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First Reports Evaluating the Effectiveness of Strategies for Preventing Violence: Firearms Laws

Findings from the Task Force on Community Preventive Services

Prepared by
Robert A. Hahn, Ph.D.[1]
Oleg O. Bilukha, M.D., Ph.D.[1]
Alex Crosby, M.D.[2]
Mindy Thompson Fullilove, M.D.[3]
Akiva Liberman, Ph.D.[4]
Eve K. Moscicki, Sc.D.[5]
Susan Snyder, Ph.D.[1]
Farris Tuma, Sc.D.[5]
Peter Briss, M.D.[1]

[1]*Division of Prevention Research and Analytic Methods*
Epidemiology Program Office
[2]*Division of Violence Prevention*
National Center for Injury Prevention and Control, CDC
Atlanta, Georgia
[3]*New York State Psychiatric Institute, Columbia University*
New York, New York
[4]*National Institute of Justice*
U.S. Department of Justice
Washington, D.C.
[5]*National Institute of Mental Health*
National Institutes of Health
Bethesda, Maryland

The material in this report was prepared by the Epidemiology Program Office, Stephen B. Thacker, M.D., Director; Division of Prevention Research and Analytic Methods, Richard E. Dixon, M.D., Director.

Summary

During 2000--2002, the Task Force on Community Preventive Services (the Task Force), an independent nonfederal task force, conducted a systematic review of scientific evidence regarding the effectiveness of firearms laws in preventing violence, including violent crimes, suicide, and unintentional injury. The following laws were evaluated: bans on specified firearms or ammunition, restrictions on firearm acquisition, waiting periods for firearm acquisition, firearm registration and licensing of firearm owners, "shall issue" concealed weapon carry laws, child access prevention laws, zero tolerance laws for firearms in schools, and combinations of firearms laws. The Task Force found insufficient evidence to determine the effectiveness of any of the firearms laws or combinations of laws reviewed on violent outcomes. (Note that insufficient evidence to determine effectiveness should not be interpreted as evidence of ineffectiveness.) This report briefly describes how the reviews were conducted, summarizes the Task Force findings, and provides information regarding needs for future research.

Background

Although firearms-related* injuries in the United States have declined since 1993, they remained the second leading cause of injury mortality in 2000, the most recent year for which complete data are available (*1*). Of 28,663 firearms-related deaths in 2000 --- an average of 79 per day---16,586 (57.9%) were suicides, 10,801 (37.7%) were homicides, 776 (2.7%) were unintentional, and

an additional 500 (1.7%) were legal interventions or of undetermined intent.

An estimated 24.3% of the 1,430,693 violent crimes (murder, aggravated assault, rape, and robbery) committed in the United States in 1999 were committed with a firearm (*2*). In the early 1990s, rates of firearms-related homicide, suicide, and unintentional death in the United States exceeded those of 25 other high-income nations (i.e., 1992 gross national product US $8,356 per capita) for which data are available (*3*). In 1994, the estimated lifetime medical cost of all firearms injuries in the United States was $2.3 billion (*4*).

Approximately 4.5 million new firearms are sold each year in the United States, including 2 million handguns. In addition, estimates of annual secondhand firearms transactions (i.e., sales, trades, or gifts) range from 2 million to 4.5 million (*5,6*). Further, an estimated 0.5 million firearms are stolen annually (*6*). Thus, the total number of firearms transactions could be as high as 9.5 million per year.

The 1994 National Survey of the Private Ownership of Firearms (NSPOF), conducted by Chilton Research Services for the Police Foundation, under sponsorship of the National Institute of Justice, indicated that American adults owned approximately 192 million working firearms, an average of one per adult (*7*). The NSPOF also indicated that firearm ownership was unevenly distributed in the population: only 24.6% of U.S. adults owned a firearm (41.8% of men and 9.0% of women). Another survey (*2*) found that 41% of adult respondents reported having a firearm in their home in 1994, and 35% did so in 1998. A third survey (*8*) reported that 35% of homes with children aged <18 years had at least one firearm. Rates of firearm ownership in the United States also exceed those of 14 other nations for which data are available, with the exception of Finland (*9*).

Of the estimated 192 million firearms owned in the United States at the time of the 1994 NSPOF survey, 65 million were handguns; 70 million, rifles; 49 million, shotguns; and the remainder were other guns (*7*). Among handgun owners, 34.0% kept their guns loaded and unlocked. An estimated 10 million handguns, one sixth of the handguns owned, were regularly carried by their owners, approximately half in the owners' cars and the other half on the owners' persons.

The manufacture, distribution, sale, acquisition, storage, transportation, carrying, and use of firearms in the United States are regulated by a complex array of federal, state, and local laws and regulations. This review examines firearms laws as one of many approaches to reducing firearms violence (*10,11*).

Introduction

The independent, nonfederal Task Force on Community Preventive Services (the Task Force) is developing the *Guide to Community Preventive Services* (the *Community Guide*) with the support of the U.S. Department of Health and Human Services (DHHS) in collaboration with public and private partners. Although CDC provides staff support to the Task Force for development of the *Community Guide*, the conclusions presented in this report were developed by the Task Force and are not necessarily the conclusions of DHHS or CDC.

This report is one in a series of topics included in the *Community Guide*, a resource that includes multiple systematic reviews, each focusing on a preventive health topic. A short overview of the process used by the Task Force to select and review evidence and summarize its findings is included in this report. A full report on the findings and additional evidence (including discussions of possible additional benefits, potential harms, existing data problems, research gaps, and directions for future research) will be published in the *American Journal of Preventive Medicine*.

