

Interventions Intended to Reduce Pregnancy-Related Outcomes Among Adolescents  
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- Title of review:** Interventions Intended to Reduce Pregnancy-Related Outcomes Among Adolescents
- Reviewers:** Lauren Sue Scher, Ph.D., University of Pennsylvania  
Rebecca A. Maynard, Ph.D., University of Pennsylvania  
Matthew Stagner, Ph.D., Urban Institute
- Contact information:** Rebecca Maynard  
3700 Walnut St  
Philadelphia, PA 19104  
(215) 898-3558  
rmaynard@gse.upenn.edu
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## 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 have fallen over the past decade, they remain high and, by a considerable margin, 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, sometimes through strategies that also promote abstinence from sexual activity, sometimes through initiatives that focus mainly on promoting contraception, and most often through strategies that encourage abstinence, but that also promote contraception among sexually active teens.<sup>1</sup>

Extensive research has been conducted exploring the antecedents to sexual 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 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

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<sup>1</sup> Throughout this review, we use the terms teenage pregnancy and childbearing to refer to unplanned or mistimed teenage pregnancies and births. In the past two decades, it has been relatively uncommon for teens in the United States and most similarly developed countries intentionally to become pregnant and give birth (Brown and Eisenberg 1995).

aimed at younger versus older adolescents. To date, no consensus has emerged from the literature regarding either the effectiveness of particular intervention strategies or their implementation in particular settings.

Thirteen (13) 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, how they analyze the results of included studies and, as a result, their conclusions. Only a few of the reviews followed clearly defined search and inclusion criteria. Yet, one clear dimension of variability in the study base derives from decisions regarding whether to 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.

This review improves upon the prior reviews in six ways. First, the review focuses on a clear and policy relevant set of questions in terms of both the intervention and the outcomes. It focuses only on interventions with a primary goal of reducing sexual risk-taking behaviors that measure at least one of three key outcomes: (1) sexual initiation, (2) pregnancy risk (engaging in sex without contraception), and/or (3) pregnancy.

Second, this review includes 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 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 analysis of the sensitivity of the results 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 assess the generalizability of the current corpus of evidence.

Table 1: Key Features of Reviews of Programs Designed to Affect Adolescent Sexual Risk-Taking Behaviors

Summary of Findings as Reported in the Study	Authors' Conclusions and/or Recommendations
<b>Narrative Reviews</b>	
<b>Frost &amp; Forrest (1995): Experiments &amp; quasi-experiments; United States; published (5 studies)</b>	
Delayed sexual debut; increased contraceptive use; no significant change in pregnancy rates.	Sexual initiation can be reduced by as much as 15%; programs should target younger adolescents; could provide contraceptive component for sexually active teens.
<b>Grunseit et al. (1997): Variety of research methods (highlighted experiments); International (47 studies; 11 RCTs)</b>	
17 studies reported reductions in sexual behavior; 3 studies found increases in sexual behavior.	Some programs can work; little reason to believe contraceptive education encourages sexual activity.
<b>Kirby (2001): Experiments &amp; quasi-experiments; North America; published and unpublished (75 studies)</b>	
Certain programs/ components of programs reduced sexual risk-taking.	“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.” (p11)
<b>Kirby (1997): Experiments &amp; quasi-experiments; North America; published (50 or more studies)</b>	
No impact on sexual debut; some increase in knowledge; some effect on other behaviors.	Successful programs have multiple effective components.
<b>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)</b>	
Concluded that the following types of programs work: intensive programs (for females); service learning/ youth development combined with sex education; and early childhood interventions. Concluded that the following do not work: abstinence-only programs and programs designed to increase parent communication.	Concurred with Kirby's (2001) conclusions regarding which sex education, HIV education, and clinic-based program components affect adolescent sexual behavior.
<b>NHS Center for Reviews &amp; Dissemination (1997): Experiments &amp; quasi-experiments; English language; published &amp; unpublished (42 studies; 15 RCTs)</b>	
School-based sex education programs demonstrated effectiveness, particularly when linked with contraceptive services and skills building.	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
<b>Oakley et al. (1995): Experiments &amp; quasi-experiments; English language; published &amp; unpublished (12 studies)</b>	
Mixed results. Three programs increased knowledge and/or reduced sexual activity; one had harmful effects; others had no effect or ambiguous effects.	“Further well-designed studies are needed with a long enough follow up to justify conclusions about the effectiveness of sexual health education in reaching “health of the nation” goals. 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’.”
<b>Thomas (2000): Variety of methods; United States; Abstinence-based programs (9 studies)</b>	
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.” (p16)
<b>Visser &amp; Van Bilsen (1994): Variety of research methods; UK, USA (21 studies)</b>	
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.

(continued)

Table 1 (continued)

Meta-Analyses	
<b>DiCenso et al. (2002): Experiments only; N. America, New Zealand, Australia, W. Europe; published and unpublished (26 studies)</b>	
No impacts on delay of sex. 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."
<b>Franklin et al. (1997): Not described (32 studies)</b>	
Small significant impacts on contraceptive use and pregnancy. No significant effect on sexual activity.	Community-based programs are more effective than school-based; clinic-based programs can increase contraception use; programs should be modified depending on age groups served; specific foci for males vs. females.
<b>Kim et al. (1997): United States (40 studies; 4 meta analyzed)</b>	
One-third to half of the studies reported increased condom use and higher rates of abstinence. More favorable results for nonexperimental design studies.	"... intervention programs may be strengthened by inclusion of the following recommendations... Base the program on a theoretical framework... Incorporate community and/or cultural aspect of the target population . . . Include training in coping skills... Consider the duration of the intervention..."
<b>Silva (2002): United States (12 studies)</b>	
Evidence of very small 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 more effective. There is no relationship between program duration and effectiveness.

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

## OBJECTIVES OF THE REVIEW

This review summarizes the evidence regarding the effectiveness of interventions designed to reduce sexual 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 sexual 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 average impacts on sexual initiation, pregnancy risk (sex without the use of contraception), and pregnancy?
- What are the 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; (3) sex education programs with a contraception component; and (4) multi-component youth development programs?
- What are the average estimated impacts of programs targeted at different age groups of youth?
- What are the average 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 differed had it included evidence from quasi-experimental design studies?

## METHODOLOGY

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

### *Searching for and selecting studies for inclusion in the review*

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 new pregnancy prevention intervention.
4. **Target population.** The program targeted exclusively or primarily school-age youth, 11 and 18 years old.
5. **Outcome measures.** The study reports impact estimates for at least one of three outcomes: (1) sexual initiation; (2) pregnancy risk (has sex without using contraception); 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 pertain to the full study sample, not self-selected sub-samples, such as those who participate in the intervention or complete the program.<sup>2</sup>
6. **Intervention setting.** The study reports on field trials conducted in the United States or in developed countries with relatively high rates of teen pregnancy, such as Canada, England, New Zealand, Australia, or Western Europe, and published between 1980 and November 2002.<sup>3</sup>
7. **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.
8. **Sample retention.** The study reports outcome data for at least 60 percent of the original baseline sample (or at least 60 percent of a randomly selected subset of the original sample if the follow-up was limited to a portion of the original sample).
9. **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.

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<sup>2</sup> Studies also were 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. 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.

<sup>3</sup> Only English-language databases and journals were explored. However, had a foreign language study meeting the criteria had been identified, it would have been included in the review.

