Methods for Conducting Community Guide Systematic Reviews of Evidence on Effectiveness and Economic Efficiency of Group-Based Behavioral Interventions to Prevent Adolescent Pregnancy, Human Immunodeficiency Virus, and Other Sexually Transmitted Infections

Comprehensive Risk Reduction and Abstinence Education

Theresa Ann Sipe, PhD, Helen B. Chin, MPH, Randy Elder, PhD, Shawna L. Mercer, MSc, PhD, Sajal K. Chattopadhyay, PhD, Verughese Jacob, PhD, Community Preventive Services Task Force

Abstract: This paper describes methods used to conduct systematic reviews and meta-analyses and economic reviews of group-based behavioral interventions for adolescents to prevent pregnancy, HIV, and other sexually transmitted infections. The steps described include developing a conceptual approach, defining the interventions, identifying outcome and moderator variables, searching the literature, abstracting the data, and analyzing the results. In addition, identification of potential harms and benefits, applicability of results, barriers to implementation, and research gaps are described.

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Introduction

The *Guide to Community Preventive Services* is a resource for many audiences who are interested in systematic reviews of public health interventions. The general methods for conducting systematic reviews in the *Community Guide* have been described elsewhere.[1,2] This paper will describe specific methods used to conduct two systematic reviews and meta-analyses[3] of the effectiveness of group-based comprehensive risk-reduction and abstinence education interventions for adolescents, to prevent or reduce the risk of pregnancy, HIV, and other sexually transmitted infections (STIs). These methods, which are parallel to other *Community Guide* reviews, include identification of the coordination team, conceptualization of the intervention to be reviewed, development of the research questions, identification and evaluation of the body of evidence, data analysis, assessment of other effects, applicability of findings, barriers to implementation, and identification of research gaps. In addition, the methods used for the economic review are described.

The results of these reviews provide the basis for recommendations by the Community Preventive Services Task Force (Task Force), an independent, nonfederal, volunteer body of public health decision makers in both the public and private sectors.[4]

Coordination Team

One of the first steps in the process involved convening a Coordination Team (the team), which consisted of a *Community Guide* coordinating scientist and research fellow, staff from other CDC areas, and members from

From the Community Guide Branch, Epidemiology and Analysis Program Office, CDC, Atlanta, Georgia

The names and affiliations of the Task Force members are listed at www.thecommmunityguide.org/about/task-force-members.html.

Address correspondence to: Theresa Ann Sipe, PhD, Prevention Research Branch, CDC, 1600 Clifton Road, Mailstop E-37, Atlanta GA 30333. E-mail: TSipe@cdc.gov.

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independent research organizations, academia, and other groups with expertise in adolescent health. The team collaboratively defined the interventions and the scope of the review, drafted the analytic framework, identified relevant recommendation outcomes for the review, and provided guidance on important decisions throughout the process. The *Community Guide* staff on the team managed the data collection and review process, analyzed the data, presented findings to the Task Force, and drafted reports of findings.

Conceptual Approach

The effectiveness of behavioral interventions in promoting health-protective behaviors and reducing sexual risk behaviors repeatedly has been demonstrated in studies of sexually experienced adolescents,[5] men who have sex with men,[6,7] heterosexual men and women,[8] and drug users.[9,10] Published reviews of behavioral interventions for adolescents also have shown favorable outcomes, including reductions in number of sex partners[11] and in the frequency of unprotected intercourse,[12] as well as increased condom use.[13] However, important questions remain about individual, intervention, and contextual influences on adolescent health-protective or sexual risk reduction behaviors and the limits of their effectiveness.

The current reviews investigate some of these influences within the context of broad research questions: Are group-based comprehensive risk-reduction and abstinence education interventions for adolescents effective in reducing sexual activity and sexual risk behaviors to prevent HIV, other STIs, and pregnancy? Does intervention effectiveness vary by population characteristics, intervention characteristics, or study characteristics? Are adverse effects associated with these interventions?