Methods

The *Community Guide's* methods for conducting systematic reviews and linking evidence to recommendations have been described elsewhere (*12*). In brief, for each *Community Guide* topic, a multidisciplinary team (the systematic review development team) conducts a review consisting of the following steps:

- developing an approach to organizing, grouping, and selecting the interventions to be reviewed;
- systematically searching for and retrieving evidence;
- assessing the quality of and summarizing the strength of the body of evidence of effectiveness;
- assessing cost and cost-effectiveness evidence, identifying applicability and barriers to implementation (if the effectiveness of the intervention has been established);
- summarizing information regarding evidence of other effects; and
- identifying and summarizing research gaps.

Firearms laws were identified as high-priority interventions for violence prevention review in April 1997 by a group of consultants[†] representing diverse experience. The group generated a comprehensive list of strategies and created a priority list of interventions for review on the basis of 1) the potential to reduce violence in the U.S. population; 2) the potential benefits of expanding use of seemingly effective, but underutilized, interventions and reducing use of seemingly ineffective, but overutilized, interventions; 3) current interest in this intervention among potential audiences; and d) diversity of intervention types.

The interventions included in this review address several of the objectives outlined in *Healthy People 2010* (*13*), the disease prevention and health promotion agenda for the United States. Many of the *Healthy People 2010* objectives outlined in Chapter 15, "Injury and Violence Prevention," relate to firearms laws and their proposed effects on violence-related outcomes (Box).

To be included in the review of effectiveness, studies had to 1) be a primary evaluation of the selected intervention rather than, for example, a guideline or review; 2) provide information on at least one outcome of interest from the list of violent outcomes preselected by the systematic review development team; 3) be conducted in Established Market Economies[§]; and 4) compare outcomes in groups of persons exposed to the intervention with outcomes in groups of persons not exposed or less exposed to the intervention (whether the comparison was concurrent between groups or before-and-after within the same group).

Electronic searches for any research published before July 2001 were conducted in MEDLINE, EMBASE, ERIC, National Technical Information Service (NTIS), PsychINFO, Sociological Abstracts, National Criminal Justice Reference Service (NCJRS), Public Affairs Information Service (PAIS), Criminal Justice Index, and Gale Group Legal Research Index.[¶] The references listed in all retrieved articles were also reviewed, and specialists on the systematic review development team and elsewhere were consulted to identify additional reports. Journal articles, government reports, books, and book chapters were included in this review.

Because the purpose of this review was to assess the effectiveness of firearms laws in preventing violence, studies of firearms laws were reviewed only if they assessed at least one violent outcome. The outcome measures evaluated to determine the effect of each intervention were violent crimes (i.e., murder, aggravated assault, robbery, and rape), suicide, and unintentional firearm injury. Aggravated assault was considered a health-related outcome insofar as it is "an unlawful attack by one person upon another for the purpose of inflicting severe or aggravated bodily injury" (*2*). Similarly, robbery was considered a health-related outcome insofar as it is "the taking or attempting to take anything of value from the care, custody, or control of a person or persons by force or threat of force or violence or by putting the victim in fear" (*2*). For each of the firearms laws, the team developed an analytic framework indicating possible causal links between that intervention and one or more of the predefined outcomes of interest.

Each study meeting the inclusion criteria was evaluated with a standardized abstraction form (*14*) and was assessed for suitability of study design and threats to validity (*12*). On the basis of the number of threats to validity, studies were characterized as having good, fair, or limited execution. Results for each outcome of interest were obtained from each study that met the minimum quality criteria. Measures that were adjusted for the effects of potential confounders were used in preference to crude effect measures. If two or more studies of a firearms law overlapped in terms of population, time period, and outcomes studied, the systematic review development team chose the study with the fewest execution flaws and the best design to represent effects of the intervention.

A median was calculated as a summary effect measure for each outcome of interest. For bodies of evidence consisting of seven or more studies, an interquartile range was calculated as an index of variability. Unless otherwise noted, the results of each study were represented as a point estimate for the relative change in the violent outcome rate associated with the intervention.

The body of evidence of effectiveness was characterized as strong, sufficient, or insufficient on the basis of the number of available studies, the suitability of study designs for evaluating effectiveness, the quality of execution of the studies, the consistency of the results, and the median effect size (*12*).

The *Community Guide* uses systematic reviews to evaluate the evidence of intervention effectiveness, and the Task Force makes recommendations based on the findings of these reviews. The strength of each recommendation is based on the strength of the evidence of effectiveness (i.e., the Task Force can recommend an intervention [or recommend against its use] on the basis of strong evidence of effectiveness or sufficient evidence of effectiveness** [*12*]). Other types of evidence can also affect a recommendation. For example, evidence that harms from an intervention outweigh improved outcomes might lead to a recommendation against use of the intervention. If interventions are found to be effective, they are evaluated for cost effectiveness by using economic evaluation guidelines developed for the *Community Guide* (*15*). Because none of the firearm laws reviewed was found to have sufficient evidence to draw conclusions regarding their effectiveness, no economic reviews were conducted.

A finding of insufficient evidence to determine effectiveness should not be interpreted as evidence of ineffectiveness but rather as an indicator that additional research is needed before an intervention can be evaluated for its effectiveness.

