

Interventions Intended to Reduce Pregnancy-Related Outcomes Among Teenagers
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EXECUTIVE SUMMARY

This review synthesizes the evidence on the effectiveness of programs aimed at reducing sexual risk-taking among teens. By including only rigorous randomized controlled trials that meet additional methodological criteria, it uses meta-analytic techniques to estimate the average effects that interventions have on reducing sexual experience, unprotected sexual activity, and pregnancy rates. It focuses on four main types of interventions: (1) one-time consultations; (2) sex education programs with an abstinence focus (and no contraceptive focus); (3) sex education programs with a contraception component; and (4) multi-component youth development programs. In total, this review presents findings based on over 37,000 youth who were the subjects of 31 studies that reported on a total of 38 randomized trials of interventions aimed at reducing teen sexual activity and pregnancy.

This review finds no consistent evidence that the types of pregnancy prevention programs evaluated rigorously to date will alter in intended ways the sexual activity or pregnancy risks of youth. However, this overall pooling of studies mixes results of different program types serving different populations of adolescents. When looking more specifically by intervention type, the following results were found:

- Too little evidence to make specific judgments about one-time consultations.
- Limited evidence regarding sex education programs with an abstinence focus. Studies evaluated rigorously showed pooled statistically significant effect favoring the control group on pregnancy rates. However, none of the rigorously evaluated programs is representative of abstinence-only programs that have grown in popularity over the course of the past decade, and thus these results cannot be used to generalize to the broader set of abstinence focused interventions currently in operation.
- No consistent evidence that sex education programs altered the likelihood that youth would initiate sex, would risk pregnancy, or would become (or get someone) pregnant. Notably, there is great variability in the nature of the programs included within this category, as well as a high degree of variability in the size, direction, and statistical significance of the impact estimates for the various programs. However, a number of individual studies have found positive program effects, particularly related to increased contraception use, and have been considered by advocates to be models to be replicated (Solomon and Card, 2004). As more replication study results become available, it will be possible to pool more similar programs to assess systematically the effects of particular program models.
- The most promising results are for the more intensive multi-component youth development programs serving higher risk adolescents. Moreover, within this category, the results tend to be most favorable for females. However, there is a paucity of rigorous evaluations of such programs, and further replication and evaluation is warranted.

While the body of knowledge in this field is continually growing, this review highlights the relative dearth of evidence to judge the overall effectiveness of particular intervention strategies. For this reason, further research and evaluation is necessary, including studying programs that have not yet been evaluated rigorously and programs that have been replicated and are serving new populations of adolescents in different communities. Once a larger body of more similar programs have been evaluated rigorously and reported consistently, then it will be possible to pool the evidence to make more concrete conclusions regarding program efficacy.

BACKGROUND

This review examines the effectiveness of teen pregnancy prevention programs in delaying first intercourse, in reducing the likelihood teens will engage in intercourse without using contraception, and in reducing the likelihood of pregnancy among teens. The review also examines evidence regarding the relative effectiveness of different types of and settings for interventions. Teens who become pregnant, and especially those who give birth at a young age, face negative economic and social consequences, both in the short-term and as they transition to adulthood (Maynard, 1997; McLanahan, 1994; Moore et al, 1993). Although the rates of teen sexual activity, pregnancy and births in the United States have fallen over the past decade, they remain high and, by a considerable margin, the U.S. rates are the highest of all industrialized countries (Centers for Disease Control and Prevention 2005; Darroch et al., 2001a). The persistently high rates of sexual activity, pregnancy rates, and births among teens in the U.S., in particular, has led to a wide range of programmatic initiatives aimed at reducing teen pregnancy and birth rates. Most of these strategies promote abstinence from sexual activity. Some programs focus mainly on promoting contraception. But, most often, programs encourage abstinence, but also promote contraception among sexually active teens.¹

Extensive research has been conducted exploring the antecedents to heterosexual risk-taking behaviors. For example, the research has identified numerous correlates of sexual-risk taking among teens, including community characteristics; school characteristics; family characteristics; biological factors; psychological factors; relationships with peers, parents, and school; as well as attitudes and beliefs concerning sex (Bearman et al, 1999; Blum et al, 2000; Costa et al., 1996; Jaccard et al. 1996; Kirby, 2001; Miller, 1998; Resnick et al., 1997; Weinstein and Thornton, 1989; and Wu and Martinson, 1993). These findings have guided program and policy decisions regarding the design and targeting of pregnancy prevention interventions.

The policy response to adolescent sexual risk-taking in the U.S. and other developed countries with relatively high rates of teen pregnancies has been similarly varied. Interventions implemented over the past few decades have emphasized different combinations of the antecedents identified above. Furthermore, these various intervention strategies have been implemented by a multitude of actors, ranging from schools to community-based organizations to religious organizations (U.S. Department of Health and Human Services, 2000; Sonfield and Gold, 2001).

Policymakers, researchers, and practitioners have engaged in ongoing debates concerning the content and timing of pregnancy prevention programs. Specifically, two major issues have engendered considerable controversy: (1) whether sex education programs should have an abstinence-only focus or whether such programs also should include information and education on contraception, and (2) whether pregnancy prevention programs should be aimed at younger versus older teens. To date, no consensus

¹ Throughout this review, we use the terms teen pregnancy and childbearing to refer to unplanned or mistimed pregnancies and births among teens. In the past two decades, it has been relatively uncommon for teens in the United States and most similarly developed countries to become pregnant and give birth intentionally (Brown and Eisenberg 1995). Since the primary interest for this systematic review is in preventing teen pregnancies, sexual activity has been defined as heterosexual intercourse. Reviewers who are interested in HIV prevention may choose to define sexual activity more broadly. In addition, reviewers interested in HIV prevention may choose to include studies from a broader set of countries including developing countries where many programs aimed at reducing teen sexual risk-taking are primarily HIV prevention efforts.

has emerged from the literature regarding either the effectiveness of particular intervention strategies or their implementation in particular settings.

Twenty (20) reviews of evidence on the effectiveness of teen pregnancy prevention programs conducted over the past decade yield inconsistent conclusions (see Table 1). The reviews differ in their criteria for including studies and how they analyze the results of included studies. One important difference among reviews is whether they include only findings of randomized controlled trials, both randomized control trials and quasi-experimental design studies, or all studies (including those with no matched control group). A few of the reviews included statistical meta-analyses. However, most provided only a narrative description of findings. Finally, some of these reviews are outdated and some have a primary focus that differs from this review. In general, among the more recent reviews that narratively pool studies, there is a growing consensus that certain programs and program components appear to be effective.² However, no consistent meta-analytic results, to date, have validated these claims.

This review seeks to improve upon the prior reviews in six ways. First, this review focuses on a clear and policy relevant set of questions in terms of both the interventions and the outcomes. It focuses only on interventions with a primary goal of reducing heterosexual risk-taking behaviors and that measure at least one of three key outcomes: (1) sexual experience (ever had vaginal sexual intercourse), (2) pregnancy risk (unprotected sexual intercourse versus either intercourse with contraceptives or abstinence), and/or (3) pregnancy.

Second, this review statistically pools findings from evaluations of programs operating in a broader set of geographical contexts than have most prior reviews. Yet, the review is restricted to programs that have operated in developed countries with relatively high rates of unplanned teen pregnancy.

Third, this review includes only those studies with a reasonable potential for generating credible (internally valid) findings. Specifically, the review includes only well-designed and reasonably well-implemented randomized control trials (RCTs). However, the review findings are complemented by an exploratory analysis of the sensitivity of the review findings to the inclusion of outcomes from reasonably well-implemented quasi-experimental design studies.

Fourth, this review explores differences in outcomes among clusters of programs defined by seemingly important programmatic features. These features include dimensions of program content, intensity, and implementation setting.

Fifth, this review evaluates the extent to which the research base adequately represents the range of programs currently in operation and it assesses the appropriateness of combining impact estimates across and within various types of interventions. Toward this end, we inventory strategies to prevent teen pregnancy (based on summary reports by government and non-government entities) and compare this with the range of program types and settings for which there is credible evidence of the impacts, in order to gauge the generalizability of the current corpus of evidence.

Finally, this review maintains a list of those studies that have been excluded due to data limitations and study quality considerations and provides information on the primary reasons for their exclusion.

² See, for example, Kirby (2001), Solomon and Card (2004), and DiClemente and Crosby (2006).

Table 1: Findings Reported in Narrative Reviews and Meta-Analyses of Programs Designed to Affect Adolescent Heterosexual Risk-taking Behaviors

Summary of Findings as Reported in the Study	Authors' Conclusions and/or Recommendations
Narrative Reviews	
<p>Bennet & Assefi (2005): Experiments only; United States; school-based "abstinence-only" & "abstinence-plus" (16 studies) Delayed sexual debut for 1 of 2 abstinence-only and 2 of 10 abstinence-plus programs; Decreased frequency of intercourse for 0 of 2 abstinence-only and 4 of 8 abstinence-plus; no evidence of decreases in number of partners.</p>	<p>"The results of this systematic review show that some abstinence-only and abstinence-plus programs can change teens' behaviors, although the effects are relatively modest and may last only short term." (p.78)</p>
<p>DiClemente & Crosby (2006): Experiments and quasi-experiments published after 2000 (8 studies) Most studies present positive effects on one or two behaviors, but only one trial showed positive effects on a range of behaviors.</p>	<p>Program operators need to invest significantly in program quality through adequate resources, staff training, and adequate replication and program implementation. Programs cannot be "one size fits all" as many of the programs have found positive effects for specific subgroups (for example, gender or racial/ethnic subgroups).</p>
<p>Frost & Forrest (1995): Experiments & quasi-experiments; United States; published (5 studies) Delayed sexual debut; increased contraceptive use; no significant change in pregnancy rates.</p>	<p>Sexual initiation can be reduced by as much as 15%; programs should target younger adolescents; should provide contraceptive component for sexually active teens.</p>
<p>Grunseit et al. (1997): Variety of research methods (highlighted experiments); International (47 studies; 11 RCTs) 17 studies reported reductions in sexual behavior; 3 studies found increases in sexual behavior.</p>	<p>Some programs can work; little reason to believe contraceptive education encourages sexual activity.</p>
<p>Kirby (2001): Experiments & quasi-experiments; North America; published and unpublished (75 studies) Provides a list of 10 components of effective sex education programs; also suggested that multi-component and youth development programs are promising approaches.</p>	<p>"In the final analysis, professionals working with youth should not adopt simplistic solutions with little chance of making a dent on the complex problem of teen pregnancy... They should replicate those programs that have the best evidence for success, build their efforts around the common elements of successful programs, and continue to explore, develop, and evaluate innovative and promising approaches." (p.11)</p>
<p>Kirby (1997): Experiments & quasi-experiments; North America; published (50 or more studies) No impact on sexual debut; some increase in knowledge; some effect on other behaviors.</p>	<p>Successful programs need to consider the multiple antecedents that lead adolescents to engage in risk-taking.</p>
<p>Manlove et al. (2002): Studies based on a variety of research methods, with an emphasis on experiments and studies included in prior reviews (150 or more studies) Concludes that the following types of programs work: intensive programs (for females); service learning/ youth development combined with sex education; and early childhood interventions. Concludes that the following do not work: abstinence-only programs and programs designed to increase parent-child communication.</p>	<p>"There are far fewer high-quality experimental evaluations... to help guide policy. But those that do exist point to a number of approaches that work, which include some sexuality education and HIV programs, but also include a variety of other approaches... including those that focus on early childhood investments, that involve teens in school and in outside activities (including youth development in combination with sexuality education and community volunteer learning), and those that send nurses to visit teenage mothers." (p.4)</p>
<p>NHS Center for Reviews & Dissemination (1997): Experiments & quasi-experiments; English language; published & unpublished (42 studies; 15 RCTs) School-based sex education programs demonstrated effectiveness, particularly when linked with contraceptive services and skills building.</p>	<p>Multifaceted programs/work experience with links to contraceptive services reduced teen pregnancy. Recommends targeted programs for females seeking emergency contraception; interagency collaboration; parenting skills training programs; and early education programs.</p>

(continued)

Table 1 (continued)

Oakley et al. (1995): Experiments & quasi-experiments; English language; published & unpublished (12 studies)	
Mixed results (combining evidence on knowledge, intentions and sexual behaviors): three programs were "effective"; four were deemed "partially effective," two were deemed "ineffective"; and one was "harmful," increasing sexual initiation.	"Further well-designed studies are needed with a long enough follow up to justify conclusions about the effectiveness of sexual health education ... In the absence of such evidence much of the present endeavour in sexual health promotion for young people can only be described as 'knitting without a pattern'." (p.160)
Pedlow & Carey (2004): Experiments only, published before 2003 (24 studies)	
All included interventions had at least one developmentally appropriate component. Cited studies that increased contraception use and reduced sexual initiation activity. Highlighted the particular benefits of programs with booster sessions throughout the year.	"Developmental transitions during adolescence influence sexual behavior and should be considered when developing and evaluating risk reduction interventions for youth." (p172)
Robin et al. (2004): Experiments and quasi-experiments, published during 1990s, theoretically-based (24 studies)	
Categorized and described studies by whether they had positive effects, null effects, or negative effects. Found that improvements in condom use was the most consistent program impact, and delayed sexual initiation was the least consistent impact.	"Analysis of these programs suggest four overall factors that may impact program effectiveness including the extent to which programs focus on specific skills for reducing sexual risk behaviors; program duration and intensity; what constitutes the content of a total evaluated program including researchers' assumptions of participants' exposure to prior and concurrent programs; and what kind of training is available for facilitators." (p3)
Solomon and Card (2004): Experiments and quasi-experiments, synthesis of 4 reviews/lists	
Pools together four different research syntheses or lists of programs that have found to be effective and highlights the differences in methodologies and inclusion criteria used for creating each of these lists.	"Aim for programs with evidence of effectiveness in achieving behavioral and health-related goals and objectives that are relevant for and acceptable to the target population and community... Look for programs that were effective with a population similar to the new target population... Consider the fit of the program with the available agency resources, such as setting, staffing, and funding... Determine availability of replication kits or program materials." (pp.15-16)
Thomas (2000): Variety of methods; United States; Abstinence-based programs (9 studies)	
Some evidence that well-designed abstinence-based programs will delay sexual debut. Impacts generally do not emerge until 18 months or more after the intervention.	"This review suggests that the percentage of adolescents primarily or secondarily abstinent may be increased at least in the short-term by well-designed programs adeptly implemented in a community of receptive teenagers. Parental involvement, solid theoretical grounding, reinforcement of appropriate social norms, and teaching the interpersonal skills necessary to remain abstinent appear to hold promise for program success." (p.16)
Visser & Van Bilsen (1994): Variety of research methods; UK, USA (21 studies)	
No impact on sexual activity; some interventions showed evidence of increasing contraceptive use.	Sex education in both school and clinical settings does not increase sexual activity. Programs increase knowledge and behavioral intentions.
Meta-Analyses	
DiCenso et al. (2002): Experiments only; N. America, New Zealand, Australia, W. Europe; published and unpublished (26 studies)	
No impact on delay of intercourse. Increased likelihood that boys cause pregnancy.	". . . we do not have a clear solution to the problem of high pregnancy rates among adolescents in countries such as the United States, the United Kingdom, and Canada." (p.7)

(continued)

Table 1 (continued)

Dolan Mullen et al. (2002): Experiments & quasi-experiments; 1988-1998, U.S. only; published and unpublished (20 studies)	
The pooled estimate for sex without condoms (13 studies) was statistically significant, favoring the treatment group, but was heterogeneous. There was no significant effect on the number of sex partners.	Found an overall positive effect of HIV prevention programs for sexually experienced adolescents in reducing the risk of having sex without condoms. Effects were more pronounced in programs where adolescents were of the same ethnic background. There is some evidence of publication bias.
Franklin et al. (1997): Inclusion criteria not described (32 studies)	
Small favorable significant impacts on contraceptive use and pregnancy. No significant effect on sexual activity.	Community-based programs are more effective than school-based programs; clinic-based programs can increase contraception use; programs should be modified depending on age groups served; programs should have specific foci on males or females.
Johnson et al. (2003): Experiments & quasi-experiments and covered HIV-prevention content (45 studies)	
HIV risk-reduction programs improved condom use skills, led to increase condom use, and reduced sexual frequency. Pooled effect sizes for behavioral outcomes were modest and heterogenous.	Interventions that were more likely to increase condom use tended to serve non-institutionalized populations, provided condoms, and provided condom information and skills-training.
Kim et al. (1997): United States (40 studies; 4 meta analyzed)	
One-third to half of the studies reported increased condom use and higher rates of abstinence. More favorable results in nonexperimental design studies.	Recommend that programs be theory-based and culturally appropriate, focus on coping skills, and be of long-enough duration.
Silva (2002): United States (12 studies)	
Evidence of very small favorable effects on “abstinent behavior” (delay of onset, reduction in frequency of sex).	Results suggest that parental participation and percentage of females in program is related to program effectiveness. Programs with younger adolescents, and smaller-scaled programs were most effective. There is no relationship between program duration and effectiveness.

OBJECTIVES OF THE REVIEW

This review summarizes the evidence regarding the effectiveness of interventions designed to reduce heterosexual risk-taking behaviors and pregnancy among adolescents. Specifically, this review explores the following questions:

- What is the corpus of evidence regarding the effectiveness of programs aimed at reducing heterosexual risk-taking behaviors and pregnancy among teens?
- What types of programs have been rigorously evaluated and how representative are these programs to the range of programs that exist?
- What are the estimated study-specific and average impacts on sexual experience (ever had vaginal sexual intercourse), pregnancy risk (unprotected sexual intercourse versus either intercourse with contraceptives or abstinence), and pregnancy?

- What are the estimated study-specific and average impacts of the four main types of interventions that have been studied in randomized control trials: (1) one-time consultations; (2) sex education programs with an abstinence focus (and no contraceptive focus); (3) sex education programs with a contraception component; and (4) multi-component youth development programs?
- What are the estimated impacts of programs targeted at different age groups of youth?
- What are the estimated impacts of programs for males and for females?
- How sensitive are the results to key aspects of study quality?
- How would the results of this review have differed had they included evidence from quasi-experimental design studies?

METHODOLOGY

This review was conducted following a protocol approved by the Campbell Collaboration (<http://www.campbellcollaboration.org/doc-pdf/scherteenpregnancyprot.pdf>). This protocol specifies in advance of the review the criteria for including or excluding studies, the search and coding procedures and the research synthesis methods.

Study inclusion criteria

This review includes all studies identified through an extensive search of the literature (published and unpublished) that meet nine criteria:

1. **Methodology.** The study is a randomized controlled trial.
2. **Intervention goals.** A primary goal of the intervention was to reduce sexual activity and/or pregnancy risks among nonparenting youth.
3. **Control condition.** The counterfactual condition against which the program is judged consists of “usual services” (not a specific alternative pregnancy prevention intervention) or no prevention services.
4. **Target population.** The program targeted exclusively or primarily middle and high school-age youth, between 11 and 18 years old. Programs included in the review must have focused their services primarily on school-age adolescents, even if a minority of the sample members served is not within the 11 through 18 age range.
5. **Outcome measures.** The study reports impact estimates for at least one of three outcomes: (1) sexual experience (ever had vaginal sexual intercourse); (2) pregnancy risk (unprotected sexual intercourse versus either intercourse with contraceptives or abstinence); and (3) pregnancy. The

outcomes are measured *at least* two months after the conclusion of the intervention or four months after the start of the intervention. And, the impact estimates must pertain to the full study sample, not self-selected sub-samples, such as those who participate in the intervention or complete the program. Studies also could be included in cases where it was possible to compute the impact estimates for the full follow-up sample based on information reported by the study author.³

6. **Intervention setting.** The study reports on field trials conducted in the United States or in developed countries with higher than average rates of unplanned teen pregnancy, such as Canada, England, New Zealand, Australia, or Western Europe.
7. **Reporting.** Results were reported or published between 1980 and April 2006.⁴ Due to resource constraints, only English-language databases and journals were explored.
8. **Data quality.** Data for the study were collected in a manner such that there is no reason to believe that there is systematic reporting bias in the outcome measures for the program and the control groups.⁵
9. **Sample retention.** The study reports outcome data for at least 60 percent of the original baseline sample (or at least 60 percent of the subset of the original sample followed up, in those cases where follow-up was limited to a non-self-selected subset of the original sample).⁶
10. **Data reporting.** The study reports estimates for the full follow-up sample—intention to treat estimates—or provides adequate information to permit the computation of impact estimates for this group.

Search procedures

A broad-based, thorough literature search was conducted for this review in Fall 2002 and this search was updated in Spring 2006. Our search strategy made use of electronic data bases, hand searching of journals, internet searches, and personal contacts. All searches focused on documents written or published from 1980 until April 2006.

Databases searched included: Cochrane Controlled Trials Register; Database of Abstracts of Reviews of Effectiveness (DARE) (evidence-based medicine); Dissertation Abstracts; Franklin (University of Pennsylvania library book search); Econlit; ERIC; HealthSTAR; Index to Current Urban Documents; International Bibliography of the Social Sciences; Inter-university Consortium for Political and Social

³ For example, in cases where an author reports outcomes for sexual initiation rates for the full sample and contraceptive use rates among those who had initiated sex, it is possible to compute impact estimates for pregnancy risk among the full sample.

⁴ The reason for excluding studies prior to 1980 is based on the fact that changes in social norms and contraceptive options have changed sufficiently over the years that research published prior to 1980 would not likely be relevant today. In reality, this bound on the search likely had no effect on the pool of studies included in the review.

⁵ For example, we would have excluded a study in which the data for the program group were collected by the program staff, while independent data collectors conducted surveys with the control group, unless the study provided convincing evidence that this difference in data collection method did not lead to differential survey response bias.

⁶ The decision to apply a 60 percent response rate threshold for including a study in the sample reflects an effort to balance two competing goals: excluding randomized controlled studies that lack internal validity due to non-response bias and including as rich an evidence base for reader consideration as possible.

Research (ICPSR); MEDLINE; The National Criminal Justice Reference Service Abstracts Database; PolicyFile; POPLINE; PsychInfo; Public Affairs Information Service (PAIS International); Sage Family Studies Abstracts; Social Science Electronic Data Library; Social Science Research Network; Social Services Abstracts; Social Work Abstracts; and Sociological Abstracts. Within each database, we searched on the following keywords:

(pregnancy or pregnant) AND (evaluation or adolescent or teen or prevention)
(sex AND education)
(sex education) AND (evaluation or adolescent or teen or prevention)
abstinence AND (evaluation or adolescent or teen or prevention)
clinic AND (evaluation or adolescent or teen or prevention)
(HIV or AIDS) AND (evaluation or adolescent or teen or prevention)

The first author collected and reviewed abstracts for all seemingly relevant studies. If the abstract appeared appropriate, then the full study was obtained and reviewed.

In addition, the first author and a graduate student hand-searched titles and abstracts from 1995 to April 2006 from the following ten journals: *AIDS Education and Prevention*; *American Journal of Public Health*; *Family Planning Perspectives* (currently known as “*Perspectives on Sexual and Reproductive Health*”); *Journal of Adolescent Health*; *Journal of Adolescent Research*; *Journal of Health and Social Behavior*; *Journal of School Health*; *Journal of Sex Research*; and *Pregnancy Prevention and Youth*. Other sources of data collection included: the use of personal contacts, examining reference lists from prior reviews, and basic internet search engine queries.⁷

Data extraction and coding

Data extraction. Based on information in the titles and abstracts, all potentially relevant studies were retrieved and reviewed to determine their appropriateness for the review. Bibliographic information and basic information concerning both the study design and intervention were coded for all studies retrieved. For those studies not meeting the review criteria, reasons for rejection were coded; and, for those meeting the inclusion criteria, detailed information about the intervention, the study design and implementation, and the outcomes were coded.⁸

Data coding and reliability. Two individuals coded the first five studies to resolve differences in coding decisions and clarify coding policies. Thereafter, a random sample of the studies (20 percent) was selected to be double coded. Reliability was based on the consistency of coding in the 20 percent sample.⁹

⁷ An initial set of studies was accumulated through the library Douglas Kirby collected while conducting a similar review in 2001. Basic internet search engine queries yielded an unreasonable number of hits, which, upon basic examination, did not yield any additional information. Thus, this search method was abandoned. However, internet searches of Department of Health and Human Services website, teen pregnancy prevention websites, and policy research firm websites were conducted including: www.hhs.gov, www.guttmacher.org, www.childtrends.org, www.teenpregnancy.org, www.mathematica-mpr.com, www.mdrc.org, www.abtassoc.com, www.urban.org.