## ***Outcomes and the numbers of impact estimates identified***

All three outcome measures are dichotomous and, thus, are reported as percentages and percentage point differences.<sup>4</sup> The specific definitions of the outcome measures reported in this review are as follows:

- *Sexual initiation*: The percent of youth in the program and control groups who reported in their follow-up surveys having ever had sexual intercourse. In total, 33 independent estimates of program impacts on sexual initiation rates were reported in on 18 separate studies.
- *Pregnancy risk*: The percent of youth who, at follow-up, reported engaging in sexual activity but not using an effective method of contraception.<sup>5</sup> 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 initiation. The "pregnancy risk" measure considers all non-sexually active youth as *not* at "pregnancy risk." There are 25 independent estimates of program impacts on pregnancy risk from 19 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 21 independent estimates of program impacts from 11 separate studies.

## ***Research synthesis methods***

The review both tabulates the full set of findings from all studies meeting the review criteria and, where appropriate, computes and reports the results of statistical meta-analyses of the findings overall and for key subgroups of studies. 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 sixty percent of the baseline sample has been retained.<sup>6</sup> 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 cases where a study included multiple treatments with a shared control group, only one treatment/control comparison, selected randomly, was included in a pooled estimate. No imputations for missing outcome measures were made.

In cases where there are multiple independent impact estimates for a particular subgroup of interest, pooled impact estimates were computed using Comprehensive Meta-Analysis

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<sup>4</sup> Because odds-ratios are sensitive to the base values of the outcome measures, they do not lend themselves to practical comparisons of impacts across programs or among sample subgroups using odds ratios.

<sup>5</sup> 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.

<sup>6</sup> Sensitivity analyses revealed generally robust findings regardless of the reference period for the outcome measures used.

random effects estimation models (Hedges and Vevea, 1998; Borenstein and Rothstein, 1999). In so far as most of the pooled results are based on models where there is evidence or heterogeneity or where there are too few impact estimates to test reliably for homogeneity, these pooled estimates should be viewed simply as the best point-estimate of the average impact across the available studies and not as a generalizable estimate of the effectiveness of a particular intervention.

## LITERATURE SEARCH AND YIELD

A broad-based, thorough literature search for this review was conducted in Fall 2002. The search covered five domains: (1) prior reviews of evidence; (2) searches of over 20 electronic data bases; (3) hand searches of specific journals for specified years; (4) internet searches; and (5) personal contacts. 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. Reasons for rejection were coded for those not meeting the review inclusion criteria; and, for those meeting the inclusion criteria, detailed information about the intervention, the study design and implementation, and the outcomes were coded.<sup>7</sup>

In total, 59 studies using randomized controlled trials (RCTs) were identified. Of these, 26 met the criteria for inclusion in the review, and 33 did not. Most of the studies included in the review were identified through prior reviews and were published in peer-reviewed journals. Searching uncovered a total of five additional studies, as well as numerous “companion articles” that provide supporting evidence and information concerning the included studies. Eight of the included studies (30 percent) were not formally published in a journal or book. Appendix A provides detailed characteristics the 26 studies included in the review, sorted by intervention type.

The 33 randomized control studies *excluded* from the review were excluded for a variety of reasons: 13 did not measure behavioral outcomes; 8 did not have a sufficient follow-up period; 6 did not provide sufficient information to calculate impact estimates and/or their standard errors; 7 had significant study quality flaws (for example, inappropriate randomization and/or data collection methods, differential sample attrition,); 5 had more than forty percent sample attrition; 2 served primarily non-school-aged adolescents; and 1 program did not have pregnancy prevention as a primary goal.<sup>8</sup> Appendix B provides a list of the excluded randomized control trials and describes the primary reasons for exclusion.

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<sup>7</sup> The coding instrument is available from the lead author. 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.

<sup>8</sup> These are not mutually exclusive categories.

## FINDINGS

In total, this review presents findings based on roughly 30,000 youth who were the subjects of 26 studies that reported on a total of 31 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 programs included more than 30 hours of service. The majority of the interventions targeted middle school youth, among whom low percentages had sexual experience prior to the intervention. However, 10 of the studies focused on high school youth who tended to report relatively high rates of sexual experience (Table 2, column 3). Most of the interventions served both males and females. However, eight interventions were tested with only males or females (Table 2, column 4).

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 review focused on high school-aged adolescents, two targeted females exclusively, and one targeted males exclusively; the fourth study targeted middle school boys and girls.
- (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. Moreover, the interventions that are the focus of these studies 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.<sup>9</sup> 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.

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<sup>9</sup> This study reported on three 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 third randomly assigned adolescents. This third program provided outcomes for less than 60 percent of the original sample and, thus, was excluded from this review.

Table 2: Study and Intervention Characteristics

Intervention Type, Study, Author(s), and Locatin	Program Name	Sample and intervention characteristics					Study characteristics				Outcome Measured (X)		
		Gender(s) served	% Sexually experienced at intake	Focal level in school	School-based setting	Hours duration	Unit of randomization	% response at follow-up	Months of follow-up	Control group services	Initiated sex	Pregnancy risk	Pregnancy
<b>One-time consultation</b>													
1 Boekeloo et al. (1999)	ASSESS	Both	>21%	Middle	No	1 or less	Students	92.0	9	Different goal		X	X
2 Danielson et al. (1990)	Untitled	Males	37	High	No	1 or less	Student	81.3	12	None	X	X	
3 Hanna (1990)	Untitled	Females	100	High	No	1 or less	Student	74.0	3	Usual services		X	
4 Mansfield et al. (1993)	Untitled	Females	100	High	No	1 or less	Student	92.0	2	Usual services		X	
<b>Sex education with abstinence focus</b>													
5 Jorgensen et al. (1993)	Project Taking Charge	Both	45	Middle	Yes	11-30	Classrooms	100.0	6	None	X		
6 Kirby et al. (1995): Site 1 (teen-led)	ENABL	Both	10	Middle	Yes	2-10	Classrooms	66.3	17	Usual services	X	X	X
6 Kirby et al. (1995): Site 2 (adult-led)	ENABL	Both	10	Middle	Yes	2-10	Classrooms	66.3	17	Usual services	X	X	X
6 Kirby et al. (1995): Site 3 (adult-led)	ENABL	Both	10	Middle	Yes	2-10	31 schools	73.7	17	Usual services	X	X	X
7 Thomas et al. (1992)	McMaster Teen Program	Both	19	Middle	Yes	2-10	21 schools	78.1	48	Usual services	X	X	X
<b>Sex education with contraception component</b>													
8 Baker (1990)	Untitled	Females	100	High	No	2-10		76.0	6	Usual services		X	X
9 Blake et al., (2000)	Untitled	Both	51	High	Yes	11-30	30 teachers	68.9	6	Usual services	X		
10 Coyle et al. (2000)	Draw the Line/Respect the Line	Both	4	Middle	Yes	11-30	19 schools	87.0	24	Usual services	X		
11 Eisen et al. (1990)	Teen Talk	Both	37	Mixed	Yes	11-30	Mixed	61.5	13	Usual services	X	X	
12 Herceg-Baron et al. (1981)	Family Support	Females	87	High	No	2-10	Students	78.0	15	Usual services		X	X
13 Jemmott et al. (1998)	Be Proud, Be Responsible	Both	25	Middle	Yes	2-10	Students	78.3	3 & 12	Different goal	X	X	
14 Kirby et al. (1997)	Project SNAPP	Both	8	Middle	Yes	2-10	102 classrooms	72.7	17	Usual services	X	X	X
15 Levy et al. (1995)	Youth AIDS Prevention Project	Both	35	Middle	Yes	11-30	15 districts	69.8	21	Usual services	X	X	
16 Moberg and Piper (1998)	Healthy for Life	Both	Not reported	Middle	Yes	>30	21 schools	74.1	29	Usual services	X	X	
17 Schinke et al. (1981)	Untitled	Both	Not reported	High	Yes	11-30	Students	100.0	12	Different goal		X	
18 Stanton et al. (1996)	Focus on the Kids	Both	36	Middle	No	11-30	76 peer groups	73.0	12	Usual services		X	
19 St. Lawrence et al. (1995)	BART	Both	50	Middle	No	11-30	Students	91.5	14	Usual services	X	X	
20 Wight et al. (2002)	SHARE	Both	17	Middle	Yes	11-30	25 schools	76.9	24	Usual services	X	X	
<b>Multi-component/youth development</b>													
21 Allen et al. (1997)	Teen Outreach Program (TOP)	Females	Not reported	High	Yes	>30	Mixed	81.0	9	Unknown			X
22 Grossman & Sipe (1992): Cohort 2	STEP	Both	45	High	No	>30	Students	77.2	42	Different goal	X		X
22 Grossman & Sipe (1992): Cohort 3	STEP	Both	45	High	No	>30	Students	84.7	42	Different goal	X		X
23 Handler (1987)	Peer Power	Females	12	Middle	Yes	>30	Students	79.4	12	Usual services	X		X
24 McBride & Gienapp (2000): Site "E"	Untitled	Females	63	High	No	11-30	Students	77.4	8	Usual services	X	X	
24 McBride & Gienapp (2000): Site "F"	Untitled	Females	63	High	Yes	11-30	Students	77.1	8	Usual services	X	X	
24 McBride & Gienapp (2000): Site "G"	Untitled	Females	63	High	Yes	11-30	Students	65.9	6	Usual services	X	X	
25 O'Donnell et al. (2002)	Reach for Health	Both	25	Middle	Yes	>30	18 classrooms	76.5	45	Usual services	X		X
26 Philliber et al. (2001)	Carrera Program	Both	24	Middle	No	>30	Students	80.9	36	Different goal	X	X	X

