsecured firearm and uses or displays it in a dangerous manner. In Calif., Conn., and Fla., the laws allow violators to be charged with a felony. The maximum penalty in the other states is a misdemeanor. The laws have additional variations regarding the age limit of a child, ranging from 14 to 18, as well as what qualifies as safe firearm storage.[11] These variations were explored in the multivariate models.

We chose to focus our study on children under age 15; the group covered by the majority of the laws' age restrictions. As a comparison group, we selected adults age 55 to 74, hypothesizing that this group was less likely to have a young child in the home and therefore unlikely to be influenced by the laws. Older adults unintentional firearm injuries are more likely to be self-inflicted during activities such as hunting or firearm maintenance compared with youth who are most likely to be shot by a friend or relative[12] in the victim's home or the home of a friend or relative.[13,14] Yet similar to youth age 0 to 14, the rate of unintentional firearm deaths among 55 to 74 year olds has been declining steadily over time.[1]

Prior research on CAP laws has indicated that individual states experienced different effects of CAP laws.[4,5] To identify states' individual trends, unadjusted five-year averages of unintentional firearm death rates for the years preceding and immediately after the effective date of a CAP law in individual states were compared with averages for the same years in states never enacting the laws. Two CAP law states, Mass. (law enacted in 1998) and Ill. (law enacted in 1999), were excluded from this analysis because of the lack of sufficient postlaw data.

To examine the effect of CAP laws on unintentional firearm death rates over time we created a multivariate regression model. Unintentional firearm deaths are rare events and when disaggregated by age, some states experienced no deaths in certain years. As a result, we used a variation of the Poisson model, negative binomial regression, when tests indicated that the data were overdispersed.[15] All 17 states that enacted CAP laws between 1979 and 2000 were included in the regression analyses. Results are presented as rate ratios.

In every variation of the model we included indicator variables representing individual years to control for national trends that affected each state equally. Similarly, indicator variables for each state were added to control for factors unique to an individual state that did not change over time that may have affected the rate of unintentional firearm deaths. Using variables such as these allows for within-state comparison of rates before and after a law went into effect.

To control for state-level firearm availability, we included a variable representing the annual percent of suicides in a state that were firearm suicides (FS/S). This variable is a validated proxy for state-level firearm availability.[16] We also included a variable to control for changes in coding practices from ICD-9 to ICD-10 that occurred in 1999. Prior research on CAP laws demonstrated that socio-economic factors were

not significantly associated with unintentional firearm death rates across states,[4,5] and after preliminary examination of the data we chose not to include additional covariates in the model.

The CAP laws are represented in the models by a variable that is equal to 1 when the law is in effect for an entire calendar year and 0 when no law exists. When a law's effective date falls during a calendar year, the value is equal to the proportion of the year it is in effect.[5] We chose to code the laws' effects this way to create a more accurate representation of state-years affected by a law. Because the data are repeated measures from the same states, we used Huber-White robust standard errors to adjust for nonindependence of observations.[17,18]

Our primary regression analyses examined the effect of 17 CAP laws on unintentional firearm death rates among children age 0 to 14 and adults age 55 to 74. Subsequently, we tested the described regression model with the states divided by CAP law penalty status (felony or misdemeanor), age limits, and whether the state's CAP law required firearm dealers to post a sign explaining the law. Based on results from previous studies,[4,5] we explored the sensitivity of our findings by removing individual states from the analyses. Finally, to determine whether there were systematic differences in the 17 states that passed CAP laws in the years preceding their enactment compared with those never passing laws, we created variables representing each of the 5 years before the CAP law effective dates in each state.[19] If the values of these variables were significantly different from zero, it would suggest that there were factors unique to states passing CAP laws uncontrolled for in the model.

Table 1 **Five Year Pre-law and Post-law Average Rates per 100,000 for Unintentional Firearm Deaths Age 0–14 for CAP Law and Non-CAP Law States**