Analytic Framework

The analytic framework (Figure 1) graphically displays the causal relationships through which interventions are presumed to affect health outcomes. The analytic framework for these two reviews identifies the ways in which each intervention is intended or expected to influence pregnancy and HIV/STI rates. The primary outcomes of interest for the comprehensive risk-reduction review include the behavioral outcomes of sexual activity and sexual risk behaviors, as well as the biologic outcomes of pregnancy, HIV, and other STIs. The primary outcomes of interest for the abstinence education review are the behavioral outcomes of sexual activity and the biologic outcomes (noted above). Because abstinence education was not expected to influence sexual risk behaviors, these outcomes were considered secondary outcomes. Although the framework depicts the proximal outcomes (such as knowledge and attitudes) also influenced by both interventions, changes in these outcomes do not have a sufficiently strong link to health outcomes to provide a basis for a Task Force recommendation; therefore these outcomes were not the focus of the reviews.

Developing the Body of Evidence

Data Sources

Search parameters determined by the team were used to develop a comprehensive strategy to search for studies evaluating interventions to increase protective behaviors and/or reduce sexual risk behaviors linked to pregnancy, HIV, and other STIs in U.S. adolescents. A CDC librar-

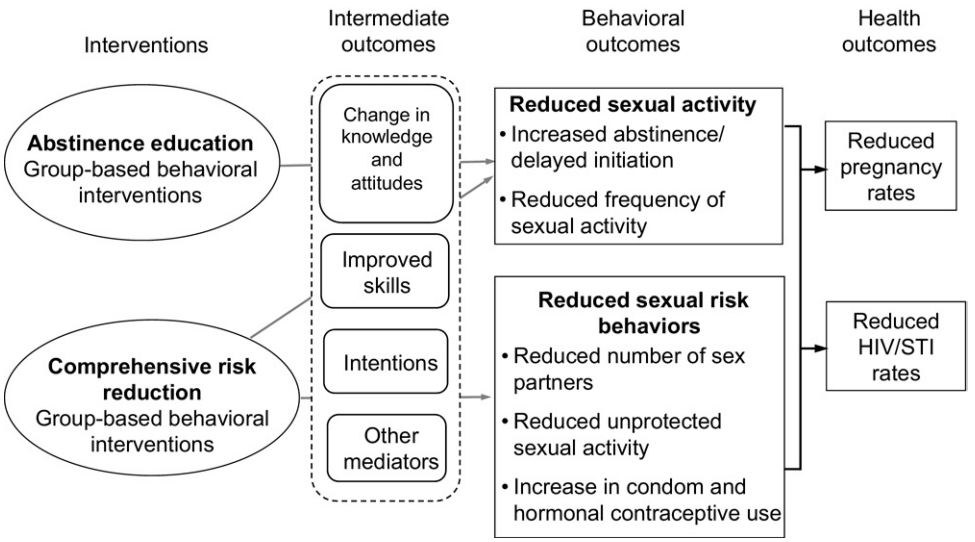

Figure 1. Analytic framework showing the effects of group-based abstinence education and comprehensive risk-reduction interventions

Note: Abstinence education interventions will lead to reductions in sexual activity only and comprehensive risk-reduction interventions will lead to reductions in sexual activity and sexual risk behaviors among adolescents. Changes in these outcomes occur through changes in the proximal outcomes relevant to each intervention strategy. Both interventions are expected to lead to reductions in the biologic outcomes of pregnancy and HIV/STIs.

STI, sexually transmitted infection

ian, with experience and training in search methods for systematic reviews, conducted the formal electronic search for papers published from 1988 through August 2007 in CINAHL, MEDLINE, PsycINFO, PubMed, Sociological Abstracts, Web of Science, ERIC, POPLINE, NTIS, EPO, CRISP, and the online Cochrane Controlled Trials Register. The specifications of the electronic search included controlled vocabulary (e.g., MeSH or indexing terms) and keywords in five areas: (1) Comprehensive risk reduction and abstinence; (2) HIV, AIDS, STI, or pregnancy; (3) prevention research methods (e.g., intervention, evaluation, impact studies); (4) sexual risk behaviors and biologic outcomes; and (5) target population (e.g., adolescent, youth, teen). The full strategy is available at www.thecommunityguide.org/hiv/supportingmaterials/SS-adolescents.html.

In addition to the formal search conducted by the librarian, search of references also included those listed in all retrieved articles, published and unpublished papers provided by members on the team and elsewhere, and references from a search of an electronic database continuously updated and maintained by Prevention Research Synthesis (PRS) in the Division of HIV and AIDS Prevention at CDC (www.cdc.gov/hiv/topics/research/prs/index.htm). Because hand searches are performed on a regular basis for the PRS database, hand searches were conducted only in relevant journals not included in that database.