**Sex education with a contraception education component** (13 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 vary widely in terms of the youth they served and their program characteristics. Thirty-percent of the programs evaluated served high school aged adolescents, 61 percent served middle-school aged adolescents only, and one program served a mixture of ages. Eight of the 13 programs studied (61 percent) served predominantly virgins. Only one of the programs offered 30 hours or more of service, and 4 of the 13 programs offered fewer than ten hours of service. Most (9) took place in schools, but some operated in clinics or community-based organizations.

(3) **Multi-component youth development programs with pregnancy a prevention component** (6 studies). Multi-component youth development programs generally aim to reduce a variety of risky behaviors, 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.

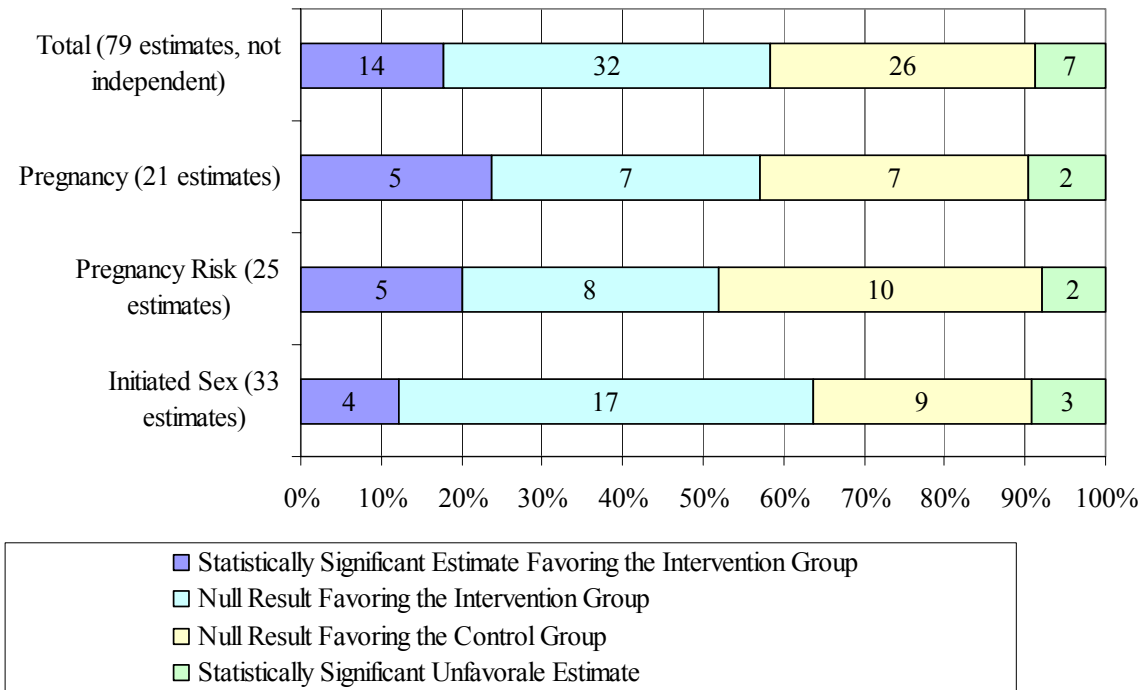
Most of the multi-component youth development programs included in this review entail over 50 hours (often more than 100 hours) of program-related activities for participating youth. Some programs target youth at “elevated risk,” while others serve broader population of adolescents. Between 12 and 63 percent of youth served by the programs evaluated had initiated sex prior to entering the program. Some of these programs operate outside of schools and others operate 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.

### ***Estimated Program Impacts***

This review finds no consistent evidence that the types of pregnancy prevention programs evaluated to date will alter in intended ways the sexual activity or pregnancy risks of youth. Rather, the results vary considerably from study to study, as well as among sample subgroups and across settings. Over the 26 studies that reported on one or more of the outcome measures, 58 percent of the 79 estimates of intervention impacts favor the intervention group and 42 percent favored the control group. Of greater relevance is the fact that 18 percent of the estimated impacts are statistically significant and favor the

intervention group, and 9 percent are statistically significant and favor the control group (Figure 1).

Figure 1: Sign and Statistical Significance of Impact Estimates, by Outcome  
(Number of independent estimates is in parentheses)



There is considerable heterogeneity in the impact estimates reported for the various interventions and even for different subgroups and settings within intervention. However, 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 less than one percentage point 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).

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
Initiated Sex	18 studies; 33 estimates	31,157	36.7%	37.3%	-0.6%	+/- 1.3%
Pregnancy Risk	19 studies; 25 estimates	25,656	14.9%	15.6%	-0.7%	+/- 1.5%
Pregnancy	11 studies; 21 estimates	15,668	9.0%	9.2%	-0.2%	+/- 1.0%

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 sexual initiation by program and program type.*** As with the overall pattern of results, there is considerable heterogeneity in estimated impacts of interventions on sexual initiation rates over all of the studies ( $p$ -value  $< 0.001$ ), as well as among the estimates for two of the three program types for which there are multiple estimates—sex education with an abstinence focus and sex education with a contraception component. The impact estimates range from a 10-percentage point *increase* in sexual initiation among males who participated in the McMaster Teen Program (Thomas et al. 1992) to an 18-percentage point *decrease* among youth in the Project Taking Charge Program (Jorgensen et al. (1993). Yet, two-thirds of the estimates are between a 5-percentage point increase and a 5-percentage point decrease (Table 4).