⁸ A copy of the coding instrument is appended to the review protocol (available at <http://www.campbellcollaboration.org/doc-pdf/scherteenpregnancyprot.pdf>)

⁹ Since inter-rater reliability was high (less than 10 percent discrepancies) among the critical data fields, we chose not to double code all studies, as was outlined in our protocol.

Data inconsistencies. There were occasions where multiple reports were available concerning specific RCTs. In most of these cases, earlier reports either represented a smaller subgroup of adolescents or followed the larger group over a shorter follow-up period. In such cases, we resolved these discrepancies by focusing on the largest sample for the longest follow-up period, meaning the last follow-up that retained at least 60 percent of the original study sample. In two cases where inconsistencies across reports still occurred, we attempted to reach the primary study authors, but were not able to resolve discrepancies in such a manner. In these cases, we chose to focus on the most recent usable information available.

Study yield

One primary researcher [LS] conducted the literature search, with the assistance of a graduate student. Two primary researchers [LS and RM] discussed and resolved issues when there were controversies or questions concerning study inclusion. The database search strategy yielded over 2,000 “hits.” Many of these hits were duplicative or were ruled out upon review of the titles.

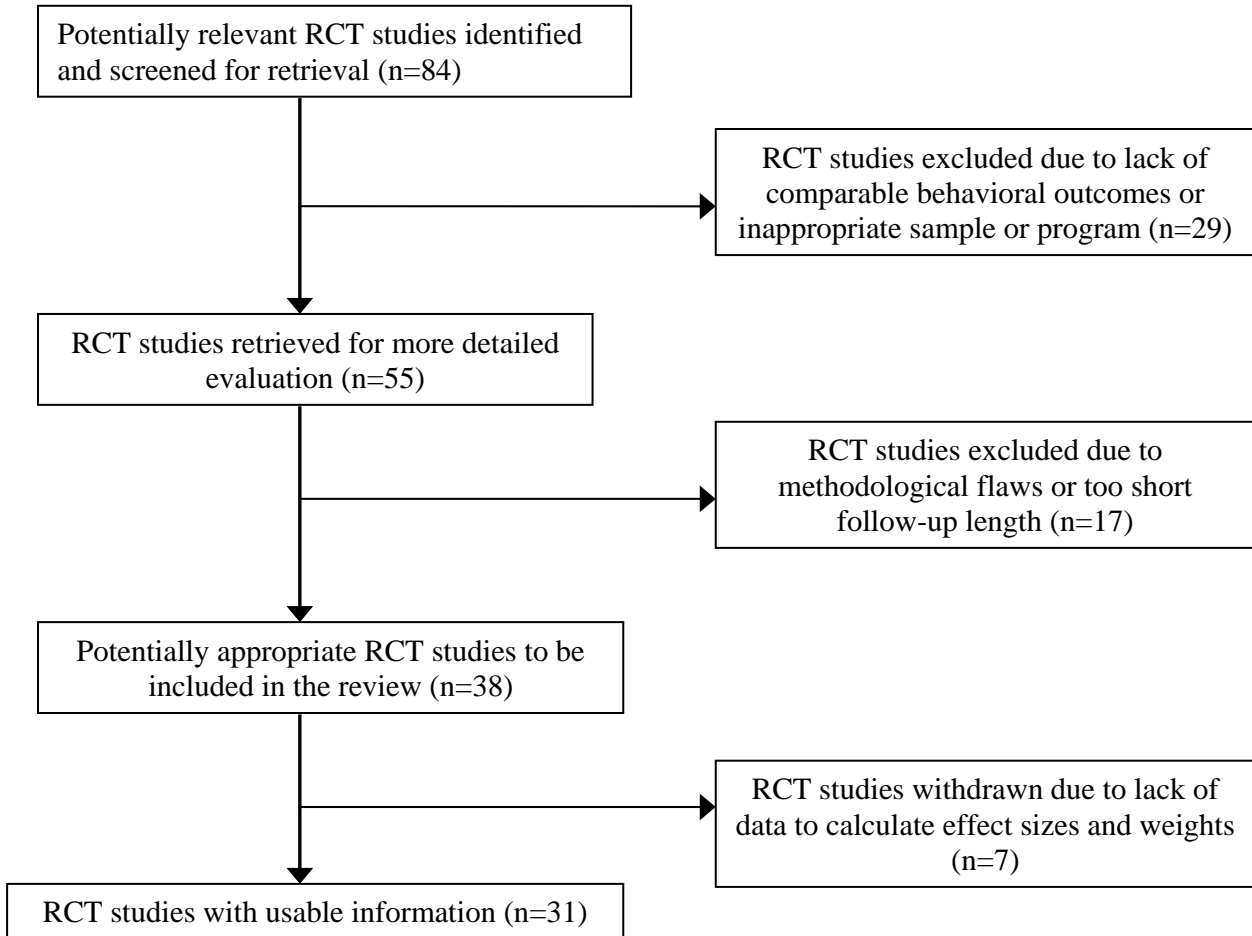
A total of 286 abstracts were reviewed. Of these, 84 were randomized controlled trial studies. Of the RCT studies, 29 were excluded due to a lack of behavioral outcomes or due to inappropriate samples (for example, programs targeting primarily college-aged adolescents) or program types (for example, reducing sexual activity not a primary focus of the program) (Figure 1).

Seventeen of the remaining studies were then excluded due to significant methodological flaws such as only partial randomization or too short a follow-up period. Finally, seven studies met all of our inclusion criteria, but either did not provide sufficient sample size data to calculate effect sizes and weights. Thus, ultimately, 31 studies were included in the review.

Appendix A provides detailed characteristics these 31 studies, sorted by intervention type. For each study, it describes the intervention, documents the research sample and analysis strategy, and presents both the author’s original findings and notes any differences between these findings and the findings presented in this review. Appendix B provides a list of the excluded randomized control trials and describes the primary reasons for exclusion.

Figure 1

Number of Randomized Controlled Trials Included and Excluded from the Review



Outcomes and the numbers of impact estimates identified

This review analyzed findings for three outcomes— sexual experience, pregnancy risk, and pregnancy. For ease of interpretation, all three outcome measures are dichotomous and, thus, are reported as percentages and percentage point differences. The specific definitions of the outcome measures reported in this review are as follows:

- *Sexual experience:* The percent of youth in the program and control groups who reported in their follow-up surveys having ever had vaginal sexual intercourse. In total, 40 independent estimates of program impacts on sexual experience rates were reported in 21 separate studies.

- *Pregnancy risk*: The percent of youth who, at follow-up, reported engaging in sexual intercourse but not using an effective method of contraception.¹⁰ Primary studies often assess contraception use only for the sub-sample of adolescents who are sexually active at follow-up. This measure may have confounding effects if the program changed youth’s decisions regarding sexual experience. The “pregnancy risk” measure considers all non-sexually active youth as *not* at “pregnancy risk.” There are 34 independent estimates of program impacts on pregnancy risk from 24 studies.
- *Pregnancy*: The percent of female sample members who, at follow-up, reported that they had ever experienced a pregnancy or the percent of male sample members who reported causing a pregnancy. There are 25 independent estimates of program impacts from 13 separate studies.

Self report. Nearly all of the outcomes measured in primary studies are based on adolescent self-reported sexual behaviors. Evidence from other studies indicates that use of self reports could lead to systematic under or over-reporting, depending on the particular samples being surveyed, the method of obtaining reports, and the wording of questionnaires (Sonenstein, 1997; Catania et al., 1996, Card, 1993). However, in general, there is no reason to expect differential under- or over-reporting between the intervention and the comparison groups.

Multiple follow-up waves. In cases where a study reported outcomes for multiple waves of follow-up, this review includes data for the latest follow-up for which a minimum of 60 percent of the baseline sample has been retained. Sensitivity analysis was conducted to assess whether there would be differences in pooled estimates depending on whether the first follow-up results or those for the most recent follow-up measure with the 60 percent minimum response rate was used. Generally, the results were robust to the reference period for the outcome measures used. However, as will be discussed in the results section, differences *across* studies can vary depending on the length of follow-up. Because the subset of studies that provide multiple effect sizes over time is limited, we do not have the ability to explore this issue in detail. These findings do suggest a need for future analyses of effects within and between studies across follow-up periods once more studies with outcomes over time become available.

Multiple independent estimates. Multiple measures of an outcome from a study are included only in those cases where multiple randomized trials were conducted within a study or where outcomes were reported separately by gender. In all but one study that had multiple treatments with a shared control group, only one treatment/control comparison was included in a pooled estimate. Appendix C presents separate impact estimates for the three studies that had multiple treatments with a shared control group, and describes the rationale for the selection of comparisons included in pooled estimates. In one study (Sikkema et al., 2005), two intervention groups shared controlled group. Since the two interventions are of different program types, we included both treatment/control comparisons in our analysis since the pooled effects by program type (the focus of our analysis) are independent. The effect size for all studies combined includes a weighted average of the effects.

¹⁰ If available, an “anchor” measure of “always” using contraception was used to compute pregnancy risk. If this measure was not available, then use of contraception at most recent intercourse was used. In the rare cases where neither of the above measures was available, any use/non-use of contraception was used. Sensitivity analyses showed that the estimated impacts did not depend on how this variable was measured.

Clustered randomized trials. In studies using clustered randomized designs (i.e., randomizing groups such as classrooms or schools), we have adjusted the standard deviation to account for between-group variation. As a result, the level of statistical significance that we report is more conservative than that reported in an original study that used a clustered randomized trial design, but did not account for clustering in the analysis. Since none of clustered-randomized trials in this review provided the between-group and total variance estimates needed to adjust the statistical significance, we relied on our own estimates from the nationally representative sample of adolescents clustered in schools represented in the Longitudinal Survey of Adolescent Health to make adjustments to author-reported significance levels. In doing so, we applied the adjustment methodology used by the What Works Clearinghouse (<http://www.whatworks.ed.gov>). Discrepancies between our results and findings from the original authors due to this cluster adjustment are noted in analysis tables and in Appendix A.

Pooling methods. The review tabulates the full set of findings from all studies meeting the review criteria and computes and reports the results of statistical meta-analyses of the findings overall and for subgroups of studies by program type. Overall and subgroup pooled impact estimates were computed using *Comprehensive Meta-Analysis* random effects estimation models (Hedges & Vevea, 1998; Borenstein & Rothstein, 1999). Throughout this analysis, statistical significance at $\alpha=.10$ level was determined using a two-tailed t-test since the expected direction of program effects is uncertain. We chose the less conservative $\alpha=.10$ threshold in order to detect any evidence of effect based on prior research on the topic suggesting potentially modest effects might appear in either direction.

FINDINGS

In total, this review presents findings based on over 37,000 youth who were the subjects of 31 studies that reported on a total of 38 randomized trials of interventions aimed at reducing teen sexual activity and pregnancy (Table 2). Most of the interventions included in this review were school-based and very limited in duration. Only six of the 31 studies included programs with more than 30 hours of service. The majority of the interventions targeted middle school youth, among whom percentages having sexual intercourse prior to the intervention ranged from 4 to 45 percent. However, nine of the studies focused on high school youth who tended to report relatively higher baseline rates of sexual intercourse ranging from 37 percent to 100 percent (Table 2, page 1, column 4). Most of the interventions served both males and females. However, eight studies focused on interventions for only males or females (Table 2, page 1, column 3).

While all of the interventions included in this synthesis aim to reduce sexual risk-taking among adolescents, they vary in their relative emphasis on promoting sexual abstinence and/or contraception use, in other aspects of their services, and in the target groups they serve. Specifically, this database includes the results based on four distinct types of intervention strategies:

- (1) **One-time consultations** (4 studies). One-time consultations primarily take place in a hospital or clinic setting, often last no longer than an hour, are provided by health care practitioners (physicians, physician's assistants, or nurses), and are tailored specifically to the needs and sexual backgrounds of the participating adolescents. Three of the four studies in this category focused on high school-aged adolescents, two targeted females exclusively, and one targeted males exclusively; the fourth study targeted middle school boys and girls. The studies took place

Table 2: Characteristics of Studies included in the Review

		Sample and intervention characteristics				
Intervention Type, Study, Author(s), and Location	Program Name	Predominant gender(s) served ^a	% Sexually experienced at intake	Focal level in school targeted ^b	School-based setting	Approximate hours duration
One-time consultation						
1 Boekeloo et al. (1999)	ASSESS	Both	> 21%	Middle	No	1
2 Danielson et al. (1990)	Untitled	Males	37	High	No	1
3 Hanna (1990)	Untitled	Females	92	High	No	.25
4 Mansfield et al. (1993)	Untitled	Females	100	High	No	.5
Sex education with abstinence focus						
5 Jorgensen et al. (1993)	Project Taking Charge	Both	45	Middle	Yes	22
6 Kirby et al. (1995): Site 1 (teen-led)	ENABL	Both	10	Middle	Yes	5
6 Kirby et al. (1995): Site 2 (adult-led)	ENABL	Both	10	Middle	Yes	5
6 Kirby et al. (1995): Site 3 (adult-led)	ENABL	Both	10	Middle	Yes	5
7 Thomas et al. (1992)	McMaster Teen Program	Both	19	Middle	Yes	10
Sex education with contraception component						
8 Baker (1990)	Untitled	Females	100	High	No	5.5
9 Blake et al. (2000)	Untitled	Both	51	High	Yes	11
10 Coyle et al. (2000, 2004)	Draw the Line/Respect the Line	Both	4	Middle	Yes	15
11 DiClemente et al. (2004)	Untitled HIV prevention	Females	100	Mixed	No	16
12 Dilorio et al. (2006)	Keepin' It R.E.A.L.!	Both	9	Middle	No	14
13 Eisen et al. (1990)	Teen Talk	Both	37	Mixed	Partial	12-15
14 Herceg-Baron et al. (1981)	Family Support	Females	87	High	No	5
15 Jemmott et al. (1998)	Be Proud, Be Responsible	Both	25	Middle	Yes	8
16 Kirby et al. (1997)	Project SNAPP	Both	8	Middle	Yes	8
17 Levy et al. (1995)	Youth AIDS Prevention Project	Both	35	Middle	Yes	11
18 Li et al. (2002)	Focus on the Kids	Both	36	Middle	No	18
19 Moberg and Piper (1998)	Healthy for Life	Both	< 22	Middle	Yes	40
20 Schinke et al. (1981)	Untitled	Both	Not reported	High	Yes	14
21 Sikkema et al. (2006): Workshop	Untitled	Both	73	Mixed	No	6
22 Stanton et al. (2006)	Focus on Kids: West Virginia	Both	21	Mixed	Partial	12
23 Stephenson et al. (2004)	RIPPLE Study	Both	7	Middle	Yes	8
24 St. Lawrence et al. (1995)	BART	Both	50	Mixed	No	14
25 Wight et al. (2002)	SHARE	Both	17	Middle	Yes	15
Multi-component/youth development						
26 Allen et al. (1997)	Teen Outreach Program (TOP)	Females	Not reported	High	Yes	71
27 Grossman & Sipe (1992): Cohort 2	STEP	Both	45	Mixed	No	295
27 Grossman & Sipe (1992): Cohort 3	STEP	Both	45	Mixed	No	295
28 Handler (1987)	Peer Power	Females	12	Middle	Yes	150
29 McBride & Gienapp (2000): Site "E"	Untitled	Females	63	High	No	27
29 McBride & Gienapp (2000): Site "F"	Untitled	Females	63	High	Yes	31
29 McBride & Gienapp (2000): Site "G"	Untitled	Females	63	High	Yes	22
30 O'Donnell et al. (2002)	Reach for Health	Both	25	Middle	Yes	146
31 Philliber et al. (2001): New York	Carrera Program: NYC sample	Both	26	Mixed	No	242
31 Philliber et al. (2001): Replications	Carrera Program: Replications	Both	24	Mixed	No	205
21 Sikkema et al. (2006): Multi-Comp	Untitled	Both	73	Mixed	No	>10

(Continued)

Table 2 (Continued)

Intervention Type, Study, Author(s), and Location	Study characteristics					Outcomes included in this review ^e		
	Units Randomized	Total youth (baseline)	% response at follow-up ^c	Months of follow-up since baseline ^d	Control group services	Initiated sex	Preg-nancy risk	Preg-nancy
One-time consultation								
1 Boekeloo et al. (1999)	Students	215	92.0	9	Health exam		X	X
2 Danielson et al. (1990)	Students	1,195	81.3	12	None	X	X	
3 Hanna (1990)	Students	51	74.0	3	Video/pamphlets		X	
4 Mansfield et al. (1993)	Students	90	92.0	2	10 minute session		X	
Sex education with abstinence focus								
5 Jorgensen et al. (1993)	Classes	91	100.0	6	None	X		
6 Kirby et al. (1995): Site 1 (teen-led)	Classes	4,652 ^f	66.3	17	Regular sex ed	X	X	X
6 Kirby et al. (1995): Site 2 (adult-led)	Classes	4,652 ^f	66.3	17	Regular sex ed	X	X	X
6 Kirby et al. (1995): Site 3 (adult-led)	31 schools	5,244	73.7	17	Regular sex ed	X	X	X
7 Thomas et al. (1992)	21 schools	3,289	78.1	48	Regular sex ed	X	X	X
Sex education with contraception component								
8 Baker (1990)	Students	62	76.0	6	Clinic services		X	X
9 Blake et al. (2000)	30 teachers	1,349	68.9	6	Regular sex ed	X		
10 Coyle et al. (2004)	19 schools	2,829	87 & 71	24 & 36 ^g	Regular sex ed	X		
11 DiClemente et al. (2004)	Students	522	88.1	6 & 12	General health ed		X	X
12 Dilorio et al. (2006)	11 B&G clubs	582	90.2	4,12 & 24	1 hour session	X	X	
13 Eisen et al. (1990)	Mixed	1,444	61.5	13	Regular sex ed	X	X	
14 Herceg-Baron et al. (1981)	Students	469	78.0	15	Clinic services		X	X
15 Jemmott et al. (1998)	Students	659	78.3	3 & 12	General health ed	X	X	
16 Kirby et al. (1997)	102 classes	~2,100	72.7	17	Regular sex ed	X	X	X
17 Levy et al. (1995)	15 districts	2,392	69.8	21	Regular sex ed	X	X	
18 Li et al. (2002)	76 peer grps	383	73.0	12	Regular sex ed		X	
19 Moberg and Piper (1998)	21 schools	2,483	74.1	29	Regular sex ed	X	X	
20 Schinke et al. (1981)	Students	53	100.0	12	None		X	
21 Sikkema et al. (2006): Workshop	10 housing dvp	820	67.4	3 & 18	Video&discussion	X	X	
22 Stanton et al. (2006)	110 groups	1,131	79.9	3, 6, & 9	General health ed		X	
23 Stephenson et al. (2004)	29 schools	8,766	75.9	12 & 24	Regular sex ed	X	X	X
24 St. Lawrence et al. (1995)	Students	246	91.5	14	Regular sex ed	X	X	
25 Wight et al. (2002)	25 schools	7,616	76.9	24	Regular sex ed	X	X	
Multi-component/youth development								
26 Allen et al. (1997)	Mixed	695	81.0	9	Unknown			X
27 Grossman & Sipe (1992): Cohort 2	Students	1,635	77.2	42	Summer job	X		X
27 Grossman & Sipe (1992): Cohort 3	Students	1,591	84.7	42	Summer job	X		X
28 Handler (1987)	Students	63	79.4	12	Regular sex ed	X		X
29 McBride & Gienapp (2000): Site "E"	Students	292	77.4	8	Little to no svcs	X	X	
29 McBride & Gienapp (2000): Site "F"	Students	166	77.1	8	None	X	X	
29 McBride & Gienapp (2000): Site "G"	Students	232	65.9	6	None	X	X	
30 O'Donnell et al. (2002)	18 classes	255	76.5	45	Regular sex ed	X		X
31 Philliber et al. (2001): New York	Students	598	80.9	36	Recreation svcs	X	X	X
31 Philliber et al. (2001): Replications	Students	565	80.9	36	Recreation svcs	X	X	X
21 Sikkema et al. (2006): Multi-Comp	10 housing dvp	744	65.7	3 & 18	Video&discussion	X	X	

Notes:

^a A program is labeled as predominantly serving a particular gender if more than 90 percent of the sample is of one gender.^b A program is labeled as serving middle school or high school aged adolescents if it specifically targeted younger or older adolescents. If all school-aged adolescents were targeted, then the program is labeled as "mixed."^c Response rates reported in this table are based on the data available for use in the meta-analysis. Response rates therefore may be slightly different from primary authors' reported response rates that are documented in Appendix A.^d Follow-up length noted in this table is based on the latest follow-up with less than 40 percent sample attrition. Appendix A describes all of the follow-up lengths, regardless of sample attrition. Also, information in this table varies from published reports noted in Appendix A when primary authors calculated follow-up length from a program's conclusion rather than baseline.^e Outcomes included in this table are only those that met the criteria for inclusion in the meta-analysis. In some cases, outcomes reported in the primary studies (note in Appendix A) are excluded from this meta-analysis for one or more technical reasons such as response rates falling below the threshold applied for this review.^f Separate baseline sample sizes and response rates were not reported the two sets of programs randomized at the classroom level.^g Latest follow-up for this study was 36 months. However, due to sample retention of less than 60%, outcome for males in the study are based on the 24-month follow-up measure (87% retention). 36-month effects were included for the female sample where attrition was within acceptable range (71%).

in four quite different geographical contexts, with two studies serving primarily African-American youth in Washington D.C. and in northeastern U.S., and two programs serving primarily white adolescents in the U.S. Pacific Northwest and upper Midwest. For more detailed information, see Appendix A, programs 1 through 4.

- (2) **Sex education with an abstinence focus** (3 studies). Programs in this category include sex education programs that explicitly or implicitly include an abstinence focus and do not provide information on contraception. Despite the fact that there has been a significant growth in these types of programs over the past decade (Darroch et al. 2001b), only three studies met the criteria for inclusion in this meta-analysis, and none of the included studies took place within the past decade. Moreover, the included interventions are not representative of typical abstinence-only efforts most common today (National Campaign to Prevent Teen Pregnancy 2005). Only one of these studies—Project Taking Charge—focused on a strict “abstinence-only” message (Jorgensen, Potts and Camps, 1993). Kirby et al. (1995) studied one teen-led and two adult led trials of the five-session ENABL program (Education Now, Babies Later) for middle school-aged adolescents.¹¹ Finally, Thomas et al. (1992) studied a 10-session program—the McMaster Program—that was not intended to be an abstinence-only program, but due to political pressures, was not able to provide contraception education. For more detailed information, see Appendix A, programs 5 through 7.

- (3) **Sex education with a contraception education component** (18 studies). Nearly all sex education programs explicitly mention that abstinence is the safest method for avoiding unwanted pregnancies and sexually transmitted infections (STIs). However, many also encourage use of contraception among those who choose to become or remain sexually active. These programs vary in the prominence and nature of their contraception component. For example, the untitled intervention evaluated by Blake et al. (2000) emphasized abstinence, but provided one lesson (out of 17) on contraception use. In contrast, Project BART (St. Lawrence et al. 1995) emphasized abstinence and contraception use equally and included condom demonstrations and practice in its curriculum.

Programs in this category that have met the inclusion criteria for this review vary widely in terms of the youth they served and their program characteristics. Just under one-quarter (4 of 18) of the programs served high school aged adolescents, half (9 programs) served middle-school aged adolescents only, and five programs served a mixture of ages. Eleven of the 18 programs studied (61 percent) served predominantly virgins. Only one of the programs offered 30 hours or more of service, and 6 of the 18 programs offered fewer than ten hours of service. Most (11 of 18) took place at least partially in schools, while others (7 studies) operated solely in clinics or community-based organizations. For more detailed information, see Appendix A, programs 8 through 25.