Candidate Study Selection

To be eligible for inclusion in this review, studies had to (1) be reported in English during the period 1988 through August 2007 (1988 was chosen as the starting point to capture studies conducted *after* 1986, when CDC explicitly identified HIV in adolescence as a public health issue and began providing money and technical assistance to states); (2) be developed for adolescents (aged 10–19 years); (3) be delivered in U.S. schools, community settings, or both; (4) evaluate a group-based comprehensive risk-reduction or abstinence education intervention; (5) be focused on one or more of the following: abstinence education, HIV/STI prevention, or pregnancy prevention; (6) use an experimental or quasi-experimental design; and (7) measure at least one of the behavioral or biologic outcomes specified in the analytic framework.

Group-based behavioral interventions specifically designed for HIV-infected adolescents to prevent HIV transmission were excluded, as were interventions delivered to teen parents to prevent repeat pregnancy. These exclusion criteria were based on the team's judgment that HIV-infected adolescents and teen parents differ in important ways from the general population in terms of motivation and behavior patterns. Also excluded were interventions that used youth development approaches that did not include a component explicitly addressing HIV/STI, pregnancy, or sexual abstinence. Finally, interventions delivered to college or university students were excluded because such interventions are sufficiently different from those in the current study to warrant separate review.

Organization of Studies by Intervention Strategy

Studies were categorized into one of two types of group-based adolescent sexual behavior interventions—comprehensive risk-reduction strategies and abstinence education strategies—and analyzed separately. Each intervention strategy is defined below.

Comprehensive Risk-Reduction Interventions

Definition

Comprehensive risk-reduction interventions promote behaviors that prevent or reduce the risk of pregnancy, HIV, and other STIs. These interventions (1) suggest a hierarchy of recommended behaviors, identifying abstinence as the "best" or "preferred" method, but also provide information about sexual risk reduction strategies; (2) promote abstinence and sexual risk reduction without placing one strategy above the other; or (3) primarily or solely promote sexual risk reduction strategies. These reviews evaluated comprehensive risk-reduction interventions delivered in school or community settings to groups of adolescents. Some comprehensive risk-reduction interventions in these reviews also included additional components that ranged from condom distribution to STI screening and others used a more comprehensive youth development approach that also included components focused on risk reduction in pregnancy, HIV, or other STIs.

Abstinence Education Interventions

Definition

Abstinence education interventions promote abstinence from sexual activity (either delayed initiation or abstinence until marriage) and mention condoms or other birth control methods only to highlight their failure rates, if at all. These interventions generally include messages about the psychological and health benefits of abstinence as well as the harms of sexual activity. Most of the interventions adhere to the eight federal guidelines required to obtain Title V federal funding (see Table 1 in accompanying article).[3] This review evaluated abstinence education interventions delivered in school or community set-

Table 1. Behavioral outcome categories for the comprehensive risk-reduction and abstinence-only reviews of adolescents

Outcome category	Definition	Included outcomes
Sexual activity[a]	Either having sex (sexual activity) or not having sex (abstinence); Measures of abstinence were recoded to reflect sex.	Abstinence Transition to sex Sexual activity
Frequency of sexual activity[a]	Number of times an individual had sex in a given time period	Number of acts Number of days Mean change in number of acts Multiple episodes of sex (≥6)
Number of sex partners	Number of partners per individual or change in number of partners	Number of partners in recent past or ever Mean change in number of partners
Unprotected sexual activity[a]	Proportion of individuals who had sex without a condom, frequency of individuals having sex without a condom, or frequency of unprotected sex	Unprotected sex Proportion sometimes/never used a condom Number of episodes of unprotected sex Number of days of unprotected sex or no condom use Number of acts of unprotected sex
Use of protection (favorable in the opposite direction from other outcomes)	Proportion of sexually active individuals using condoms, or frequency or consistency of use of condoms, oral contraceptives, or both (dual use)	Condom use Condom use Consistent condom use Percentage condom-protected intercourse Condom use at last sex Frequency of condom use Hormonal contraceptive use Oral contraceptive use Percentage oral contraceptive-protected intercourse Oral contraceptive use at last sex Frequency of oral contraceptive use Dual use (condoms and hormonal contraceptives) Oral contraceptives and condom use at last sex

[a]"Sex" was defined as vaginal, oral, or anal, and outcomes were chosen in that order. The vast majority of studies included vaginal sex only.

tings to groups of adolescents. These interventions could include other components, such as media campaigns to community service events or could use a more comprehensive youth development approach.

