Effectiveness of Universal School-Based Programs to Prevent Violent and Aggressive Behavior
A Systematic Review

Robert Hahn, PhD, MPH, Dawna Fuqua-Whitley, MA, Holly Wethington, PhD, Jessica Lowy, MPH, CHES,
Alex Crosby, MD, MPH, Mindy Fullilove, MD, Robert Johnson, MD, Akiva Liberman, PhD,
Eve Moscicki, ScD, MPH, LeShawndra Price, PhD, Susan Snyder, PhD, Farris Tuma, ScD, Stella Cory, MD, MPH,
Glenda Stone, PhD, Kaushik Mukhopadhaya, PhD, Sajal Chattopadhyay, PhD,
Linda Dahlberg, PhD, Task Force on Community Preventive Services

Abstract: Universal, school-based programs, intended to prevent violent behavior, have been used at all grade levels from pre-kindergarten through high school. These programs may be targeted to schools in a high-risk area—defined by low socioeconomic status or high crime rate—and to selected grades as well. All children in those grades receive the programs in their own classrooms, not in special pull-out sessions. According to the criteria of the systematic review methods developed for the *Guide to Community Preventive Services* (*Community Guide*), there is strong evidence that universal, school-based programs decrease rates of violence among school-aged children and youth. Program effects were consistent at all grade levels. An independent, recently updated meta-analysis of school-based programs confirms and supplements the *Community Guide* findings.
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Introduction

Youth violence is a substantial public health problem in the United States. In a representative national survey in 2003, U.S. adults reported more than 1.56 million incidents of victimization by perpetrators estimated to be aged between 12 and 20 years—indicating that violent crimes were committed at a rate of approximately 4.2 for every 100 youths in that age group.[1,2] Victims report that youth perpetrators commit violent acts at a higher rate than any other age group.[1,2] Two thirds of reports by victims were of "simple assaults" (i.e., attacks without a weapon and not resulting in an injury requiring more than 2 days of hospitalization); the remaining victimizations were "serious violent crimes" (i.e., aggravated assaults, robberies, or rapes, but not murder, because these were victim surveys). Over the last 25 years, youths aged 10 to 17 years, who constitute less than 12% of the population, have been involved as offenders in approximately 25% of serious violent victimizations.[3] Homicide and suicide, respectively, are the fourth and fifth leading causes of death among children aged 5 to 14 years, and the second and third leading causes of death among people aged 15 to 24 years.[4]

Risk factors for youth violence include low socioeconomic status (SES), poor parental supervision, harsh and erratic discipline, and delinquent peers.[5] Delinquent youths commonly have other problems as well,[6] including drug abuse, difficulties at school, and mental health problems (as indicated by being in the top 10% of the distribution of externalizing and internalizing symptoms in the Child Behavior Checklist[7]). These youths are threats not only for the direct harm they may cause, but also because they may play roles in the socialization of other potential delinquents.[8]

The prevention of youth violence and aggression, in addition to being of value in itself, is also desirable because early violent and aggressive behavior is an indicator of later problem behaviors. "Early antisocial behavior may be the best predictor of later delinquency. . . . In fact, early aggression appears to be the most significant social behavior characteristic to predict delinquent behavior before age 13."[5] Researchers categorize risk factors for early delinquency, including violent behavior, within an ecologic framework as individual, family,

From the National Center for Health Marketing (Hahn, Fuqua-Whitley, Wethington, Lowy, Snyder, Cory, Stone, Mukhopadhaya, Chattopadhyay), and National Center for Injury Prevention and Control (Crosby, Dahlberg), Centers for Disease Control and Prevention, Atlanta, Georgia; Mailman School of Public Health, Columbia University (Fullilove), New York, New York; National Institute of Justice (Liberman), Washington, DC; University of Medicine and Dentistry of New Jersey (Johnson), Newark, New Jersey; and National Institute of Mental Health (Moscicki, Price, Tuma), Bethesda, Maryland

The names and affiliations of the Task Force members are listed at the beginning of this supplement and at www.thecommunityguide.org.

Correspondence and reprint requests: Robert A. Hahn, PhD, Community Guide Branch, Centers for Disease Control and Prevention, 1600 Clifton Road, MS E-69, Atlanta GA 30333. E-mail: Rhahn@cdc.gov.

peers, school, and community.[9] Factors in all categories are thought to contribute to the development of early and chronic violent behavior, and all are thought to provide opportunities for intervention to reduce the development of these behaviors.[5,10]

Rates of the violent victimization of youth by other youth or by adults are also substantial. During the last decade, the highest rates of homicide in the U.S. occurred among people aged 15 to 24 years.[11] In the late 1990s, reliable data from 14 established market economies showed that young people aged 10 to 29 years in the U.S. were homicide victims more than six times as often as their New Zealand counterparts (the country with the next highest rate).[12] In 2002, in addition to fatal violent crimes, nonfatal violent crimes were committed against approximately 5.6 per 100 youths aged 12 to 19 years.[1]

Violence in the school environment per se was not the focus of this review. The most serious forms of violent crime rarely occur in schools. Between July 1, 1992 and June 30, 2000, school-aged youth were at least 70 times more likely to be murdered away from school than at school.[13] Much nonfatal crime, however, including both nonviolent and violent crime, occurs in school facilities or on the way to or from school.[13] In 2003, although rates of violent crime at school had declined over the past decade, 740,000 violent crimes were committed against youth aged 12 to 18 years at school—approximately 1.3 per 100 youth, and 150,000 of these crimes were classified as "serious" (i.e., rape, robbery, sexual assault, and aggravated assault).[13]

Less serious violent behavior is also prevalent among students. In 2003, 33.0% of high school students reported being in a physical fight at least once in the past year, 12.8% on school property. Of students aged 12 to 18 years, 7.2% reported having been bullied at school in the last 6 months.[13] Approximately 5.4% of high school students surveyed in 2005 reported carrying a gun at least once in the past month—a risk factor for serious violence.[14] In high schools in 2005, 7.9% of students were threatened or injured with a weapon on school property in the same year.[15] Teachers also reported being threatened and injured.[13] Violence at school may make students afraid to attend school; in 2005, 6.0% of high school students reported feeling too unsafe to go to school at least once in the past 6 months.[14]

The purpose of this review was to assess the effectiveness of universal school-based programs in preventing violent behavior. Thus, studies of school-based programs were reviewed only if they assessed violent outcomes or proxies for violent outcomes. The effects on other outcomes were not assessed systematically, but are reported if they were addressed in the studies reviewed.