Notably, the pooled impact estimates are near zero for each of the four categories of intervention and none is statistically significant (Figure 2). Furthermore, for the three categories of interventions for which there are multiple impact estimates, the range of estimates tends to be large and include some results favoring the intervention group and others favoring the control group. For example, of the nine estimates for sex education programs with an abstinence focus, there are two statistically significant estimates favoring the intervention group and two favoring the control group. One of six estimated impacts for ENABL (Kirby et al. 1995) and the estimated impact for Project Taking Charge (Jorgenson et al. (1983) favor the intervention group; another of the six estimated impacts for ENABL and the estimated impact of the McMaster Program (Thomas et al. 1992) favor the control group.

Of the 12 estimates for sex education programs with a contraception component, there are 2 statistically significant estimates favoring the intervention group and one favoring the control group. Those favorable to the intervention group are for the untitled program evaluated by Blake et al. (2000) for Draw the Line (Coyle et al. 2000). The estimated impact of the Healthy for Life Program (Moberg and Piper 1998) favors the control group. And, of the 10 impact estimates for multi-component youth development programs, the 2 statistically significant (and sizeable) impact estimates favoring the intervention group come

Table 4: Results for Sexual Initiation Based on Experimental Design Studies

Intervention Type, Study, Author(s), and Locatin	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
<b>One-time consultations</b>								
2. Danielson et al. (1990)	Male	53.7%	53.8%	-0.1%	5.3%	488	483	971
<b>Sex education with abstinence focus</b>								
5. Jorgensen et al. (1993)	Both	55.8%	74.4%	-18.6% *	16.1% <sup>a</sup>	52	39	91
6. Kirby et al. (1995): Site 1	Female	17.6%	15.3%	2.2%	4.1% <sup>a</sup>	393	509	902
Kirby et al. (1995): Site 1	Male	34.1%	37.8%	-3.7%	6.0% <sup>a</sup>	311	384	695
Kirby et al. (1995): Site 2	Female	18.0%	19.7%	-1.7%	3.5% <sup>a</sup>	654	740	1,394
Kirby et al. (1995): Site 2	Male	30.5%	36.0%	-5.5% *	4.9% <sup>a</sup>	456	533	989
Kirby et al. (1995): Site 3	Female	23.6%	20.9%	2.8%	2.9% <sup>a</sup>	1129	1115	2,244
Kirby et al. (1995): Site 3	Male	35.1%	29.4%	5.6% **	3.8% <sup>a</sup>	804	819	1,623
7. Thomas et al. (1992)	Female	48.0%	46.9%	1.1%	4.6% <sup>a</sup>	831	524	1,355
Thomas et al. (1992)	Male	54.1%	44.2%	9.9% **	4.9% <sup>a</sup>	762	453	1,215
<b>Pooled results: 3 programs, 9 estimates</b>		<b>30.5%</b>	<b>29.5%</b>	<b>1.0%</b>	<b>2.9%</b>	<b>5,340</b>	<b>5,077</b>	<b>10,508</b>
<b>Sex education with contraception component</b>								
9. Blake et al., (2000)	Both	51.0%	58.0%	-6.9% **	5.4% <sup>a</sup>	390	540	930
10. Coyle et al. (2000)	Female	11.0%	10.0%	1.0%	2.9% <sup>a</sup>	663	571	1,234
Coyle et al. (2000)	Male	13.9%	21.0%	-7.1% ***	3.6% <sup>a</sup>	632	595	1,227
12. Eisen et al. (1990)	Female	44.2%	40.4%	3.7%	7.4% <sup>a</sup>	249	230	479
Eisen et al. (1990)	Male	64.2%	68.4%	-4.2%	7.7% <sup>a</sup>	212	196	408
13. Jemmott et al. (1998)	Both	25.0%	32.3%	-7.3%	8.0% <sup>a</sup>	176	167	343
14. Kirby et al. (1997)	Female	15.7%	15.5%	0.3%	4.1% <sup>a</sup>	426	427	853
Kirby et al. (1997)	Male	29.7%	29.5%	0.2%	5.7% <sup>a</sup>	347	342	689
15. Levy et al. (1995)	Both	52.9%	54.5%	-1.5%	4.1% <sup>a</sup>	1001	668	1,669
16. Moberg and Piper (1998)	Both	21.5%	17.0%	4.5% **	3.1% <sup>a</sup>	1164	676	1,840
19. St. Lawrence et al. (1995)	Both	55.8%	65.5%	-9.7%	10.6% <sup>a</sup>	113	113	226
20. Wight et al. (2002)	Male	33.7%	34.0%	-0.3%	3.0% <sup>a</sup>	1288	1436	2,724
Wight et al. (2002)	Female	41.6%	42.6%	-1.0%	2.9% <sup>a</sup>	1553	1577	3,130
<b>Pooled results: 9 programs, 13 estimates</b>		<b>33.8%</b>	<b>35.2%</b>	<b>-1.4%</b>	<b>1.9%</b>	<b>8,214</b>	<b>7,538</b>	<b>15,752</b>
<b>Multi-component youth development programs</b>								
22. 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
23. Handler (1987)	Female	32.0%	40.0%	-8.0%	22.3%	25	25	50
24. 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
25. O'Donnell et al. (2002)	Female	48.4%	57.4%	-9.0%	15.2% <sup>a</sup>	62	54	116
O'Donnell et al. (2002)	Male	73.8%	83.8%	-10.0%	15.0% <sup>a</sup>	42	37	79
26. Philliber et al. (2001)	Female	59.0%	64.9%	-6.0%	7.0%	268	251	519
Philliber et al. (2001)	Male	69.1%	73.2%	-4.0%	7.2%	217	205	422
<b>Pooled results: 5 programs, 10 estimates</b>		<b>71.5%</b>	<b>72.7%</b>	<b>-1.2%</b>	<b>2.0%</b>	<b>2,019</b>	<b>1,907</b>	<b>3,926</b>
<b>All studies: 28 programs, 33 estimates</b>		<b>36.7%</b>	<b>37.3%</b>	<b>-0.6%</b>	<b>1.3%</b>	<b>16,061</b>	<b>15,005</b>	<b>31,157</b>