- (4) **Multi-component/youth development programs with a pregnancy prevention component** (7 studies). Multi-component/youth development programs generally aim to reduce a variety of

¹¹ This study reported on four different randomized controlled trials. Two of them randomized at the classroom level (one adult-led and one peer-led program), one randomly assigned schools, and a fourth randomly assigned adolescents. This fourth program provided outcomes for less than 60 percent of the original sample and, thus, was excluded from this review.

risky behaviors (for example, sexual behaviors, alcohol/drug use, life planning), incorporate multiple components, collaborate with multiple networks, and/or provide youth with development-focused activities. Promoting abstinence and/or responsible sexual behavior is only one goal of such programs.

Most of the multi-component/youth development programs included in this review entail over 50 hours (often more than 100 hours) of program-related activities for participating youth. Often these hours include paid work or community services hours. Most programs target youth at “elevated risk” (for example, based on school counselor or social service referrals), while others serve broader populations of adolescents (but who are often living in areas where the majority of the population is considered to be “at risk”). Between 12 and 73 percent of youth served by the programs evaluated had initiated sex prior to entering the program. Some of these programs operated outside of schools and others operated in schools. All offer a diverse set of activities that may include one or more of the following: volunteer experiences, paid work experiences, and mentorship programs, life skills classes, academic support and remediation, and contraception education and/or services. For more detailed information, see Appendix A, programs 26 through 31.

The Corpus of Evidence and Its Representativeness of Programs that Exist

A number of organizations such as the Alan Guttmacher Institute (AGI), the Kaiser Family Foundation (KFF), the National Campaign to Prevent Teen Pregnancy (NCTPTP), the Sexuality and Education Council of the United States (SIECUS), and Advocates for Youth have attempted to inventory and/or document the kinds of pregnancy and HIV prevention efforts available to adolescents. It is difficult to determine the exact proportion of programs and services that exist and are offered to different subgroups within the population. Yet, four general conclusions emerge from information provided by these organizations and through descriptive analysis of data from a nationally representative sample of adolescents in the United States (Longitudinal Study of Adolescent Health). First, sex education is nearly universal in this country. Nearly all adolescents receive such education at some point during their secondary schooling. At any given moment, adolescents who have recently received sex education tend to be younger, less sexually experienced, and have fewer risk factors and more protective factors for teen pregnancy as compared to those who have not recently experienced sex education. Second, within the subgroup of sex education programs, there has been a substantial increase in the proportion of school-based programs that focus solely on abstinence. Third, other reproductive services such as family planning counseling and services, diagnosis and/or treatment for STDs, and contraceptive distribution programs also serve a large proportion of adolescents. These programs are often provided by non-private medical providers such as family planning clinics and tend to target higher-risk adolescents. Fourth, there has been a movement towards multi-component programs operated in and outside of schools that combine traditional pregnancy prevention education and services with additional supports and programs such as mentoring, service learning, recreation, and basic or occupational skills training.

Within the four categories of intervention types explored in this review, there is reason to believe that programs evaluated rigorously using experimental designs may not be representative of programs that have been or are currently in operation. While one-time consultations included in the review are diverse

geographically and with regard to subjects served, four studies cannot represent the full sample of one-time consultations.

Similarly, only three studies of abstinence-only sex education programs met the criteria for inclusion in this review and, as mentioned above, they are not representative of programs in operation, particularly since there has been a tremendous growth in such programs over the past decade that include a variety of established curricula on the topic, and none of the included studies too place in the past decade.

It is much more difficult to determine the representativeness of the sex education programs with a contraception component. On the one hand, the eighteen studies included in this review do vary widely (for example, with regard to the populations served, curricular focus, and geographic location), and there is good evidence to suggest that programs in operation also are quite diverse. However, there is not enough information available from external sources to suggest, with certainty, whether the variety of programs evaluated rigorously mimics the variety of programs in operation. Indeed, it is unlikely that eighteen studies will be able to capture the variety available across the population of programs in operation.

Six of the seven multi-component/youth development programs served primarily low income, minority populations and the one program that served a primarily white population, targeted adolescents who were at “elevated risk” of pregnancy. Therefore, one should not generalize these results to a less “at-risk” population of adolescents. Since it is likely that program operators will invest in more costly and intensive multi-component programs for those adolescent most in need of such services, there may be some element of representativeness of multi-component programs in operation. However, the fact that only seven studies are included in this review may limit their ability to represent the varied multi-component efforts that have been gaining in popularity.

Estimated Program Impacts

This review finds no consistent evidence that the types of pregnancy prevention programs evaluated rigorously to date will alter in intended ways the sexual activity or pregnancy risks of youth. Regardless of the sign and significance of the estimated impacts, the magnitude of the differences in the percentages of program and the control group youth reporting having engaged in sex, having sex without using contraception, and becoming or getting someone pregnant generally are modest in size—typically under five percentage points. Furthermore, across all intervention studies, the weighted average estimated impacts generated using random effects models are approximately one percentage point or less in magnitude (favoring the intervention group) for each of the three outcome measures examined, and none of the pooled impact estimates is statistically different from zero (Table 3).

While this overall finding is important, it should not be interpreted to mean that programs do not work for two main reasons. First, this overall pooling of studies mixes results of different program types serving different populations of adolescents. Statistical heterogeneity tests from these analyses suggest that the effect sizes differ beyond what would be expected from sampling error. This heterogeneity exists because certain studies have significantly larger or smaller effect sizes than the overall “average” effect size. This variation may be the result of differences in methodological characteristics, program models, target populations, and/or subgroups served. For this reason, the remainder of this analysis will focus primarily on outcomes by program type.

Second, from a statistical standpoint, our analysis suggests that we are unable to reject our “null hypothesis” which states that there are no differences in sexual behavior outcomes between intervention and control group adolescents. This means that we have not found consistent evidence that programs studied work, not vice versa. Again, this suggests a need to dig deeper into subgroup analyses to get a better sense, at least correlationally, of whether there are impacts for specific kinds of programs or for particular adolescents.

Table 3: Pooled Impact Estimates, by Outcome

Outcome	# of studies and impact estimates	Sample size	Measured Outcomes		Estimated Impacts	
			Intervention group mean	Control group mean	Percentage point difference	90% confidence interval
Sexual Experience	21 studies; 40 estimates	37,705	37.9%	39.1%	-1.2%	+/- 1.6%
Pregnancy Risk	24 studies; 34 estimates	33,405	13.7%	15.0%	-1.3%	+/- 1.7%
Pregnancy	13 studies; 25 estimates	19,012	8.2%	8.6%	-0.4%	+/- 1.1%

Source: For detailed results see Tables 4, 5 and 6.

Note: Estimates are based on random-effects models estimated using *Comprehensive Meta-analysis* (Borenstein and Rothstein 1999). None of the pooled impact estimates is statistically significant.

Estimated impacts on experience with vaginal sexual intercourse. Because the overall pooled analysis is significantly heterogeneous ($Q=50.8$, $I^2=21.3$, $df=40$, $p<.10$), the focus of this analysis is on looking within program type.¹² This analysis does not find consistent evidence that specific programs or program types evaluated rigorously reduce sexual experience rates. Figure 2 shows that rates of sexual experience varied widely across program types, but when looking within intervention type, the rates appear to be nearly identical for treatment and control groups. After adjusting for clustering within groups, none of the pooled impacts within program types are statistically significant.¹³ Table 4, which provides more details on individual and pooled effects for the sexual experience outcome, further shows that after adjusting for clustering within groups, only one of the study-specific impacts is statistically significant. Nearly two-thirds of the estimates are between a 5-percentage point increase and a 5-percentage point decrease.

¹² After adjusting for clustering within groups, statistical homogeneity tests were non-significant for all pooled effects within program types.

¹³ Prior to adjusting for clustering within groups, there was a statistically significant effect favoring the intervention group for sex education programs with a contraception component.

Table 4: Results for Sexual Experience Rates (Ever Had Vaginal Intercourse) Based on Experimental Design Studies

Intervention Type, Study, Author(s), and Location	Gender	Measured Outcomes		Estimated Impacts		Sample Size		
		Intervention group mean	Control group mean	Percentage point difference	1/2 90% confidence interval	Intervention group	Control group	Total
One-time consultations								
2. Danielson et al. (1990)	Male	53.7%	53.8%	-0.1%	5.3%	488	483	971
Sex education with abstinence focus								
5. Jorgensen et al. (1993)	Both	55.8%	74.4%	-18.6% ^a	27.1%	52	39	91
6. Kirby et al. (1995): Site 1	Female	17.6%	15.3%	2.2%	5.6%	393	509	902
Kirby et al. (1995): Site 1	Male	34.1%	37.8%	-3.7%	7.8%	311	384	695
Kirby et al. (1995): Site 2	Female	18.0%	19.7%	-1.7%	4.8%	654	740	1,394
Kirby et al. (1995): Site 2	Male	30.5%	36.0%	-5.5% ^a	6.8%	456	533	989
Kirby et al. (1995): Site 3	Female	23.6%	20.9%	2.8%	7.6%	1129	1115	2,244
Kirby et al. (1995): Site 3	Male	35.1%	29.4%	5.6% ^a	8.8%	804	819	1,623
7. Thomas et al. (1992)	Female	48.0%	46.9%	1.1%	11.1%	831	524	1,355
Thomas et al. (1992)	Male	54.1%	44.2%	9.9% ^a	12.1%	762	453	1,215
Pooled results: 3 programs, 9 estimates		30.5%	29.5%	1.0%	2.6%	5,392	5,116	10,508
Sex education with contraception component								
9. Blake et al., (2000)	Both	51.0%	58.0%	-6.9% ^a	8.1%	390	540	930
10. Coyle et al. (2004)	Female	20.4%	22.1%	-1.7%	10.6%	530	476	1,006
Coyle et al. (2000)	Male	13.9%	21.0%	-7.1% ^a	9.7%	632	595	1,227
12. Dilorio et al. (2006)	Both	26.1%	26.1%	-0.3%	15.5%	180	176	356
13. Eisen et al. (1990)	Female	44.2%	40.4%	3.7%	7.4%	249	230	479
Eisen et al. (1990)	Male	64.2%	68.4%	-4.2%	7.7%	212	196	408
15. Jemmott et al. (1998) ^b	Both	25.0%	32.3%	-7.3%	8.0%	176	167	343
16. Kirby et al. (1997)	Female	15.7%	15.5%	0.3%	5.4%	426	427	853
Kirby et al. (1997)	Male	29.7%	29.5%	0.2%	7.2%	347	342	689
17. Levy et al. (1995)	Both	52.9%	54.5%	-1.5%	14.2%	1001	668	1,669
19. Moberg and Piper (1998)	Both	21.5%	17.0%	4.5% ^a	9.4%	1164	676	1,840
21. Sikkema et al. (2005): Workshop ^c	Both	40.5%	42.1%	-1.6%	17.4%	274	252	526
23. Stephenson et al. (2004)	Female	37.8%	43.3%	-5.5% ^a	10.0%	1614	1298	2,912
Stephenson et al. (2004)	Male	31.9%	34.2%	-2.3%	9.5%	1702	1298	3,000
24. St. Lawrence et al. (1995)	Both	55.8%	65.5%	-9.7%	10.6%	113	113	226
25. Wight et al. (2002)	Male	33.7%	34.0%	-0.3%	10.2%	1288	1436	2,724
Wight et al. (2002)	Female	41.6%	42.6%	-1.0%	10.7%	1553	1577	3,130
Pooled results: 12 programs, 17 estimates		34.9%	36.9%	-2.0%^a	2.2%	11,851	10,467	22,318
Multi-component youth development programs								
27. Grossman & Sipe (1992): Cohort 2	Both	74.1%	77.1%	-3.0%	4.3%	548	532	1,080
Grossman & Sipe (1992): Cohort 3	Both	71.5%	70.8%	0.7%	4.4%	582	571	1,153
28. Handler (1987)	Female	32.0%	40.0%	-8.0%	22.3%	25	25	50
29. McBride & Gienapp (2000): Site "E"	Female	98.2%	96.4%	1.8%	3.5%	114	112	226
McBride & Gienapp (2000): Site "F"	Female	56.5%	59.3%	-2.8%	14.4%	69	59	128
McBride & Gienapp (2000): Site "G"	Female	70.7%	72.1%	-1.5%	12.3%	92	61	153
30. O'Donnell et al. (2002)	Female	48.4%	57.4%	-9.0%	18.5%	62	54	116
O'Donnell et al. (2002)	Male	73.8%	83.8%	-10.0%	16.8%	42	37	79
31. Philliber et al. (2001): NYC	Female	53.8%	65.9%	-12.1% ^{**}	9.8%	130	138	268
Philliber et al. (2001): NYC	Male	73.2%	78.8%	-5.6%	9.5%	112	104	216
Philliber et al. (2001): Replications	Female	63.8%	63.7%	0.1%	10.0%	138	113	251
Philliber et al. (2001): Replications	Male	64.8%	67.3%	-2.6%	10.9%	105	101	206
21. Sikkema et al. (2005): Multi-Comp ^c	Both	35.0%	42.1%	-7.0%	7.2%	237	252	489
Pooled results: 6 programs, 13 estimates		67.4%	69.1%	-1.7%	1.9%	2,256	2,159	4,415
All studies: 21 studies, 40 estimates		37.9%	39.1%	-1.2%	1.6%	19,732	17,973	37,705

Source: Full citations for and descriptions of the referenced studies are presented in Appendix A.

Note: Estimates are based on random-effects models estimated using Comprehensive Meta-analysis (Borenstein and Rothstein 1999).

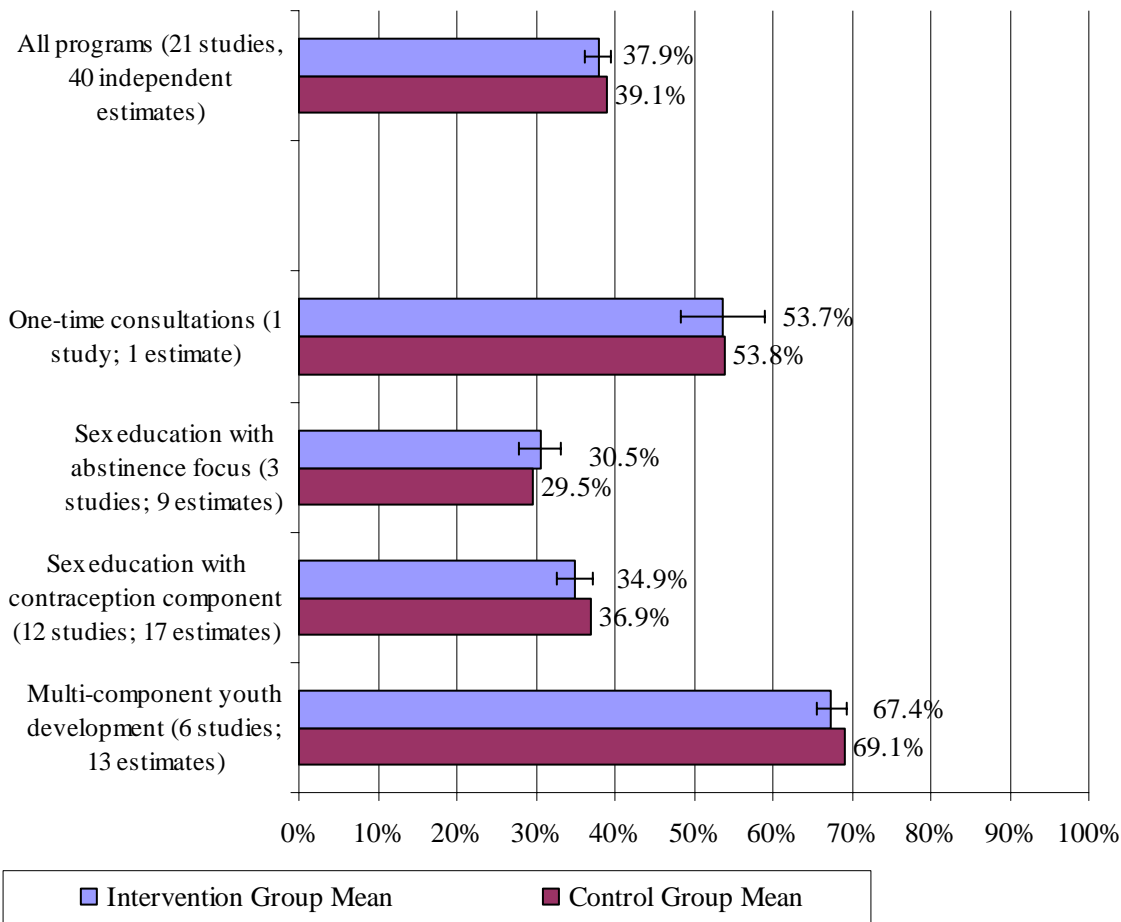
^a Although this estimate was initially statistically significant, after our analysis adjusted for clustering within groups (for example, classrooms or schools), the effect no longer remained significant.

^b The estimate used in the meta-analysis exploring sexual experience was for the abstinence focused intervention, whose primary goal was to reduce sexual initiation (but made limited mention of contraception). See Appendix C for impacts for the Safer Sex intervention.

^c Sikkema included two intervention groups with a shared controlled group. Since the interventions are of different program types, both are included in this table. However, the effect size for all studies combined (last row of this table) includes a weighted average of the effects.

*** $p \leq .01$, ** $p \leq .05$, * $p \leq .10$.

Figure 2: Intervention and Control Group Sexual Experience Rates for All Programs and by Program Type

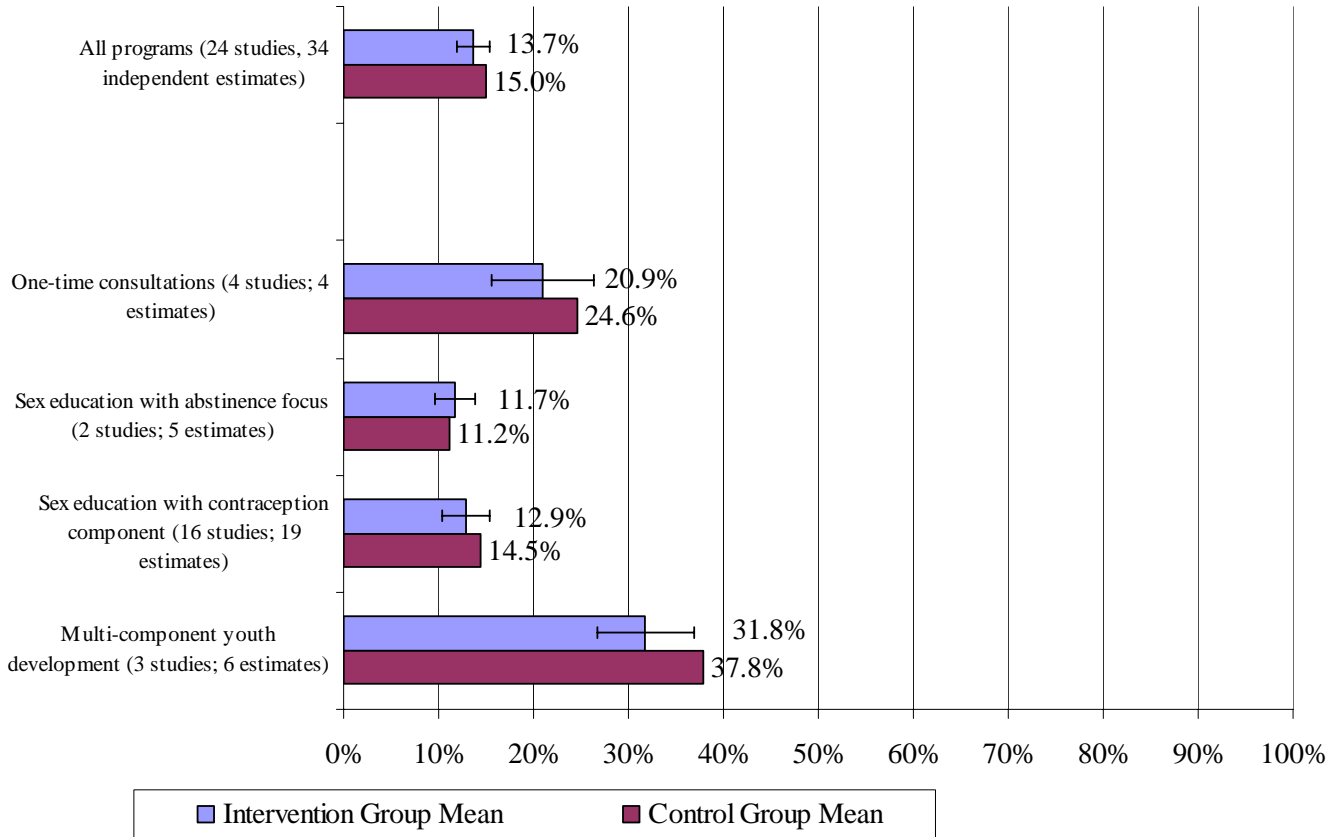


Estimated impacts on pregnancy risk (unprotected sexual intercourse versus either intercourse with contraceptives or abstinence). Program impacts on pregnancy risk vary widely across programs, leading to considerable heterogeneity among the full set of estimated impacts on pregnancy risk ($Q=77.2$, $I^2=57.3$, $df=33$, $p < 0.001$). There is also significant variability among the impact estimates

from sex education programs with a contraception component, the program type with the largest number of impact estimates ($Q=51.3, I^2=64.9, df=18, p<0.001$).

Among the subgroups of programs with more similar impact estimates, the only statistically significant effect on pregnancy risk is for multi-component/youth development programs (Figure 3). Across these three studies, there was an estimated 6.0 percentage point decline in rates of unprotected sexual intercourse. At least one statistically significant effect was found in each of the three studies (Table 5).

Figure 3: Estimated Impacts on Pregnancy Risk Rates for All Programs and by Program Type



The pooled impacts for one-time consultations and sex education with an abstinence focus are not statistically significant. For one-time consultations, which are primarily focused on reducing unprotected sexual intercourse, the pooled effect was a non-significant 3.7 percentage point reduction in pregnancy risk.

Sex education programs with an abstinence focus do not cover issues concerning contraception use, and thus, we would not expect increases in contraception use. However, such programs could reduce pregnancy risk by decreasing the number of adolescents engaging in sexual intercourse. The pregnancy risk measure incorporates both of these issues into its calculation.¹⁴ Thus, there is a chance that

¹⁴ Numerator is having unprotected sex, denominator is *either* engaging in contraceptively protected sex or not engaging in any sexual intercourse.