Results

The systematic review development team identified 51 studies that evaluated the effects of selected firearms laws on violence and met the inclusion criteria for this review. No study was excluded because of limitations in design or execution. Information on violent outcomes was available in 48 studies, and the remaining three studies, which provided information on counts or proportions of regulated firearms used in crime, were used as supplementary evidence. Several studies examined more than one type of firearm law.

Several separate studies evaluated effects of the same law in the same populations during overlapping time periods. Such studies

were considered nonindependent, and effect estimates from the best study in the group (as determined by the quality of design and execution and the length of the follow-up period) were chosen to represent the effects of the intervention. The total number of studies for each intervention, and the number of studies that actually contributed effect estimates to the body of evidence, are listed (Table). More extensive evidence tables will be available at http://www.thecommunityguide.org when the full evidence review is published.

Evidence was insufficient to determine the effectiveness of any of these laws for the following reasons.

- **Bans on specified firearms or ammunition.** Results of studies of firearms and ammunition bans were inconsistent: certain studies indicated decreases in violence associated with bans, and others indicated increases. Several studies found that the number of banned guns retrieved after a crime declined when bans were enacted, but these studies did not assess violent consequences (*16,17*). Studies of the 1976 Washington, D.C. handgun ban yielded inconsistent results (*18--20*). Bans often include "grandfather" provisions, allowing ownership of an item if it is acquired before the ban, complicating an assessment of causality. Finally, evidence indicated that sales of firearms to be banned might increase in the period before implementation of the bans (e.g., the Assault Weapons Ban of 1994) (*21*).
- **Restrictions on firearm acquisition.** The federal government and individual states restrict the acquisition and use of firearms by individuals on the basis of their personal history. Reasons for restriction can include prior felony conviction, conviction of misdemeanor intimate partner violence, drug abuse, adjudication as "mentally defective,"†† and other characteristics (e.g., specified young age). The Brady Law (*22*) established national restrictions on acquisition of firearms and ammunition from federal firearms licensees. The interim Brady Law (1994--1998) mandated a 5-day waiting period to allow background checks. The permanent Brady Law, enacted in 1998, eliminated the required waiting period. It normally allows 3 days for a background check, after which, if no evidence of a prohibited characteristic is found, the purchase may proceed (*23*). Certain states have established additional restrictions, and some require background checks of all firearms transactions, not only those conducted by federal firearms licensees.
  The permanent Brady Law depends on the National Instant Criminal Background Check System (NICS). However, NICS lacks much of the required background information, particularly on certain restriction categories (*23*). Efforts to improve the availability of background information have been supported by the National Criminal History Improvement Program (*24*). Approximately 689,000 applications to acquire a firearm (2.3% of 30 million applications) were denied under the Brady Law from its first implementation in 1994 through 2000 (*25*); the majority of denials were based on the applicant's criminal history. However, denial of an application does not always stop applicants from acquiring firearms through other means.
  Overall, evaluations of the effects of acquisition restrictions on violent outcomes have produced inconsistent findings: some studies indicated decreases in violence associated with restrictions, and others indicated increases. One study indicated a statistically significant reduction in the rate of suicide by firearms among persons aged >55 years; however, the reduction in suicide by all methods was not statistically significant. Furthermore, this benefit appears to have been a consequence of the waiting period imposed by the interim Brady Law (which has since been dropped in the permanent law) rather than of the law's restrictions on the basis of the purchaser's characteristics (*26*).
- **Waiting periods for firearm acquisition.** Waiting periods for firearm acquisition require a specified delay between application for and acquisition of a firearm. Waiting periods have been established by the federal government and by states to allow time to check the applicant's background or to provide a "cooling-off" period for persons at risk of committing suicide or impulsive acts against others. Studies of the effects of waiting periods on violent outcomes yielded inconsistent results: some indicated a decrease in violent outcome associated with the delay and others indicated an increase. As noted previously, one study of the interim Brady Law indicated a statistically significant reduction in firearms suicide among persons aged >55 years associated with the waiting period requirement of the interim law. Several studies suggested a partial "substitution effect" for suicide (i.e., decreases in firearms suicide are accompanied by smaller increases in suicide by other means) (*26*).
- **Firearm registration and licensing of owners.** Registration requires that a record of the owner of specified firearms be created and retained (*27*). At the national level, the Firearm Ownership Protection Act of 1986 specifically precludes the federal government from establishing and maintaining a registry of firearms and their owners. Licensing requires an individual to obtain a license or other form of authorization or certification to purchase or possess a firearm (*27*). Licensing and registration requirements are often combined with other firearms regulations, such as safety training or safe storage requirements. Only four studies examined the effects of registration and licensing on violent outcomes; the findings were inconsistent.
- **"Shall issue" concealed weapon carry laws.** Shall issue concealed weapon carry laws (shall issue laws) require the issuing of a concealed weapon carry permit to all applicants not disqualified by specified criteria. Shall issue laws are usually implemented in place of "may issue" laws, in which the issuing of a concealed weapon carry permit is discretionary (based on criteria such as the perceived need or moral character of the applicant). A third alternative, total prohibition of the carrying of concealed weapons, was in effect in six states in 2001.
  The substantial number of studies of shall issue laws largely derives from and responds to one landmark study (*28*). Many of these studies were considered to be nonindependent because they assessed the same intervention in the same population during similar time periods. A review of the data revealed critical problems, including misclassification of laws, unreliable county-level crime data, and failure to use appropriate denominators for the available numerator crime data (*29*). Methodological problems, such as failure to adjust for autocorrelation in time series data, were also evident. Results across studies were inconsistent or conceptually implausible. Therefore, evidence was insufficient to determine the effect of shall

issue laws on violent outcomes.