Year CAP Law Effective	State	Prelaw 5 Yr Average Rate	Postlaw 5 Yr Average Rate	Percent Change
1989	Florida	0.59	0.20	−66
	Non-CAP law states	*0.75*	*0.62*	*−17*
1990	Connecticut	0.19	0.09	−53
	Non-CAP law states	*0.73*	*0.59*	*−19*
	Iowa	0.36	0.30	−17
	Non-CAP law states	*0.73*	*0.59*	*−19*
1991	Nevada	0.73	0.49	−33
	Non-CAP law states	*0.72*	*0.51*	*−29*
1992	California	0.31	0.19	−39
	Non-CAP law states	*0.72*	*0.47*	*−35*
	Hawaii	0.17	0	−100
	Non-CAP law states	*0.72*	*0.47*	*−35*
	Maryland	0.10	0.05	−50
	Non-CAP law states	*0.72*	*0.47*	*−35*
	New Jersey	0.06	0.04	−33
	Non-CAP law states	*0.72*	*0.47*	*−35*
	Virginia	0.35	0.35	0
	Non-CAP law states	*0.72*	*0.47*	*−35*
	Wisconsin	0.32	0.30	−6
	Non-CAP law states	*0.72*	*0.47*	*−35*
1993	Minnesota	0.34	0.13	−62
	Non-CAP law states	*0.71*	*0.44*	*−38*
	North Carolina	0.83	0.31	−63
	Non-CAP law states	*0.71*	*0.44*	*−38*
1994	Delaware	0.42	0.13	−69
	Non-CAP law states	*0.66*	*0.41*	*−38*
1995	Rhode Island	0	0	0
	Non-CAP law states	*0.73*	*0.34*	*−53*
	Texas	0.59	0.30	−49
	Non-CAP law states	*0.73*	*0.34*	*−53*

RESULTS

Rates of unintentional firearm deaths for children age 0 to 14 in the United States have been declining for decades. In 1981, the age-adjusted rate for this age group was 0.57 per 100,000 and by 2002 it was 0.10, an 82% decrease. In comparison, the rate of unintentional firearm death for adults 55 to 74 declined 60% from 0.50 per 100,000 in 1981 to 0.20 in 2002. Whereas the population of children under age 15 in the United States has remained stable, the proportion of the total number of unintentional firearm deaths that this age group represents has declined from 16% in 1981 to 8% in 2002.

States that enacted CAP laws had lower rates of unintentional firearm deaths for both children and adults in the 5 years preceding the laws' enactment compared with states without CAP laws. The only exceptions were Nevada and North Carolina for children age 0 to 14 and Texas for adults 55 to 74 (Tables 1 and 2).

The decrease in rates of unintentional firearm deaths for children 0 to 14 in CAP law states exceeded the average for states without CAP laws in 9 of the 14 states for which data were available (Table 1). R.I. experienced no unintentional firearm deaths among children age 0 to 14 during the study period and therefore was excluded from this analysis. For adults age 55 to 74, CAP law states experienced greater declines than states without CAP laws in 5 out of 13 states (R.I. and Hawaii experienced no deaths) (Table 2).

Results from the multivariate model showed a statistically significant association between CAP laws and rates of unintentional firearm deaths for children 0 to 14 years old when all 17 states are included in the model (RR 0.78, 95% confidence interval [CI] 0.61–0.99). For adults, age 55 to 74, the coefficient for the CAP law variable was not statistically significant (RR 0.88, 95% CI 0.63–1.22). When either Fla. or Calif. was removed from the model using children, the CAP law variable representing the other 16 states was no longer statistically significant. No other state's exclusion had a statistically significant impact on the result. Among adults age 55 to 74, no single state had significant influence on the results (Table 3).

When felony and misdemeanor states were considered separately, for youth under age 15, states that permitted felony prosecution of offenders had lower than expected rates of unintentional firearm death (RR 0.64, 95% CI 0.46–0.89) than states without CAP laws whereas misdemeanor states

Table 2 Five Year Pre-law and Post-law Average Rates per 100,000 for Unintentional Firearm Deaths Age 55–74 for CAP Law and Non-CAP Law States