Table 5: Results for Pregnancy Risk Rates Based on Experimental Design Studies

Intervention Type, Study, Author(s), and Location	Gender	Measured Outcomes		Estimated Impacts		Sample Size		
		Intervention group mean	Control group mean	Percentage point difference	1/2 90% confidence interval	Intervention group	Control group	Total
One-time consultations								
1. Boekeloo et al. (1999)	Both	9.6%	8.7%	0.8%	6.8%	94	103	197
2. Danielson et al. (1990)	Male	18.2%	21.7%	-3.5%	4.2%	488	483	971
3. Hanna (1990)	Female	23.5%	52.4%	-28.9% *	24.7%	17	21	38
4. Mansfield et al. (1993)	Female	72.5%	81.4%	-8.9%	15.2%	40	43	83
Pooled effects: 4 programs, 4 estimates		20.9%	24.6%	-3.7%	5.4%	639	650	1,289
Sex education with abstinence focus								
6. Kirby et al. (1995): Site 1	Both	10.6%	9.7%	0.8%	4.1%	700	893	1,593
Kirby et al. (1995): Site 2	Both	8.6%	10.5%	-1.9%	3.2%	1100	1273	2,373
Kirby et al. (1995): Site 3	Both	9.5%	8.0%	1.5% ^a	5.0%	1930	1927	3,857
7. Thomas et al. (1992)	Female	17.6%	18.1%	-0.6%	8.4%	831	524	1,355
Thomas et al. (1992)	Male	25.3%	21.4%	3.9%	9.6%	762	453	1,215
Pooled effects: 2 programs, 5 estimates		11.7%	11.2%	0.5%	2.1%	5,323	5,070	10,393
Sex education with contraception component								
8. Baker (1990)	Female	39.1%	58.3%	-19.2%	23.5%	23	24	47
11. DiClemente et al. (2004)	Female	42.0%	54.8%	-12.8% ***	7.6%	219	241	460
12. Dilorio et al. (2006)	Both	1.1%	4.0%	-2.9% ^a	6.5%	180	175	355
13. Eisen et al. (1990)	Female	24.5%	15.2%	9.3% *	8.8%	249	231	480
Eisen et al. (1990)	Male	25.0%	30.1%	-5.1%	7.3%	212	196	408
14. Herceg-Baron et al. (1981)	Female	55.1%	48.1%	7.0%	10.6%	98	156	254
15. Jemmott et al. (1998) ^b	Both	7.1%	11.5%	-4.4%	5.1%	169	174	343
16. Kirby et al. (1997)	Both	9.4%	7.3%	2.1%	3.3%	785	768	1,553
17. Levy et al. (1995)	Both	9.8%	7.8%	2.0%	7.3%	1001	668	1,669
18. Li et al. (2002)	Both	6.7%	16.2%	-9.5% **	7.3%	149	105	254
19. Moberg and Piper (1998)	Both	9.3%	7.1%	2.2%	2.1%	1164	676	1,840
20. Schinke et al. (1981)	Both	11.5%	51.9%	-40.3% ***	18.9%	26	27	53
21. Sikkema et al. (2005): Workshop ^c	Both	9.1%	14.7%	-5.6% ^a	11.6%	264	238	502
22. Stanton et al (2006)	Both	21.6%	21.8%	-0.2%	5.2%	670	234	904
23. Stephenson et al. (2004)	Female	6.6%	7.8%	-1.2%	5.3%	1606	1286	2,892
Stephenson et al. (2004)	Male	5.0%	6.6%	-1.6% ^a	4.8%	1687	984	2,671
24. St. Lawrence et al. (1995)	Both	13.3%	32.7%	-19.5% ***	9.0%	113	113	226
25. Wight et al. (2002)	Female	14.0%	13.9%	0.1%	8.5%	1534	1520	3,054
Wight et al. (2002)	Male	23.7%	22.2%	1.6%	6.9%	1252	1376	2,628
Pooled effects: 16 programs, 19 estimates		12.9%	14.5%	-1.6%	2.5%	11,401	9,192	20,593
Multi-component/youth development programs								
29. McBride & Gienapp (2000): Site "E"	Female	14.3%	26.5%	-12.2% **	9.2%	98	102	200
31. Philliber et al. (2001): NYC	Female	34.6%	52.9%	-18.3% ***	9.8%	130	138	268
Philliber et al. (2001): NYC	Male	66.1%	63.5%	2.6%	10.7%	112	104	216
Philliber et al. (2001): Replications	Female	42.8%	42.5%	0.3%	10.3%	138	113	251
Philliber et al. (2001): Replications	Male	52.4%	51.5%	0.9%	11.5%	105	101	206
21. Sikkema et al. (2005): Multi-Comp ^c	Both	8.3%	14.7%	-6.4% **	4.8%	242	238	480
Pooled effects: 3 programs, 6 estimates		31.8%	37.8%	-6.0% **	5.1%	825	796	1,621
All studies: 24 studies, 34 impact estimates		13.7%	15.0%	-1.3%	1.7%	17,935	15,470	33,405

Source: Full citations for and descriptions of the referenced studies are presented in Appendix A.

Note: Estimates are based on random-effects models estimated using Comprehensive Meta-analysis (Borenstein and Rothstein 1999).

^a Although this estimate was initially statistically significant, after our analysis adjusted for clustering within groups (for example, classrooms or schools), the effect no longer remained significant.

^b The estimate used in the meta-analysis exploring pregnancy risk was for the Safer Sex intervention, whose primary goal was to reduce unprotected sex. See Appendix C for impacts for the abstinence intervention.

^c Sikkema included two intervention groups with a shared controlled group. Since the interventions are of different program types, both are included in this table. However, the effect size for all studies combined (last row of this table) includes a weighted average of the effects.

*** $p \leq .01$, ** $p \leq .05$, * $p \leq .10$.

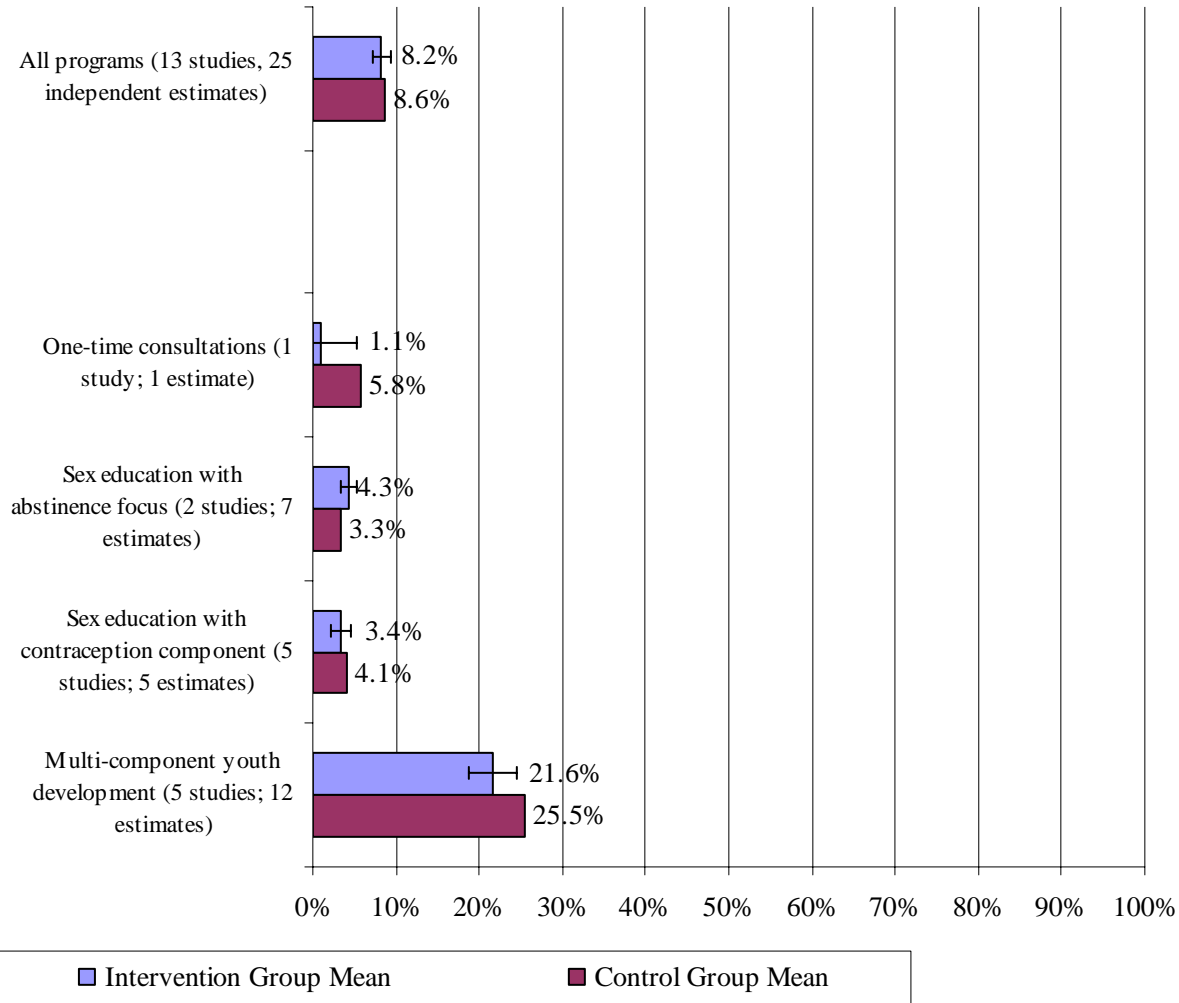
abstinence-focused programs could reduce (or possibly increase) pregnancy risk. Based on the limited information currently available, there is no evidence that these programs either increase or decrease pregnancy risk. The pooled impact estimate of 0.5 percentage points favoring the control group has a confidence interval three times as large (Table 5).

The most variation in impact estimates occurs for studies of sex education programs with a contraception component, making it imprudent to interpret the pooled effects on pregnancy risk. Five of the 19 estimates for sex education programs with a contraception component are statistically significant, four favoring the treatment group and one favoring the control group.¹⁵ The average effect—1.6 percentage points—is not statistically significant, but is not particularly telling due to the variation across studies within this intervention type.

Estimated impacts on pregnancy rates. Consistent with the results for sexual experience and pregnancy risk, there also is evidence of heterogeneity among the full set of estimated impacts on pregnancy ($Q=52.1$, $I^2=53.9$, $df=24$, $p < .001$). One cause for this variation may be related to the level of risk among the samples studied across intervention types. Figure 4 shows that among the one one-time consultation study and the seven studies of sex education, less than 5 percent of sample members (treatment or control) reported pregnancies, whereas, more than 20 percent of the sample of adolescents who participated in studies of multi-component programs reported pregnancies. Given the diversity of settings and variability of impacts across intervention types, the near zero (-0.4 percentage points) overall pooled impact estimate is not particularly telling (Table 6).

¹⁵ Three of the four programs that found statistically significant positive program effects were theory-based and culturally sensitive HIV prevention programs serving primarily African American adolescents. See Appendix A for study details.

Figure 4: Estimated Impacts on Pregnancy Rates for All Programs and by Program Type



Although small sample sizes limit the power of the test, there is no evidence of heterogeneity in the pooled pregnancy rate impacts once studies are grouped by intervention type. The point estimate of effects for the single study of a one-time consultation was statistically significant favoring the treatment group (-4.8 percentage points). Among the two sex education intervention types, the magnitude of the pooled impacts is quite small. However, it is notable that the pooled estimate from two studies of sex education program with an abstinence focus (six of seven of the impacts from one study) is statistically significant favoring the control group (1-percentage point). While all five studies of sex education programs with a contraception component favor the treatment group, none are statistically significant after adjusting for clustering, and the pooled impact is near zero (-.7 percentage points).

Multi-component/youth development programs showed the greatest evidence of favorable impacts on pregnancy rates. The pooled estimate for the five studies (12 estimates) is moderate in size (-3.9 percentage points) and is statistically significant.

Table 6: Results for Pregnancy Rates Based on Experimental Design Studies

Intervention Type, Study, Author(s), and Location	Gender	Measured Outcomes		Estimated Impacts		Sample Size		
		Intervention group mean	Control group mean	Percentage point difference	1/2 90% confidence interval	Intervention group	Control group	Total
One-time consultations								
1. Boekeloo et al. (1999)	Both	1.1%	5.8%	-4.8% *	4.2%	94	103	197
Sex education with abstinence focus								
6. Kirby et al. (1995): Site 1	Female	2.1%	1.0%	1.1%	1.9%	385	495	880
Kirby et al. (1995): Site 1	Male	6.3%	2.7%	3.6% *	3.6%	300	371	671
Kirby et al. (1995): Site 2	Female	2.8%	1.7%	1.1%	1.9%	639	717	1,356
Kirby et al. (1995): Site 2	Male	3.5%	3.3%	0.3%	2.8%	427	522	949
Kirby et al. (1995): Site 3	Female	3.3%	2.6%	0.6%	3.5%	1097	1098	2,195
Kirby et al. (1995): Site 3	Male	4.0%	2.9%	1.1%	3.7%	784	799	1,583
7. Thomas et al. (1992)	Female	9.9%	8.7%	1.2%	7.1%	1049	652	1,701
Pooled effects: 2 programs, 7 estimates		4.3%	3.3%	1.0% *	1.0%	4,681	4,654	9,335
Sex education with contraception component								
8. Baker (1990)	Female	4.3%	16.7%	-12.3%	14.3%	23	24	47
11. DiClemente et al. (2004)	Female	5.9%	8.3%	-2.4%	3.9%	219	241	460
14. Herceg-Baron et al. (1981)	Female	13.3%	13.9%	-0.5%	7.4%	90	166	256
16. Kirby et al. (1997)	Both	1.2%	1.5%	-0.3%	1.6%	739	743	1,482
23. Stephenson et al. (2004)	Female	2.3%	3.3%	-1.0% ^a	3.3%	1621	1263	2,884
Pooled effects: 5 programs, 5 estimates		3.4%	4.1%	-0.7% ^a	1.3%	2,692	2,437	5,129
Multi-component/youth development programs								
26. Allen et al. (1997)	Female	10.4%	19.6%	-9.3% ***	4.9%	280	280	560
27. Grossman & Sipe (1992): Cohort 2	Female	47.7%	43.1%	4.6%	6.3%	367	311	678
Grossman & Sipe (1992): Cohort 2	Male	20.9%	27.1%	-6.2% *	5.8%	268	314	582
Grossman & Sipe (1992): Cohort 3	Female	31.5%	34.7%	-3.2%	5.9%	381	323	704
Grossman & Sipe (1992): Cohort 3	Male	19.6%	17.2%	2.4%	5.1%	301	337	638
28. Handler (1987)	Female	7.7%	11.1%	-3.4%	13.1%	26	27	53
30. O'Donnell et al. (2002)	Female	8.1%	18.5%	-10.5% ^a	12.8%	62	54	116
O'Donnell et al. (2002)	Male	2.4%	5.4%	-3.0%	7.9%	42	37	79
31. Philliber et al. (2001): NYC	Female	10.0%	21.7%	-11.7% ***	7.2%	130	138	268
Philliber et al. (2001): NYC	Male	10.7%	9.6%	1.1%	6.8%	112	104	216
Philliber et al. (2001): Replications	Female	19.6%	29.2%	-9.6% *	9.0%	138	113	251
Philliber et al. (2001): Replications	Male	9.5%	12.9%	-3.3%	7.2%	105	101	206
Pooled effects: 5 studies, 12 estimates		21.6%	25.5%	-3.9% **	2.8%	2,212	2,139	4,351
All studies: 13 programs, 25 estimates		8.2%	8.6%	-0.4%	1.1%	9,679	9,333	19,012

Source: Full citations for and descriptions of the referenced studies are presented in Appendix A.

Note: Estimates are based on random-effects models estimated using Comprehensive Meta-analysis (Borenstein and Rothstein 1999).

^a Although this estimate was initially statistically significant, after our analysis adjusted for clustering within groups (for example, classrooms or schools), the effect no longer remained significant.

*** p ≤ .01, ** p ≤ .05, * p ≤ .10.

Estimated impacts of programs targeted at middle and at high school youth. One highly discussed policy debate concerns the age-range on which to target pregnancy prevention efforts. Frost and Forrest (1995) recommended targeting abstinence education programs on younger adolescents who are not yet sexually active and targeting programs that include contraception components on older youth who are more likely to be sexually active. However, there is insufficient empirical evidence to inform such a judgment. The only randomized controlled trials of sex education programs with an abstinence focus targeted their services on middle school youth, making it impossible to assess the effectiveness of such programs for older adolescents. Furthermore, only 4 of the 18 studies of sex education programs with contraception components identified for this review focused exclusively on high school age youth (see Table 2 above).

For all three outcome measures, the pooled impact estimates (Table 7, top panel) based on a random effects model are small (less than one percentage point) and not statistically significant for the programs targeting middle school youth. They are larger (-0.9 to -11.1 percentage points, favoring the intervention group) for those programs targeting high school youth. However, only the -11.1 percentage point impact on pregnancy risk rates is statistically significant. In addition, there were statistically significant effects favoring the intervention group on both sexual experience rates and pregnancy rates for programs aimed at mixed ages.

When looking at the more homogeneous group of interventions by program type, sample sizes limit comparisons across ages served. Comparisons were assessed only in cases where there were at least two effect size estimates per age category. No comparisons can be made for one-time consultations or sex education programs with an abstinence focus. With regard to sex education programs with a contraception component, there was a significant difference ($p < .05$) in the magnitude of the effect sizes for pregnancy risk depending on the age served, with the smallest estimated effects on middle school aged adolescents (-.2 percentage points) and the largest effects for programs serving high school age adolescents (-14.6 percentage points). However, none of the pooled effect sizes by age subgroup were statistically significant.

Within the subgroup of multi-component/youth development programs, there was a statistically significant difference ($p < .10$) in sexual experience rates depending on ages served, with a 0.0 percentage point difference among the five estimates of programs serving high school age adolescents, a statistically significant 5.8 percentage point effect among the five estimates of programs serving a mixture of ages, and a non-significant difference of 9.2 percentage points among the three estimates of programs aimed at middle school aged adolescents.

These few differences that were found suggest that age may be an important factor to consider when determining differences in program effects. However, due to sample size limitations, this analysis has not found any clear patterns with regard to differences in effects based on ages served.

Table 7: Pooled Estimates of the Percentage Point Impacts of Programs on Sexual Experience, Pregnancy Risk, and Pregnancy, by Grade Levels of Youth Targeted

Type of Program and Outcome	Middle School		High School		Mixed Grade Levels	
	# of impact estimates	Estimated impact	# of impact estimates	Estimated impact	# of impact estimates	Estimated impact
All interventions						
Sexual experience	24	-0.8%	7	-0.9%	9	-3.8% **
Pregnancy risk	16	0.1%	8	-11.1% ***	10	-4.0%
Pregnancy	13	0.3%	8	-2.7%	4	-5.6% *
One-time consultations						
Sexual experience	0	n.a.	1	n.a.	0	n.a.
Pregnancy risk	1	n.a.	3	-7.6%	0	n.a.
Pregnancy	1	n.a.	0	n.a.	0	n.a.
Sex education with abstinence focus						
Sexual experience	9	1.0%	0	n.a.	0	n.a.
Pregnancy risk	5	0.5%	0	n.a.	0	n.a.
Pregnancy	7	1.0% *	0	n.a.	0	n.a.
Sex education with contraception component						
Sexual experience	12	-1.7%	1	n.a.	4	-2.0%
Pregnancy risk	10	-0.2%	4	-14.6%	5	-3.7%
Pregnancy	2	-0.6%	3	-2.5%	0	n.a.
Multi-component/youth development programs						
Sexual experience	3	-9.2%	5	0.0%	5	-5.8% **
Pregnancy risk	0	n.a.	1	n.a.	5	-4.8%
Pregnancy	3	-5.1%	5	-2.5%	4	-5.6% *

Source: Full citations for and descriptions of the referenced studies are presented in Appendix A.

Note: Estimates are based on random-effects models estimated using Comprehensive Meta-analysis (Borenstein and Rothstein 1999).

n.a. means not applicable due to either no studies or only one study in this category.

*** p<.01, ** p<.05, * p<.10.

Estimated impacts by gender and intervention strategy. One expects that pregnancy prevention programs may have different impacts for females and for males. Thus, ideally, all studies would report findings separately by gender. Indeed, DiCenso et al. (2002), in their review of pregnancy prevention interventions, chose not to include studies that did not report results separately by gender.

This review includes estimated impacts for all studies meeting the stated inclusion criteria, separating the estimates by gender whenever possible (Table 8, top panel). The available evidence shows no overall program impacts for males or for females. The pooled impact estimates are small (-2.9 percentage points or less) for all three outcomes and not statistically significant for either gender.

Table 8: Pooled Estimates of the Percentage Point Impacts of Programs on Sexual Experience, Pregnancy Risk, and Pregnancy, by Gender of Youth

Type of Program and outcome	Male Effect Sizes Only		Female Effect Sizes Only		Females and Males	
	# of impact estimates	Estimated impact	# of impact estimates	Estimated impact	# of impact estimates	Estimated impact
All interventions						
Sexual experience	13	-1.2%	16	-0.6%	40	-1.2%
Pregnancy risk	7	-0.7%	12	-2.9%	34	-1.3%
Pregnancy	8	0.7%	15	-1.0%	25	-0.4%
One-time consultations						
Sexual experience	1	n.a.	0	na	1	n.a.
Pregnancy risk	1	n.a.	2	15.8%	4	-3.7%
Pregnancy	0	n.a.	0	n.a.	1	n.a.
Sex education with abstinence focus						
Sexual experience	4	1.7%	4	1.2%	9	1.0%
Pregnancy risk	1	n.a.	1	n.a.	5	0.5%
Pregnancy	3	1.3%	4	0.9%	7	1.0% *
Sex education with contraception component						
Sexual experience	5	-2.7%	5	-1.7%	17	-2.0%
Pregnancy risk	3	-1.1%	6	0.1%	19	-1.6%
Pregnancy	0	n.a.	4	-1.2%	5	-0.7%
Multi-component/youth development programs						
Sexual experience	3	-5.4%	7	-0.9%	13	-1.7%
Pregnancy risk	2	1.8%	3	-10.2% *	6	-6.0% **
Pregnancy	5	-1.5%	7	-5.9% **	12	-3.9% **

Source: Full citations for and descriptions of the referenced studies are presented in Appendix A.

Note: Estimates are based on random-effects models estimated using Comprehensive Meta-analysis (Borenstein and Rothstein 1999).

n.a. means not applicable due to either no studies or only one study in this category.

*** p<.01, ** p<.05, * p<.10.

Again, sample size limitations prevent drawing any clear conclusions regarding differences in impacts for males versus females, particularly among one-time consultations. There were no significant differences in impacts of either sex education programs with an abstinence focus or sex education programs with a contraception component for either males or females, and there were no differences in the estimated impacts by gender. There were statistically significant differences in impacts for both pregnancy risk rates ($p < .05$) and for the pregnancy rates ($p < .10$), with the impacts for females more pronounced than the impacts for males. Specifically, the pooled effects for males in multi-component/youth development programs were not statistically significant for any outcomes. However, for females, the pooled effects were larger and statistically significant for pregnancy risk (10.2 percentage point reduction) and pregnancy rates (5.9 percentage point reduction).

Impact estimates from studies with different methodological characteristics. Although this review was designed to include only rigorously evaluated studies, there is evidence that qualities of the studies that made it through the filter are correlated with the impact estimates (Table 9). This exploration of methodological characteristics is primarily descriptive and correlational. If, for example, two methodological characteristics are highly correlated with one another, then it is not possible to determine

Table 9: Pooled Estimates of the Impacts of Programs on Sexual Experience, Pregnancy Risk, and Pregnancy, by Study Characteristics

	Sexual Experience			Pregnancy Risk			Pregnancy		
	# of impact estimates	Estimated impact ^a	p-value	# of impact estimates	Estimated impact ^a	p-value	# of impact estimates	Estimated impact ^a	p-value
All interventions	40	-1.2%	0.113	34	-1.3%	0.115	25	-0.4%	0.443
Percent sample retention		***			***				
60 through 69 percent	12	-2.3%	0.013	7	-3.4%	0.214	0	n.a.	n.a.
70 through 79 percent	19	0.4%	0.658	14	0.4%	0.512	9	-0.3%	0.672
80 percent or higher	9	-4.9%	0.003	13	-5.0%	0.005	16	-0.6%	0.417
Counterfactual					***			***	
Usual prevention services ^c	28	-1.0%	0.261	23	-0.5%	0.453	14	0.4%	0.280
No prevention services	12	-1.6%	0.191	11	-5.8%	0.015	10	-2.9%	0.048
Duration of follow-up								***	
Less than one year	6	-4.2%	0.144	6	-5.9%	0.106	3	-6.9%	0.000
One year to twenty-three months	17	-0.4%	0.636	16	-2.6%	0.043	10	0.6%	0.058
Two years or more	17	-1.3%	0.276	12	-0.3%	0.721	12	-1.8%	0.121

Source: Full citations for and descriptions of the randomized control trial studies are presented in Appendix A.

Note: Estimates are based on random-effects models estimated using Comprehensive Meta-analysis (Borenstein and Rothstein 1999).

^a Asterisks above a set of impact estimates denotes statistical differences among or between the estimates in the cluster.

^b These p-values are biased downward (suggesting greater statistical significance) in so far as none of the studies that used cluster randomization appears to have accounted for clustering in the analysis (Raudenbush and Bloom 2005).

^c "Usual prevention services include: sex education program in existence prior to the new program and/or reproductive clinic services such as contraception consultation or distribution. General health programs or examinations, recreation services, or summer jobs are considered as "no prevention services."

n.a. means not applicable.

*** p<.01, ** p<.05, * p<.10.

if one or both of the characteristics are responsible for variations in effect sizes. Furthermore, if methodological characteristics are highly correlated with particular program characteristics, then it may be possible that variations in effect sizes may be due not to method, but to program quality. However, the correlational relationships expressed in Table 9 suggest that estimated pooled effect sizes may vary depending on methodological quality.