The School Health Policies and Programs Study (SHPPS)[16] indicates that most schools in the U.S. report having implemented programs to educate their students about violence and nonviolent behavior. In 88% of schools, funding or staff development for violence prevention is available. More than 90% of schools (elementary, middle, junior and senior high) teach about anger management, bullying, prosocial behavior (such as cooperation, praise, or support of others), communications skills, decision-making skills, goal-setting skills, and other techniques for avoiding conflict and violence. In 52% of middle schools and 77% to 83% of high schools, instruction about sexual assault and dating violence is offered; less than 50% of schools teach about gun safety. Despite the high levels of reported instruction, teachers indicate spending a median of only 4 to 5 hours per year in violence prevention instruction.[16] (The number of program sessions in the interventions included in the present review ranged from 5 to 480, with a median of 36, making it unlikely that the reviewed programs are similar to those surveyed by SHPPS.)

Although not always explicit in study reports, several theories are offered as the basis for universal school-based programs.[17] Diverse approaches to the prevention of violent behavior are reviewed by Goleman in *Emotional Intelligence*[18]; see also *Health Behavior and Health Education: Theory, Research and Practice*[19] for a summary of behavior change theories. Theories of behavior change vary in their focus on individuals; interpersonal relations; the physical and social environment, including social norms; and combinations of these. Several programs focus on providing information about the problem of violence and approaches to avoiding it, on the assumption that providing this information to students will lead to its application and reduced violence, and that information is necessary, if not sufficient, to change behavior. Some programs[20] are designed on the converse theory that self-concept and self-esteem derive from positive action and its rewards, so that if children's behavior can be made more positive and sociable, they will develop a better attitude toward themselves and then continue to make positive choices.

Many programs, such as Responding in Peaceful and Positive Ways[21] and Students for Peace,[22] cite social learning theory[23] as the foundation of their intervention design. The Second Step[24,25] program, for example, posits that changing the way children experience and think about social problems and providing practice in this new way of thinking will improve their behavior around conflict and aggression; the program focuses on developing children's competence in empathy, social problem solving, and impulse control. Modeling of these competencies by teachers is another component of this program, and efforts are also made to engage schoolwide and parental support and involvement. The names of some programs reflect a similar approach: Interpersonal Cognitive Problem-Solving[26] and Providing Alternative Thinking Strategies.[27]

Table 1. Selected *Healthy People 2010*[30] objectives related to school-based violence prevention programs

Objective	Population	Baseline	2010 objective
Injury prevention			
Reduce hospitalization for nonfatal head injuries per 100,000 population (Objective 15-1)	All	60.6 (1998)[a]	45.0
Reduce hospitalization for nonfatal spinal cord injuries per 100,000 population (15-2)	All	4.5 (1998)[a]	2.4
Reduce firearm-related deaths per 100,000 population (15-3)	All	11.3 (1998)[a]	4.1
Reduce nonfatal firearm-related injuries per 100,000 population (15-5)	All	24.0 (1997)[a]	8.6
Reduce hospital emergency department visits per 1000 population (15-12)	All	131 (1997)[a]	126
Violence and abuse prevention			
Reduce homicides per 100,000 population (15-32)	All	6.5 (1998)[a]	3.0
Reduce maltreatment of children per 1000 children aged <18 years (15-33a)	Children	12.9[b] (1998)	10.3
Reduce child maltreatment fatalities per 100,000 children aged <18 years (15-33b)	Children	1.6[b] (1998)	1.4
Reduce the rate of physical assault by current or former intimate partners per 1000 people aged ≥12 years (15-34)	Adolescents/adults	4.4 (1998)	3.3
Reduce the annual rate of rape or attempted rape per 1000 people aged ≥12 years (15-35)	Adolescents/adults	0.8 (1998)	0.7
Reduce sexual assault other than rape per 1000 people aged ≥12 years (15-36)	Adolescents/adults	0.6 (1998)	0.4
Reduce physical assaults per 1000 people aged ≥12 years (15-37)	Adolescents/adults	31.1 (1998)	13.6
Reduce physical fighting among adolescents (students in grades 9 through 12, fighting during the previous 12 months) (15-38)	Adolescents	36% (1999)	32%
Reduce weapon carrying by adolescents on school property (students in grades 9 through 12, carrying during the past 30 days) (15-39)	Adolescents	6.9% (1999)	4.9%

[a]Age adjusted to year 2000 standard population.
[b]Note that objective 15-33a is per 1000 children aged <18 years, whereas objective 15-33b is per 100,000 children aged <18 years. Comparable objectives would be reduction of child maltreatment to 1290 per 100,000 children aged <18 years and reduction of child maltreatment fatalities to 1.6 per 100,000.

Some programs are founded on the theory that they will be most effective if they modify the broader environment of the child. The multicomponent PeaceBuilders program[28] involves the entire school—outside and inside the classroom—as well as parents and the community.

The Guide to Community Preventive Services

The systematic review in this report represents the work of the independent, nonfederal Task Force on Community Preventive Services (the Task Force). 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. The Centers for Disease Control and Prevention (CDC) provides staff support to the Task Force for development of the *Community Guide*. The book, *The Guide to Community Preventive Services: What Works to Promote Health?* (available at www.thecommunityguide.org) presents the background and the methods used in developing the *Community Guide*.[29]

Healthy People 2010 Goals and Objectives

The intervention reviewed here may be useful in reaching several objectives specified in *Healthy People 2010*,[30] the disease prevention and health promotion agenda for the U.S. These objectives identify some of the significant preventable threats to health, and focus the efforts of public health systems, legislators, and law enforcement officials for addressing those threats. Many of the proposed *Healthy People* objectives in Chapter 15, "Injury and Violence Prevention," relate to universal school-based programs and their proposed effects on violence-related outcomes. Violence-specific objectives with potential relevance to universal school-based programs are listed in Table 1.

Information from Other Advisory Groups

A National Institutes of Health State of the Science Review of the Prevention of Youth Violence held in 2005 recommended several universal school-based programs for the prevention of youth violence.[31] The

Surgeon General's 2001 report on youth violence[10] listed several school-based violence prevention programs as model or promising programs: the Seattle Social Development Project[32] was named as a model program for the primary prevention of violence among youth; the Bullying Prevention program,[33] Families and Schools Together (FAST) Track[34] and its PATHS curriculum,[27] I Can Problem Solve,[26] the Good Behavior Game,[35] and Linking the Interests of Families and Teachers (LIFT)[36] were recommended as promising. Conversely, the report noted that the Drug Abuse Resistance Education (DARE) program, which may include a violence reduction component, is ineffective in reducing violence or drug abuse.[10]

The Center for the Study and Prevention of Violence also recommends the Bullying Prevention Program[37] and PATHS curriculum[27] as model "Blueprint" programs that meet its highest standards of evaluation evidence for experimental design, substantial effect, replication, and sustainability. Additionally, the Center recommends the Good Behavior Game, FAST Track, Seattle Social Development Project, I Can Problem Solve, and LIFT as promising programs.[38] The *Community Guide* differs from these others insofar as it draws conclusions on intervention types (which may include many different specific programs) rather than specific intervention programs.