Year CAP Law Effective	State	Prelaw 5 Yr Average Rate	Postlaw 5 Yr Average Rate	Percent Change
1989	Florida	0.10	0.13	30
	Non-CAP law states	*0.70*	*0.43*	*−38*
1990	Connecticut	0.14	0.08	−43
	Non-CAP law states	*0.70*	*0.45*	*−38*
	Iowa	0.21	0.08	−62
	Non-CAP law states	*0.70*	*0.45*	*−38*
1991	Nevada	0	0.52	+
	Non-CAP law states	*0.58*	*0.43*	*−26*
1992	California	0.20	0.16	−20
	Non-CAP law states	*0.54*	*0.32*	*−41*
	Hawaii	0	0	0
	Non-CAP law states	*0.54*	*0.32*	*−41*
	Maryland	0.06	0.33	450
	Non-CAP law states	*0.54*	*0.32*	*−41*
	New Jersey	0.19	0.09	−53
	Non-CAP law states	*0.54*	*0.32*	*−41*
	Virginia	0.36	0.23	−36
	Non-CAP law states	*0.54*	*0.32*	*−41*
	Wisconsin	0.28	0.18	−36
	Non-CAP law states	*0.54*	*0.32*	*−41*
1993	Minnesota	0.28	0.12	−57
	Non-CAP law states	*0.56*	*0.38*	*−32*
	North Carolina	0.32	0.40	25
	Non-CAP law states	*0.56*	*0.38*	*−32*
1994	Delaware	0	0.34	+
	Non-CAP law states	*0.50*	*0.36*	*−28*
1995	Rhode Island	0	0	0
	Non-CAP law states	*0.43*	*0.32*	*−19*
	Texas	0.53	0.22	−58
	Non-CAP law states	*0.43*	*0.32*	*−19*

did not experience the same effect (RR 0.93, 95% CI 0.76–1.13). Removing any of the three felony prosecution states (Calif., Conn., or Fla.) did not affect the statistical significance of the results. The model for the adult population did not exhibit any difference by prosecution status (Table 3).

Dividing the states by whether notification of the law was required to be posted did not result in statistically significant results for youth or adults. When the model was divided by the CAP laws age limits, however, the states representing age 16 and under demonstrated a statistically significant association with lower rates of unintentional firearm deaths among youth but not with the other two age groups, under 14 and under 18. The age 16 group included Florida and Connecticut that were responsible for this effect. When the model was restricted to the years 1979 to 1998, the value for the CAP law variable for children was no longer statistically significant (RR 0.80, 95% CI 0.63–1.02) and remained the same for adults age 55 to 74 (RR 0.87, 95% CI 0.62–1.23).

Table 3 Negative Binomial Model for Unintentional Firearm Deaths Age 0–14 and 55–74

Model	Age 0–14 RR (95% CI)	Age 55–74 RR (95% CI)
CAP law	0.78* (0.61–0.99)	0.88 (0.63–1.22)
Felony CAP law	0.64* (0.46–0.89)	0.90 (0.72–1.12)
Misdemeanor CAP law	0.93 (0.76–1.13)	0.88 (0.54–1.44)
CAP laws without Fla.	0.86 (0.72–1.03)	0.87 (0.61–1.28)
CAP laws without Calif.	0.77 (0.56–1.06)	0.86 (0.45–1.27)

All models include indicator variables representing each state and year and the percent of suicides by firearm.

* $p < 0.05$.

The variable representing household firearm prevalence (FS/S) was not statistically significant in the regression model when state indicator variables were included and did not affect the results for the CAP variable when it was removed. When FS/S was included in a model that did not contain state indicator variables, the FS/S variable was statistically significant and results for the CAP law variable were similar to the model using state indicator variables, suggesting that the variables representing each state adequately capture the variation in state-level firearm prevalence.

The values for the variables representing the years before the CAP law enactment dates were close to one and not statistically significant, giving no indication of uncontrolled differences between states with CAP laws and those without in the years preceding the laws' enactment dates (results not shown).

DISCUSSION

Unintentional firearm deaths are declining in the United States, with the rate for children under age 15 declining faster than adults. Most states that enacted CAP laws experienced greater subsequent declines in the rate of unintentional firearm deaths for children age 0 to 14 compared with states without the laws, however not all states did. The variability among the states is highlighted by the discovery that the average effect of these laws appears to be largely attributable to declines in Fla. and Calif., two states that allow felony prosecution. For adults age 55 to 74, a group less likely to have young children in the home and thus less likely to be influenced by CAP laws, there was no indication that CAP laws consistently affected unintentional firearm death rates.

Firearm prevalence, measured at the state level, was not significantly associated with unintentional firearm deaths among children or adults when included in a model that also included state indicator variables. When used in place of state variables, household firearm prevalence was strongly associated with unintentional firearm deaths in both groups. These findings suggest that household firearm prevalence is an important construct to address, and that prior research,[4,5] which included state indicator variables, adequately controlled for firearm prevalence.