One example relates to the results for the sexual experience outcome for studies with different sample retention rates. The pooled impact estimate for the studies with the largest rates of sample retention (80 percent or higher) are significantly larger in magnitude (nearly -5.0 percentage points favoring the intervention) than for the two groups with lower sample retention (-2.3 and 0.4 percentage points, respectively). Differences for the pregnancy risk outcome across retention rate categories mimic the same pattern as the sexual experience outcome.

The pooled impact estimates also vary significantly depending on whether the control group received usual prevention services rather than no services or services unrelated to pregnancy prevention. For both the pregnancy risk and the pregnancy outcomes, studies of interventions where control group

adolescents received no pregnancy prevention services tended to have more positive impacts than did studies where control group adolescents received the usual pregnancy prevention services offered in their schools and communities. This makes intuitive sense, since the presence of an alternative treatment likely diminishes the net change in services provided and, thus, the expected program impact.

Finally, particularly for pregnancy rate outcome, the pooled impact estimates varied by the length of time between sample enrollment and the follow-up data collection. The pooled estimates of impacts for all three outcomes are largest among those studies with the shortest follow-up period. For the pregnancy outcome, in particular, the strongest pooled impact is among the studies that follow-up their samples for less than one year, a nearly 7 percentage point reduction ($p < .01$). The only statistically significant impact favoring the control group is the small (0.6 percentage point, $p = .058$) impact on pregnancy rates for studies with 12 to 23 months of follow-up. However, this result is driven by a single study of ENABL (Kirby, 1995), which makes it impossible to determine whether this variation is related to the ENABL itself or to the duration of follow-up.¹⁶ None of the pooled estimates based on studies with two or more years of follow-up is statistically significant for any of the outcome measures.

What if the review included quasi-experimental design studies?

As noted above, there is considerable debate among the evaluation community as to the credibility of impact estimates based on quasi-experimental designs. Guyatt et al. (2000) examined impact estimates generated from pregnancy prevention program evaluations based on both experimental and quasi-experimental design studies (QEDs). They concluded that there were meaningful differences in the estimates associated with study design and, thus, they chose to focus only on randomized controlled trials.

This review also includes only results from randomized control trials. However, as a supplement to the review, the results of the experimental design studies that met the review criteria are compared with those of 16 quasi-experimental design studies that had been included in one of the prior reviews—that by Kirby (2001)—and that otherwise met the criteria for this review. Due to resource limitations, the comparison between RCT and QED pooled findings has not been systematically explored and should be considered as exploratory. Because the majority of the experimental studies included in this review overlap with those included in Kirby’s narrative review, we have less reason to believe that differences in pooled impacts for treatment versus control group are due to varied search strategy and inclusion criteria of the reviewers. However, a more systematic research synthesis would be necessary to verify this conclusion.

Ten (10) of the sixteen quasi-experimental studies examine one of the four categories of interventions for which there is one or more randomized control trial. However, six of the studies are of comprehensive clinic-based interventions, which have not been evaluated using randomized control trials. Appendix D provides a detail of the individual findings from all 16 studies, organized by program type and Appendix E provides full citations.

¹⁶ Six of the nine effect sizes used to estimate the pooled effect on pregnancy among programs with one- to two-year follow-up come from Kirby et al. (1995). When this study is omitted, the pooled estimate based on the three remaining studies is not statistically significant.

A total of 12 studies included 25 independent estimates of program impacts on sexual experience, with 9 of these estimates relating to one of the four intervention types for which there also is evidence of impacts from randomized control trials. Ten (10) of the studies contain 22 independent estimates of impacts on pregnancy risk, with 6 of these estimates pertaining to the interventions for which there also is evidence from randomized control trials. And, 8 of the quasi-experimental design studies contain 20 independent estimates of impacts on pregnancy rates. However, only five of the impact estimates pertain to one of the four types of interventions for which there is evidence of intervention effectiveness from a randomized controlled trial.

In general, the pooled impact estimates from the randomized controlled trials are smaller than those from the quasi-experimental design studies (Table 10, top panel).

In addition, looking at the results by type of intervention, there is a tendency for the results from the quasi-experimental design studies, which have lower internal validity, to suggest impacts more favorable to the interventions than do those results based on the randomized control trials. In four of the six cases where pooled estimates show evidence of intervention effects, the pooled impact estimates based on the randomized controlled trials are smaller and have lower statistical significance than do those based on the quasi-experimental design studies. For example, the pooled impact for sexual experience rates for sex education programs with a contraception component among the 17 RCT effect sizes is a statistically insignificant 2.0 percent reduction. The six QED effect size estimates have a pooled effect of 6.5 percent reduction in sexual experience rates. In the two remaining cases, both of which are for multi-component/youth development programs, the RCT impacts are stronger than the QED impacts (for the pregnancy risk and pregnancy outcomes).

There is one class of programs—comprehensive community-based programs—that has been evaluated only using quasi-experimental design studies. This is because the community-wide nature of the interventions precludes randomizing youth within a community to intervention or control group status. The results of the five studies (15 to 16 independent effect sizes for each outcome measure) show no evidence of impacts on initiation of sex or on pregnancy and small impacts favoring the intervention group on pregnancy risk (-2.7 percentage points). However, both due to the lower causal validity of these estimates in general and the fact that there is evidence of considerable heterogeneity in the impact estimates, it seems prudent to treat these results with some degree of caution ($Q=72.32$, $I^2=79.3$, $df=15$, $p<.001$).

Table 10: Pooled Estimates of Program Impacts for Random Controlled Trial Studies and Quasi-Experimental Design Studies, Overall and by Type of Intervention

Type of Program and Studies Included	Sexual Experience			Pregnancy Risk			Pregnancy		
	# of impact estimates	Total sample	Estimated impact	# of impact estimates	Total sample	Estimated impact	# of impact estimates	Total sample	Estimated impact
All programs									
Randomized controlled trials	40	37,705	-1.2%	34	33,405	-1.3%	25	19,012	-0.4%
Quasi-experiments	25	32,021	-2.0% **	22	25,537	-3.1% **	20	13,037	-0.9%
All studies	65	69,726	-1.5% ***	56	58,942	-2.3% ***	45	32,049	-0.7% *
One-time consultations									
Randomized controlled trials	1	971	-0.1%	4	1,289	-3.7%	1	197	-4.8% *
Quasi-experiments	0	n.a.	n.a.	1	672	-5.3% ***	0	n.a.	n.a.
All studies	1	971	-0.1%	5	1,961	-4.2% **	1	197	-4.8% *
Sex education with abstinence focus									
Randomized controlled trials	9	10,508	1.0%	5	10,393	0.5%	7	9,335	1.0% *
Quasi-experiments	1	412	-0.7%	0	n.a.	n.a.	0	n.a.	n.a.
All studies	10	10,920	0.9%	5	10,393	0.5%	7	9,335	1.0% *
Sex education with contraception component									
Randomized controlled trials	17	22,318	-2.0%	19	20,593	-1.6%	5	5,129	-0.7%
Quasi-experiments	6	4,890	-6.5% ***	3	1,576	-1.8%	2	1,101	1.0%
All studies	23	27,208	-3.0% ***	22	22,169	-1.6% *	7	6,230	-0.6%
Multi-component/youth development									
Randomized controlled trials	13	4,415	-1.7%	6	1,621	-6.0% **	12	4,351	-3.9% **
Quasi-experiments	2	1,466	-5.3%	2	1,466	-5.3%	3	2,176	-1.3% **
All studies	15	5,881	-2.8% **	8	3,087	-5.8% ***	15	6,527	-2.9% ***
Comprehensive community-based programs									
Randomized controlled trials	0	n.a.	n.a.	0	n.a.	n.a.	0	n.a.	n.a.
Quasi-experiments	16	25,253	-0.6%	16	21,823	-2.7% *	15	9,760	-0.7%
All studies	16	25,253	-0.6%	16	21,823	-2.7% *	15	9,760	-0.7%

Source: Full citations for and descriptions of the randomized control trial studies are presented in Appendix A. Citations for the quasi-experimental design studies are presented in Appendix E.

Note: Estimates are based on random-effects models estimated using Comprehensive Meta-analysis (Borenstein and Rothstein, 1999).

n.a. means not applicable.

*** p<.01, ** p<.05, * p<.10.

DISCUSSION

The experimental data presented in this analysis suggests that there is no consistent evidence that programs designed to delay sexual initiation, reduce pregnancy risk, and prevent teen pregnancy achieve these goals. There are a handful of interventions for which the estimated impacts are statistically significant and a few impact estimates that are large (a difference of more than 10 percentage points). While the majority of the statistically significant impact estimates favor the intervention group, a non-trivial number favor the control group.

One should not conclude from these findings that pregnancy prevention efforts are futile for four reasons. First, the particular programs that have been evaluated are not representative of programs in operation. Thus, the generally null findings could reflect the fact that the most successful efforts have not yet been evaluated using methods that are expected to yield internally valid impact estimates. Second, the adolescents served in the programs included in this review are not representative of all adolescents. Notably, the majority of the programs evaluated were targeted interventions that often focused on urban, high-risk youth.¹⁷ Third, most of the control group youth in the programs evaluated had access to some type of sex education and pregnancy prevention services in their schools and communities, and thus instead of exploring the *overall* impacts, this review often explores the *relative* impacts of programs aimed at reducing sexual risk-taking compared with other services. This is consistent with national statistics showing that roughly 90 percent of school age adolescents receive some form of health and sex education in school (tabulations from the National Survey of Adolescent Health). And, fourth, the studies followed sample youth for relatively short periods of time. Particularly for those programs serving middle school youth, most youth in the study samples have not yet become sexually active by the time the follow up data for the study were collected.

The results of the review highlight the danger in relying heavily on the pooled impact estimates in judging the effectiveness of particular types of interventions. Homogeneity tests revealed significant variation in impact estimates across the various types of interventions, and even within some program types such as sex education programs with a contraception component. In concept, it should be more appropriate to pool evidence across subgroups of studies that focus on particular types of interventions or that target particular subgroups of youth. Yet, the small numbers of independent impact estimates within these subgroups generally means that there is insufficient power to judge the homogeneity of the estimates. Thus, the pooled estimates by type of intervention, by grade levels of youth targeted and by gender simply offer descriptive summaries of the results for these groups based on the present corpus of evidence.

With all the above noted caveats in mind, the current evidence base on which to judge the effectiveness of various types of interventions can be summarized as follows:

- One-time consultations: There is not currently enough evidence available to determine whether these programs are effective in reducing sexual risk-taking.

¹⁷ For example, none of the programs evaluated focused solely on suburban or rural youth, and the majority of studies in this review focused exclusively on urban youth.

- Abstinence focused sex education programs: There has recently been a rise in the number of intensive, abstinence-only sex education programs that often utilize a variety of methods to emphasize an “abstinence until marriage” message. There are only three interventions that met the criteria for inclusion in this review, and while they focus on an abstinence message and do not include contraception information, they are not representative of this pool of newer programs that have recently emerged. All three of these programs offered a very limited intervention, in two cases between 2 and 10 hours of instruction and in the third between 11 and 30 hours. Among the evaluations included in this review, there is no evidence that, as a group, these programs have changed the likelihood that youth will initiate having sex or that they will be more or less likely to have sex without using contraception. The results suggest a very small impact (1 percentage point) on pregnancy rates favoring the control group.
- Sex education programs with contraception component: There is no consistent evidence that sex education programs altered the likelihood that youth would initiate sex, would risk pregnancy, or would become (or get someone) pregnant. Notably, there is great variability in the nature of the programs included within this category, as well as a high degree of variability in the size, direction, and statistical significance of the impact estimates for the various programs. However, a number of individual studies have found positive program effects, particularly related to increased contraception use, and have been considered by advocates to be models to be replicated (Solomon and Card, 2004). As more replication study results become available, it will be possible to pool more similar programs to assess systematically the effects of particular program models.
- Multi-component youth development programs: The most promising results are for the more intensive multi-component youth development programs serving higher risk adolescents.¹⁸ Moreover, within this category, the results tend to be most favorable for females. However, there is a paucity of rigorous evaluations of such programs, and further replication and evaluation is warranted.

While the body of knowledge in this field is continually growing, this review highlights the relative dearth of evidence to judge the overall effectiveness of particular intervention strategies. For this reason, further research and evaluation is necessary, including studying programs that have not yet been evaluated rigorously and programs that have been replicated and are serving new populations of adolescents in different communities. Researchers should also increase the breadth of evaluations to estimate more routinely program impacts for key subgroups of youth defined by factors such as age, gender, and family background. Once a larger body of more similar programs have been evaluated rigorously and reported consistently, then it will be possible to pool the evidence to make more concrete conclusions regarding program efficacy. Having access to solid information about whether particular types of interventions are effective, as well as information regarding *for whom* programs are effective and not effective, will help policy makers and practitioners better address the sexual health risks of youth.

¹⁸ Comparisons across intervention types have not been derived experimentally, and thus it is not possible to use the information from this analysis to suggest that one particular intervention type is more or less effective than another. For example, intervention types could be confounded with other study features such as study design and methods or subgroups served.

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Appendix A: Randomized Controlled Trials Included in Research Synthesis, by Program Type

ONE-TIME CONSULTATIONS

1. ASSESS (Awareness, Skills, Self-Efficacy/Self-Esteem, and Social Support)

(Boekeloo et al., 1999)

Intervention characteristics

Year(s) of operation: 1995-1997

Setting: This program took place in five managed-care sites in metro Washington, DC (3 suburban, 2 inner-city).

Duration: Approximately 1 hour

Adolescents served: Program served 12 to 15 year olds, both genders, primarily African-American, all members of health maintenance organizations, 21% of the baseline sample had been sexually active within the past three months.

Program components: Physicians attempted to assess an adolescent's prior sexual experience and then tailor their instruction to emphasize either abstinence or condom use. Theoretical models employed included social cognitive theory (emphasizing development of confidence in executing skills) and theory of reasoned action (emphasizing adolescent perception of physician expectations). Intervention group received a pre-visit audio taped risk-assessment, a discussion icebreaker tool, a private discussion with a physician, and brochures focusing on resistance skills, self-efficacy, community resources, and for parents.

Research sample

Sample size:

Baseline: 215 adolescents

3 month follow-up: 200 (93%)

9 month follow-up: 197 (92%)

Unit of randomization: Adolescents were randomized to intervention or "usual care"

Control group experiences: "Usual care" included a general health examination.

Length of follow-up: 3 and 9 months.

Findings

No long-term differences in recent sexual intercourse. Short-term benefits on contraception use for the sexually active, but no differences at 9 months. Some evidence of decreased incidences of STDs (non-statistically significant due to small sample size) and incidences of pregnancies (statistically significant at $p < .10$). Outcomes for pregnancy risk and pregnancy are included in the review, and are consistent with findings from the original study.

Notes

This study can only be generalized to the sample of adolescents whose parents are members of an HMO and would consent to their adolescents receiving the intervention (more than half of eligible sample did not consent). The intervention was quite short (one physician visit), and there was very limited evidence of long-term benefits.

2. Untitled – Reproductive Health Consultation

(Danielson et al., 1990)

Intervention characteristics

Year(s) of operation: 1985-1986

Setting: This program took place in medical offices at a large health-maintenance-organization in Portland, Oregon and Vancouver, Washington.

Duration: Approximately 1 hour

Adolescents served: Program served boys between the ages of 15 and 18, primarily White and middle class, 37% had initiated sex at baseline.

Program components: This "highly explicit" program included a slide tape program and a consultation with a health-care practitioner. The slide tape provided explicit information on anatomy, fertility, self-examination, couples communication, and access to services. The consultation was guided by patient interest and focused on contraception, but also discussed abstinence and repercussions of unsafe sexual activity, and communication/role playing.

Research sample

Sample size:

Baseline: 1,195 boys

Follow-up: 971 (81%)

Unit of randomization: Adolescents were randomized to treatment or control.

Control group experiences: Control group members received the treatment after the 12 month follow-up period.

Length of follow-up: 12 months.

Findings

No effect on sexual activity. Positive effect on contraception use for sexually active boys (particularly among those who initiated sex between baseline and follow-up). Outcomes for sexual experience and pregnancy risk are included in the review, and are both not statistically significant.

Notes

The authors suggest that explicit information does not encourage sexual activity, and may improve contraceptive effectiveness, particularly for those who were not sexually active prior to receiving the treatment.

3. Untitled – Nurse-client interaction intervention

(Hanna, 1990)

Intervention characteristics

Year(s) of operation: 1989

Setting: This program took place during the summer in a clinic in the upper Midwest of the U.S.

Duration: Approximately 25 minutes (10 minutes video on contraception use, 10-15 minute nurse-client interaction)

Adolescents served: Females ages 16 through 18, primarily white (98%), 92 percent had initiated sex at baseline, and all sample members were attending the clinic seeking oral contraceptives.

Program components: This intervention is based on King's theory of nurse-client interaction. This one-time session includes provision of contraceptive information, and counseling regarding the perceived benefits and barriers to contraception use, confirming goals, and developing an adherence regimen.

Research sample

Sample size:

Baseline: 51

Follow-up: 38 (75 %)

Unit of randomization: Adolescents were randomized to treatment or control conditions.

Control group experiences: Contraception information only (video and pamphlets).

Length of follow-up: 3 months

Findings

Improved contraceptive adherence for the intervention group. Pregnancy risk outcome is included in the review, and is statistically significant favoring the intervention group.

Notes

The study experienced more sample attrition from the program than the control group, threatening the validity of the experiment that already began with a small sample size. However, the positive results are promising and may warrant further testing.

4. Untitled – Physician delivered AIDS education and counseling program

(Mansfield et al., 1993)

Intervention characteristics

Year(s) of operation: 1990

Setting: This program took place in an adolescent clinic at an urban northeastern children's hospital.

Duration: Half hour (10 minutes "standard care", 20 minutes counseling).

Adolescents served: Primarily females (93%), African-American (81%), on average 17-18 years old, all had initiated sex and had experienced at least one STD.

Program components: In addition to standard care, treatment group adolescents received a counseling session with a physician which covered in-depth issues concerning HIV prevention (including condom use and needle use) and knowledge-based issues concerning HIV transmission and testing.

Research sample

Sample size:

Baseline: 90

Follow-up: 83 (92%)

Unit of randomization: Adolescents were randomized to treatment or control conditions.

Control group experiences: “Standard care” was a ten minute session which included HIV risk assessment, condom use counseling, providing and HIV pamphlet, and offering condoms.

Length of follow-up: 2 months

Findings

Both the intervention and the standard care condition decreased incidences of sexual activity and increased condom use. Differences between the two groups were not statistically significant. The pregnancy risk outcome is included in the review, and findings are consistent with the original study.

Notes

The program was very short in duration and the follow-up period was also short. The authors suggest that the small sample size was insufficient to detect differences in outcomes between the two groups.

SEX EDUCATION WITH AN ABSTINENCE FOCUS

5. Project Taking Charge

(Jorgensen, Potts & Camp, 1993)

Intervention characteristics

Year(s) of operation: 1989

Setting: This school-based abstinence-only intervention took place in communities in Delaware and Mississippi with relatively high rates of adolescent pregnancy.

Duration: A 6-week program (approx 22 hours)

Adolescents served: Low income, middle-school aged girls and boys; primarily white and African-American, 45% had initiated sex at baseline.

Program components: Self-development, sex education (anatomy/physiology, information on pregnancy and STIs, importance of abstinence), vocational goal-setting, family values, communication, parent involvement.

Research sample

Sample size:

Baseline: 91 adolescents (39 in Delaware, 52 in Mississippi).

Follow-up: No sample attrition.

Unit of randomization: Home economics classrooms were randomized to Project Taking Charge or control group.

Control group experiences: “no other form of sexuality education existed beforehand.” (p403)

Length of follow-up: 6 months after end of program.

Findings

Evidence of decreased sexual experience. Sexual experience outcome is included in the review, and no longer is statistically significant after adjusting for clustering.

Notes

This study was based on a small sample, and the researchers did not statistically account for the fact that classrooms were randomized. Nevertheless, it does provide promising results and may warrant further replication and evaluation.

6. Education Now, Babies Later (ENABL)

(Kirby et al, 1995)

Intervention characteristics

Year(s) of operation: Year(s) of operation: 1992 through 1994

Setting: This intervention took place primarily in schools, but also in community organizations across California.

Duration: Five 1-hour sessions

Adolescents served: Middle school-aged boys and girls from varied ethnic and socio-economic backgrounds, approximately 10% had initiated sex at baseline.

Program components: Used Postponing Sexual Involvement (PSI) curriculum, based on social influences theory and focused on the risks of early sexual activity, pressures from the media, society and peers, and learning resistance skills. A smaller subsample also included PSI for Parents, developed and made known public health referral networks, used media

campaigns, and included other school and community events focused on alternatives to sexual activity. Site 1 provided peer-led instruction.

Research sample

Sample size:

Baseline: 10,600 adolescents: Sites 1 and 2: 4,652; Site 3: 5,244; Site 4: 704

17 Month Follow-up: 7,340 (69%): Sites 1 and 2: 3,086 (66.3%); Site 3: 3,867 (73.7%); Site 4: 387 (55.0% and thus did not meet threshold for inclusion in meta-analysis)

Unit of randomization: Four study subgroups: Sites 1 and 2 randomized classrooms (one peer-led and one adult-led program), Site 3 randomized schools, and Site 4 randomized adolescents.

Control group experiences: Control group often received “some type of instruction on sexuality” before or during study.

Length of follow-up: 3 months (Site 2 and subgroup of Site 1) and 17 months (full sample)

Findings

No overall differences in sexual experience, frequency of sexual activity, or contraception use. Significant effects favoring the control group for sexual experience for Site 3 males, pregnancy risk for Site 3, and pregnancy for Site 1 males. Significant positive impacts for sexual experience among Site 2 males. Outcomes for sexual initiation, pregnancy risk and pregnancy are included in the review. After adjusting for clustering, the only statistically significant effect that remains is for the pregnancy outcome among Site 1 males, favoring the control group.

Notes

Participation in this program did not lead to reduced sexual risk-taking. The authors suggest that the program should be enhanced by providing additional reproductive health instruction, better training of instructors (particularly the peer instructors), and more opportunities for adolescents to practice refusal skills. Sample retention among the group that was randomized at the adolescent level was below 60 percent.

7. McMaster Teen Program

(Thomas et al., 1992)

Intervention characteristics

Year(s) of operation: Year(s) of operation: 1985

Setting: This school-based program took place in a blue collar community in Hamilton, Ontario.

Duration: 10 hours (ten, one-hour classroom sessions).

Adolescents served: Seventh and eighth grade boys and girls, from predominantly “blue collar” backgrounds, 19% had initiated sex at baseline.

Program components: This intervention was based on cognitive-behavioral models and was provided by trained tutors in small groups of six to eight students. It covered four main issues: (1) information about development, sexuality and relationships, (2) communication skills, (3) problem-solving/communication skills, (4) practicing responsible decision-making. Classroom activities included discussions, role-plays, films, and question and answer sessions.

Research sample

Sample size:

Baseline: 3,289

Follow-up: 2,570 (78%)

9 month follow-up:

Unit of randomization: 21 schools were randomly assigned using a random numbers table.

Control group experiences: “conventional board of education sex education program... segregated by gender” dealing with “puberty/growth issues.”

Length of follow-up: 48 months

Findings

No effect on sexual experience, contraception use, or incidences of pregnancies. Outcomes for sexual experience, pregnancy risk and pregnancy are included in the review, and are consistent with findings from the original study.

Notes

The authors suggest that this program was ineffective for the following reasons: (1) brief duration of intervention, (2) program operators were not allowed to provide information on contraception, (3) program did not “fit” the target population it served, and (4) program not developed to factor in gender differences in relationship to outcomes. Two main methodological concerns may have affected the results: (1) low consent rates among the control group (consent occurred after random assignment), and (2) program and control students mixed together once they entered high school.

SEX EDUCATION WITH A CONTRACEPTION COMPONENT

8. Untitled – Clinic-based self-efficacy training program

(Baker, 1990)

Intervention characteristics

Year(s) of operation: 1989

Setting: This program took place a family planning center in urban, northeast New Jersey.