Evaluating and Summarizing Studies

Two reviewers read and evaluated each eligible study using an abstraction form[2] adapted for this review. Reviewers abstracted data describing study characteristics, participant characteristics, evaluation methods, intervention features, and study results. Study authors were contacted in cases where data for the results of the study were missing or when numbers reported in the text did not match data reported in tables or figures. In each case with missing or inconsistent results, an e-mail was sent to the first author of the paper to request additional information or clarification. Data provided by authors in response to this e-mail inquiry were used in addition to or in place of data provided in the paper.

After abstracting the relevant data from each study, the suitability of study design and threats to internal and external validity (quality of execution) were assessed. Study reviewers met to compare data abstraction and assessment of quality of execution for each study and resolve differences in abstraction and quality scoring. When reviewers disagreed, differences were reconciled by consensus among the team.

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 which have multiple pre- or post-measurements but no concurrent comparison population.[1] The team excluded, a priori, designs designated by the *Community Guide* as least suitable, including single-group pre/post and post-only designs. Because of rapid maturation in adolescents and their vulnerability to biologic, social, and other influences, the least suitable designs were considered to have an unacceptably high potential for bias.

Quality of study execution includes seven categories of threats to validity. Limitations are assigned for each threat to validity identified in the studies, up to a total of nine limitations across seven categories: description of study population and intervention (one limitation); sampling (one limitation); measurement of exposure (one limitation); measurement of outcomes (one limitation);

data analysis (one limitation); interpretation of results/sources of potential bias (up to three limitations), and other problems (one limitation). Studies with up to one limitation are categorized as having good execution, studies with two to four limitations are categorized as fair execution, and studies with five or more limitations are categorized as limited execution.[1] Studies with limited quality of execution were excluded from further analysis.

Outcomes

As previously noted in the analytic framework, the outcomes of interest in this review were related to both sexual behavior and biologic outcomes. For the behavioral outcomes, the effectiveness of an intervention was based on reductions in the amount of sexual activity reported or increases in protective behaviors. For biologic outcomes, effectiveness of an intervention was based on reductions in pregnancies or STIs reported. To combine similar sexual behavior outcomes, the team created five categories: sexual activity, frequency of sexual activity, number of sex partners, unprotected sexual activity, and use of protection. Transformations were performed when necessary to ensure that outcomes in each category were consistent in direction. The definition and types of outcomes in each category are presented in Table 1.

The three biologic outcomes relevant for this review are pregnancy, STIs, and HIV status; most outcome measures were self-reports. Pregnancy outcomes could include "ever been pregnant" reported by a girl or "ever gotten someone pregnant" reported by a boy. Only some of the STI outcomes were confirmed with lab testing. No studies reported HIV status. The validity of self-reported measures of sexual behavior among adolescents has been evaluated in a review of several studies.[14] Although these self-reports were affected by cognitive and situational factors, adolescents responded consistently when asked about sexual activity and condom use, when asked under appropriate conditions.[14]

In many of the included studies, investigators reported multiple measurements in the same outcome category. For example, a study might report frequency of sexual activity as both the number of acts in a specified time period and the number of days within a specified time period. To choose the most relevant measurement for the population being studied, the team devised a hierarchy to select the primary outcome when different measurements were reported for a single outcome category. Across all behavioral outcomes, sex was defined as vaginal, oral, or anal and sex-related outcomes were chosen in that order when multiple outcomes were reported. Most studies, however, reported on vaginal sex only.

In addition to different measures for the same outcome category, many studies also reported results at multiple follow-up times. For this review, "length of follow-up" was the time from the beginning of the intervention to the assessment. Outcome variables were categorized into two groups, quick-to-change and slow-to-change, based on the classification of sexual behaviors from a previous review of sex and HIV education programs[15] and team deliberations. Only outcomes measured after the intervention ended were collected and follow-up times were calculated from the start of the intervention, similar to other reviews.[16] For the quick-to-change outcomes, the outcome closest to 3 months was collected. The quick-to-change outcomes included frequency of sexual activity, frequency of unprotected sexual activity, and use of condoms or other contraceptives. For slow-to-change outcomes the outcome measure collected closest to 12 months was collected. The slow-to-change outcomes included sexual activity, number of sex partners, pregnancy, and STIs.