The results for the CAP laws appear to be somewhat conflicting; suggesting an association between CAP laws and lower rates of unintentional firearm deaths among children,

and then reporting that this effect is limited to just two large states. Earlier research on CAP laws also found that the effect of the CAP laws on unintentional firearm fatalities in children was attributable to states that allowed felony prosecutions, and more specifically, Fla.[4,5] In this study, we found that Calif., in addition to Fla., had a significant effect on unintentional firearm death rates. Conn., the only other felony prosecution state, had a total of 11 unintentional firearm deaths to children under 15 in the 9 years preceding the law and only three in the 10 years after the law's enactment, a result that is suggestive of an effect, but is not statistically significant. Further exploration of Calif. reveals the large reduction in unintentional firearm deaths among children did not occur until 1997, 5 years after the passage of the law. Although a 5-year delayed impact of the law is possible, it is likely that other factors contributed to the 1997 to 2000 decline. Calif. has continued to enact additional firearm regulations since 1992, and saw a drop in the number of handguns purchased in the late 1990s.[20]

These findings highlight the variability in individual states' responses to CAP laws. Almost all of the states that enacted CAP laws had lower than average rates of unintentional firearm deaths before the laws became effective signifying perhaps that systems were already in place that were contributing to lower rates of unintentional deaths. The state variability could also be attributable to differences in implementation and enforcement of the CAP laws or simply sociodemographic changes. Longitudinal data on firearm storage patterns have never been collected; indeed, before 2001, cross-sectional data for most states were not available limiting our ability to test hypotheses regarding how CAP laws may have changed individuals' firearm storage behavior. We do know, however, that nationally fewer households currently have firearms present than in the past, perhaps reducing children's exposure.[21] There have also been efforts made by the medical and public health communities to educate parents and caregivers about safe firearm storage.[22] The decline in unintentional firearm deaths among children may be the result of a combination of factors working together that, unfortunately, remain difficult to measure.

It is also possible that our results underestimate the effect of CAP laws. Publicity surrounding the enactment of these laws may have created a greater awareness of firearm storage issues and influenced storage practices in non-CAP law states, reducing the differences between states with CAP laws and those without. In addition, certain states including Kans., Maine, and Mont. have laws or legal precedent that allow prosecution for child endangerment in situations where firearm owners leave a firearm accessible to a child[23]; some cities have passed similar laws.[24]

It is generally agreed that the nationally reported data for unintentional firearm deaths undercount the number of fatalities and that the practices of state coroners and medical examiners vary when classifying the cause of death in unintentional firearm shootings.[2,25,26] Our results could have been affected if states differentially experienced recording changes during the study period that resulted in a significant shift in the type of firearm deaths coded as unintentional. At this time, there is no evidence that such changes have occurred.

The statistical approach we chose to use, a pooled cross-sectional time-series model, allows for control of national trends and state-level differences. It allows for a before and after comparison of rates within a state while comparing the state with a CAP law to all other states without the laws. It does not, however, control for factors unique to individual years in individual states. For example, if a state experienced a highly publicized event that led to more people making firearms less accessible to children in a certain year, our model would be unable to control for this. Additionally, we model the effect of the CAP law as becoming immediately effective because we have no compelling theoretical evidence to assume otherwise. It is possible, however that the effectiveness of these laws is more gradual or changes over time.

All of the CAP laws were enacted at a time when reported rates of unintentional firearm deaths were declining and, in general, enacted in states with lower than average rates of unintentional firearm deaths among children. The latest national data suggest that this trend is continuing, with greater declines among children than adults.[1]The reduced exposure of people to firearms in the home resulting from a decline in the number of households with firearms present, and improvement in trauma systems and emergency medical care have all been discussed as contributing causes of this decline.[27] The evidence of this and other studies suggests that CAP laws may have had some influence on the continued reduction in national death rates. Caution is warranted, however, before drawing broad conclusions on the general efficacy of CAP laws until we better understand the mechanisms driving the decline in deaths, and in particular why certain states experience declines and others do not. Research on both individuals' understanding of their state's firearm laws and on changes in firearm storage behavior would help us better evaluate the effect of CAP law requirements.