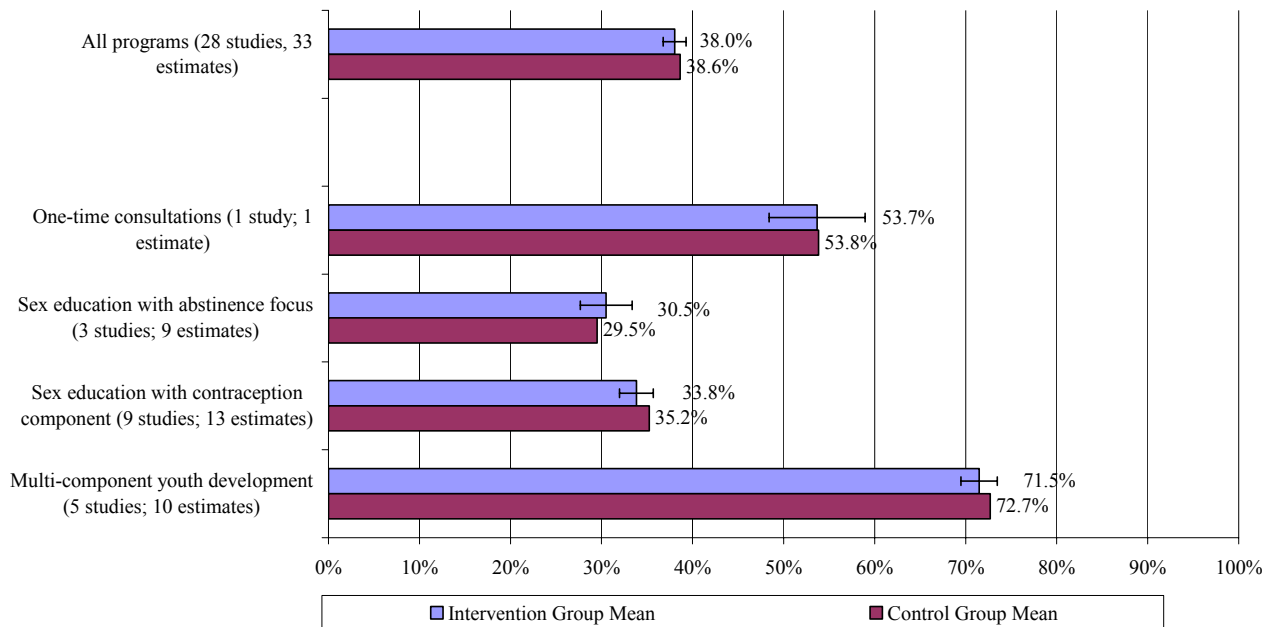
Source: Full citations for and descriptions of the referenced studies are presented in Appendix A.

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

<sup>a</sup> This estimate was the result of a clustered randomized trial, and the analysis does not appropriately adjusted for clustering and, thus, will overstate the statistical significance of the impact estimates.

\*\*\* p ≤ .01, \*\* p ≤ .05, \* p ≤ .10.

Figure 2: Estimated Impacts on Sexual Initiation for All Programs and by Program Type



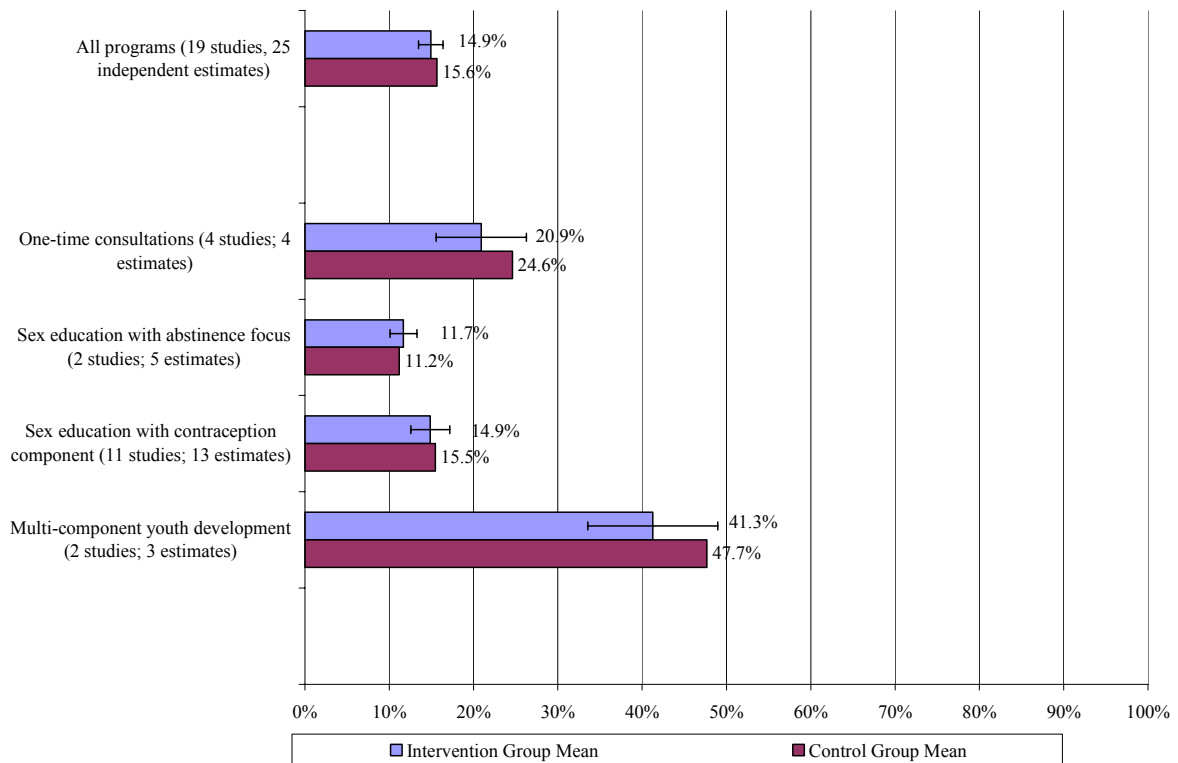
from the same small study of the Reach for Health Community Service Program (O’Donnell et al. 2002).<sup>10</sup>

**Estimated impacts on pregnancy risk by program and program type.** There is considerable heterogeneity among the full set of estimated impacts on pregnancy risk (p-value < 0.001), as well as for impact estimates related to the one type of program for which there was a sizeable number of studies represented—the sex education programs with a contraception component. The pooled estimated impact on pregnancy risk across the entire set of interventions and settings is near zero (-0.7 percentage points), as are the estimates for both categories of sex education programs (Figure 3). The pooled point estimates of effects are substantially larger (although not statistically significant) for both the one-time consultations and for the multi-component youth development programs (-3.7 and -6.4 percentage points, respectively).<sup>11</sup>

<sup>10</sup> This study, like many others included in this review, randomized classrooms of students and ignored this fact when conducting the analysis. Because of the limited number of classrooms represented in the study, the statistical significance of the impact estimates likely is strongly biased upward (Raudenbush et al. 2005).

<sup>11</sup> Statistical tests failed to detect significant evidence of heterogeneity of the impact estimates for one-time consultations and for the multi-component youth development interventions. However, due to the small number of estimates in each of these categories, the test has low statistical power.

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



One of the four estimated impacts for the one-time consultations is very large (-28.9 percentage points) and statistically significant—that for the untitled program evaluated by Hanna (1990) (Table 5). And, both studies of multi-component programs found sizeable, statistically significant impacts for females (McBride and Gienapp, 2000 and Philliber et al., 2001).

All five estimates of the impacts from the studies of two sex education programs that have an abstinence focus are small (under 5 percentage points), with two estimates favoring the intervention group and three favoring the control group. The pooled impact estimate is 0.5 percentage points favoring the control group with a confidence interval six times this large (Table 5). Only the 1.5 percentage point impact estimate (favoring controls) for one of the ENABL programs (Kirby et al., 1995) is statistically significant.