Moderator Variables

The team identified 12 variables as the most critical for further examination as potential modifiers of intervention effectiveness: population characteristics (age, gender, race/ethnicity, virginity status); intervention characteristics (setting, dosage, focus, deliverer, multicomponent, targeting); and study characteristics (study design, comparison group type). For the analysis, most of these variables were recoded as dichotomous variables (Table 2). Each variable or characteristic has been identified in the theoretic or empirical literature but varies in the extent to which its role is understood, particularly in the context of multiple influences on adolescent sexual behavior. Examinations of these moderator variables are important in considering potential sources of heterogeneity and the applicability of the study results to various populations and contexts.

Data Analysis Methods

Effect Estimates

Odds ratios were chosen as the effect estimate parameter because most of the data were proportions and mean data can be transformed into ORs. Calculation of ORs and 95% CIs was performed for all studies with sufficient information. Effect estimates were adjusted for baseline where data were available. For all outcomes except the protective behaviors, ORs <1.0 indicated effects in the favorable direction (i.e., risk behaviors or biologic outcomes were reduced in the intervention versus the comparison groups). For the protective behavior outcomes, ORs >1.0 indicated effects in the favorable direction (i.e., protective behaviors of condom or other contraceptive use were increased in the intervention versus the compar-

Table 2. Effect modifiers, definitions, and levels for coding for the critical variables examined in the comprehensive risk-reduction and abstinence education reviews

Variable	Levels
Age (years)	10–14 (middle school) 15–19 (high school)
Gender	Female Male
Ethnicity	Categoric variable: majority African-American; majority white; majority Asian; majority Hispanic; majority unknown
Virginity status	Virgin Nonvirgin
Setting	School: in school, during the school day Community: outside of school day, regardless of delivery location
Dosage[a]	Continuous variable: total number of hours participants were exposed to the intervention (range of values: 1–48 hours)
Focus	HIV/STI only or multi (HIV/STI and pregnancy) Pregnancy only
Deliverer	Adult deliverer only Peer only or peer and adult deliverer
Multicomponent	Single (group-based education only) Multi (group-based education plus another related intervention)
Targeting	No targeting Targeting (to gender, race/ethnicity, or other subcultural identity)
Study design	Non-RCT RCT
Comparison group	Untreated and minimal treatment Treated (received a treatment comparable to the intervention group)

[a]Because the distribution of this variable was skewed, the variable was windsorized using Tukey's hinges.
STI, sexually transmitted infection

ison groups). Estimated risk ratios also were calculated for all outcomes that provided enough data and were based on the OR and the average control group risk for each outcome. A combination of Microsoft Excel and Comprehensive Meta-Analysis, version 2.2050, was used for effect-size calculation and meta-analyses, which are described in the next section.

Meta-analyses. Meta-analyses were conducted on each outcome variable to answer the main research question on the effectiveness of group-based comprehensive risk-reduction and abstinence education interventions to prevent or reduce the risk of adolescent pregnancy, HIV, and other STIs. Using the random-effects model, data were aggregated across all of the studies and calculated an overall weighted mean OR with corresponding 95% CIs. The random-effects model was chosen because the interventions, populations, and contexts varied substantially across the studies included in this review, and the random-effects model accounts for both within-study sampling error and variation among studies, as opposed to the fixed-effects model, which accounts for only within-study variability.[17] Results were displayed in forest plots, which give a visual depiction of individual effect sizes and 95% CIs as well as the overall weighted mean OR.

Homogeneity tests. Homogeneity tests, the Q statistic and the I^2 statistic, also were conducted. The Q statistic tests whether the variability among studies is greater than would be expected by chance,[17] and the I^2 statistic estimates the magnitude of this additional variability. I^2 values can range from 0% to 100%, and values $>50\%$ are considered to reflect substantial heterogeneity.[18] In a systematic review, however, the interpretation of heterogeneity should not be limited to the I^2 value but also take into account the size and direction of treatment effects as well as methodologic differences among the studies.[18]

Univariate analyses. Univariate analyses were conducted on each of the moderator variables to (1) assess whether they are associated with increased or decreased intervention effects and (2) explore potential sources of heterogeneity in the overall mean effect size for each outcome. When authors reported outcomes by male/female or virgin/nonvirgin, within-study analyses were conducted for these modifier variables. Between-study analyses were conducted on the remaining moderator variables because either no, or too few, studies reported outcomes by age, race/ethnicity, setting, dosage, focus, deliverer, multicomponent, or targeting. Between-study analyses were conducted also on types of comprehensive risk-reduction interventions study designs, and comparison groups.