REFERENCES

1. Centers for Disease Control and Prevention. Web-based Injury Statistics Query and Reporting System (WISQARS). *National Center for Injury Prevention and Control, Centers for Disease Control and Prevention.* Available at: www.cdc.gov/ncicp/wisqars. Accessed February 15 2005.
2. Frattaroli S, Webster DW, Teret SP. Unintentional gun injuries, firearm design, and prevention: what we know, what we need to know, and what can be done. *J Urban Health. Mar.* 2002;79:49–59.
3. Miller M, Azrael D, Hemenway D. Firearm availability and unintentional firearm deaths, suicide, and homicide among 5–14 year olds. *J Trauma.* 2002;52:267–274; discussion 274–265.
4. Cummings P, Grossman DC, Rivara FP, Koepsell TD. State gun safe storage laws and child mortality due to firearms. *JAMA.* 1997; 278:1084–1086.
5. Webster DW, Starnes M. Reexamining the association between child access prevention gun laws and unintentional shooting deaths of children. *Pediatrics.* 2000;106:1466–1469.

6. Lott JR, Whitley J. Safe-storage gun laws: accidental deaths, suicides, and crime. *J Law Economics.* 2001;44:659–689.
7. Centers for Disease Control and Prevention. Compressed Mortality Files, 1979–2000. *National Center for Health Statistics.* Available at: http://.wonder.cdc.gov, 2003.
8. World Health Organization. *International Classification of Diseases, Ninth Revision.* Geneva, Switzerland: WHO; 1977.
9. World Health Organization. *ICD-10 International Statistical Classification of Diseases and Related Health Problems: Tenth Revision Based on the Recommendations of the Tenth Revision Conference, 1989, and Adopted by the Forty-Third World Health Assembly.* Geneva: WHO; 1992.
10. Anderson R, Minimo A, Hoyert D, Rosenberg H. Comparability of cause of death between ICD-9 and ICD-10: Preliminary estimates. *National Center for Health Statistics.* Available at: http://www.cdc.gov/nchs/data/nvsr49/nvsr49_02.pdf.
11. Vernick JS, Hepburn LM. Examining state and federal gun laws: trends 1970–1999. In: Ludwig J, Cook PJ, eds. *Evaluating Gun Policy.* Washington, DC: Brookings Institution Press; 2003.
12. Cherry D, Runyan C, Butts J. A population based study of unintentional firearm fatalities. *Inj Prev.* 2001;7:62–65.
13. Nash BP. Kids shooting kids: an analysis of newspaper accounts of unintentional shootings of Utah children, 1988–2003. *Gun Violence Prevention Center of Utah*. 2004.
14. Grossman DC, Reay DT, Baker SA. Self-inflicted and unintentional firearm injuries among children and adolescents: the source of the firearm. *Arch Pediatr Adolesc Med.* 1999;153:875–878.
15. Breslow N. Extra-Poisson variation in log linear models. *Appl Stat.* 1986;33:38–44.
16. Azrael D, Cook PJ, Miller M. State and local prevalence of firearm ownership: measurement, structure and trends. *J Quantitative Criminol.* 2004;20:43–62.
17. Huber P. The behavior of maximum likelihood estimates under non-standard conditions. *Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability.* Vol 1. Berkeley, CA: University of California Press; 1967;221–233.
18. White H. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica.* 1980;48:817–838.
19. Donohue JJ. The impact of state laws permitting citizens to carry concealed handguns. In: Ludwig J, Cook PJ, eds. *Evaluating Gun Policy.* Washington, DC: Brookings Institution Press; 2003.
20. Violence Prevention Research Program. *Handgun Commerce in California, 2000.* Sacramento, CA 2004.
21. National Opinion Research Center. General social survey. Available at: www.norc.uchicago.edu/projects/gensoc.asp, 2004.
22. McGee K, Coyne-Beasley T, Johnson R. Review of evaluations of educational approaches to projmote safe storage of firearms. *Inj Prev.* 2003;9:108–111.
23. State gun laws. Available at: www.bradycampaign.org. Accessed April 2004;16.
24. Handgun Control Inc. State Firearms Legislation: Selected Summary by State. Available at: http://www.handguncontrol.org/gunlaws/B2/b2stlaws.html, 1998.
25. Barber C, Hemenway D, Hochstadt J, Azrael D. Underestimates of unintentional firearm fatalities: comparing Supplementary Homicide Report data with the National Vital Statistics System. *Inj Prev.* 2002; 8:252–256.
26. Schaechter J, Duran I, De Marchena J, Lemard G, Villar ME. Are "accidental" gun deaths as rare as they seem? A comparison of medical examiner manner of death coding with an intent-based classification approach. *Pediatrics.* 2003;111(Pt 1):741–744.
27. Hemenway D. *Private Guns Public Health.* Ann Arbor: University of Michigan Press; 2004.