The impact estimates for sex education programs with a contraception component range from a 40-percentage point reduction in pregnancy risk to a 9-percentage point increase. Six of the 13 estimates favor the intervention group, while seven favor the control group, with the pooled impact estimate being near zero (0.6 percentage points favoring the intervention group). Only three of the 13 estimates for sex education programs with a contraception component are statistically significant. Two of these estimates favor the intervention group—the 40.3 percentage point impact on pregnancy risk estimated for the very small

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

Intervention Type, Study, Author(s), and Locatin	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
<b>One-time consultations</b>								
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
<b>Pooled effects: 4 programs, 4 estimates</b>		<b>20.9%</b>	<b>24.6%</b>	<b>-3.7%</b>	<b>5.4%</b>	<b>639</b>	<b>650</b>	<b>1,289</b>
<b>Sex education with abstinence focus</b>								
6. Kirby et al. (1995): Site 1	Both	10.6%	9.7%	0.8%	2.5% <sup>a</sup>	700	893	1,593
Kirby et al. (1995): Site 2	Both	8.6%	10.5%	-1.9%	2.0% <sup>a</sup>	1100	1273	2,373
Kirby et al. (1995): Site 3	Both	9.5%	8.0%	1.5% *	1.5% <sup>a</sup>	1930	1927	3,857
7. Thomas et al. (1992)	Female	17.6%	18.1%	-0.6%	3.5% <sup>a</sup>	831	524	1,355
Thomas et al. (1992)	Male	25.3%	21.4%	3.9%	4.1% <sup>a</sup>	762	453	1,215
<b>Pooled effects: 2 programs, 5 estimates</b>		<b>11.7%</b>	<b>11.2%</b>	<b>0.5%</b>	<b>1.6%</b>	<b>5,323</b>	<b>5,070</b>	<b>10,393</b>
<b>Sex education with contraception component</b>								
8. Baker (1990)	Female	39.1%	58.3%	-19.2%	23.5% <sup>a</sup>	23	24	47
11. Eisen et al. (1990)	Female	24.5%	15.2%	9.3% **	5.9% <sup>a</sup>	249	231	480
Eisen et al. (1990)	Male	25.0%	30.1%	-5.1%	7.3% <sup>a</sup>	212	196	408
12. Herceg-Baron et al. (1981)	Female	55.1%	48.1%	7.0%	10.6%	98	156	254
13. Jemmott et al. (1998)	Both	7.1%	11.5%	-4.4%	5.1%	169	174	343
14. Kirby et al. (1997)	Both	9.4%	7.3%	2.1%	2.3% <sup>a</sup>	785	768	1,553
15. Levy et al. (1995)	Both	9.8%	7.8%	2.0%	2.3% <sup>a</sup>	1001	668	1,669
16. Moberg and Piper (1998)	Both	9.3%	7.1%	2.2%	2.1% <sup>a</sup>	1164	676	1,840
17. Schinke et al. (1981)	Both	11.5%	51.9%	-40.3% ***	18.9%	26	27	53
18. Stanton et al. (1996)	Both	5.3%	8.6%	-3.3%	5.1% <sup>a</sup>	150	128	278
19. St. Lawrence et al. (1995)	Both	13.3%	32.7%	-19.5% ***	9.0%	113	113	226
20. Wight et al. (2002)	Female	14.0%	13.9%	0.1%	2.2% <sup>a</sup>	1534	1520	3,054
Wight et al. (2002)	Male	23.7%	22.2%	1.6%	2.5% <sup>a</sup>	1252	1376	2,628
<b>Pooled effects: 11 programs, 13 estimates</b>		<b>14.9%</b>	<b>15.5%</b>	<b>-0.6%</b>	<b>2.3%</b>	<b>6,776</b>	<b>6,057</b>	<b>12,833</b>
<b>Multi-component/youth development programs</b>								
24. McBride & Gienapp (2000): Site "	Female	14.3%	26.5%	-12.2% **	9.2%	98	102	200
26. Philliber et al. (2001)	Female	38.8%	48.2%	-9.4% **	7.1%	268	251	519
Philliber et al. (2001)	Male	59.4%	59.4%	1.9%	7.9%	217	205	422
<b>Pooled effects: 2 programs, 3 estimates</b>		<b>41.3%</b>	<b>47.7%</b>	<b>-6.4%</b>	<b>7.7%</b>	<b>583</b>	<b>558</b>	<b>1,141</b>
<b>All studies: 19 programs, 25 impact estimates</b>		<b>14.9%</b>	<b>15.6%</b>	<b>-0.7%</b>	<b>1.5%</b>	<b>13,321</b>	<b>12,335</b>	<b>25,656</b>

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).

<sup>a</sup> This estimate was the result of a clustered randomized trial, and the analysis does not appropriately adjusted for clustering and, thus, will overstate the statistical significance of the impact estimates.

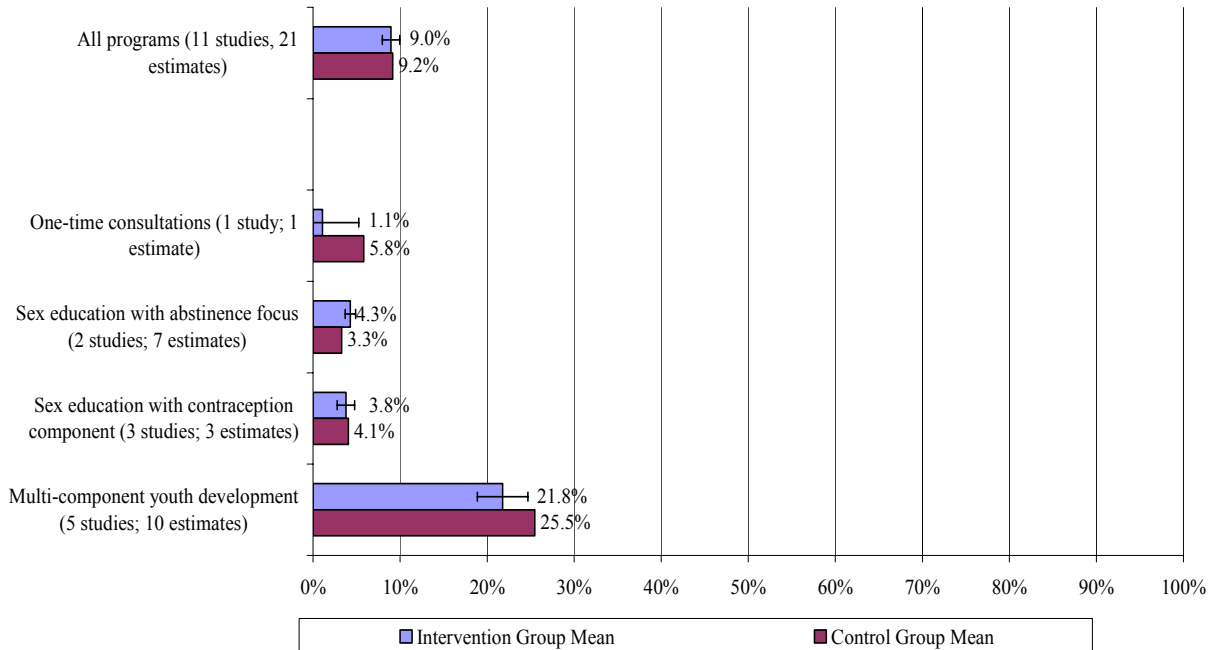
\*\*\* p ≤ .01, \*\* p ≤ .05, \* p ≤ .10.