Similar to the meta-analyses, ORs and CIs were calculated for each category of the moderator variable as well as a Q statistic and I^2. In addition, a p-value for the difference between the effect sizes for categories of each moderator variable (e.g., targeted versus untargeted interventions) was calculated. Because the dosage variable is continuous as opposed to dichotomous, a meta-regression was conducted using Comprehensive Meta-Analysis Software, version 2.2050.

Sensitivity Testing

Publication bias. Orwin's fail-safe N analyses were performed for each outcome variable to check for publication bias. This analysis determines the number of unpub-

lished studies reporting null or contrary results needed to reduce the accumulated effect across studies to the point of nonsignificance or a trivial effect[19,20] (i.e., significant, but not meaningful). The trivial effect was set to an OR = 0.95 for all outcomes except protective behaviors, which were set at OR = 1.05. Thus the resulting fail-safe N is the number of missing studies that will move the overall weighted mean OR past the specified threshold (Comprehensive Meta-Analysis Software Version 2.2050). In addition to Orwin's fail-safe N, funnel plots were inspected visually to examine the data for evidence of publication bias.[21]

One-study-removed analysis. A one-study-removed sensitivity analysis was performed on each outcome to examine how the weighted mean effect size changed when any one individual study effect size was removed. This analysis tests the sensitivity of the overall effect estimate to any one study.[22] Any changes in size or significance of the effect indicate that one study has a large influence on the overall weighted mean effect estimate.

Correlations. Bivariate correlations were performed between follow-up time and the effect estimate, the overall weighted mean OR, to assess whether follow-up time is associated with size of the effect.

Translating the Evidence Into Recommendations

The Task Force recommendations for comprehensive risk-reduction and abstinence education interventions delivered to adolescents are presented in the accompanying article[4] and are based on the strength of evidence of effectiveness as determined by *Community Guide* methods.[1] The number of available studies included in the review, the strength and quality of their study designs, and the magnitude and consistency of the effect estimates for the outcomes of interest in the review determine the strength of evidence of effectiveness. The Task Force characterizes the evidence in support of their findings as sufficient or strong.

When the body of evidence for a review contains a sufficient number of studies of acceptable quality with consistent results of sufficient magnitude in the favorable direction, the Task Force finds the intervention to be effective. The Task Force also can find insufficient evidence to determine effectiveness of the intervention under review[1] when the body of evidence for a review is not of sufficient size, consistency, and quality to support conclusions or is too small to have a public health impact. The finding of insufficient evidence does not mean that the intervention is not effective but rather that the Task Force could not determine, from the body of evidence, whether the intervention is effective or not.

Applicability

Applicability of comprehensive risk-reduction and abstinence education interventions is based on the variety of populations and settings represented in the studies included in the reviews. The team provided guidance and the Task Force drew conclusions about the applicability of the results to various populations and settings after considering the conceptual basis for the interventions, examining data on participant and intervention characteristics, and robustness of results across studies. Variables considered were age, gender, race/ethnicity, urbanicity, region of the U.S., and setting. Further, the team and the Task Force assessed whether gaps existed in the representation of subgroups and if the interventions reviewed had any unique factors that would limit their applicability to specific subgroups of adolescents.

Other Effects: Potential Benefits and Harms

In addition to outcomes collected and examined as primary recommendation outcomes for the review, information was collected on other outcomes that may provide benefit or cause harm as a result of the intervention. These additional potential benefits of the interventions were identified from studies included in the effectiveness review, a review of background literature on adolescent behavior, or from team members. Concerns about the potential harms of sexual education of adolescents either using a comprehensive risk-reduction or abstinence education approach were numerous; many are raised by the general public, as well as experts and the scientific literature. Because of the great number of concerns about the potential harms, the team decided to limit the potential harms addressed to those for which data were available from the studies included in these reviews; thus, this review did not address all of the harms currently under debate.