- **Child access prevention laws.** Child access prevention (CAP) laws are designed to limit children's access to and use of firearms in homes. The laws require firearms owners to store their firearms locked, unloaded, or both, and make the firearm owners liable when children use a household firearm to threaten or harm themselves or others. In three states with CAP laws (Florida, Connecticut, California), this crime is a felony; in several others it is a misdemeanor.
  Only three studies examined the effects of CAP laws on violent outcomes, and only one outcome, unintentional firearms deaths, was assessed by all three. Of these, two studies assessed the same states over the same time periods and were therefore nonindependent. The most recent study, which included the most recent states to pass CAP laws and had the longest follow-up time, indicated that the apparent reduction in unintentional firearm deaths associated with CAP laws that carry felony sanctions was statistically significant only in Florida and not in California or Connecticut (*30*). Overall, too few studies of CAP law effects have been done, and the findings of existing studies were inconsistent. In addition, although CAP laws address juveniles as perpetrators of firearms violence, available studies assessed only juvenile victims of firearms violence.
- **Zero tolerance laws for firearms in schools.** The Gun-Free Schools Act (*31*) stipulates that each state receiving federal funds must have a state law requiring local educational agencies to expel a student from school for at least 1 year if a firearm is found in the student's possession at school. Expulsion may lead to alternative school placement or to "street" placement (full expulsion, with no linkage to formal education). In contrast to the 3,523 firearms reported confiscated under the Gun-Free Schools Act in the 1998--99 school year, school surveys (*32*) indicate that an estimated 3% of the 12th grade student population in 1996 (i.e., 85,350 students) reported carrying firearms on school property one or more times in the previous 30 days. Thus, even if only 12th grade students carry firearms, fewer than 4.3% of firearms are being detected in association with the Gun-Free Schools Act.
  No study reviewed attempted to evaluate the effects of zero tolerance laws on violence in schools, nor did any measure the effect of the Gun-Free Schools Act on carrying of firearms in schools. One cross-sectional study, however, assessed the effectiveness of metal detector programs in reducing the carrying of firearms in schools (*33*). Although firearms detection is not explicitly required in the Gun-Free Schools Act, the effectiveness of the law may depend on the ability to detect firearms by various means. The study reported that schools with and without metal detectors did not differ in rates of threatening, fights, or carrying of firearms outside of school, but the rate of carrying firearms to, from, or in schools with detection programs was half that of schools without such programs. The effectiveness of zero tolerance laws in preventing violence cannot be assessed because appropriate evidence was not available. A further concern is that "street" expulsion might result in increased violence and other problems among expelled students.
- **Combinations of firearms laws.** Governmental jurisdictions (e.g., states or nations) can be characterized by the degree to which they regulate firearm possession and use. Whether a greater degree of firearms regulation in a jurisdiction results in a reduction of the amount of violence in that jurisdiction still needs to be determined. Three kinds of evidence were reviewed for this study: 1) studies of the effects of comprehensive national laws within nations; 2) international comparisons of comprehensive laws; and 3) studies in which law types within jurisdictions (i.e., regulation of specific, defined aspects of firearm acquisition and use) were categorized and counted, and counts compared with rates of specific forms of violence within the same jurisdictions. The latter type are referred to here as index studies because they developed indices of the degree of regulation. In drawing conclusions about law combinations, findings from the three approaches were considered. On the basis of national law assessments (the Gun Control Act of 1968 in the United States and the Criminal Law Amendment Act of 1977 in Canada), international comparisons (between the United States and Canada), and index studies (all conducted within the United States), available evidence was insufficient to determine whether the degree of firearms regulation was associated with decreased (or increased) violence. The findings were inconsistent and most studies were methodologically inadequate to allow conclusions about causal effects. Moreover, as conducted, index studies, even if consistent, would not allow specification of which laws to implement.

In summary, the Task Force found insufficient evidence to determine the effectiveness of any of the firearms laws reviewed for preventing violence. References and key findings are listed (Table).

Research Needs

The Task Force's review of firearms laws found insufficient evidence to determine whether the laws reviewed reduce (or increase) specific violent outcomes (Table). Much existing research suffers from problems with data, analytic methods, or both. Further high-quality research is required to establish the relationship between firearms laws and violent outcomes. Potential areas for further investigation will be discussed in detail in an upcoming article in the *American Journal of Preventive Medicine*.

Several recurring problems were associated with the studies that evaluated the effects of firearms laws on violent outcomes:

- The assessment or "measurement" of laws and their provisions has been noted as a problem in certain studies and may occur in others as well. As with all interventions, assessing the degree of implementation of laws may be important in evaluating their effects; yet this has not been a part of law evaluations. Better information regarding implementation might allow more sophisticated explanation of inconsistent effects.
- Several facets of the measurement of violent outcomes have been problematic. Crime data are substantially underreported and, at the county level, may not be sufficiently reliable for research purposes (*29*). In addition, selected outcome measures are often not directly relevant to the law being assessed (e.g., the evaluation of child access prevention laws by

measurement of juvenile victims [rather than perpetrators] and the evaluation of shall issue laws by the measurement of crimes occurring in the home [where the law does not apply]). Another problem is that crime data are often aggregated, so that the circumstances of violent events cannot be determined. Aggregated data hinder the assessment of the ways in which laws might and might not work. Individual record data systems currently being implemented --- the National Incident-Based Reporting System of the FBI and the National Violent Death Reporting System of CDC and partners --- might resolve some of these difficulties and greatly facilitate the evaluation of firearms laws.