Methods

In the *Community Guide*, evidence is summarized on (1) the effectiveness of interventions in altering selected health-related outcomes, and (2) positive or negative effects of the intervention other than those assessed for the purpose of determining effectiveness, including positive or negative health and nonhealth outcomes.[39] When an intervention is shown to be effective, information is also included about (3) the applicability of evidence (i.e., the extent to which available effectiveness data might apply to diverse population segments and settings), (4) the economic impact of the intervention, and (5) barriers to implementation of the intervention.

As with other *Community Guide* reviews, the process used to review evidence systematically and then translate that evidence into conclusions involves forming a systematic review development team; developing a conceptual approach to organizing, grouping, and selecting interventions; selecting interventions to evaluate; searching for and retrieving evidence; assessing the quality of and abstracting information from each study; assessing the quality of and drawing conclusions about the body of evidence of effectiveness; and translating the evidence of effectiveness into recommendations.

This section summarizes how these methods were used in developing the review of universal school-based programs. The review was produced by the systematic review development team (the team; see author list) and a multidisciplinary team of specialists and consultants representing a variety of perspectives on violence (see Acknowledgments section).

The Intervention

In this review, the effectiveness of universal school-based programs in preventing violence and aggressive behavior among children and youth of preschool and school age was assessed. Evaluated school programs were designed to teach all students in a given school or grade about the problem of violence and its prevention or about one or more of the following topics or skills intended to reduce aggressive or violent behavior: emotional self-awareness, emotional control, self-esteem, positive social skills, social problem solving, conflict resolution; and team work. In this review, violence refers to both victimization and perpetration. Studies were reviewed only if the reduction of violent or aggressive behavior was an objective of the program, although it need not have been the only or principal objective. In this review, programs that include not only universal classroom interventions, but other components as well, such as modification of the school environment, community involvement, or parental involvement, are referred to as "multicomponent."

Universal programs are defined to mean programs delivered to all children in a given school or grade, not only to those who had already manifested violent or aggressive behavior or risk factors for these behaviors. Although they may be part of an overall violence reduction strategy, programs directed exclusively to youths who had already manifested problems of violence or were considered at high risk of violence were not the focus of this review. Universal programs were included that were targeted by grade and school in high-risk areas, defined by low SES or high crime rate, because, in those selected settings, the programs are delivered to all children. Also included were programs implemented in special schools, such as schools for children with specific disabilities. Our review included pre-kindergarten, elementary, middle, junior high, and senior high schools; school settings and targeting were noted to assess differences in effectiveness associated with these variables.

Conceptual Approach and Analytic Framework

The general methods for conducting systematic reviews for the *Community Guide* have been described in detail elsewhere.[39,40] This section briefly describes the conceptual approach and the determination of outcomes considered in assessing the effects of universal school-based programs on violence.

The conceptual model, or analytic framework, used to evaluate the effectiveness of universal school-based programs in reducing violence (Figure 1) depicts the flow of influences from the intervention to two broad outcome categories: violence by youths and victimization of youths. The working hypotheses are that, through influences of school personnel, school programs affect student skills, attitudes, behaviors, and the school environment, each of which supports the others. These changes result in a reduction of negative social behaviors (including violence and aggression), improved school behavior, and improved social behavior outside of school, leading to an overall reduction in the perpetration of and victimization by violence. These reductions in violence lead, in turn, to reductions in physical and psychological harm to victims and those around them.
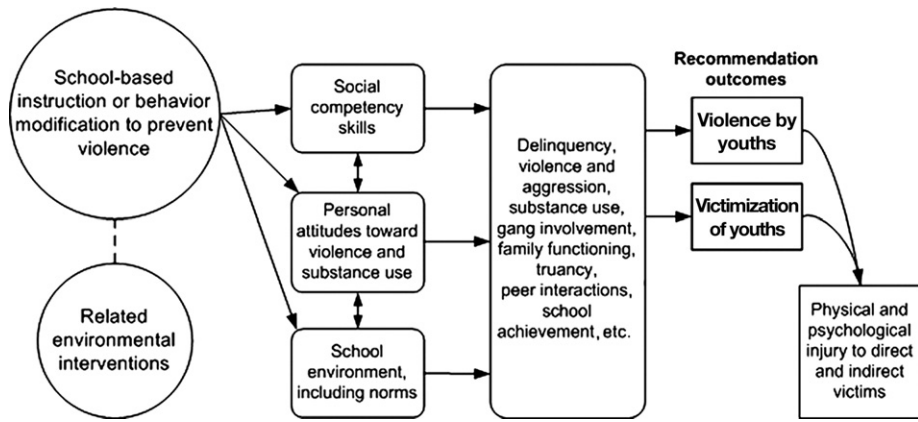
Figure 1. Analytic framework: School-based programs for violence prevention using classroom instruction and/or behavior modification techniques. Circles, intervention components; rounded rectangles, intermediate outcomes; dashed line, optional link; solid lines, hypothetical causal pathways.

Outcomes

Studies that assessed any of the following directly measured violent outcomes were reviewed:

- Self- or other-reported or observed aggression or violence, including violent crime.
- Aggression or violence as observed by the researcher.

Studies examining any of five proxies for violent outcomes, which may include clearly violent behavior as well as behavior that is not clearly violent were also reviewed:

- Measures of conduct disorder (the psychiatric condition, in which "the basic rights of others or major age-appropriate societal norms or rules are violated").[41]
- Measures of externalizing behavior (i.e., rule-breaking behaviors and conduct problems, including physical and verbal aggression, defiance, lying, stealing, truancy, delinquency, physical cruelty, and criminal acts).[42]
- Measures of acting out (i.e., aggressive, impulsive, or disruptive class behaviors) or conduct problems (includes talking in class, stealing, fighting, lying, not following directions, teasing, and damaging property).
- Measures of delinquency, which may include violent behavior as well as behavior not regarded as violent.
- School records of suspensions or disciplinary referrals.

Search for Evidence

Electronic searches for literature were conducted in the MEDLINE, EMBASE, ERIC, Applied Social Sciences Index and Abstracts, NTIS (National Technical Information Service), PsycINFO, Sociological Abstracts, NCJRS (National Criminal Justice Reference Service), and CINAHL (Cumulative Index to Nursing and Allied Health Literature) databases in June and July 2002, and updated in December 2004. The references listed in all retrieved articles were reviewed, and experts on the systematic review development team and elsewhere were consulted. The studies in this review were published as journal papers, governmental reports, books, and book chapters.

Articles published prior to December 2004 were considered for inclusion in the systematic review if they evaluated a universal school-based program; assessed at least one of the violent outcomes specified in the analytic framework; were conducted in countries with high-income economies (as defined by the World Bank);[a] reported on a primary study rather than, for example, a guideline or review; and compared a group of people exposed to the intervention with a comparison group that had not been exposed or had been less exposed. Studies with a total sample size of <20 students were excluded because results from such studies were regarded as unreliable. While searching for evidence, the team also sought information about effects on other outcomes not related to violence, such as changes in school performance and drug use.