Duration: 5 ½ hours (one session)

Adolescents served: Females ages 15 through 18, primarily African American (83%), living in female-headed households, all were sexually active and seeking contraceptives at baseline.

Program components: The principal investigator, who also was a certified school psychologist, provided this self efficacy training program based on social learning theory. Activities included, provision of factual information regarding reproduction and contraception, discussion of problem-solving and communication skills, modeling of verbal and non-verbal behaviors, and role plays.

Research sample

Sample size:

Baseline: 62

Follow-up: 47 (76%)

Unit of randomization: Adolescents were randomized to treatment or control conditions.

Control group experiences: General family planning clinic services.

Length of follow-up: 6 months.

Findings

No statistically significant differences in contraceptive use or pregnancy. Fewer intervention females engaged in sexual activity during the follow-up period. Outcomes for pregnancy risk and pregnancy are included in the review, and are consistent with findings from the original study.

Notes

The study had a small sample size, and few subjects experienced outcomes such as pregnancy during the follow-up period. Thus, there may not have been sufficient power to detect differences between treatment and control conditions.

9. Untitled – HIV/STD Prevention curriculum

(Blake et al., 2000)

Intervention characteristics

Year(s) of operation: 1994

Setting: This program took place in schools across Michigan.

Duration: Approximately 11 hours (17 lessons)

Adolescents served: High school-aged boys and girls from diverse economic backgrounds and racial/ethnic backgrounds (52% White, 36% African-American), 51% had initiated sex at baseline.

Program components: Emphasized abstinence, used principles of social learning theory, interactive/skills-based, prevention skills, role-plays. One lesson on contraception use.

Research sample

Sample size:

Baseline: 1,349 adolescents

Follow-up: 930 (69%)

Unit of randomization: Thirty teachers were randomly assigned (leading to 29 intervention classes and 40 comparison classes). Treatment and control groups differed in baseline sexual experience. Authors attempted to control for these differences.

Control group experiences: “Standard practice,” heterogeneous curricula, primarily information-based, minimal focus on STD information or prevention skills. Some students may have received somewhat similar treatment.

Length of follow-up: 6 months after intervention ended

Findings

No differences in sexual experience or condom use at follow-up. Positive effects on intentions to abstain, particularly among those who were non-sexually active at baseline. Sexual experience outcome is included in the review and is consistent with finding from the original study.

Notes

Although this evaluation did not find positive effects on behaviors, it did find evidence of effects on intentions to abstain, suggesting that a longer-term follow-up period may have resulted in positive effects on sexual experience. Researchers were unable to match student questionnaire data to explore individual changes over time. Authors recommend longer-term follow-up, tracking individual adolescents over time, and perhaps providing a similar program to younger (less sexually active) adolescents.

10. Draw the Line/Respect the Line

(Coyle et al., 2000 and Coyle et al., 2004)

Intervention characteristics

Year(s) of operation: 1997-1999

Setting: This program took place in urban middle schools in Northern California.

Duration: Approximately 15 hours (20 sessions)

Adolescents served: Program served middle-school-aged adolescents, both genders, ethnically diverse but primarily (59%) Latino, 4% had initiated sex at baseline.

Program components: This interactive program based on social learning and social inoculation theories included a 20 session curriculum plus office hours for high risk children. In sixth grade, adolescents had 5 lessons on limit setting and refusal skills. Seventh grade included an additional 8 lessons covering similar topics, but directly related them to sexual activity, in addition to providing information on the consequences of unplanned sex. In eighth grade, adolescents received 7 lessons that included an HIV infected speaker, condom demonstration, and practicing refusal skills.

Research sample

Sample size:

Baseline: 2,829 adolescents

First follow-up: 2,546 (90%)

Second follow-up: 2,461 (87%)

Third follow-up: 1,811 (64%) (based on information in Coyle et al., 2004)

Unit of randomization: 19 schools (10 intervention, 9 control). Schools were matched and then randomized

Control group experiences: “Usual classroom activities” related to HIV, other STD and pregnancy prevention.

Length of follow-up: 12 and 24 months following program entry.

Findings

Intervention boys were less likely than control to initiate sex or be sexually active. No effects for girls. Sexual experience outcome is included in the review, and neither effect for boys or girls are statistically significant after adjusting for clustering.

11. Untitled HIV Prevention Intervention

(DiClemente et al., 2004)

Intervention characteristics

Year(s) of operation: 1995-2002

Setting: This program took place in four community health agencies in the south.

Duration: 16 hours (four 4-hour sessions)

Adolescents served: Program served African-American females between the ages of 14 and 18 who were seeking services and had reported having vaginal intercourse in the past six months.

Program components: This program was based on social cognitive theory and the theory of gender and power. Trained African-American peer educators and a trained African American health educator delivered this program that included modeling, creating supportive group norms, focused on ethnic and gender pride, discussed abstinence and condom use, and included role-plays, refusal skills development, and discussed health relationships.

Research sample

Sample size:

Baseline: 522 girls

First follow-up: 469 (90%)

Second follow-up: 460 (88%)

Unit of randomization: Adolescents were randomly assigned to the HIV intervention or to a general health promotion condition.

Control group experiences: The general health promotion condition included a 16 hour class focusing on nutrition and exercise.

Length of follow-up: 6 and 12 months follow-up.

Findings

Intervention group members were more likely to use contraception consistently, had reduced sexual activity rates, no evidence of reductions in pregnancy rates. Outcomes for pregnancy risk and pregnancy are included in the review, and the findings are consistent with the original study author's findings.

12. Keepin' it R.E.A.L.!

(Dilorio et al., 2006)

Intervention characteristics

Year(s) of operation: 1996-2001

Setting: This program took place in Boys and Girls Clubs of Metro Atlanta.

Duration: 14 hours (seven 2-hour sessions over a 14 week period)

Adolescents served: Program served adolescents (approximately 60 percent males) ages 11 through 14 who were members of the Boys and Girls Club, who were living with their mothers, and who were primarily sexually inexperienced at baseline.

Program components: There were two treatment conditions: one based on social cognitive theory (SCT) and one based on problem behavior theory that was a life skills program (LSK). In the SCT condition, mothers and their children attended four sessions together that focused on HIV information, communication skills, sex, and values. The sessions covered a variety of issues concerning reproduction and contraception and included activities such as discussions, role-plays, videos, skits and demonstrations. The LSK program primarily separated the mothers and children and focused on stress reduction, school performance, discussion of a variety of at-risk behaviors, community involvement activities, and for the mothers, a focus on parenting skills development.

Research sample

Sample size:

Baseline: 582 adolescent/parent pairs

First follow-up: 550 (95%)

Second follow-up: 544 (93%)

Third follow-up: 525 (90%)

Unit of randomization: Eleven Boys and Girls Club of Metro Atlanta sites were randomized to SCT (4 sites), LSK (3 sites) or control (4 sites) conditions.

Control group experiences: One hour HIV prevention session (20 minute knowledge-based tape) and a discussion of risk and prevention.

Length of follow-up: 4, 12 and 24 months follow-up.

Findings

No differences in sexual experience rates. LSK group members were more likely to use contraception at follow-up. Outcomes for sexual experience and pregnancy risk are included in the review, and none of the effects are statistically significant after adjusting for clustering.

Notes

13. Teen Talk

(Eisen, Zellman, and McAllister, 1990)

Intervention characteristics

Year(s) of operation: 1986-1987

Setting: This program took place at schools in one school district and in 6 family planning service agencies in Texas and California. The settings ranged from an urban family planning facility to a rural health clinic.

Duration: Approximately 12 to 15 hours.

Adolescents served: Program served boys and girls between the ages of 13 and 19, a variety of race/ethnicities but primarily Latino (53%), primarily low income, 37% had initiated sex at baseline.

Program components: Family planning agency educators or school staff provided this program that was based on the health belief model and social learning theory. Lectures, simulations, discussions and role-plays were used to cover four content areas: (1) factual information, (2) group discussion of factual information, (3) group discussions of values, feelings and emotions, (4) discussions of decision-making and personal responsibilities for sexual behaviors.

Research sample

Sample size:

Baseline: 1,444 adolescents

Follow-up: 888 (61%)

Unit of randomization: 5 sites randomly assigned classrooms, 2 sites randomly assigned adolescents.

Control group experiences: Curriculum covered general information concerning fertility, contraceptives, STDs, and values/norms, less active student involvement, and less focus on risk perceptions or repercussions of behaviors.

Length of follow-up: 12 months

Findings

Authors found that males were more likely to maintain abstinence over a year, but there were no difference in sexual activity rates for females. Females intervention group members were less likely to use an effective contraceptive at most recent intercourse. Outcomes for sexual experience and pregnancy risk are included in the review, and the only significant effect that remained was the effect on pregnancy risk for females favoring the control group.

Notes

Authors present evidence that prior exposure to sex education was related to behavioral outcomes. Authors also suggest that females, in particular, are over saturated with such programs, thus diluting the effects of any new program. Authors recommend using health belief model as a screener to assess the particular needs of individual adolescents.

14. Family Support

(Herceg-Baron et al., 1981)

Intervention characteristics

Year(s) of operation: 1980 through 1981

Setting: This program took place in nine clinics within six agencies in urban and suburban southeastern Pennsylvania (two Planned Parenthood sites, two hospital clinics, and one neighborhood health center).

Duration: (1) Family Support intervention: 5 hours (six, 50-minute sessions); (2) Period Support intervention: Approx. 2 hours (2-6 phone calls)

Adolescents served: Females, primarily ages 16 or 17, 53 percent African-American, diverse socioeconomic backgrounds, 87 percent had initiated sexual intercourse at baseline.

Program components: (1) **Family Support intervention:** Family planning counseling provided by a trained family therapist. Adolescents were encouraged to bring a family member or “surrogate” family member to sessions with the goal of enhancing support for adolescents in their contraceptive practices and decision-making; (2) **Periodic Support intervention:** Study staff provided periodic phone calls to adolescents over a four to six week period following the clinic visit in order to monitor adjustment to the contraceptive method.

Research sample

Sample size:

Baseline: 469

15-Month Follow-up: Family Support: 88%; Periodic Support: 72%; Control group A: 80%, Control group B: 87%

Unit of randomization: Adolescents were randomized to two treatment or two control conditions. One control condition was questioned at all three time periods, the other was followed up only at the final time period in order to assess the effects of the questionnaire.

Control group experiences: Services “routinely offered at the clinics they attended.”

Length of follow-up: 6 and 15 months.

Findings

No differences in contraception use or incidences of pregnancies for either treatment condition. Outcomes for pregnancy risk and pregnancy rates are included in the review, and the findings are consistent with the original study findings.

Notes

Only 36 percent of the family support treatment group actually received counseling services (and only 22 percent came to counseling with a family member). The authors suggest that those who tended to attend counseling often lacked outside support. The authors further note that the periodic support treatment may have been too brief to have an effect, but did provide a useful mechanism for maintaining contact with clinic patients. **Note:** due to the two treatment groups sharing control groups, only one intervention (Family Support) was included in the meta-analysis (see Appendix C for more information).

15. Be Proud, Be Responsible (Two Interventions: Abstinence and Safer Sex)

(Jemmott, Jemmott, and Fong, 1998)

Intervention characteristics

Year(s) of operation: n/a

Setting: These programs took place on two Saturdays at three middle schools in Philadelphia, PA.

Duration: Approximately 8 hours.

Adolescents served: Sixth and seventh grade boys and girls, primarily African-American, low income, 25% had initiated sex at baseline.

Program components: Peer and adult facilitators provided these interventions that were based on social cognitive theory, the theory of reasoned action, and theory of planned behavior. Both interventions were highly structured, culturally sensitive, and encouraged adolescents to be proud and responsible for themselves and their communities and to consider future goals. The Abstinence intervention focused on increasing knowledge, belief in abstinence, and increased self-efficacy and refusal skills, and focused minimally on contraception use. The Safer Sex intervention focused on increased knowledge about HIV/STD and condom use, allaying fears of loss of sexual enjoyment due to condom use, and increasing skills/self-efficacy to use condoms.

Research sample

Sample size:

Baseline: 659 adolescents

Follow-up: 3month: 636 (96.5%); 6-month 622 (94.4%); 12-month 610 (92.6%)

Unit of randomization: Adolescents were randomly assigned to one of three groups (Abstinence, Safer Sex, or Control)

Control group experiences: A “health promotion intervention” focusing on behaviors related to cardiovascular disease, stroke and cancers.

Length of follow-up: 3, 6 and 12 months.

Findings

The Abstinence intervention had positive impacts on reduced sexual intercourse at 3 months, but not at 6 or 12 months. The Safer Sex program had positive effects on condom use at all three follow-up periods. Outcomes for sexual experience and pregnancy risk are included in the review, and none of the effects are statistically significant after focusing on the latest follow-up period and calculating full sample measures for pregnancy risk.

Notes

The two interventions both showed positive effects on reducing sexual risk-taking. However, the effects of the Abstinence program diminished over time, while the increased condom use effects of the Safer Sex curriculum remained steady. This program was tailored very specifically to the needs of the particular population served. This suggests that other programs may want to tailor their programs to the cultural needs of their particular populations.

16. Project SNAPP

(Kirby et al., 1997)

Intervention characteristics

Year(s) of operation: n/a

Setting: This program took place in classrooms in six Los Angeles middle schools.

Duration: Approximately 8 hours.

Adolescents served: This program served middle school-aged girls and boys, who are from predominantly (64%)

Latino backgrounds, 8% had initiated sex at baseline.

Program components: Trained teen educators (including teen mothers and HIV infected males) provided this program based on social learning theory and the health belief model. Eight sessions over a two-week period were delivered that contained hands-on activities, games, role-playing, discussions, knowledge-building, and a focus on improving communication/refusal skills and enhancing self-efficacy regarding these skills. Both abstinence and contraceptive use practices were reinforced.

Research sample

Sample size:

Baseline: >2,000

5 month follow-up: 1,549 (73%)

17 month follow-up: 1,616 (77%)

Unit of randomization: 102 classrooms were randomly assigned.

Control group experiences: Standard instruction was “generally of a more didactic nature, on reproduction, pregnancy prevention, HIV, and STD.”

Length of follow-up: Five and seventeen months.

Findings

The program increased knowledge but had no effects on behaviors including: sexual experience, condom use, pregnancies or STDs. Outcomes for sexual experience, pregnancy risk, and pregnancy are included in the review, and the findings are consistent with the original study results.

Notes

The authors suggest that the program may have been too short in duration, that control group students may have received a somewhat similar treatment, and that it may have unintentionally glamorized the lifestyle of the teenage mother. The authors suggest that structured, theory-based programs may not be enough if they are not comprehensive, operate in a variety of settings, and address a more broad array of risk factors affecting adolescents’ lives.

17. Youth AIDS Prevention Project (YAPP)

(Levy et al., 1995)

Intervention characteristics

Year(s) of operation: 1991 through 1993

Setting: This school-based program took place in “high risk schools” located throughout the Chicago, IL metropolitan area.

Duration: Approximately 11 hours (15 sessions).

Adolescents served: Middle school aged boys and girls, primarily African-American (60%), low income, 35% had initiated sex at baseline.

Program components: Trained educators (non-school personnel) provided this program based on the social cognitive theory and the social influences model. In 7th grade, students experienced 10 lessons, and in 8th grade, students attended 5 lessons. The program was interactive and included lectures, discussions, videos, small group exercises, role-plays, and parent-child communication activities. The program focused on abstinence, refusal/decision-making skills, and enhancing self-efficacy. The “parent interactive” treatment also included parent involvement through activities such as attending meetings and helping with homework.

Research sample

Sample size:

Baseline: 2,392 adolescents

Follow-up: 1,669 (70%)

Unit of randomization: Fifteen school districts were randomized: 5 assigned to “parent interactive” intervention, 5 assigned to “parent noninteractive”, and 5 assigned to control. (Since the parent interactive component was not implemented, the authors combined the two treatment groups to create one treatment group for analysis.)

Control group experiences: Basic AIDS education program which usually included either a short, information-based workshop, or a field trip to a health museum.

Length of follow-up: Approximately 21 months from baseline.

Findings

No effect on sexual experience or contraception use. Lower sexual activity rates for “changers” (those who initiated sex between baseline and follow-up). Outcomes for sexual experience and pregnancy risk are included in the review, and the findings are consistent with the original study results.

Notes

Since it was difficult to get parents involved in the “parent interactive” intervention, the two intervention types wound up to be nearly identical. This does call into question a program’s ability to engage and include parents. The authors use their findings to suggest the importance of providing interventions before adolescents begin engaging in sexual activity. Analysis did not adjust for clustering within school districts.

18. Focus on Kids- AIDS Prevention Program

(Li et al., 2002 and Stanton et al, 1996)

Intervention characteristics

Year(s) of operation: 1993

Setting: This program took place in recreation centers affiliated with three public housing developments.

Duration: Approximately 18 hours (seven, 1.5 hour sessions plus a day-long campsite retreat).

Adolescents served: Boys and girls ages 9 through 15, African-American, low income, 36% were sexually experienced at baseline.

Program components: Two “interventionists” delivered this HIV prevention program to naturally developed groups of friends. Program was based on the Protection Motivation Theory (a social cognitive theory), and also was designed to be developmentally and culturally appropriate. The program included small group discussions, videos, games, role plays, acting, storytelling, arts and crafts projects, and development of a community project focused on the intervention message. Facts about AIDS, STDs, contraception and human development were discussed, and condoms were provided. It is important to note that the majority of intervention group members attended fewer than five of the classes and thus did not receive the full treatment.

Research sample

Sample size:

Baseline: 383

6-month follow-up: 301 (79%)

12-month follow-up: 278 (73%)

18-month follow-up: 263 (69%)

24 month and 36 month follow-up had less than 60% sample retention for at least one treatment condition

Unit of randomization: Seventy-six peer friendship groups were stratified into pairs and randomized.

Control group experiences: Weekly sessions were provided to control group members that included factual movies, discussions, and condoms provided. Only 24% of control group members attended at least one session.

Length of follow-up: 6, 12, 18, 24, and 36 months.

Findings

Increased condom use at 6 months and at 18 months. Pregnancy risk outcome is included in the review and is statistically significant favoring the intervention group.

Notes

While the author's initial study suggested that there were only short-term benefits, the follow-up analysis found positive impacts at 18 months follow-up that remained statistically significant even after adjusting for clustering.

19. Healthy for Life (HFL)

(Moberg and Piper, 1998)

Intervention characteristics

Year(s) of operation: 1987 through 1990

Setting: This school-based program took place in small cities, towns, and suburbs in Wisconsin.

Duration: Approximately 40 hours.

Adolescents served: This program served middle school-aged girls and boys, who are from predominantly white, middle class backgrounds, most were sexually inexperienced at baseline.

Program components: Trained teachers provided these interventions based on the social influences model. Sixteen class periods (54 lessons) used active learning, student participation, and peer leaders to provide information and to equip adolescents with the “social competencies” to deal with high risk social situations, confront issues of body image, and resist peer pressures. Family and community components were also included in the model, but were not fully implemented as planned. The Intensive treatment took place during seventh grade only, while the Age Appropriate treatment was spread out across sixth through eighth grade.

Research sample

Sample size:

Baseline: 2,483

9th grade follow-up: 1,853 (75%)

10th grade follow-up: 1,310 (53%)

Unit of randomization: 21 schools were randomized using a “nested cohort design” (Including a control group and two treatments, Intensive or Age Appropriate. Potential treatments were self-selected prior to random assignment).

Control group experiences: “Usual programming” included published or locally developed prevention-oriented curricula.

Length of follow-up: Three and four years after baseline (different length of follow-up after completion of intervention for Intensive versus Age Appropriate treatments).

Findings

Higher levels of sexual experience among both program groups versus control group, no effects on condom use. Outcomes for sexual experience and pregnancy risk are included in the review, and none of the effects are statistically significant after adjusting for clustering.

Notes

The authors suggest that the multiple messages of HFL (including drugs, smoking, drinking) may have diluted the message regarding sexuality (only 12 of the 40 hours of classroom time was dedicated expressly for sex education). The authors further state that other factors influence the lack of impacts, including: insufficient duration, lack of community-level programs and support, difficulty in implementing the Age Appropriate intervention over time, possible “fatigue factor” and over-saturation of message, and targeting all students rather than tailoring to the needs of specific groups. Also, the tenth grade follow-up only included about half the original baseline sample, and excluded a disproportionate number of treatment students (not included in meta-analysis).

20. Untitled – Cognitive behavioral group training program

(Schinke et al., 1981)

Intervention characteristics

Year(s) of operation: n/a

Setting: This program took place in small group settings in an urban public high school in Washington state.

Duration: 14 hours (fourteen 1-hour sessions).

Adolescents served: School-aged adolescents, both genders, who have never parented a child.

Program components: This cognitive-behavioral program was delivered by female/male teams of social worker leaders. Groups consisting of 8 to 12 adolescents used audio/visual aids, guest speakers, Socratic exchanges, discussions, and behavior modeling, and role-plays to address the following issues: (1) facts about reproduction and contraception, (2) decision-making skills, and (3) communication skills.

Research sample

Sample size:

Baseline: assuming 53

Follow-up: 53 (assuming 100%)

Unit of randomization: Adolescents were randomized to treatment or control conditions.

Control group experiences: No comparable services provided.

Length of follow-up: 6, 9 and 12 months.

Findings

The program group members experienced a reduction in rates of sexual intercourse and improved contraception use. Pregnancy risk outcome is included in the review and is statistically significant favoring the intervention group.

Notes

This study included a very small sample of adolescents. In addition, very little information was available concerning the sample size, sample attrition, and the background characteristics of sample members. However, very large differences between treatment and control groups suggest promising results that could be replicated and studied more thoroughly.

21. Untitled -- Workshop and community-level HIV prevention interventions

Sikkema et al., 2005

Intervention characteristics

Year(s) of operation: 1998 to 2000

Setting: This program took place in 15 low income housing developments in Milwaukee and Racine, WI; Roanoke, VA; and Seattle and Tacoma, WA.

Duration: Workshop intervention: 6 hours (two 3-hour workshops); Community intervention: >10 hours (workshop + variety of activities and additional sessions -- see below)

Adolescents served: School-aged adolescents (ages 12-17), both genders, living in urban housing developments, 51% African American.

Program components: The workshop only condition was provided by two trained facilitators and provided separate workshops for adolescents 12-14 and adolescents 15-17 years old. The program focused on delaying sexual initiation, reducing sexual activity, and encouraging consistent contraceptive use among sexually active. Curriculum focused on refusal skills, negotiation skills, risk behavior self-management, and covered themes of pride and respect. The community intervention included the workshop plus two follow-up sessions, participation in a Teen Health Project Leadership Council, participation in leadership council-sponsored activities (creating pamphlets, t-shirts, and participation in community-wide activities), and a 90-minute workshop for parents.

Research sample

Sample size:

Baseline: 1,172

Short-term follow-up: 865 (74%)

Long-term follow-up: 763 (65%)

Unit of randomization: Fifteen housing developments were randomized into one of three conditions: workshop only, community-level intervention, or the control group.

Control group experiences: All participants were invited to attend a one-time session on AIDS education which included a video, discussions, and condom and brochure distribution. Fifteen percent of the control group sample attended.

Length of follow-up: 3 months following workshop completion, 2 months following community-level completion (12 months after completion of workshop)

Findings

Community-level program group members were less likely to initiate sexual intercourse than control group and were more likely to use contraception if they were sexually active. Workshop-only program group members were more likely to use contraception than control group. Outcomes for sexual experience and pregnancy risk are included in the review, and after adjusting for clustering, the only statistically significant effect that remains is for pregnancy risk favoring the community-level program group.

22. Focus on Kids - West Virginia replication

Stanton et al., 2006

Intervention characteristics

Year(s) of operation: n/a

Setting: This program took place in community and school-based settings in 12 counties in rural West Virginia.

Duration: Between 8 and 12 hours (originally intended as eight 1 1/2-hour sessions, but in some cases was modified to a full day session or two half-day sessions)

Adolescents served: Adolescents ages 12 to 16, 58 percent female, primarily White.