- The measurement of potential confounders has been a challenge in evaluating the effects of firearms laws. Potentially important confounders include socioeconomic status and poverty, drug cycles, gang activity, and the intensity of law enforcement. Measuring these phenomena is difficult and requisite data are often not available. In addition, endogeneity (i.e., the presence of common characteristics, such as crime counts, as both dependent and independent variables in equations) has been a problem in firearms law evaluations.
- Study designs and analytic techniques used in firearms law evaluations have been problematic. Rates of violence may affect the passage of firearms laws and firearms laws may then affect rates of violence; knowledge of temporal sequence is thus critical in separating cause and effect, and cross-sectional studies are at a disadvantage. Time series analyses of firearms laws and violent outcomes have not consistently adjusted for temporal and spatial autocorrelation, and thus may have exaggerated hypothesized associations. Additionally, firearms studies often fail to note potential biases associated with measurement of outcomes not directly associated with the law in question (e.g., using victims rather than agents of violence in the assessment of CAP laws).

In conclusion, the application of imperfect methods to imperfect data has commonly resulted in inconsistent and otherwise insufficient evidence with which to determine the effectiveness of firearms laws in modifying violent outcomes.

This is a critical period for focused research on the effectiveness of firearms laws in reducing violence in the United States. International comparisons indicate that the United States is an outlier among developed, industrialized nations in rates of firearms violence (*2*). Widespread public concern exists about criminal firearms violence, firearms violence among youth, and other forms of firearms violence, and popular support for many firearms laws is evident (*34,35*). Although the Task Force's systematic review of the existing literature on firearms laws found insufficient evidence to determine the effectiveness of these laws in preventing violence, research should continue on the effectiveness of firearms laws as one approach to the prevention or reduction of firearms violence and firearms injury. Evaluation should include not only the laws reviewed here, but the broad array of other federal, state, and local laws.

Additional Information Regarding the *Community Guide*

In addition to the firearms laws reviewed in this report, reviews for the *Community Guide* have been completed on the effectiveness of preventing violence through early childhood home visitation (*36*) and therapeutic foster care (to be published in the near future). Reviews of several other violence prevention interventions are pending or under way, including the effects of school-based, social and emotional skill learning programs, and the treatment of juveniles as adults in the justice system.

Community Guide topics are prepared and released as each is completed. The findings from systematic reviews on vaccine-preventable diseases, tobacco use prevention and reduction, motor vehicle occupant injury, physical activity, diabetes, oral health, and the social environment have been published. A compilation of systematic reviews will be published in book form in 2004. Additional information regarding the Task Force, the C*ommunity Guide*, and a list of published articles is available at http://www.thecommunityguide.org.

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* A firearm is a weapon (e.g., a handgun, rifle, or shotgun) in which a shot is propelled by gunpowder.

† Consultants for the systematic reviews of violence prevention interventions were Laurie Anderson, Ph.D., CDC, Olympia, Washington; Carl Bell, M.D., Community Mental Health Council, Chicago, Illinois; Red Crowley, Men Stopping Violence, Atlanta, Georgia; Sujata Desai, Ph.D., CDC, Atlanta, Georgia; Deborah French, Colorado Department of Public Health and Environment, Denver, Colorado; Darnell F. Hawkins, Ph.D., J.D., University of Illinois at Chicago, Chicago, Illinois; Danielle LaRaque, M.D., Harlem Hospital Center, New York, New York; Barbara Maciak, Ph.D., CDC, Detroit, Michigan; James Mercy, Ph.D., CDC, Atlanta, Georgia; Suzanne Salzinger, Ph.D., New York State Psychiatric Institute, New York, New York; Patricia Smith, M.S., Michigan Department of Community Health, Lansing, Michigan. Other aspects of this review benefited by comments from Phillip Cook, Ph.D., Duke University, Durham, North Carolina; Gary Kleck, Ph.D., School of Criminology and Criminal Justice, Florida State University, Tallahassee, Florida; Jon Vernick, Ph.D., Johns Hopkins University, Baltimore, Maryland; Daniel Webster, Sc.D., Johns Hopkins University, Baltimore, Maryland; James Wright, Ph.D., University of Central Florida, Orlando, Florida; Frank Zimring, J.D., University of California, Berkeley, California.

§ Established Market Economies as defined by the World Bank are Andorra, Australia, Austria, Belgium, Bermuda, Canada, Channel Islands, Denmark, Faeroe Islands, Finland, France, Germany, Gibraltar, Greece, Greenland, Holy See, Iceland, Ireland, Isle of Man, Italy, Japan, Liechtenstein, Luxembourg, Monaco, the Netherlands, New Zealand, Norway, Portugal, San Marino, Spain, St. Pierre and Miquelon, Sweden, Switzerland, the United Kingdom, and the United States.