Assessing the Quality and Summarizing the Body of Evidence on Effectiveness

Each study that met the inclusion criteria was read by two reviewers who used standardized criteria (available at www.thecommunityguide.org/methods/abstractionform.pdf) to assess the suitability of the study design and threats to validity.[39,40] Disagreements between the reviewers were reconciled by consensus among the team members. Our classification of the designs of studies reviewed is in accord with the standards of the *Community Guide* review process, and sometimes differs from the classification used in the original studies. On the basis of the number of threats to validity, studies were assigned a number of penalties and characterized as having good, fair, or limited execution for the purposes of this review.[39] Studies with good or fair quality of execution, and any level of design suitability (greatest, moderate, or least), were included in the body of evidence. Studies with greatest design suitability are those in which data on exposed and control populations are collected prospectively; studies with moderate design suitability are those in which data are collected retrospectively or in which there are multiple pre- or post- measurements, but no concurrent comparison population; and studies with least suitable designs are those in which there is no comparison population and only a single pre- and post- measurement in the intervention population. In this review, a sensitivity analysis was conducted, which excluded studies with least suitable designs.

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[a]Countries with high-income economies (as defined by the World Bank) are Andorra, Antigua and Barbuda, Aruba, Australia, Austria, The Bahamas, Bahrain, Barbados, Belgium, Bermuda, Brunei, Canada, Cayman Islands, Channel Islands, Cyprus, Denmark, Faeroe Islands, Finland, France, French Polynesia, Germany, Greece, Greenland, Guam, Hong Kong (China), Iceland, Ireland, Isle of Man, Israel, Italy, Japan, Republic of Korea, Kuwait, Liechtenstein, Luxembourg, Macao (China), Malta, Monaco, Netherlands, Netherlands Antilles, New Caledonia, New Zealand, Norway, Portugal, Puerto Rico, Qatar, San Marino, Singapore, Slovenia, Spain, Sweden, Switzerland, Taiwan (China), United Arab Emirates, United Kingdom, United States, Virgin Islands (U.S.).

The primary outcomes assessed in this review—violence by youths and victimization of youths—are referred to as recommendation outcomes because, if evidence of change in the desired direction is sufficient or strong, they provide the basis for recommending the intervention. Relative percentage change was calculated using the following formulas:

1. For studies with before-and-after measurements and concurrent comparison groups:

$$\text{Effect size} = (I_{post}/I_{pre})/(C_{post}/C_{pre}) - 1$$

where I_{post} = last reported outcome rate in the intervention group after the intervention, I_{pre} = reported outcome rate in the intervention group before the intervention, C_{post} = last reported outcome rate in the comparison group after the intervention, and C_{pre} = reported outcome rate in the comparison group before the intervention.

2. For studies with post measurements only and concurrent comparison groups:

$$\text{Effect size} = (I_{post} - C_{post})/C_{post}$$

3. For studies with before-and-after measurements but no concurrent comparison:

$$\text{Effect size} = (I_{post} - I_{pre})/I_{pre}$$

The effect of the intervention is reported as desirable when the intervention was associated with a decrease in a violence-related outcome, compared with its effect in the control population, and as undesirable when the intervention was associated with an increase in the violence-related outcome. Because the outcome of interest is violence or aggression, a reduction in the intervention compared with the control population is desirable; thus, negative effect sizes, which indicate a decrease in violence or aggression, are desirable. Effects are reported as percentages.

To report effect sizes from multiple studies, the median is used, and, for seven or more effect sizes, the lower quartile (Q_1, the 25th percentile) and the upper quartile (Q_3, the 75th percentile), reported as the interquartile interval (IQI). Q_1 and Q_3 provide information on the range of the middle 50% of the study effect sizes, and can therefore be interpreted as reflecting the range of typical effects. In some cases, a selection had to be made among several possible effect measures for the summary measures of effectiveness. When available, effect measures adjusted for potential confounders in multivariate analyses, rather than crude effect measures, were included.

The classification and reporting of grades and school levels vary among U.S. studies, and European and U.S. classifications do not correspond. Programs were classified as being directed to pre-kindergarten/kindergarten, elementary (grades 1 to 5), middle (6 to 8), and high (9 to 12) as well as possible, using available information on age and program duration. In addition, some programs included students in both elementary and middle school and others include both middle and high school. To limit the number of grade classifications and because middle school includes fewer years of program exposure (three) than elementary (five) or high school (four), programs including elementary and middle

school were classified as elementary programs, and programs including middle and high school as high school programs.

Length of follow-up (i.e., time from the conclusion of the school program to the assessment of the outcome) was considered when deciding which studies to include in the review. No studies were excluded from the evaluation strictly on the basis of an insufficient follow-up period. However, because enduring effects were of the most interest, studies with follow-up periods of <1 year were penalized. For the same reason, if the intervention program had multiple evaluations at different follow-up points, the evaluation at the longest follow-up period that had an attrition rate <30% was chosen. The strength of the body of evidence was summarized on the basis of the number of available studies, the strength of their design and execution, and the size and consistency of reported effects using *Community Guide* standards.[39] Results were presented graphically and statistically.

The reviewed studies were classified in terms of several program characteristics, and the variability of program effects associated with these characteristics was explored. Because these comparisons are bivariate and were not tested with inferential statistics, differences among strata are best interpreted as suggestive rather than definitive evidence of true effect differences.

Applicability

If an intervention was found to be effective, evidence regarding its applicability was assessed in diverse settings, populations, and circumstances. Note is made of whether existing evidence derives from limited conditions, making its generalizability uncertain. The goal of this assessment is the determination of known and unknown conditions under which the intervention is effective, and thus, the known limits of its application.

Other Effects, Barriers to Implementation of Interventions, and Economic Evaluations

As noted, the *Community Guide* review of school-based violence prevention programs did not systematically assess the effects of this intervention on other outcomes (e.g., drug abuse, school achievement, truancy, psychological adjustment). However, some of the noted benefits are mentioned in the reviewed studies. The potential harms of school-based violence prevention programs are also noted if these harms were mentioned in the effectiveness literature or were thought to be of importance by the team.

In *Community Guide* reviews, barriers to implementation are summarized and economic evaluations are performed only if the intervention is shown to be effective. In this review, the economic evaluations identified assessed the costs and benefits of the interventions in terms of the violent and other outcomes that are the focus of the review. Methods used in *Community Guide* economic evaluations have been published previously.[43,44]

Summarizing Research Gaps

Systematic reviews in the *Community Guide* identify existing information on which to base public health decisions about implementing interventions. An additional benefit of these reviews is identification of areas in which information is lacking or of poor quality. To summarize these gaps in the

literature, remaining research questions for each intervention evaluated are identified by the team.