(N=53) study of an untitled intervention evaluated by Schinke et al. (1981) and the 19.5 percentage point impact for Project BART (St. Lawrence et al., 1995). In contrast, Eisen et al. (1990) estimated a 9.3 percentage point *higher* rate of pregnancy risk among females in the Teen Talk Program as compared with their control group counterparts.

**Estimated impacts on pregnancy by program and program type.** Consistent with the results for sexual initiation and pregnancy risk, there also is evidence of heterogeneity among the full set of estimated impacts on pregnancy risk (p-value = 0.078). Moreover, the pattern of impacts tends to mirror that for pregnancy risk. The pooled impact estimate across this diverse set of interventions and settings is near zero (-0.2 percentage points), as are the estimates for both categories of sex education programs (Figure 4). Of these

estimates, only the pooled estimate for sex education program with an abstinence focus (1 percentage points favoring the control group) is statistically significant.

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



The point estimate of effects for the single study of a one-time consultation and the pooled estimate for the five studies (10 estimates) of multi-component youth development programs are moderate in size (4.8 and 3.7 percentage points, respectively) and statistically significant. Notably, there is considerable heterogeneity among the estimates for the multi-component youth development programs ( $p$ -value = 0.01), with the estimated impacts ranging from a non-statistically significant 5 percentage point difference favoring the control group to a statistically significant 10 percentage point difference favoring the intervention group.

Those estimates that are statistically significant range in magnitude from a 6.2 to a 10.5 percentage point impact favoring the intervention group. These include the estimates for the Teen Outreach Program (Allen et al., 1997), the STEP program for males in cohort 2 (Grossman & Sipe, 1992), the Reach for Health Program for females (O'Donnell et al., 2002), and the Carrera Program for females (Philliber et al., 2001).

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
<b>One-time consultations</b>								
1. Boeke et al. (1999)	Both	1.1%	5.8%	-4.8% *	4.2%	94	103	197
<b>Sex education with abstinence focus</b>								
6. Kirby et al. (1995): Site 1	Female	2.1%	1.0%	1.1%	1.4% <sup>a</sup>	385	495	880
Kirby et al. (1995): Site 1	Male	6.3%	2.7%	3.6% **	2.7% <sup>a</sup>	300	371	671
Kirby et al. (1995): Site 2	Female	2.8%	1.7%	1.1%	1.3% <sup>a</sup>	639	717	1,356
Kirby et al. (1995): Site 2	Male	3.5%	3.3%	0.3%	1.9% <sup>a</sup>	427	522	949
Kirby et al. (1995): Site 3	Female	3.3%	2.6%	0.6%	1.2% <sup>a</sup>	1097	1098	2,195
Kirby et al. (1995): Site 3	Male	4.0%	2.9%	1.1%	1.5% <sup>a</sup>	784	799	1,583
7. Thomas et al. (1992)	Female	9.9%	8.7%	1.2%	2.4% <sup>a</sup>	1049	652	1,701
<b>Pooled effects: 2 programs, 7 estimates</b>		<b>4.3%</b>	<b>3.3%</b>	<b>1.0% ***</b>	<b>0.6%</b>	<b>4,681</b>	<b>4,654</b>	<b>9,335</b>
<b>Sex education with contraception component</b>								
8. Baker (1990)	Female	4.3%	16.7%	-12.3%	14.3% <sup>a</sup>	23	24	47
13. Herceg-Baron et al. (1981)	Female	13.3%	13.9%	-0.5%	7.4%	90	166	256
13. Kirby et al. (1997)	Both	1.2%	1.5%	-0.3%	1.0% <sup>a</sup>	739	743	1,482
<b>Pooled effects: 3 programs, 3 estimates</b>		<b>3.8%</b>	<b>4.1%</b>	<b>-0.3%</b>	<b>1.0%</b>	<b>852</b>	<b>933</b>	<b>1,785</b>
<b>Multi-component/youth development programs</b>								
21. Allen et al. (1997)	Female	10.4%	19.6%	-9.3% ***	4.9% <sup>a</sup>	280	280	560
22. 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
23. Handler (1987)	Female	7.7%	11.1%	-3.4%	13.1%	26	27	53
25. O'Donnell et al. (2002)	Female	8.1%	18.5%	-10.5% *	10.4% <sup>a</sup>	62	54	116
O'Donnell et al. (2002)	Male	2.4%	5.4%	-3.0%	7.2% <sup>a</sup>	42	37	79
26. Philliber et al. (2001)	Female	14.9%	25.1%	-10.2% ***	5.8%	268	251	519
Philliber et al. (2001)	Male	10.1%	11.2%	-1.1%	5.0%	217	205	422
<b>Pooled effects: 5 studies, 10 estimates</b>		<b>21.8%</b>	<b>25.5%</b>	<b>-3.7% **</b>	<b>2.9%</b>	<b>2,212</b>	<b>2,139</b>	<b>4,351</b>
<b>All studies: 11 programs, 21 estimates</b>		<b>9.0%</b>	<b>9.2%</b>	<b>-0.2%</b>	<b>1.0%</b>	<b>7,839</b>	<b>7,829</b>	<b>15,668</b>

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).

<sup>a</sup> This estimate was the result of a clustered randomized trial, and the analysis does not appropriately adjust for clustering and, thus, will overstate the statistical significance of the impact estimates.

\*\*\*  $p \leq 0.01$ , \*\*  $p \leq 0.05$ , \*  $p \leq 0.10$ .

***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. Their recommendation is not supported by the results from this review, however. In fact, there simply is insufficient 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. Furthermore, only 4 of the 16 studies of sex education programs identified for this review focused high school age youth (see Table 2

above). Moreover, the number of independent effect sizes available for estimating impacts on any outcome by program type ranges from 0 to 5 for high school youth and 0 to 10 for middle school youth. The evidence that does exist shows clear evidence of heterogeneity in the impact estimates for both the middle school programs and the high school programs.

For all three outcome measures, the pooled impact estimate based on a random effects model are small (less than one percentage point) and not statistically significant for the programs targeting middle school youth (Table 7, top panel). They are larger (0.9 to 11.4 percentage points, favoring the intervention group) for those programs targeting high school youth. However, only the 11.4 percentage point impact on pregnancy risk rates is statistically significant. There is only one study (which generated estimates for males and for females) of a program that served both middle and high school youth (Eisen et al 1990), and this study showed no evidence of impacts on any of the three outcome measures (Table 7, far right columns).

Table 7: Pooled Estimates of the Percentage Point Impacts of Programs on Sexual Initiation, 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
<b>All interventions</b>						
Initiated sex	24	-0.6%	7	-0.9%	2	-0.2%
Pregnancy risk	16	0.2%	7	-11.4% **	2	2.3%
Pregnancy	14	0.3%	7	-2.8%	0	n.a.
<b>One-time consultations</b>						
Initiated sex	0	n.a.	1	-0.1%	0	n.a.
Pregnancy risk	1	0.8%	3	-7.6%	0	n.a.
Pregnancy	1	-4.8% *	0	n.a.	0	n.a.
<b>Sex education with abstinence focus</b>						
Initiated sex	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.
<b>Sex education with contraception component</b>						
Initiated sex	10	-1.0%	1	-6.9% **	2	-0.2%
Pregnancy risk	8	-0.1%	3	-16.6%	2	2.3%
Pregnancy	1	-0.3%	2	-4.4%	0	n.a.
<b>Multi-component/youth development programs</b>						
Initiated sex	5	-5.9% **	5	0.0%	0	n.a.
Pregnancy risk	2	-3.9%	1	-12.2% **	0	n.a.
Pregnancy	5	-5.2% **	5	-2.5%	0	n.a.