¶ These databases can be accessed as follows: MEDLINE: http:// www.ncbi.nlm.nih.gov/PubMed; EMBASE: DIALOG http://www.dialogclassic.com (requires id/password account), ScienceDirect: http://www.sciencedirect.com/science/search/database/embase; ERIC: http://www.askeric.org/Eric/; NTIS: DIALOG http://www.dialogclassic.com (requires id/password account), http://grc.ntis.gov/ntisdb.htm; PsycINFO: DIALOG http://www.dialogclassic.com (requires id/password account), http://www.apa.org/psycinfo/products/psycinfo.html; Sociological Abstracts: DIALOG http://dialogclassic.com (requires id/password account), http://www.csa.com/detailsV5/socioabs.html; NCJRS: http://abstractsdb.ncjrs.org/content/AbstractsDB_Search.asp; PAIS: DIALOG http://dialogclassic.com (requires id/password account); Criminal Justice index: DIALOG http://dialogclassic.com (requires id/password account); Gale Group Legal Research Index: DIALOG http://dialogclassic.com (requires id/password account); CINAHL: DIALOG http://www.dialogclassic.com (requires id/password account), http://www.cinahl.com/wpages/login.htm.

** At the June 2002 meeting of the Task Force on Community Preventive Services, new terminology was adopted to reflect the findings of the Task Force. Instead of being referred to as "strongly recommended" and "recommended," such interventions are now referred to as "recommended (strong evidence of effectiveness)" and "recommended (sufficient evidence of effectiveness)," respectively. Similarly, the finding previously referred to as "insufficient evidence" is now more fully stated: "insufficient evidence to determine effectiveness." These changes were made to improve the clarity and the intent of the findings.

†† The term "mentally defective" is a determination by a lawful authority that a person, as a result of marked subnormal intelligence or mental illness, is a danger to self or others, or lacks the mental capacity to manage his or her own affairs. The term also includes a court finding of insanity in a criminal case, incompetence to stand trial, or not guilty by reason of lack of mental responsibility. **Source:** Bureau of Alcohol Tobacco and Firearms. Federal firearms regulations reference guide. Washington, DC: U.S. Department of the Treasury, Bureau of Alcohol, Tobacco and Firearms, 2000, ATF P 5300.4 (01-00). Available at http://www.atf.treas.gov/pub/fire-explo_pub/2000_ref.htm.

Table

TABLE. Findings of the Task Force on Community Preventive Services regarding firearms laws and prevention of violence

Intervention (No. of studies contributing effect estimates)	Task force finding	Intervention description	Key findings
Bans on specified firearms or ammunition (6)*	Insufficient evidence to determine effectiveness†	Prohibit acquisition or possession of certain categories of firearms (e.g., machine guns or assault weapons) or ammunition (e.g., large-capacity magazines). Can also include prohibitions on the manufacture of the specified firearms. Often "grandfather" guns acquired before ban.	Evidence insufficient because of small numbers of studies, inconsistent evidence of effectiveness, and limitations in execution of available studies. Studies of Washington, D.C. handgun ban produced conflicting results that could not be resolved. Bans may lead to pre-ban increases in sales of firearms to be banned.
Restrictions on firearm acquisition (4)§	Insufficient evidence to determine effectiveness†	Prohibit purchase of firearms by persons with specified characteristics thought to indicate high risk of illegal or other harmful use. Restriction characteristics include criminal histories (e.g., felony conviction or indictment, domestic violence restraining order, fugitive of justice, conviction on drug charges), personal histories (e.g., adjudicated to be "mentally defective," illegal immigrant, dishonorable military discharge), or other characteristics (e.g., juvenile).	Evidence insufficient because of small numbers of studies, inconsistent evidence of effectiveness, and limitations in design and execution of available studies. Record systems for assessing restriction histories of firearms purchase applicants are lacking, especially for restriction histories other than felony.
Waiting periods for firearm acquisition (7)¶	Insufficient evidence to determine effectiveness†	Require that the acquisition of a firearm be delayed for a specified period after application for firearm acquisition is filed. Requirement is usually imposed to allow time for a background check on prospective purchaser or to provide "cooling-off" period for persons at risk of committing suicide or an impulsive crime against others.	Evidence insufficient because of small numbers of studies, inconsistent evidence of effectiveness, and limitations in design and execution of available studies. Apparent reduction in rates of firearms suicide among persons aged >55 years, associated with the interim Brady Law, is attributable to waiting period in the interim law.
Firearm registration and licensing of firearm owners			
Registration of firearms (2)**	Insufficient evidence to determine effectiveness†	Record of owner of specified firearms must be created and retained.	Evidence insufficient because of small numbers of studies and limitations in the design and execution of available studies.
Licensing of firearm owners (5)††	Insufficient evidence to determine effectiveness†	License or other form of authorization or certification is required for purchase or possession of a firearm.	Evidence insufficient because of small numbers of studies, inconsistent evidence of effectiveness, and limitations in design and execution of available studies.
"Shall issue" concealed weapon carry laws (9)§§	Insufficient evidence to determine effectiveness†	Require issuing of concealed weapon carry permit to all applicants not disqualified by specified criteria. Usually implemented in place of "may issue" laws, in which issuing of a concealed weapon carry permit is discretionary (based on criteria such as perceived need or moral character of applicant).	Evidence insufficient because of critical flaws in quality of data used in the majority of studies and limitations in execution of available studies.
Child access prevention laws (3)¶¶	Insufficient evidence to determine effectiveness†	Designed to limit child access to, and use of, firearms kept in homes. Require owners to store firearms locked or unloaded and make the firearm owner liable when children use or threaten to use a household firearm to harm themselves or another.	Evidence insufficient because of small numbers of studies, inconsistent evidence of effectiveness, and limitations in execution of available studies. Inappropriate outcome measures used in studies (e.g., rates of juvenile victimization rather than perpetration of firearm violence by juveniles).
Zero tolerance laws for firearms in schools (1)***	Insufficient evidence to determine effectiveness†	Require that participating schools expel for at least 1 year students found carrying a gun in school. Local modifications possible for individual students.	Evidence insufficient because of absence of relevant studies; no studies evaluated violent outcomes of zero-tolerance laws. Possible violent and other harmful consequences of expulsion.
Combinations of laws			
Comprehensive national law studies (2)†††	Insufficient evidence to determine effectiveness†	Comprehensive firearm laws that include more than one kind of legislation.	Evidence insufficient because of small numbers of independent studies, inconsistent evidence of effectiveness, and limitations in study execution.
International comparative studies (3)§§§	Insufficient evidence to determine effectiveness†	Cross-national comparisons examining differences in an existing sum of national firearm laws.	Evidence insufficient because of small numbers of studies, inconsistent evidence of effectiveness, and limitations in the execution of available studies. Difficult to control confounding.
Studies that use the index of overall law restrictiveness (6)¶¶¶	Insufficient evidence to determine effectiveness†	Use a derived measure of overall restrictiveness of existing firearm laws a basis for comparison.	Evidence insufficient because of inconsistent evidence of effectiveness and limitations in execution of available studies. As conducted, index studies would not indicate which laws are effective (or ineffective) in which combinations.