Results, Part I. Intervention Effectiveness
Study Characteristics

Fifty-three studies[20,25,26,32,33,35,36,45–62,64–91] of universal school-based programs that met our inclusion criteria were found. Of these, seven[35,51,55,59,60,62,76] were of greatest design suitability and good execution, 32[25,26,32,36,45–50,53,56–58,61,64–68,71,72,75,77,78,82,83,86,87,89–91] were of greatest design suitability and fair execution, five[20,33,54,80,88] were of moderate design suitability and fair execution, one[52] was of least suitable design and good execution, and eight[69,70,73,74,79,81,84,85] were of least suitable design and fair execution. Study sample sizes ranged from 21 to 39,168 students, with a median sample size of 563. Forty-one studies (77.4%) employed direct measures of violence or aggression, and 12 studies (23.6%) used proxy outcome measures. Follow-up time from the conclusion of the intervention to the final assessment ranged from none (assessment immediately following the end of the intervention) to 6 years; the median follow-up time was 6 months.

School Program Characteristics

The characteristics of school programs were first assessed at four different grade levels: pre-kindergarten and kindergarten (pre-K/K), elementary, middle, and high school. In this analysis, programs spanning two school levels (e.g., elementary and middle) are counted at each spanned level (i.e., elementary AND middle) because the program characteristics apply to both levels.

Several trends are associated with grade level groupings (Table 2). Focus on disruptive and antisocial behavior is common in elementary school and in middle school. In middle and high school, the focus shifts to general violence and to specific forms of violence, including bullying and dating violence. The intervention approach shifts from a cognitive/affective approach, which focuses on modifying behavior by changing the cognitive and affective mechanisms linked with such behavior, to an approach that makes greater use of social skills training, which emphasizes the development of behavioral skills rather than changes in cognition, consequential thinking, or affective processes. With increasing grade level, there may also be a decreased focus on the teacher as the primary program implementer and an increase in the use of other personnel such as student peers or members of the team conducting the research study. Understandably, because of our definition of the intervention in this review, the classroom is the principal setting of these school programs at all grade levels. Finally, no

Table 2. Predominant characteristics of school programs by school level

Grade level (n studies)	Focus (%)	Intervention strategy (%)	Personnel (%)	Setting (%)	5 days/week, % Frequency (days/week)/duration (weeks)	Schools in low SES and/or high crime rate %	Majority race/ethnicity of study population, by % of studies
Pre K-K (7)	Disruptive/antisocial behavior (50)	Cognitive/affective (50) Social skills (33)	Teachers (100)	Classroom (100)	33 3.2/16.4	50	Black 50% White 33%
Elementary (28)	Disruptive/antisocial behavior (57) General violence (29)	Social skills (48) Environmental change (14)	Teachers (79)	Classroom (93)	40 3.3/30.3	35	Black 27% White 60%
Middle (30)	Disruptive/antisocial behavior (30) General violence (43) Bullying (17)	Knowledge/information (21) Social skills (52)	Teachers (66) Researchers (14) Non-school personnel (10)	Classroom (93)	35 2.9/24	29	Black 37% White 53% Hispanic 11%
High (4)	General violence (50) Dating (25) Bullying (25)	Knowledge/information (33) Social skills (33) School environment change (33)	Teachers (66) Student peers (33)	Classroom (100)	0 2.0/24	50	White 100%

Note: In this analysis, programs spanning school levels (e.g., elementary and middle) are counted at each spanned level (i.e., elementary *and* middle). Because of small numbers of studies, only major proportions of program characteristics are presented; percentages may not total 100.
SES, socioeconomic status.

Table 3. Bivariate analysis of effect size by demographic and program variations

Characteristic (*n* studies)	Median effect (relative % change in intervention versus control populations)	25th and 75th percentiles
Grade		
All grades combined (65)	−15.0	−44.1, −2.3
Pre-K/K (6)	−32.4	—
Elementary (34)	−18.0	−44.8, −2.5
Middle (21)	−7.3	−35.2, 2.3
High (4)	−29.2	—
Intervention		
Information conveyed (10)	−8.6	−22.9, 18.3
Cognitive/affective (6)	−14.0	—
Social skills (30)	−19.1	−35.2, −2.1
Environmental change - classroom (3)	−15.0	—
Environmental change - school (12)	−11.7	−63.6, −1.7
Peer mediation (2)	−61.2	—
Behavior modification (0)	—	—
Program focus		
General violence (19)	−10.3	−50.0, −1.7
Disruptive or antisocial behavior (33)	−19.1	−44.3, −2.8
Bullying (10)	−6.7	−64.8, 17.2
Gang activity (2)	−5.3	—
Dating violence (1)	−29.2	—
Primary program personnel		
Students/peers (4)	−41.6	—
Teachers (49)	−17.5	−44.3, −2.3
Administrators/counselors (3)	34.4	—
Non-school personnel (2)	−5.3	—
Researchers (7)	−7.3	−42.5, 2.3
Community environment		
Not stated (14)	−1.6	−10.3, 3.3
Not low SES/not high crime (24)	−21.0	−50.0, −5.2
Not stated plus not high crime/low SES (38)	−11.2	−44.4, −1.4
High crime/low SES (15)	−29.2	−42.5, −6.7
Majority ethnicity		
Black (15)	−16.8	−44.3, −5.2
White (22)	−20.4	−40.2, −5.0
Hispanic (6)	−0.5	—
No information provided (13)	−30.9	−44.4, 8.0
No clear majority (8)	−10.3	−87.5, −1.4

Note: Effect sizes calculated as relative change in violent outcomes in intervention compared with control populations.
SES, socioeconomic status; K, kindergarten.

clear trends are apparent in frequency and duration of programs by school level.

Among studies for which the information is provided, many are offered in settings characterized by the presence of low SES, high crime rates, or both. Many programs are conducted in communities with large proportions of minority students.

Effectiveness

Comparison of program characteristics and populations served at different school levels indicates substantial heterogeneity by level and intercorrelation among characteristics. Thus, bivariate analysis of program effects by program characteristics might misleadingly suggest the causal association of these characteristics, which are actually confounded by other associations. Bivariate associations of program characteristics with

effect sizes are provided, recognizing the potential for other program characteristics to confound apparent associations (Table 3).