Barriers to Implementation

Identification of barriers to implementation of comprehensive risk-reduction and abstinence education interventions was similar to the approach used for potential benefits and harm. Qualifying studies, as well as relevant related literature, were examined for information on barriers and facilitators to intervention implementation. The team evaluated these barriers and included those that

may provide important guidance to decision makers and intervention implementers.

Summarizing Research Gaps

During the course of conducting these systematic reviews, areas were identified in which information about the effectiveness of the interventions was lacking or of poor quality.[1] For interventions found to have insufficient evidence to determine effectiveness, research gaps identified focus on the information needed to determine effectiveness (e.g., more studies of good quality and rigorous study design; use of consistent outcome measures and follow-up times). When effectiveness has been established and the interventions are recommended, additional research may be needed to determine with greater specificity when and where the intervention is effective and what particular elements of the intervention make it more or less effective.

Evaluating Economic Efficiency

Established *Community Guide* methods to conduct systematic reviews of economic efficiency are discussed elsewhere.[23] The major steps involve searching for and retrieving the body of evidence, abstracting and adjusting the economic data, and summarizing and interpreting evidence on economic efficiency. In most cases, a review of economic evaluations for a given intervention is performed only when the intervention is found to be effective and therefore recommended by the Task Force. For this topic, however, the economic review was conducted for both comprehensive risk-reduction and abstinence education interventions as they were considered companion reviews.

Searching for and Retrieving Evidence on Economic Efficiency

To be eligible for economic review, studies must satisfy the intervention definition stipulated in the effectiveness review. The economic search combined economics-specific keywords such as *cost*, *cost–benefit*, *cost-effectiveness*, and *cost-utility* with the effectiveness search terms and expanded the search with additional databases, EconLit, SSCI, JSTOR, Google Scholar, and repositories of health economics research at selected universities and institutes, including the University of York. The same CDC librarian conducted the effectiveness and economic literature searches.

Abstracting and Adjusting Economic Data

Data from each study that met the inclusion criteria for the economic review were abstracted using a standardized form (www.thecommunityguide.org/about/Econ Abstraction_v5.pdf). Information collected on this form includes classification of study design and methods; description of the intervention and study population; specification of the comparison group; measurement of intervention effectiveness; perspective (such as societal or healthcare systems); duration of intervention and analytic horizon; and total costs and benefits and economic summary measures reported. Studies are rated very good, good, satisfactory, or unsatisfactory based on an evaluation of five performance categories—study design, costs, benefits measurements, effects, and analysis. Only studies with a rating of satisfactory or better were included in the economic review. Quality assessment was not conducted for review papers that analyzed multiple interventions.

All monetary values were adjusted to 2008 U.S. dollars, using purchasing power parities from the World Bank[24] to convert from foreign currencies, and either the general or medical consumer price index from the Bureau of Labor Statistics[25] to adjust for the price level.

Summarizing and Interpreting Evidence on Economic Efficiency

For each included study, a summary table provides a brief description of the intervention, the setting, and the number of participants. It also captures what labor and other resources were included in the compilation of intervention or program cost reported by each study and the source of economic benefits calculated, such as averted healthcare cost or averted productivity losses at work. Where the study reports both costs and benefits of the intervention or where the intervention cost is reported along with a measure of health benefit attributable to the intervention, a summary economic measure indicating the economic value of the intervention is presented as net benefit, cost–benefit ratio, or cost effectiveness such as cost of intervention per quality adjusted life year ($/QALY).

Quantitative synthesis of results from different studies is not attempted beyond reporting maximums, minimums, and medians, given the usual heterogeneity of economic studies. Variance in intervention costs and summary economic measures across the reviewed studies are discussed and interpreted in light of differences in intervention components, sample size, and the types of program costs and benefits considered in the studies.

Summary

This paper describes the methods used in the systematic review, meta-analysis, and economic evaluation of comprehensive risk-reduction and abstinence education interventions delivered to adolescents to prevent pregnancy, HIV, and other STIs. The accompanying papers in this issue present the detailed findings from these system-

atic reviews[3] as well as the Task Force recommendations[4] for comprehensive risk-reduction and abstinence education interventions.

Points of view are those of the authors and do not necessarily reflect those of the CDC.

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