TABLE. (*Continued*) Findings of the Task Force on Community Preventive Services regarding firearms laws and prevention of violence

* Sources: Britt CL, Bordua DJ, Kleck G. A reassessment of the D.C. gun law: some cautionary notes on the use of interrupted time series designs for policy impact assessment. Law Soc Rev 1996;30:361–80. Kleck G, Patterson EB. The impact of gun control and gun ownership levels on violence rates. J Quant Criminol 1993;9:249–87. Loftin C, McDowall D, Wiersma B, Cottey TJ. Effects of restrictive licensing of handguns on homicide and suicide in the District of Columbia. N Engl J Med 1991;325:1615–20. Roth JA, Koper CS. Impacts of the 1994 Assault Weapons Ban: 1994–1996. Washington, DC: US Department of Justice, 1999. Vernick JS, Webster DW, Hepburn LM. Effects of Maryland's law banning Saturday night special handguns on crime guns. Inj Prev 1999;5:259–63. Weil DS, Knox RC. The Maryland ban on the sale of assault pistols and high-capacity magazines: estimating the impact in Baltimore. Am J Public Health 1997;87:297–8.

† A determination that evidence is insufficient should not be interpreted as evidence of ineffectiveness. A determination of insufficient evidence assists in identifying 1) areas of uncertainty regarding effectiveness of an intervention, and 2) specific continuing research needs. In contrast, evidence of ineffectiveness or evidence of harm outweighing benefit leads to a recommendation against use of the intervention.

§ Sources: Kleck G, Patterson EB. The impact of gun control and gun ownership levels on violence rates. J Quant Criminol 1993;9:249–87. Ludwig J, Cook PJ. Homicide and suicide rates associated with implementation of the Brady Handgun Violence Prevention Act. JAMA 2000;284:585–91. Wintemute GJ, Wright MA, Drake C, Beaumont JJ. Subsequent criminal activity among violent misdemeanants who seek to purchase handguns. JAMA 2001;285:1019–26. Wright MA, Wintemute GJ, Rivara FP. Effectiveness of denial of handgun purchase to persons believed to be at high risk for firearm violence. Am J Public Health 1999;89:88–90.

¶ Sources: Cantor CH, Slater PJ. The impact of firearm control legislation on suicide in Queensland: preliminary findings. Med J Aust 1995;162:583–5. DeZee MR. Gun control legislation: impact and and ideology. Law Policy Q 1983;5:367–79. Kleck G, Patterson EB. The impact of gun control and gun ownership levels on violence rates. J Quant Criminol 1993;9:249–87. Lott JR, Whitley JE. Safe-storage gun laws: accidental deaths, suicides, and crime. J Law Econ 2001;44:659–90. Ludwig J, Cook PJ. Homicide and suicide rates associated with implementation of the Brady Handgun Violence Prevention Act. JAMA 2000;284:585– 91. Magaddino JP, Medoff MH. An empirical analysis of federal and state firearm control laws. In: Kates DB, ed. Firearms and violence. Cambridge, MA: Ballinger Publishing Company, 1984:225–58. Murray D. Handguns, gun control laws and firearm violence. Soc Probl 1975;23:81–92.

** Sources: Kleck G, Patterson EB. The impact of gun control and gun ownership levels on violence rates. J Quant Criminol 1993;9:249–87. Webster DW, Vernick JS, Hepburn LM. Relationship between licensing, registration, and other gun sales laws and the source state of crime guns. Inj Prev 2001;7:184–9.

†† Sources: DeZee MR. Gun control legislation: impact and and ideology. Law Policy Q 1983;5:367–79. Kleck G, Patterson EB. The impact of gun control and gun ownership levels on violence rates. J Quant Criminol 1993;9:249–87. Magaddino JP, Medoff MH. An empirical analysis of federal and state firearm control laws. In: Kates DB, ed. Firearms and violence. Cambridge,MA: Ballinger Publishing Company, 1984:225–58. Murray D. Handguns, gun control laws and firearm violence. Soc Probl 1975;23:81–92. Webster DW, Vernick JS, Hepburn LM. Relationship between licensing, registration, and other gun sales laws and the source state of crime guns. Inj Prev 2001;7:184–9.