Grade. For all grades combined, the median effect was a 15.0% relative reduction in violent behavior among students who received the program (IQI, −44.2% to −2.3%). The effects of school programs were found at all school levels, from a 7.3% relative reduction in violent behavior among middle school students who received the program (15 studies,[49,52,53,55–59,76–78,81,84,88,90] IQI, −35.2% to 2.3%) to a 29.2% relative reduction in violent behavior among high school students (four studies,[66,71,82,87] percentiles not calculated) (Table 3, Figure 2). In elementary school programs, the median reduction of violent behavior was 18.0% (26 studies,[20,25,32,33,35,36,45,46,48,51,54,64,65,67–70,73,75,79,80,84–87,89] IQI, −44.8% to −2.5%). In pre-K/K school programs,
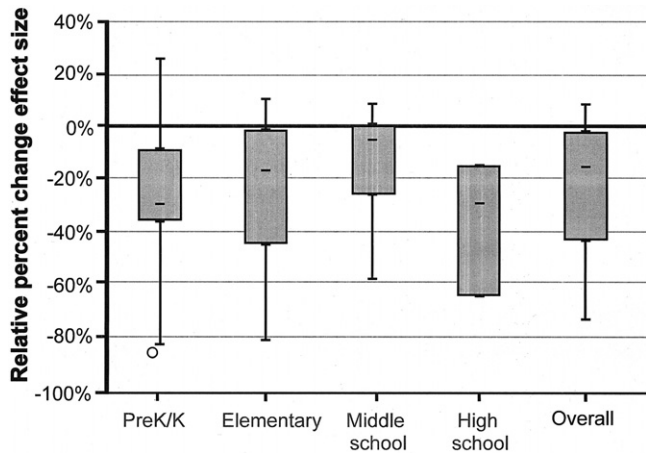
Figure 2. Relative change in violence-related outcome associated with school program by school level. Vertical lines inside boxes show medians, ends of boxes show 25th and 75th percentiles, ends of whiskers show 10th and 90th percentiles, and circle shows an outlier.

the median effect size was −32.4% (six studies,[26,47,72,74,83,91] percentiles not calculated).

A sensitivity analysis was conducted to examine intervention effects when studies with least suitable designs (i.e., those without concurrent comparison populations who were unexposed or less exposed to the intervention) were not included in the analysis. The 40 studies of greatest or moderate design suitability[20,25,26,32,33,35,36,45–49,51,53–59,64–68,71,72,75–78,80,82,83,86–91] provided 53 data points. Overall, the median effect size was −13.9% (IQI, −34.5% to −2.0%). By school level, the median was −30.9% for pre-K/K (five studies,[26,47,72,83,91] percentiles not calculated), −17.5% for elementary school (20 studies,[20,25,32–36,45,46,48,54,64,65,67,68,75,80,86,87,89] IQI, −45.3% to −2.3%), −7.3% for middle school (12 studies,[49,53,55–59,76–78,88,90] IQI, −31.5% to 2.3%), and −22.0% for high school (four studies,[66,71,82,87] percentiles not calculated). Thus, results were consistent whether studies with least suitable design were included or not. The remaining analyses were thus conducted including studies with least suitable design.

Associations between several program characteristics and effect size were explored. The goal of this exploration was to develop hypotheses that might explain the heterogeneity of program effects. Because of the intercorrelation of program characteristics noted above, this bivariate presentation should be regarded as simply reporting empirical associations rather than as an assessment of causal explanations for effect variability.

Intervention strategies. All school program intervention strategies (e.g., informational, cognitive/affective, and social skills building) were associated with a reduction in violent behavior. All program foci (e.g., disruptive or antisocial behavior, bullying, dating violence) similarly were associated with reduced violent behavior.

With the exception of programs administered by school administrators or counselors, violent behavior was reduced in programs administered by all personnel types examined, including students and peers, although some of these effect sizes were based on small numbers of studies.

School environments. The effects of programs delivered in school environments defined by the presence of lower SES, high rates of crime, or both, were compared with school environments without these characteristics. For 14 studies,[26,35,54,56,57,67,69,75,81,82,85,86,89,91] these characteristics were not described. In environments with lower SES, high crime rates, or both, effectiveness was consistent with overall study results (15 studies,[32,34,36,52,53,58–60,64,71–74,76,79] median −29.2%, IQI, −42.5% to −6.7%). It appeared that the programs were similarly effective in settings in which lower SES and high crime rates were absent (24 studies,[20,25,27,43,46–50,55,61,62,65,66,68,70,77,78,80,83,84,87,90,92] median −21.0%, IQI, −50.0% to −5.2%). If it could be assumed that data points for which this information was not provided actually represented settings without these characteristics (which may thus not have been regarded as remarkable or noteworthy), the combined data points (no information and the absence of these characteristics) indicated an apparently smaller relative reduction of 11.2% (38 studies,[20,25–27,33,46–50,54–57,61,62,65–70,75,77,78,80–92] IQI, −44.4% to −1.4%), which was still consistent in direction with overall study results.

Predominant ethnicity. Finally, the effects of universal school-based programs were explored in terms of the predominant ethnicity of the study school population. In schools in which the population was ≥50% black, the median reduction in violent behavior was 14.9% (13 studies,[26,35,52,53,56,57,60,73,74,76,79,83,86] IQI, −29.2% to 0.50%). Where the population was ≥50% white, the median reduction in violent behavior was 17.7% (16 studies,[25,33,36,45,49,54,58,59,66,67,72,75,82,87,88,91] IQI, −34.1%
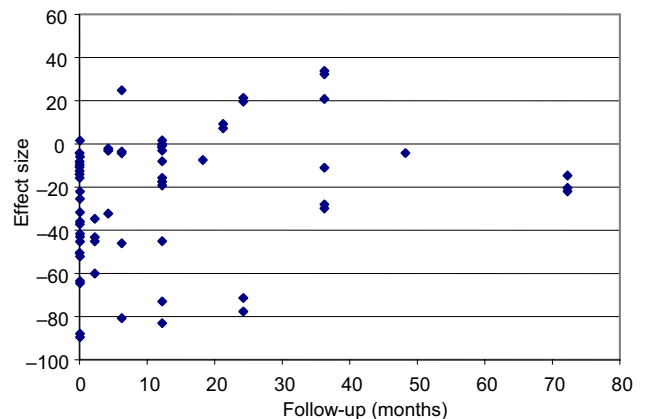

Figure 3. Relative change in violence-related outcome associated with school program by months following program end.

to −6.3%). Where the population was ≥50% Hispanic, the median reduction in violent behavior was 18.5% (three studies,[64,77,78] percentiles not calculated; based on three studies, this estimate may be unreliable). In studies that did not provide information on ethnicity, the median reduction in violent behavior was 10.3% (15 studies,[20,34,47,50,55,62,68–71,81,85,89,90,93] IQI, −47.1% to −2.5%); and in studies with no clear majority population, the median reduction in violent behavior was 23.0% (five studies,[32,46,48,61,80] IQI −50.0% to −7.3%).

Length of program exposure. To explore whether more program exposure was associated with larger effects, the associations between effect size and program frequency (sessions per week), as well as duration (in months), were examined graphically. An outlier effect size was omitted from this analysis. No clear association emerged for either frequency or duration. The association between effect size and total program exposure (the product of the number of days/week and the number of weeks, that is, total number of exposures to the program) was also assessed. No clear relationship was discerned. The correlation coefficients (*r*) were less than 0.17 for all of these associations.

Time since program end. To determine whether the reduction in violent behavior diminished as the time following the end of the intervention increased (i.e., a decay in program benefit), the association between length of follow-up time and effect size was assessed graphically (Figure 3). Again, an outlier effect size was omitted from this analysis. Although the review included few studies with long-term follow-up, it appeared that longer follow-up was associated with smaller effect size. However, the R^2 for this association was less than 0.03. Omitting the longest follow-up times (48 and 72 months) yielded similar results, that is, an apparent decrease in the reduction in violent behavior was still associated with longer follow-up (graph not presented). Thus, within the time periods assessed, the effectiveness of school programs appears to decrease slightly as time since the conclusion of the program increases.