Program components: See description in Study #18 (Li et al., 2002) for information on Focus on Kids (FOK). In this replication, 2 versions of FOK were used: (1) the original version (with minor modifications including less emphasis on condom access and demonstration), and (2) a "culturally adapted" version.

Research sample

Sample size:

Baseline: 1,131

3 month follow-up: 898 (79%)

6 month follow-up: 938 (83%)

9 month follow-up: 904 (80%)

Unit of randomization: 110 "recruitment groups" were randomized to three variations of Focus on Kids or the control group. The analysis presented in this paper treats the FOK group as one single group.

Control group experiences: Control group received an environmental health curriculum of comparable length to FOK.

Length of follow-up: 3, 6 and 9 months.

Findings

Did not find any evidence of reductions (or increases) in sexual activity or contraception use. Pregnancy risk outcome is included in the review and is not statistically significant.

Notes

An additional published study, Stanton et al., 2005 compared the two treatments in the West Virginia sample and did not find differences in behaviors depending on whether individuals were assigned to the original FOK condition or the condition that was culturally adapted to West Virginia. This study also highlighted that neither of the two interventions were implemented with strict fidelity.

23. RIPPLE Study

Stephenson et al., 2004

Intervention characteristics

Year(s) of operation: 1997 to 2001

Setting: This program took place in comprehensive, non-selective rural and urban schools in central and southern England.

Duration: 3 hours (3 peer-led sessions)

Adolescents served: All students attending year 9 in study schools (ages 13-14).

Program components: Program was provided by peer educators (ages 16-17). It was not designed around a particular theoretical framework, but focused on enhancing communication skills, increasing knowledge concerning pregnancy, HIV, contraception use, and availability of local services.

Research sample

Sample size:

Baseline: 8,766

First follow-up: 7,770 (89%)

Second follow-up: 6,656 (76%)

Unit of randomization: Twenty-nine schools were stratified based on risk levels, and then randomized to treatment or control conditions.

Control group experiences: Usual, teacher-based sex education program.

Length of follow-up: 6 and 18 months post intervention

Findings

Authors found that while the students appeared more satisfied with the peer-delivered instruction than the teacher-level, there were modest to no clear differences in behavioral outcomes. Outcomes for sexual experience, pregnancy risk, and pregnancy are included in the review, and after adjusting for clustering none of the effects are statistically significant.

24. Project BART (Becoming a Responsible Teen)

(St. Lawrence et al., 1995)

Intervention characteristics

Year(s) of operation: Early 1990s

Setting: This program took place in a comprehensive health center in Jackson, Mississippi.

Duration: Approximately 14 hours (8 week period, weekly 90-120 minute sessions).

Adolescents served: Adolescents ages 14 through 18, primarily female (72%), primarily African-American, low income, approximately half were sexually experienced at baseline.

Program components: Trained male and female co-facilitators provided this HIV prevention program based on social learning theory that contained the following components: (1) AIDS education (stressing abstinence and contraception use), (2) group discussion and video regarding decision-making and values, (3) condom demonstration and practice, (4) role plays and discussions focusing on social competency and communication skills, (5) discussions with HIV-positive youth, focus on cognitive competency, (6) peer coping models focusing on social support and empowerment.

Research sample

Sample size:

Baseline: 246

12 Month Follow-up: 225 (91.5%)

Unit of randomization: Adolescents were randomized to an education program (control) or the behavioral skills training intervention.

Control group experiences: Two hour knowledge-based program, providing standard HIV/AIDS information, developmentally and culturally appropriate, less sexually explicit than intervention program, included lectures, group discussions, and games.

Length of follow-up: 6 and 12 months following completion of intervention.

Findings

At one year post-program, decreased sexual experience among subsample of virgins at baseline, decreased incidences of unprotected sex. Outcomes for sexual experience and pregnancy risk are included in the review, and the statistically significant effect that remains after accounting for full samples is for pregnancy risk favoring the intervention group.

Notes

Control group received a knowledge-based intervention, but the evidence from this study suggests that such a program may not be as effective as a program that combines the knowledge-based component with behavioral skills training. Authors point out that trends over time varied (for both intervention and control) by gender. They also recommend targeting programs to adolescents before they begin engaging in sexual activity.

25. SHARE (Sexual Health and Relationships: Safe, Happy, and Responsible)

(Wight et al., 2002)

Intervention characteristics

Year(s) of operation: 1996 through 1998

Setting: This school-based program took place in two cities in Scotland.

Duration: Approximately 15 hours (20 sessions)

Adolescents served: Adolescents ages 13 through 15, both genders, 17 percent had initiated sex at baseline.

Program components: The program included a five-day training program for educators. Intervention was theory-based and included active learning, role plays, videos, skills-building exercises, provision of information related to sexual health, and condom use information and demonstration.

Research sample

Sample size:

Baseline: 7,616

Follow-up: 5,854 (77 %) (Note: less than 60 percent of follow-up sample retained in pregnancy outcome)

Unit of randomization: Twenty-five schools were randomly assigned using a balanced randomization method.

Control group experiences: Conventional sex education included from seven to 12 lessons focused on provision of information and discussions.

Length of follow-up: 24 months following the start of the intervention (6 months following completion of intervention).

Findings

No statistically significant differences in sexual experience, contraception use or incidences of pregnancies. Outcomes for sexual experience and pregnancy risk are included in the review, and the results are consistent with the original study findings.

Notes

The authors note that this program was no more or less successful in reducing risky sexual behaviors than the conventional program. However, students did rate this program more positively than control group students, and there were increases in knowledge. The authors suggest further refinement and testing.

MULTI-COMPONENT/YOUTH DEVELOPMENT PROGRAMS

26. Teen Outreach Program (TOP)

(Allen et al., 1997)

Intervention characteristics

Year(s) of operation: 1991 through 1995

Setting: This evaluation took place either during or after school in 22 sites across the United States (representing 10 percent of all Teen Outreach programs operating across the country).

Duration: Approximately 71 hours (an average of 46 hours of volunteer service plus 36 weeks (approx. 25 hours) of classroom discussions).

Adolescents served: High school aged, primarily girls (85%), majority African-American (67%), diverse socio-economic backgrounds, baseline sexual experience information not available.

Program components: This program had two main goals: to reduce incidences of school failure and teen pregnancies. Intervention included: (1) supervised community volunteer services (minimum of 20 hours), (2) classroom-based discussions about service experiences, and (3) classroom-based related to “social-development tasks.” Classroom lessons were taught by trained facilitators and included group exercises, role-plays, guest speakers, informational presentations. Less than 15% of written curriculum focused on sexuality.

Research sample

Sample size:

Baseline: 695

Follow-up: 560 (81%) (female only)

Unit of randomization: Most often randomized at the student level, but also “less frequently” randomized classrooms.

Control group experiences: Unclear.

Length of follow-up: 9 months from program entry.

Findings

Reductions in incidences of pregnancies (also reductions in school failure and academic suspensions). The pregnancy outcome was included in the review and was statistically significant, favoring the intervention group.

Notes

The authors note that this program was designed to reduce pregnancies and school failure, but had very few program components directly related to these two main goals. Also, the two goals were quite different, but the program appeared to achieve both. Methodological concerns include: (1) unclear numbers of adolescents randomized at the classroom level (and no adjustment for this clustering), (2) unclear information on control group experiences.

27. Summer Training and Education Program (STEP)

(Grossman and Sipe, 1992)

Intervention characteristics

Year(s) of operation: 1986 through 1988

Setting: This program took place primarily during two summers in five U.S. cities (Boston, Fresno, Portland, San Diego, and Seattle).

Duration: Approximately 295 hours (90 hours remediation, 36 hours classroom, 9 hours school year support, averaging 160 hours in part-time jobs over 2 summers).

Adolescents served: This program served 14 and 15-year old adolescents, low-income, primarily racial/ethnic minorities, 45% had initiated sex at baseline.

Program components: Primary program goals were twofold: reduce both academic failure and incidences of teen pregnancies. Adolescents were paid for both their classroom and work hours. Combination of work experience, basic skills remediation, and life skills and opportunities instruction (classes that covered issues concerning responsible social and sexual decision-making), and school year support.

Research sample

Sample size:

Baseline: 3,226

42 or 54 months follow-up: 2,610 (81%) (Note: less than 60 percent follow-up represented in pregnancy risk measure)

Unit of randomization: Two cohorts of adolescents were randomized over two years (an initial pilot test cohort was not included in the experiment).

Control group experiences: A full-time summer job in a federally funded Summer Youth Employment and Training Program.

Length of follow-up: 42 months (for Cohort 3) and 54 months (for Cohort 2).

Findings

No effect on sexual experience, minimal evidence of positive impacts on contraception use, no effects on pregnancies. Outcomes for sexual experience and pregnancy are included in the review, and the only statistically significant effect ($p < .10$) is for pregnancy among males in the second cohort of the intervention group.

Notes

Although authors note that they found short-term effects on academic and social behaviors, these effects did not remain over time. It is important to note, however, that the control group did receive full-time summer employment. The authors question the usefulness of short-term initiatives and recommend targeting to meet the needs of different subgroups of youths, and the importance of confronting the larger contextual issues influencing adolescent decisions and behaviors.

28. Peer Power Project

(Handler, 1987)

Intervention characteristics

Year(s) of operation: 1984 through 1985

Setting: This program took place two public schools in Chicago, IL, serving primarily low income African-American students.

Duration: Approximately 150 hours (school year: 1.5 hours per week; summer: three hours per day, five days a week for six weeks)

Adolescents served: African-American females in 7th-8th grade, primarily low income backgrounds, 12 percent had initiated sex at baseline.

Program components: A school counselor and a paid community aide facilitated this public/private partnership that included the following components: (1) Peer Power group project: aimed at developing self-concept and decision-making skills as adolescents developed a project to address community-based problems, (2) Family Life Education: a supplemental and comprehensive sexuality education program, (3) intergenerational support: including parents and/or adult volunteers to help with projects, (4) Exposure to contraceptive/health services: field trips and guest speakers, (5) exposure to career opportunities: trips and guest speakers, and (6) enrichment activities. field trips to cultural events. This program was evaluated during its first year of implementation, and much of the planned intervention was not fully implemented.

Research sample

Sample size:

Baseline: 63

Follow-up: 53 (84 %)

Unit of randomization: Adolescents were randomized to treatment or control conditions. Mention of violation of random assignment, but researcher excluded those cases from the analysis.

Control group experiences: Mention of “ongoing Family Life Education” provided as part of science curriculum.

Length of follow-up: 12 months after the start of the intervention.

Findings

No statistically significant differences in initiation, contraception use (among subsample of sexual initiators) or pregnancy. Outcomes for sexual experience and pregnancy are included in the review, and neither effect is statistically significant.

Notes

The author suggests that since the program was only in its first year of operation, it was not fully implemented as planned and thus the experimental findings may have been diluted. Also, small sample sizes and some mention of violation of random assignment may have influenced the both power to detect impacts and the integrity of the experiment.

29. Untitled – “Client-Centered” Approaches

(McBride and Giennapp, 2000)

Intervention characteristics

Year(s) of operation: mid to late 1990s

Setting: This study evaluated the effects of seven programs, three of which were focused on adolescents. All three programs took place in Washington State, including: (1) a clinic-based program that was run by the local health department (Site E), (2) a school-based program that was run by a Planned Parenthood (Site F), and (3) a school-based program that was run by a local health department (Site G).

Duration: Site E: average of 27 hours (approximately); Site F: average of 31 hours; Site G: average of 22 hours

Adolescents served: Primarily females (90%), ages 14 through 17, 74 percent white, considered at “elevated” risk, 63 percent had initiated sexual intercourse at baseline.

Program components: All three programs used a “client centered approach” which, rather than being theoretically based, is based on service providers’ beliefs that services need to be tailored to the individual needs of each adolescent, and that adolescents need information on sexual activity and its consequences, guidance and support, and coping skills.

- Site E: Nurses, health educators and social workers provided education/support, including counseling/connecting with community services.

- Site F: Health and sexuality educators provided weekly education and skills-building group sessions covering a variety of topics, individual and group-level support services, and social/recreational activities.

Site G: Health and sexuality educators and social workers provided weekly group sessions covering a variety of topics, individual support including counseling and referrals, and matched adolescents with mentors.

Research sample

Sample size:

Baseline: 690

Follow-up: 507 (73%) (Note: less than 60 percent follow-up for pregnancy risk measure for Sites F and G)

Unit of randomization: Adolescents were randomized to treatment or control conditions.

Control group experiences: Control group adolescents were offered education and skills-building courses, but no individualized services (such as counseling, advocacy or mentoring). On average, control group teens received approximately two hours of services (Site E) and no services (Sites F and G).

Length of follow-up: 8 months (Sites E and F) and 6 months (Site G).

Findings

No differences in sexual experience, one site (Site F) had positive effects on intercourse in the past month and on contraception use. The review included sexual experience outcome information for all three sites, none of which were statistically significant. Due to sample attrition, the only pregnancy risk outcome included in the review was for Site E, and this program had statistically significant effects favoring the intervention group.

Notes

Methodological weaknesses included small sample sizes in the outcome tables that often do not reflect the full randomized samples, and evidence was presented that the follow-up sample was demographically different from the baseline sample (higher risk adolescents were lost at follow-up). Authors suggest that programs for high risk adolescents need to be longer and more intensive. Their results show that the program that provided the most number of hours of services tended to have better results.

30. Reach for Health Community Service Intervention (RFH CYS)

(O’Donnell et al., 2002)

Intervention characteristics

Year(s) of operation: 1994 through 1996

Setting: This program took place in public middle school in New York City.

Duration: 146 hours (90 hours of community service, 40 sessions in 7th grade, 34 sessions in 8th grade).

Adolescents served: Middle school aged boys and girls, primarily African-American (71%) and Latino (26%), low income, approximately one-quarter had initiated sex at baseline.

Program components: This intervention combined classroom health instruction with community service field placements. Field placements took place in senior centers, nursing homes, clinics, and child care centers. Health classes, offered by trained health educators, provided debriefing sessions to discuss community service experiences and included traditional Reach for Health curriculum instruction that was culturally appropriate and included hands-on activities that focused on unprotected sex, violence, and substance use.

Research sample

Sample size:

Baseline: 255

Follow-up: 195 (76%)

Unit of randomization: 18 classrooms were randomly assigned to CYS or curriculum only conditions. 36 students (23%) were transferred from the curriculum only condition to the CYS condition.

Control group experiences: Control group members received the RFH classroom instruction component

(approximately 56 hours).

Length of follow-up: 45 months.

Findings

Adolescents who received the RFH CYS intervention were less likely to initiate sex than those in the curriculum only group, and there is evidence of reductions in pregnancy rates among females. Outcomes for sexual experience and pregnancy are included in the review, and after adjusting for clustering, none of the effects are statistically significant.

Notes

Twenty-six percent of the subjects switched between treatment and control conditions, compromising the integrity of the experiment and calling into question the validity of the dosage analysis in the primary study. Results presented in this meta-analysis are based on adolescents assigned to their original treatment statuses.

31. Children's Aid Society – Carrera Program

(Philliber et al., 2001 and Philliber et al., 2002)

Intervention characteristics

Year(s) of operation: 1997-2000

Setting: This program took place in 12 community based centers in New York city, Baltimore, MD, Broward County, FL, Houston, TX, Portland, OR, Rochester, NY, and Seattle, WA. The original program sample was based in New York City. Replications took place in the other locations.

Duration: Intervention group adolescents participated, on average, in 242 hours of activities in New York City sites, and 205 hours in replication sites.

Adolescents served: Boys and girls ages 13 through 15, primarily African-American and/or Latino, low income, approximately 24% were sexually experienced at baseline (26% in NYC sites, 24% in replication sites).

Program components: The multi-component, multi--year program included a full-time coordinator and a full time community organizer, and part-time employees. The program had five main components: (1) work experience and support through a "job club", (2) educational component (tutoring, SAT prep, college entrance assistance), (3) family life and sex education, (4) self expression through the arts, and (5) lifetime individual sports. In addition, adolescents were provided with comprehensive medical services including reproductive counseling/contraceptive services, year-round support services, and social/recreational/cultural field trips.

Research sample

Sample size:

Baseline: 1,163 (565 NYC sample, 598 replication sample)

Follow-up: 941 (81%) (484 NYC sample, 457 replication sample)

Unit of randomization: Adolescents were randomized to treatment or control conditions.

Control group experiences: Generally "some other alternative", which often included recreation, homework help, and arts and crafts.

Length of follow-up: 36 months.

Findings

Positive effects on sexual experience (particularly for females), contraception use, and incidences of pregnancies (particularly for females). Outcomes for sexual experience, pregnancy risk, and pregnancy risk are included in the review separately for the New York City sample and the replications sample, showing statistically significant positive effects for sexual experience, pregnancy risk and pregnancy rates among females in the New York City sample, positive effects on pregnancy rates for the replication sample, and no statistically significant effects for males.

Notes

The authors suggest that although there were positive effects on sexual experience, the chief impact on pregnancy was related to improved contraception use. One concern of the program is that the highest risk adolescents were least likely to participate. The authors find that this program, overall, is an effective method for reducing teen pregnancy.

Appendix B: Randomized Controlled Trials Excluded from Research Synthesis

Study Number and Citation	Reason(s) for Exclusion
1. Aarons , Sigrid J., Jenkins, Renee R., Raine, Tina R. et al. (2000). Postponing sexual intercourse among urban junior high school students -- a randomized controlled evaluation. <i>Journal of Adolescent Health</i> , 27 (4), 236-247.	Not enough information to create effect size, methodological problems (low consent rates, cross-sectional analysis)
2. Anderson, N. L. R., Koniak-Griffin, D., Keenan, C. K., Uman, G., Duggal, B. R., & Casey, C. (1999). Evaluating the outcomes of parent-child family life education. <i>Scholarly Inquiry for Nursing Practice: An International Journal</i> , 13(3), 211-234.	No comparable behavioral outcomes
3. Babouri, Esther M. (1985). Use of the group modality in the prevention of sexually transmitted diseases among adolescent girls. <i>International Journal of Adolescent Medicine and Health</i> , 1 (3&4), 325-336.	Unclear whether randomly assigned
4. Barth, R. P., Fetro, J. V., Leland, N., & Volkan, K. (1992). Preventing adolescent pregnancy with social and cognitive skills. <i>Journal of Adolescent Research</i> , 7(2), 208-232.	Improper randomization (a portion of schools assigned larger classes to treatment group)
5. Blake, Susan M., Simkin, Linda, Ledsky, et al. (2001). Effects of a parent-child communications intervention on young adolescents' risk for early onset of sexual intercourse. <i>Family Planning Perspectives</i> , 33 (2), 52-61.	No behavioral outcomes
6. Bolu, O.O., Lindsey, C., Kamb, M.L. et al. (2004). Is HIV/sexually transmitted disease prevention counseling effective among vulnerable populations?: A subset analysis of data collected for a randomized, controlled trial evaluating counseling efficacy (Project RESPECT). <i>Sexually Transmitted Diseases</i> 31 (8), 469-474.	No comparable behavioral outcomes
7. Borgia, P., Marinacci, C., Schifano, P., Perucci, C.A. (2005). Is peer education the best approach for HIV prevention in schools? Findings from a randomized controlled trial. <i>Journal of Adolescent Health</i> 35, 508-516.	Two new treatments compared.
8. Christopher, F. S., & Roosa, M. W. (1990). An evaluation of an adolescent pregnancy prevention program: is 'just say no' enough?! <i>Family Relations</i> , 39, 68-72.	Short follow-up period
9. Coyle, Karin, Basen-Enquist, Karen, Kirby, Douglas et al. (2001). Safer Choices: Reducing Teen Pregnancy, HIV, and AIDS. <i>Public Health Reports: 2001, Supplement 1</i> (116), 82-93.	Not enough information to create effect size
10. DeLamater, John, Wagstaff, David A., Havens, Kayt Klein. (2000). The impact of a culturally appropriate STD/AIDS education intervention on black male adolescents' sexual and condom use behavior. <i>Health Education & Behavior</i> , 27 (4), 453-469.	Less than 60% sample retention
11. De Wit, R., Victoir, A., & Van den Bergh, O. (1997). 'To touch them, is to love them': effects of direct experience with condoms on adolescents' attitudes toward condoms. <i>Health Education Research</i> , 12(3), 301-310.	No behavioral outcomes
12. Denny, G., Young, M., & Spear, C. E. (1999). An evaluation of the Sex Can Wait abstinence education curriculum series. <i>American Journal of Health Behavior</i> , 23(2), 134-143.	No behavioral outcomes

13. DiClemente, R. J., Pies, C. A., Stoller, E. J., Straits, C., Olivia, G. E., Haskin, J., & Rutherford, G. W. (1989). Evaluation of school-based AIDS education curricula in San Francisco. <i>Journal of Sex Research</i> , 26(2), 188-198.	No behavioral outcomes
14. Di Noia, J., Schinke, S.P., Pena, J.B., Schwinn, T.M. (2004). Evaluation of a brief computer-mediated intervention to reduce HIV risk among early adolescent females. <i>Journal of Adolescent Health</i> 35, 62-64.	No behavioral outcomes, short follow-up period
15. Elliott, L & Gruer, L. (1996). Theatre in AIDS education -- a controlled study. <i>AIDS Care</i> 8 (3), 321-341.	Two new treatments compared.
16. Ellis, J.A., Cohall, R.M., & Cohall, A.T. (2003). The need for increased comprehensive preventive care of male adolescents: results from a school-based intervention. <i>Journal of Adolescent Health</i> , 32 (2), 152.	No behavioral outcomes
17. Ferguson, Stephanie L. (1998). Peer counseling in a culturally specific adolescent pregnancy prevention program. <i>Journal of Health Care for the Poor and Underserved</i> , 9 (3), 322-340.	Study quality (differential attrition, small sample, little difference in treatment)
18. Fitzgerald, A. M., Stanton, B. F., Terreri, N., Shipena, H., Li, X., Kahihuata, J., Ricardo, I. B., Galbraith, J. S., & De Jaeger, A. M. (1999). Use of western-based HIV risk-reduction interventions targeting adolescents in an african setting. <i>Journal of Adolescent Health</i> , 25(1), 52-61.	Short follow-up period
19. Hahn, A., Leavitt, T., & Aaron, P. (1994). <i>Evaluation of the Quantum Opportunities Program (QOP), Did the Program Work?</i> Waltham, MA: Brandeis University, Heller Graduate School.	Pregnancy prevention not primary goal
20. Harrington, N.G., Giles, S.M., Hoyle, R.H. et al. (2001). Evaluation of the All Stars character education and problem behavior prevention program: effects on mediator and outcome variables for middle school students. <i>Health Education and Behavior</i> , 28 (5), 533-546.	Not enough information to create effect size.
21. Hewitt, N. (1998). <i>Africentricity, HIV behavioral intervention, and HIV risk associated behavior among African-American adolescents: a randomized controlled trial.</i> Unpublished doctoral dissertation, Princeton University, Princeton, NJ.	Not enough information to create effect size.
22. Hovell, M., Blumberg, E., Sipan, C., Hofstetter, C. R., Burkham, S., Atkins, C., & Felice, M. (1998). Skills training for pregnancy and AIDS prevention in Anglo and Latino youth. <i>Journal of Adolescent Health</i> , 23(2), 139-149.	No behavioral outcomes, short follow-up period
23. Jay, M. Susan, DuRant, Robert H., Shoffitt, Tamsen, et al. (1984). Effect of peer counselors on adolescent compliance in use of oral contraceptives. <i>Pediatrics</i> , 73 (2), 126-131.	No comparable behavioral outcomes, differential attrition
24. Jemmott, J.B. III, Jemmott, L.S., Fong, G.T. (1992). Reductions in HIV risk-associated sexual behaviors among black male adolescents: effects of an AIDS prevention intervention. <i>American Journal of Public Health</i> , 82 (3), 372-377.	Not enough information to create effect size
25. Jemmott, J.B. III, Jemmott, L.S., Fong, G.T. (1999). Reducing HIV risk-associated behavior among African American adolescents: testing the generality of intervention effects. <i>American Journal of Community Psychology</i> , 27 (2), 161-187.	No comparable behavioral outcomes
26. Jemmott, J.B., Jemmott, L.S., Braverman, P.K., & Fong, G.T. (2005). HIV/STD risk reduction interventions for African American and Latino adolescent girls at an adolescent medicine clinic. <i>Archives of Pediatric Medicine</i> 159, 440-449.	No comparable behavioral outcomes