§§ Sources: Black DA, Nagin D. Do right-to-carry laws deter violent crime? J Leg Stud 1998;27:209–19. Kleck G, Patterson EB. The impact of gun control and gun ownership levels on violence rates. J Quant Criminol 1993;9:249–87. Lott JR. More guns, less crime: understanding crime and gun-control laws, 2nd edition. Chicago: University of Chicago Press, 2000. Ludwig J. Concealed-gun-carrying laws and violent crime: evidence from state panel data. Int Rev Law Econ 1998;18:239–54. McDowall D, Loftin C, Wiersma B. Easing concealed firearms laws: effects on homicide in three states. J Criminal Law Criminol 1995;86:193–206. Moody CE. Testing for the effects of concealed weapons laws: specification errors and robustness. J Law Econ 2001;44:799–813. Mustard DB. The impact of gun laws on police deaths. J Law Econ 2001;44:635–58. Olson DE, Maltz MD. Right-to-carry concealed weapon laws and homicide in large U.S. counties: the effect on weapon types, victim characteristics, and victim–offender relationship. J Law Econ 2001;44:747–70. Plassmann F, Tideman TN. Does the right to carry concealed handguns deter countable crimes? Only a count analysis can say. J Law Econ 2001;44:771–98.

¶¶ Sources: Cummings P, Koepsell TD, Grossman DC, Savarino J, Thompson RS. The association between the purchase of a handgun and homicide or suicide. Am J Public Health 1997;87(6):974-8. Lott JR, Whitley JE. Safe-storage gun laws: accidental deaths, suicides, and crime. J Law Econ 2001;44:659–90. Webster DW, Starnes M. Reexamining the association between child access prevention gun laws and unintentional shooting deaths of children. Pediatrics 2000;106:1466–9.

*** Source: CDC. Violence-related attitudes and behaviors of high school students—New York City, 1992. MMWR 1993;42:773–7.

††† Sources: Magaddino JP, Medoff MH. An empirical analysis of federal and state firearm control laws. In: Kates DB, ed. Firearms and violence. Cambridge,MA: Ballinger Publishing Company; 1984:225–258. Department of Justice Canada. A statistical analysis of the impacts of the 1977 firearms control legislation. Ottawa, Ontario: Department of Justice Canada, Programme Evaluation Section, 1996.

§§§ Sources: Centerwall BS. Homicide and the prevalence of handguns: Canada and the United States, 1976 to 1980. Am J Epidemiol 1991;134:1245–60. Sloan JH, Kellermann AL, Reay DT, et al. Handgun regulations, crime, assaults, and homicide: a tale of two cities. N Engl J Med 1988;319:1256–62. Sloan JH, Rivara FP, Reay DT, Ferris JAJ, Path MRC, Kellermann AL. Firearm regulations and rates of suicide: a comparison of two metropolitan areas. N Engl J Med 1990;322:369–73.

¶¶¶ Sources: Boor M, Blair JH. Suicide rates, handgun control laws, and sociodemographic variables. Psychol Rep 1990;66:923–30. Geisel M, Roll R, Wettick R. The effectiveness of state and local regulation of handguns. Duke Law J 1969;43:647–73. DeZee MR. Gun control legislation: impact and and ideology. Law Policy Q 1983;5:367–79. Kleck G, Patterson EB. The impact of gun control and gun ownership levels on violence rates. J Quant Criminol 1993;9:249–87. Magaddino JP, Medoff MH. An empirical analysis of federal and state firearm control laws. In: Kates DB, ed. Firearms and violence. Cambridge, MA: Ballinger Publishing Company, 1984:225–258. Medoff MH, Magaddino JP. Suicides and firearm control laws. Eval Rev 1983;7:357–72.

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Box

BOX. Selected *Healthy People 2010 objectives potentially affected by firearms laws**

Injury Prevention

- Reduce firearm-related deaths from 11.3 to 4.1 per 100,000 population† (Objective 15-3).
- Reduce the proportion of persons living in homes with firearms that are loaded and unlocked from 19% to 16%† (Objective 15-4).
- Reduce nonfatal firearm-related injuries from 24.0 (in 1997) to 8.6 per 100,000 population (Objective 15-5).

Unintentional Injury Prevention

- Reduce deaths caused by unintentional injuries from 35.0 to 17.5 per 100,000 population† (Objective 15-13).
- (Developmental) Reduce nonfatal unintentional injuries (Objective 15-14).

Violence and Abuse Prevention

- Reduce homicides from 6.5 to 3.0 per 100,000 population† (Objective 15-32).
- Reduce the rate of physical assault by current or former intimate partners from 4.4 (in 1998) to 3.3 per 1,000 persons aged ≥12 years (Objective 15-34).
- Reduce the annual rate of rape or attempted rape from 0.8 (in 1998) to 0.7 per 1,000 persons aged ≥12 years (Objective 15-35).
- Reduce sexual assault other than rape from 0.6 (in 1998) to 0.4 per 1,000 persons aged ≥12 years (Objective 15-36).
- Reduce physical assaults from 31.1 (in 1998) to 13.6 per 1,000 persons aged ≥12 years (Objective 15-37).
- Reduce weapon carrying by adolescents on school property from 6.9% (in 1999) to 4.9% (students in grades 9 through 12, carrying during the past 30 days) (Objective 15-39).

* Source: US Department of Health and Human Services. Healthy people 2010. 2nd ed. With Understanding and Improving Health and Objectives for Improving Health (2 vols). Washington, DC: US Department of Health and Human Services, 2000.
† Baseline: 1998 data, age adjusted to the year 2000 standard population.

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