Overall, according to *Community Guide* methods,[39] the results of this systematic review provide strong evidence that universal school-based programs are effective in reducing violence.

Applicability

Universal school-based programs were found to be effective at all school levels and across different populations. The reviewed studies assessed the effects of programs in communities characterized by the presence of lower SES, high rates of crime, or both, as well as in communities characterized by the absence of both of these factors. Program effectiveness was also assessed in predominantly black and predominantly white school populations; few

studies were conducted in predominantly Hispanic school populations.

Other Positive and Negative Effects

Other benefits of universal school-based programs have been noted, and supporting evidence exists for some of these effects. Improvements have been reported for social behavior more broadly,[64] including reduced drug abuse[56] and delinquency.[25] Substantial improvements in school attendance and achievement have also been reported.[20,34,65,94]

Potential harms are difficult to imagine, but it is possible that, during exposure to ideas and expressions about violence, students' unaddressed or unresolved personal issues with violence may be aroused. No descriptions or evidence of this situation occurring were found in the reviewed literature. Such occurrences might call for the linking of affected students with counseling services.

Economic Efficiency

School-based programs to prevent violent behavior are often associated with benefits not directly related to violence or aggression, such as reduced rates of delinquency and substance abuse, improved school attendance, higher educational attainment, and better job prospects. However, many benefits from such prevention programs would be future benefits to taxpayers and potential crime victims from reduced crime.[95] A comprehensive economic evaluation of these programs should consider all current and future benefits both to the participants and to members of society at large. Such a task is made difficult because of the long follow-up period required to properly capture all benefits throughout the lifetime of program participants.

Most studies identified by our search reported the costs of programs but no economic summary measures based on both costs and benefits. Vazsonyi et al.[96] found cost per child to be <$200 for the PeaceBuilders intervention implemented in nine schools in the Tucson metropolitan area. Aber et al.[97] found the implementation costs for the Resolving Conflict Creatively Program in 15 New York City elementary schools to be $2449 per teacher and $98 per child. Greenberg et al.[27,45] estimated that the program costs for the PATHS curriculum over a 3-year period would range from $15 to $45 per student per year, depending on whether the current staff was redeployed or a new on-site coordinator was hired. These costs appear minimal compared to the potential benefits of reduced violence, as well as the other benefits of such programs.

The only study that estimated both costs and benefits[95] was based on the Seattle Social Development Project.[32] This study was rated as good according to the *Community Guide*'s quality assessment criteria for economic studies.[44] The average effect size for this pro-

gram, which focused on elementary schools in a high-crime urban area, was a decrease of 13% in basic crime outcomes. The total benefits, including cost savings to taxpayers because of reduced expenses for the criminal justice system and reduced personal and property losses for crime victims, were estimated to be $14,426 in 2003 U.S. dollars per participant. Net saving per participant amounted to $9837. In terms of cost–benefit ratio, this program showed a benefit of $3.14 for every dollar invested in the program. Although the effect size found in the study is near the median effect size of other school programs, this program is more comprehensive, more intensive and of longer duration than many programs, as well as more costly. Thus, the cost benefit of many programs may differ from that determined for the Seattle Social Development Project.

In summary, investment in universal school-based programs to prevent violence has the potential for significant positive economic returns in the future. More studies are needed, however, to establish firmly and conclusively the economic benefits from such programs.

Barriers to Intervention Implementation

Schools and their curricula are subject to many requirements and demands. Because the reduction of violence and aggression may not be seen as necessary or central to instructional goals, it may be difficult to introduce effective programs into school curricula and schedules. However, the beneficial effects of many programs on traditional academic outcomes, such as attendance and school performance, may enhance the interest of school policy makers, administrators, and teachers in these programs. The need for teacher training also may make acceptance and implementation of the programs difficult. Finally, some programs may make additional demands on parents and the community, and these demands may be resisted.

Few of the studies reviewed have measured the fidelity of program implementation.[25,56,98] Where outcome information was reported by level of implementation, findings from the highest level of implementation available were used, on the assumption that this information best represented the potential effect of the program.[99] Fidelity can be a substantial obstacle to program success, and may be particularly problematic when implemented by communities without investigator scrutiny. It may be important for programs to provide ways in which school or community implementers can monitor fidelity.[100]

Conclusion

According to *Community Guide* methods,[39] the number of studies in this systematic review overall and the number of studies at each grade level, of adequate

quality, consistency of effect, and effect size, provide strong evidence that universal school-based programs are associated with decreases in violence-related outcomes. Beneficial results were found at all school levels examined, from pre-kindergarten through high school.

Results, Part II. Research Issues

Although strong evidence was found that universal school-based programs to prevent violence are effective, important research issues remain.

- Some school programs are more effective than others. What characteristics of the programs, or perhaps of the settings in which they are implemented, make some programs or settings more or less effective?
- There appears to be a decrease in program effectiveness as time after program completion passes. It will be important to explore ways to extend the benefit of programs, either within the programs themselves or with booster programs.
- Are school programs equally effective for high-risk and low-risk children, and in high-risk and low-risk environments? Are programs targeted to high-risk children overall more effective, and, if so, more cost effective, than universal programs?
- Many programs assessed in the review were not ongoing, standing programs, but instead were conducted for purposes of research. Because research programs are often more effective than ongoing programs—perhaps because of the intensity of monitoring and implementation—it will be important to understand what maximizes the effectiveness and sustainability of ongoing programs.
- In what ways is the effectiveness of universal school-based programs to prevent violence moderated by the predominant ethnicity of the student population? How might addressing cultural and social differences in diverse populations improve the effectiveness of school programs?
- Studies of the economic efficiency of school programs, measured, for example, as net benefits or cost-benefit ratio, should assess not only violent or criminal behavior averted, but all current and future social, health, academic, and labor market outcomes associated with school violence prevention programs. It will be interesting to assess what proportion of the total benefits is crime-related. It will be important to assess the extent to which the data used in the derivation of the summary measure are nationally representative.

Discussion

This review is subject to several limitations common to literature syntheses. Classifying interventions, their components, and the outcomes assessed in evaluation

studies is challenging, because interventions often are not described in sufficient detail, study reports do not use common vocabulary, common terms do not always carry the same meaning, and descriptions may not conform to what was actually carried out. Interventions and outcomes were classified as well as possible, given the available descriptions in study reports; and an attempt has been made to be as transparent as possible about the procedures. Problems of program implementation may also affect the evaluation of programs, so that when a program is reported not to work, it is not clear whether a program truly does not work even when perfectly implemented or simply that an efficacious program was not adequately executed. The quality of program implementation is not routinely reported.