27.	Kennedy, M. G., Mizuno, Y., Hoffman, R., Baume, C., & Strand, J. (2000). The effect of tailoring a model HIV prevention program for local adolescent target audiences. <i>AIDS Education and Prevention</i> , 12(3), 225-238.	Short follow-up period
28.	Kipke, M. D., Boyer, C., & Hein, K. (1993). An evaluation of an AIDS risk reduction education and skills training (ARREST) program. <i>Journal of Adolescent Health</i> , 14(7), 533-539.	Short follow-up period, no behavioral outcomes
29.	Kirby, D.B., Baumler, E., Coyle, K.K. et al (2004). The "Safer Choices" intervention: its impact on the sexual behaviors of different subgroups of high school students. <i>Journal of Adolescent Health</i> , 36 (6), 442-452.	Not enough information to create effect size.
30.	Krahe, B., Abraham, C., & Scheinberger-Olwig, R. (2006). Can safer-sex promotion leaflets change cognitive antecedents of condom use? An experimental evaluation. <i>British Journal of Health Psychology</i> , in press.	Short follow-up period, no behavioral outcomes
31.	Maynard, Rebecca, Trenholm, Christopher, Devaney, Barbara, Johnson, Amy, Clark, Melissa, Homrighausen, John, and Kalay, Ece (June 2005). <i>First-Year Impacts of Four Title V, Section 510 Abstinence Education Programs</i> . Princeton, NJ: Mathematica Policy Research, Inc. http://aspe.hhs.gov/hsp/05/abstinence/index.htm	No behavioral outcomes
32.	Metzler, C. W., Biglan, A., Noell, J., Ary, D. V., & Ochs, L. (2000). A randomized controlled trial of a behavioral intervention to reduce high-risk sexual behavior among adolescents in STD clinics. <i>Behavior Therapy</i> , 31, 27-54.	Less than 60% sample retention
33.	Miller, Brent C., Norton, Maria C., Jenson, Glen O. et al. (1993). Pregnancy prevention programs: impact evaluation of FACTS and feelings - A home-based video sex education curriculum. <i>Family Relations</i> , 42 (4), 392-400.	No comparable behavioral outcomes
34.	Noell, J., Ary, D., & Duncan, T. (1997). Development and evaluation of a sexual decision-making and social skills program: 'the choice is yours -- preventing HIV/STDs'. <i>Health Education and Behavior</i> , 24(1), 87-101.	Short follow-up period, no behavioral outcomes
35.	O'Donnell, L., Stueve, A., Agronick, G., et al. (2005). Saving sex for later: an evaluation of a parent education intervention. <i>Perspectives on Sexual and Reproductive Health</i> , 37 (4), 166-173.	No behavioral outcomes
36.	Orr, D. P., Langefeld, M., Katz, B. P., & Caine, V. A. (1996). Behavioral intervention to increase condom use among high-risk female adolescents. <i>The Journal of Pediatrics</i> , 128(2), 288-295.	Less than 60% sample retention
37.	Quirk, M. E., Godkin, M. A., & Schwenzfeier, E. (1993). Evaluation of Two AIDS Prevention Interventions for Inner-City Adolescent and Young Adult Women. <i>American Journal of Preventive Medicine</i> , 9 (1), 21-26.	Average age of participants=20.3
38.	Rickert, V. I., Gottlieb, A., & Jay, M. S. (1990). A comparison of three clinic-based AIDS education programs on female adolescents' knowledge, attitudes, and behavior. <i>Journal of Adolescent Health Care</i> , 11, 298-303.	No comparable behavioral outcomes
39.	Rogers Gillmore, Mary, Morrison, Diane M., Richey, Cheryl A., et al. (1997). Effects of a skill-based intervention to encourage condom use among high risk heterosexually active adolescents. <i>AIDS Education and Prevention</i> , 9 (SupA), 44-67.	Unable to obtain appropriate sample sizes, only subsample results presented
40.	Rotherum-Borus, M. J., Lee, M. B., Murphy, D. A., Futterman, D., Duan, N., Birnbaum, J. M., & Lightfoot, M. (2001). Efficacy of a preventive intervention for youths living with HIV. <i>American Journal of Public Health</i> , 91(3), 400-403.	Majority of sample over 18, gay males
41.	Rotherum-Borus, M. J., Gwadz, M., Fernandex, M.I., & Srinivasan, S. (1998). Timing of HIV interventions on reductions in sexual risk among adolescents. <i>American Journal of Community Psychology</i> 25 (1), 73-96.	Majority of sample over 18, no comparable behavioral outcomes.

42. Schinke, S. P., Gordon, A. N., & Weston, R. E. (1990). Self-Instruction to Prevent HIV Infection Among African-American and Hispanic-American Adolescents. <i>Journal of Consulting and Clinical Psychology</i> , 58(4), 432-436.	No behavioral outcomes, short follow-up
43. Shrier, L.A., Ancheta, R., Goodman, E. et al. Randomized controlled trial of a safer sex intervention for high risk adolescent girls. <i>Archives of Pediatric and Adolescent Medicine</i> 155: 73-79.	Older sample with STDs.
44. Slade, L. N. (1989). <i>Life-outcome perceptions and adolescent contraceptive use</i> . Unpublished Dissertation, Emory University, Atlanta.	Improper data collection (cannot get full sample measures), short follow-up period
45. Slonim-Nevo, Vered, Auslander, Wendy F., Ozawa, Martha N. et al. (1996). The long-term impact of AIDS-preventive interventions for delinquent and abused adolescents. <i>Adolescence</i> , 31 (122), 409-421.	Not enough information to create effect size
46. Smith, Marcia A. Bayne. (1994). Teen incentives program: evaluation of a health promotion model for adolescent pregnancy prevention. <i>Journal of Health Education</i> , 25 (1), 24-29.	Not enough information to create effect size
47. Stanton, B., Cole, M., Galbraith, J. et al. (2004). Randomized trial of a parent intervention: parents can make a differences in long-term adolescent risk behaviors, perceptions, and knowledge. <i>Archives of Pediatrics & Adolescent Medicine</i> , 158 (10), 947-955.	Control group received Focus on Kids intervention.
48. Stevenson, H. C., & Davis, G. (1994). Impact of a culturally sensitive AIDS video education on the AIDS risk knowledge of african-american adolescents. <i>AIDS Education and Prevention</i> , 6 (1), 40-52.	No behavioral outcomes
49. St. Lawrence, J.S., Jefferson, K.W., Alleyne, E., & Brasfield, T.L. (1995). Comparison of education versus behavioral skills training interventions in lowering sexual HIV-risk behavior of substance-dependent adolescents. <i>Journal of Consulting and Clinical Psychology</i> , 63 (1), 154-157.	No comparable behavioral outcomes
50. VanDevanter, N.L., Messeri, P., Middlestadt, S.E. et al. (2005). A community-based intervention designed to increase preventive health care seeking among adolescents: the gonorrhea community action project. <i>American Journal of Public Health</i> 95 (2), 331-337.	No behavioral outcomes
51. Weeks, Kyle, Levy, Susan R., Gordon, Audrey K., et al. (1997). Does parental involvement make a difference? The impact of parent-interactive activities on students in a school-based AIDS prevention program. <i>AIDS Education and Prevention</i> , 9 (SupA), 90-106.	Less than 60% sample retention, differential sample attrition
52. Workman, G.M., Robinson, W.L., Cotler, S., & Harper, G.W. (1996). A school-based approach to HIV prevention for inner-city African-American and Hispanic adolescent females. <i>Journal of Prevention & Intervention in the Community</i> , 14 (1-2), 41-60.	Less than 60% sample retention, No comparable behavioral outcomes.
53. Wu, Y., Stanton, B.F., Galbraith, J. et al. (2003). Sustaining and broadening intervention impact: a longitudinal randomized trial of 3 adolescent risk reduction approaches. <i>Pediatrics</i> , 111 (1), 32-38.	Control group received Focus on Kids intervention.

Appendix C: Estimated Impacts for Studies with Multiple Treatments Sharing a Control Group

Intervention Type, Study, Author(s), and Location	Gender	Measured Outcomes		Estimated Impacts		Sample Size		
		Intervention group mean	Control group mean	Percentage point difference	1/2 90% confidence interval	Intervention group	Control group	Total
Sexual experience								
13. Jemmott et al. (1998): Abstinence	Both	25.0%	32.3%	-7.3%	8.0%	176	167	343
Jemmott et al. (1998): Comprehensive	Both	29.9%	32.3%	-2.4%	8.3%	167	167	334
16. Moberg and Piper (1998): Combined	Both	21.5%	17.0%	4.5%^a	3.1%	1,164	676	1,840
Moberg and Piper (1998): Age Appropriate	Both	21.1%	17.0%	4.1% ^a	3.6%	617	676	1,293
Moberg and Piper (1998): Intensive	Both	21.9%	17.0%	4.9% ^a	3.8%	547	676	1,223
Pregnancy risk								
12. Herceg-Baron et al. (1981): Family Support	Female	55.1%	48.1%	7.0%	10.6%	98	156	254
Herceg-Baron et al. (1981): Periodic Support	Female	49.2%	48.1%	1.2%	12.1%	65	156	221
13. Jemmott et al. (1998): Abstinence	Both	11.5%	11.5%	0.0%	5.6%	174	174	348
Jemmott et al. (1998): Comprehensive	Both	7.1%	11.5%	-4.4%	5.1%	169	174	343
16. Moberg and Piper (1998): Combined	Both	9.3%	7.1%	2.2%	2.1%	1,164	676	1,840
Moberg and Piper (1998): Age Appropriate	Both	9.2%	7.1%	2.1%	2.5%	617	676	1,293
Moberg and Piper (1998): Intensive	Both	9.3%	7.1%	2.2%	2.6%	547	676	1,223
Pregnancy								
12. Herceg-Baron et al. (1981): Family Support	Female	13.3%	13.9%	-0.5%	7.4%	166	256	23
Herceg-Baron et al. (1981): Periodic Support	Female	10.8%	13.9%	-3.1%	7.7%	65	166	231

Source: Full citations for and descriptions of the referenced studies are presented in Appendix A.

Note: The results presented in Tables 4 through 6, include only one independent treatment/control comparison.

Impacts denoted in **bold** reflect the information included. In the case of Herceg-Baron et al (1981), the Family Support Intervention was randomly chosen to be included in the meta-analysis since both treatment conditions were aimed at similar goals. In the Jemmott et al. (1998) study, the two treatments had slightly differing goals, and thus the abstinence intervention was included in the analysis exploring sexual experience and the Safer Sex intervention was included in the analysis exploring pregnancy risk. In the Moberg and Piper (1998) study, schools who were randomized into the treatment group were allowed to choose between two treatments after random assignment (an Age Appropriate intervention taking place over multiple school years or an Intensive program taking place over one school year). In this case, the combined intervention sample was considered as being representative of the treatment being offered due to the timing of random assignment.

^a Although this estimate was initially statistically significant, after our analysis adjusted for clustering within groups (for example, classrooms or schools), the effect no longer remained significant.

*** $p \leq .01$, ** $p \leq .05$, * $p \leq .10$.

Table D.1: Results for Sexual Experience Rates Based on Quasi-experimental Design Studies

Intervention Type, Study, Author(s), and Location	Gender	Measured Outcomes		Estimated Impacts		Sample Size		
		Intervention group mean	Control group mean	Percentage point difference	1/2 90% confidence interval	Intervention group	Control group	Total
One-time consultation								
	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Sex education with abstinence focus								
QE2. Postrado&Nicholson(1992)	Female	12.8%	13.5%	-0.7%	0.057	257	155	412
Sex education with contraception component								
QE4. Howard&McCabe(1990)	Both	46.8%	53.2%	-6.4%	0.131	359	141	500
QE5. Kirby et al. (1991a)	Both	66.0%	75.1%	-9.1% ***	0.049	429	329	758
QE6. Little&Rankin (2001)	Both	22.9%	31.4%	-8.5%	0.102	166	105	271
QE7. Nicholson&Postrado (1991a)	Female	64.2%	69.1%	-4.9%	0.084	165	178	343
QE8. Warren & King (1994)	Female	26.0%	29.0%	-3.0%	0.113	877	631	1508
Warren & King (1994)	Male	28.0%	37.0%	-9.0% ***	0.045	878	632	1510
Pooled effects (QEDs); 5 studies, 6 estimates				-6.5% ***	0.022	2,874	2,016	4,890
Multi-component youth development								
QE9. East et al. (2000)	Male	23.1%	24.6%	-1.5%	0.057	299	305	604
East et al. (2000)	Female	20.4%	29.1%	-8.7% ***	0.048	432	430	862
Pooled effects (QEDs): 1 study, 2 estimates				-5.3%	0.069	731	735	1,466
Comprehensive clinic-based								
QE11. Furstenberg et al. (1997)	Both	57.5%	58.8%	-1.3%	0.055	348	597	945
QE12. Guttmacher et al. (1997)	Both	59.7%	60.1%	-0.4%	0.017	5,264	4,264	9,528
QE13. Hughes et al. (1995)	Both	52.1%	52.1%	-0.1%	0.060	680	257	937
QE14. Kirby et al. (1991b): Dallas	Female	79.8%	75.9%	3.9%	0.056	218	449	667
Kirby et al. (1991b): Dallas	Male	83.2%	85.8%	-2.7% **	0.022	1190	2141	3331
Kirby et al. (1991b): Gary	Female	63.0%	60.1%	2.8%	0.059	386	341	727
Kirby et al. (1991b): Gary	Male	82.1%	87.1%	-5.0%	0.050	274	294	568
Kirby et al. (1991b): Jackson	Female	82.1%	75.1%	7.0% *	0.063	190	273	463
Kirby et al. (1991b): Jackson	Male	95.8%	93.0%	2.8%	0.041	119	242	361
Kirby et al. (1991b): Muskegon	Female	69.0%	72.0%	-3.1%	0.059	248	497	745
Kirby et al. (1991b): Muskegon	Male	91.3%	93.1%	-1.8%	0.040	183	432	615
Kirby et al. (1991b): Quincy	Female	82.1%	82.0%	0.1%	0.050	352	283	635
Kirby et al. (1991b): Quincy	Male	91.1%	92.1%	-1.0%	0.040	235	315	550
Kirby et al. (1991b): San Francis	Female	46.0%	36.9%	9.1% **	0.067	226	420	646
Kirby et al. (1991b): San Francis	Male	57.8%	62.9%	-5.1%	0.069	204	426	630
QE15. Kisker et al. (1994)	Both	67.4%	72.1%	-4.7% ***	0.029	3,046	859	3,905
Pooled effects (QEDs): 5 studies, 16 estimates				-0.6%	0.014	13,163	12,090	25,253
All programs: 12 studies, 25 estimates				-2.0% **	0.014	17,025	14,996	32,021

Source: References for these studies are presented in Appendix E. The pool of quasi-experimental design studies that were considered for inclusion in this sensitivity analysis was limited to those reported in Kirby (2001), a narrative review that used similar search strategies, but that also included quasi-experimental design studies.

Note: Estimates are based on random-effects models estimated using Comprehensive Meta-analysis (Borenstein and Rothstein, 1999).

*** p<.01, ** p<.05, * p<.10.

Table D.2: Results for Pregnancy Risk Rates Based on Quasi-experimental Design Studies

Intervention Type, Study, Author(s), and Location	Gender	Measured Outcomes		Estimated Impacts		Sample Size		
		Intervention group mean	Control group mean	Percentage point difference	1/2 90% confidence interval	Intervention group	Control group	Total
One-time consultation								
QE1. Winter & Breckenmaker (1991)	Female	2.6%	7.9%	-5.3%	***	228	444	672
Sex education with abstinence focus								
	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Sex education with contraception component								
QE3. Gottsegen & Philliber (2001)	Male	15.2%	15.9%	-0.6%	5.9%	335	145	480
QE5. Kirby et al. (1991a)	Both	19.1%	20.1%	-0.9%	4.8%	429	329	758
QE7. Nicholson & Postrado (1991a)	Female	15.2%	20.1%	-4.9%	6.8%	164	174	338
Pooled effects: 3 studies, 3 estimates				-1.8%	3.3%	928	648	1,576
Multi-component youth development								
QE9. East et al. (2000)	Male	9.4%	11.5%	-2.1%	4.1%	299	305	604
East et al. (2000)	Female	4.6%	12.8%	-8.2%	*** 3.1%	432	430	862
Pooled effects: 1 study, 2 estimates				-5.3%	6.0%	731	735	1,466
Comprehensive clinic-based								
QE11. Furstenberg et al. (1997)	Both	24.1%	20.8%	3.4%	4.7%	348	597	945
QE12. Guttmacher et al. (1997)	Both	17.7%	16.7%	1.0%	1.3%	5,264	4,264	9,528
QE14. Kirby et al. (1991b): Dallas	Female	29.6%	19.7%	9.8%	*** 6.0%	213	441	654
Kirby et al. (1991b): Dallas	Male	34.7%	29.3%	5.4%	7.1%	167	423	590
Kirby et al. (1991b): Gary	Female	19.9%	23.3%	-3.4%	5.1%	381	339	720
Kirby et al. (1991b): Gary	Male	28.5%	26.8%	1.7%	6.3%	270	280	550
Kirby et al. (1991b): Jackson	Female	24.6%	29.1%	-4.5%	6.9%	187	268	455
Kirby et al. (1991b): Jackson	Male	38.1%	38.9%	-0.8%	9.0%	118	239	357
Kirby et al. (1991b): Muskegon	Female	17.1%	28.8%	-11.6%	*** 5.2%	245	497	742
Kirby et al. (1991b): Muskegon	Male	19.9%	36.2%	-16.3%	*** 6.2%	181	417	598
Kirby et al. (1991b): Quincy	Female	15.7%	21.4%	-5.7%	* 5.1%	351	281	632
Kirby et al. (1991b): Quincy	Male	25.0%	26.8%	-1.8%	6.2%	308	235	543
Kirby et al. (1991b): San Francisco	Female	11.5%	12.0%	-0.5%	4.4%	226	415	641
Kirby et al. (1991b): San Francisco	Male	14.9%	21.7%	-6.9%	** 5.3%	202	414	616
QE15. Kisker et al. (1994)	Both	27.2%	35.7%	-8.5%	*** 3.0%	3,045	858	3,903
QE16. Nicholson & Postrado (1991b)	Female	15.5%	18.5%	-3.0%	7.6%	84	265	349
Pooled effects: 5 studies, 16 estimates				-2.7%	2.6%	11,590	10,233	21,823
All programs: 10 studies, 22 estimates				-3.1%	** 2.0%	13,477	12,060	25,537

Source: References for these studies are presented in Appendix E. The pool of quasi-experimental design studies that were considered for inclusion in this sensitivity analysis was limited to those reported in Kirby (2001), a narrative review that used similar search strategies, but that also included quasi-experimental design studies.

Note: Estimates are based on random-effects models estimated using Comprehensive Meta-analysis (Borenstein and Rothstein, 1999).

*** p<.01, ** p<.05, * p<.10.

Table D.3: Results for Pregnancy Rates Based on Quasi-experimental Design Studies

Intervention Type, Study, Author(s), and Location	Gender	Measured Outcomes		Estimated Impacts		Sample Size		
		Intervention group mean	Control group mean	Percentage point difference	1/2 90% confidence interval	Intervention group	Control group	Total
One-time consultation								
	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Sex education with abstinence focus								
	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Sex education with contraception focus								
QE5. Kirby et al. (1991a)	Both	13.1%	10.0%	3.0%	3.8%	429	329	758
QE7. Nicholson & Postrado (1991a)	Female	7.9%	9.6%	-1.7%	5.0%	165	178	343
Pooled effects: 2 studies, 2 estimates				1.0%	4.2%	594	507	1,101
Multicomponent youth development								
QE9. East et al. (2000)	Male	0.7%	1.3%	-0.6%	1.3%	299	305	604
	Female	3.7%	6.5%	-2.8% *	2.5%	432	430	862
QE10. Vincent et al. (1987)	Female	2.5%	4.6%	-2.1%	2.3%	319	391	710
Pooled effects: 2 studies, 3 estimates				-1.3% **	1.1%	1,050	1,126	2,176
Comprehensive clinic-based								
QE13. Hughes et al. (1995)	Female	8.0%	7.1%	0.9%	3.9%	537	154	691
QE14. Kirby et al. (1991b): Dallas	Female	21.6%	13.4%	8.2% ***	5.4%	213	426	639
	Male	9.3%	16.5%	-7.2% *	5.1%	140	389	529
	Female	13.1%	16.0%	-2.9%	4.3%	382	337	719
	Male	13.9%	12.0%	2.0%	4.7%	266	276	542
	Female	20.6%	15.8%	4.8%	6.1%	189	272	461
	Male	17.1%	11.3%	5.7%	6.6%	117	238	355
	Female	16.3%	14.4%	1.9%	4.7%	245	493	738
	Male	11.1%	12.0%	-0.8%	4.7%	180	393	573
	Female	12.3%	12.1%	0.2%	4.3%	349	280	629
	Male	6.5%	9.8%	-3.3%	4.0%	292	234	526
	Female	12.0%	8.7%	3.3%	4.2%	225	414	639
	Male	6.7%	9.9%	-3.2%	3.8%	195	406	601
QE15. Kisker et al. (1994)	Female	24.8%	34.3%	-9.5%	4.2%	1,340	429	1,769
QE16. Nicholson&Postrado (1991b)	Female	3.6%	9.8%	-6.2%	4.5%	84	265	349
Pooled effects: 4 studies, 15 estimates				-0.7%	2.0%	4,754	5,006	9,760
All programs: 8 studies, 20 estimates				-0.9%	1.3%	6,398	6,639	13,037

Source: References for these studies are presented in Appendix E. The pool of quasi-experimental design studies that were included in this sensitivity analysis was limited to those reported in Kirby (2001), a narrative review that used similar search strategies, but that also included quasi-experimental design studies.

Note: Estimates are based on random-effects models estimated using Comprehensive Meta-analysis (Borenstein and Rothstein, 1999).

*** p<.01, ** p<.05, * p<.10.

One-time Consultations

- QE1. Winter, L & Breckenmaker, L.C. (1991) Tailoring family planning services to the special needs of adolescents. *Family Planning Perspectives* 23 (1), 24-30.

Sex Education with an Abstinence Focus

- QE2. Postrado, L.T. & Nicholson, H.J. (1992). Effectiveness in delaying the initiation of sexual intercourse of girls aged 12-14: two components of the girls incorporated preventing adolescent pregnancy program. *Youth and Society* 23 (3), 356-379.

Sex Education with a Contraception Component

- QE3. Gottsegen, E. & Philliber, W.W. (2000). Impact of a male responsibility program on younger adolescents. Unpublished manuscript.
- QE4. Howard, M. & McCabe, J. (1990). Helping teenagers postpone sexual involvement. *Family Planning Perspectives*, 22 (1), 21-26.
- QE5. Kirby, D., Barth, R., Leland, N., and Fetro, J. (1991). Reducing the risk: a new curriculum to prevent sexual risk-taking. *Family Planning Perspectives*, 23 (6), 253-263.
- QE6. Little, C.B. & Rankin, A. (2001). An evaluation of the postponing sexual involvement curriculum among upstate New York eighth graders. *Sociological Forum*, 15 (4).
- QE7. Nicholson, H.J. & Postrado, L.T. (1991a). Effectiveness of taking care of business: a life options component of the girls incorporated preventing adolescent pregnancy program. In Nicholson H.J. & Postrado, L.T. *Girls Incorporated Preventing Adolescent Pregnancy: A Program Development and Research Project. Volume 1: Effectiveness of Program Components*. New York: Girls Incorporated.
- QE8. Warren, W.K. & King, A.J.C. (1994). *Development and evaluation of an AIDS/STD/sexuality program for grade 9 students*. Kingston, Ontario: Council of Ministers of Education, Canada.

Multi-component Youth Development Program

- QE9. East, P., Kiernan, E. & Chavez, G. (2003). An evaluation of California's adolescent sibling pregnancy prevention program. *Perspectives on Sexual and Reproductive Health* 35 (2), 62-70.
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