It should be recalled that this review addresses only universal school violence prevention programs, that is, programs delivered to all children in a given school setting, and not programs targeted exclusively to children considered to be at high risk of violent behavior. Thus, conclusions can be drawn only about the effects of the universal programs reviewed, and not about the relative effects of universal versus more targeted violence prevention programs.

School violence prevention programs are unlikely to be a panacea for societal violence. Childhood aggressive and violent behavior is an important risk factor and predictor of later violent behavior and violent criminal careers. However, school programs do not eliminate aggressive and violent behavior, and may not affect some children who are at highest risk of later violent behavior. Nevertheless, it is likely that the programs assessed here, if widely and thoroughly implemented, would result in a substantial reduction of societal violence.

A recently updated meta-analysis by Wilson and Lipsey[101] used roughly the same definition of the intervention as used in this report, and assessed similar outcomes. Commonalities and differences in the scope, methods, and results of both reviews were explored to assess and extend the findings of both.

As in the present *Community Guide* review, Wilson and Lipsey were interested in the effectiveness of school-based programs intended to reduce violence and aggressive behaviors. In addition to reviewing "universal" programs, in which all children in a classroom receive a program, they also reviewed programs addressed exclusively to children who either had previously manifested substantial violent or aggressive behavior or who demonstrated risk factors for such behavior (Table 4). These latter programs were not included. Wilson and Lipsey, however, stratified their results by program type; results could, therefore, be compared, excluding these selected or indicated programs.

Detailed comparison of the frameworks, definitions, and methods of the *Community Guide* and the Wilson and Lipsey reviews indicates substantial overlap, but some differences as well (Table 4). The two reviews are similar in intervention types and typologies and in outcomes assessed; however, the reviews differ in the timing of preferred outcomes—immediately following the intervention (Wilson and Lipsey) versus as long after the intervention as data are available (*Community Guide* review). Wilson and Lipsey included a broader array of literature sources than did the *Community Guide*, whereas the *Community Guide* allowed a broader array of methods in the studies reviewed and included studies in a broader group of national settings.

The present review and the Wilson and Lipsey analysis reviewed 27 studies in common, approximately 50.9% of the total number (53) of studies included in the present review and 43.5% of the total (62) included in the Wilson and Lipsey review. (The numbers of studies reported here do not match the numbers reported by Wilson and Lipsey because the counts in their analysis included studies reporting results separately for distinct populations, such as males and females. Just as we did in counting studies in the present review, we also collapsed such separately counted results in counting their studies.) Of the studies included in Wilson and Lipsey and not in this review, 15[102–116] were dissertations, four[117–120] were not published, and seven studies could not be used because of limited quality of execution[121–125] or incommensurate outcome assessments.[126,127] Of the studies included in this review and not in Wilson and Lipsey, nine[52,69,70,73,74,79,81,84,85] were of least suitable design, four[33,47,84,87] were conducted in non-English-speaking countries, two[45,68] were conducted among handicapped children, and the remaining 11[20,32,36,48,54,65,66,76,80,88,90] were not included for a variety of methodologic reasons. The lack of overlap between these reviews is substantial, allowing each review to serve as a sensitivity analysis for the other. Given the lack of overlap, the consistency of findings is remarkable.

Basic findings of Wilson and Lipsey's meta-analysis indicate that the associations reported in the *Community Guide* review are not greatly confounded; the meta-analysis, controlling for measured potential confounders, reaches conclusions similar to those of the present review. Both reviews found evidence that school-based programs for the prevention of violence are effective at all school levels. Although effect sizes differ by school level, Wilson and Lipsey do not draw a conclusion of differences in effectiveness, because the program content and outcome measures also differ by school level. Wilson and Lipsey found that the programs have greater effect on elementary school children in high-risk than in non high-risk settings. Wilson and Lipsey also found that program duration is inversely associated with effect size; they speculate that programs of differing duration may also differ in intensity. The (standardized) effect size (reported as positive when the outcome

Table 4. Universal school-based programs to prevent violence. Comparison of *Community Guide* systematic review and Wilson and Lipsey[101] meta-analysis

	Community Guide systematic review (53 studies)	Wilson and Lipsey meta-analysis (62 studies)
Target populations		
Universal programs	Included	Included
Selected/indicated	Not included	Included
Special schools/classes	Included if administered to all students in class	Included (excluding handicapped children)
Literature reviewed		
Published studies	Yes	Yes
Government publications	Yes	Yes
Unpublished studies	No	Yes
Dissertations	No	Yes
Study design		
Prospective studies, with comparison population	Yes	Yes (if same cohort measured over time)
Retrospective studies or studies with multiple pre/post-assessments without comparison	Yes	Yes
Pre-post studies without comparison population	Yes (sensitivity analyses suggest comparable results)	No
Geographic inclusion	Studies conducted in countries with high-income economies,[a] published in English language	Studies conducted among English-speaking populations only
Intervention focus		
Behavioral strategies	Included	Included
Cognitively oriented strategies	Included	Included
Social skills programs	Included	Included
Counseling, talk therapy	Included (if provided to all in classroom setting)	Included
Multicomponent (involving interventions beyond classroom)	Included if administered to all students in class	Included
Outcomes		
Aggressive or violent behavior (e.g., fighting, bullying, crimes against persons)	Included	Included
Disruptive behavior (e.g., behavior problems, conduct disorder, acting out)	Included	Included
Problem behavior (e.g., include both internalizing and externalizing behavior)	Included	Included
Outcome assessment		
Follow-up	Latest outcome assessed	Earliest outcome assessed
Adjustment for small sample sizes and for extreme values	No	Yes
Effect size measure	Relative change	Standardized mean difference
Method of handling extreme outliers	Deleted for graphic presentation, but included in medians and IQIs	Restricted the magnitude of outliers
Percentage of studies in common	50.9%	43.5%

IQI, interquartile interval.

was relatively improved in the intervention compared with the control populations) of 0.06 for multicomponent programs (referred to as "comprehensive" by Wilson and Lipsey), although statistically significant, is one third that for single component, classroom programs (0.18).

Wilson and Lipsey also found additional benefits of these programs beyond those on violent or aggressive behavior, including reduced truancy and improvements in school achievement, "problem behavior," activity levels, attention problems, social skills, and internalizing problems (e.g., anxiety and depression). The effect sizes for

three outcomes—association with antisocial peers, substance abuse, and family adjustment—are not statistically different from zero. The studies included in their review were selected because they addressed violent or aggressive behavior rather than these other outcomes; their findings on these questions, therefore, may not represent all available evidence on these topics.

Schools present a critical opportunity for changing societal behavior. Almost the entire population passes through these institutions, starting during an early and formative period and continuing over many years. With approximately 71 million children in U.S. primary and secondary schools in 2003 and an overall high school graduation rate of 85%,[63] it is difficult to overestimate this opportunity to effect change. The potential benefits of improved school function alone are notable. The broader and longer-term benefits in reduced delinquency and anti-social behavior are yet more substantial. Universal school-based violence prevention programs are an important means of reducing violent and aggressive behavior in our society.

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