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.

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

Although the pooled impact estimates for middle school programs are trivial in size and not statistically significant, there are some significant findings within the more homogeneous impact estimates for the various program types. Notably, there is a significant effect on

pregnancy favoring the intervention group (4.8 percentage points) for the single study of a one-time consultation program, ASSESS (Boekeloo et al., 1999); significant effects on pregnancy favoring the control group (0.9 percentage points) among the two sex education programs with an abstinence focus (7 independent estimates)—ENABL and the McMaster Program (Kirby et al., 1995 and Thomas et al., 1992); and significant effects favoring the intervention group for sexual initiation rates (-5.9 percentage points) and pregnancy rates (-5.2 percentage points) among the three studies (5 independent estimates) of multi-component/youth development programs—Peer Power, Reach for Health, and the Carrera Program (Handler, 1987; O'Donnell et al., 2002; and Philliber et al., 2001).

Despite the evidence of heterogeneity in the impact estimates for the four programs serving high school youth, the pooled results from a random effects model show evidence that the programs reduce pregnancy risk significantly. The pooled 11-percentage point impact estimate derives from moderate to large estimated differences favoring the intervention group for six of the seven independent estimates. These include the following: three one-time consultations (Danielson et al., 1990; Hanna, 1990; and Mansfield et al., 1993); three sex education programs with a contraceptive component (Baker, 1990; Herceg-Baron et al., 1981; and Schinke et al., 1991); and one multi-component youth development programs (McBride and Gienapp, 2000). The pooled results show no evidence that, as a group, the programs targeting high school age youth changed significantly either sexual initiation rates or pregnancy itself.<sup>12</sup>

***Estimated impacts by gender, overall and by intervention strategy.*** One expects that 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 evidence of program impacts for males or for females. The pooled impact estimates are small (2.2 percentage points or less) for all three outcomes and not statistically significant for either gender. Notably, there is no evidence of heterogeneity among the 14 independent estimates of impacts on sexual initiation for females, suggesting that this pooled impact estimate may have some degree of generalizability. The only other set of estimates where there was no significant evidence of heterogeneity was for the five independent pregnancy risk estimates for males. In this case, the five underlying impact estimates range in size from a 3.9 percentage point increase in risk to a 5.1 percentage point decrease, with all five impact estimates having large confidence intervals.

Nearly all of the pooled impacts by program type include fewer than five independent impact estimates. On the one hand, this results in fewer significant tests of heterogeneity

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<sup>12</sup> The estimate for sexual initiation was statistically homogeneous when pooling across the seven available impact estimates for programs serving high school aged adolescents, but heterogeneity was present among the seven impact estimates for pregnancy rates.

Table 8: Pooled Estimates of the Percentage Point Impacts of Programs on Sexual Initiation, 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
<b>All interventions</b>						
Initiated sex	11	-1.0%	14	0.5%	33	-0.6%
Pregnancy risk	5	-0.2%	9	-2.2%	25	-0.7%
Pregnancy	7	0.7%	12	-0.9%	21	-0.2%
<b>One-time consultations</b>						
Initiated sex	1	-0.1%	0	na	1	-0.1%
Pregnancy risk	1	-3.5%	2	15.8%	4	-3.7%
Pregnancy	0	n.a.	0	n.a.	1	-4.8% *
<b>Sex education with abstinence focus</b>						
Initiated sex	4	1.7%	4	1.2%	9	1.0%
Pregnancy risk	1	3.9%	1	-0.6%	5	0.5%
Pregnancy	3	1.3%	4	0.9% **	7	1.0% ***
<b>Sex education with contraception component</b>						
Initiated sex	4	-2.9%	4	0.3%	13	-1.4%
Pregnancy risk	2	-0.9%	4	4.0%	13	-0.6%
Pregnancy	0	n.a.	2	-4.4%	3	-0.3%
<b>Multi-component/youth development programs</b>						
Initiated sex	2	-5.2%	6	-0.5%	10	-1.2%
Pregnancy risk	1	1.9%	2	-10.4% ***	3	-6.4%
Pregnancy	4	-1.6%	6	-5.3% *	10	-3.7% *

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.

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

(likely, in part, due to the low power of the test). It also makes it impossible to draw defensible conclusions regarding the relative effectiveness of the different types of interventions for males versus females. For example, the largest statistically significant effect in Table 8, is for females in multi-component youth development program (10.4 percentage point reduction in pregnancy risk). This estimate is based on results from only two studies—McBride and Gienapp’s (2000) study of an unnamed program and Philliber et al.’s (2001) study of the Carrera program. The only statistically significant effect by gender that includes over five independent effect sizes is the 5.3 percentage point reduction in pregnancy rates for females attending multi-component youth development programs. However, the heterogeneity in the underlying impact estimates, making it inappropriate to generalize from this pooled estimate.

***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). One example relates to the results for sexual initiation. All three clusters of estimates based on studies with different levels of sample retention show evidence of statistically significant impacts. However, the pooled estimates for the studies with the largest and smallest rates of sample retention are largest in magnitude and favor the

intervention group, while the pooled estimate for those with retention rates between 70 and 79 percent favors the control group.

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

	Initiated Sex			Pregnancy Risk			Pregnancy		
	# of impact estimates	Estimated impact <sup>a</sup>	p-value	# of impact estimates	Estimated impact <sup>a</sup>	p-value	# of impact estimates	Estimated impact <sup>a</sup>	p-value
<b>All interventions</b>	33	-0.6%	0.399	25	-0.7%	0.441	21	-0.2%	0.665
<b>Percent sample retention</b>		***			***				
60 through 69 percent	10	-2.1%	0.029	4	-0.5%	0.894	0	n.a.	n.a.
70 through 79 percent	16	1.6%	0.090	12	1.0%	0.168	8	-0.2%	0.869
80 percent or higher	7	-4.1%	0.051	9	-4.8%	0.027	13	-0.4%	0.594
<b>Unit of randomization</b>					***			***	
Clusters (classrooms, schools or districts)	22	-0.2%	0.82 <sup>b</sup>	13	1.0%	0.083 <sup>b</sup>	11	0.5%	0.355 <sup>b</sup>
Individual students	11	-1.4%	0.206	12	-7.6%	0.005	10	-2.8%	0.069
<b>Counterfactual</b>		*			***			***	
Usual prevention services	26	-0.1%	0.877	19	1.0%	0.083	13	0.6%	0.057
No prevention services	7	-2.7%	0.064	6	-7.6%	0.005	7	-2.7%	0.151
<b>Duration of follow-up</b>					*			***	
Less than one year	6	-4.2%	0.144	5	-9.3%	0.065	3	-6.9%	0.000
One year to twenty-three months	14	0.0%	0.987	13	-1.0%	0.438	9	0.6%	0.049
Two years or more	13	-0.5%	0.726	7	0.9%	0.367	9	-2.1%	0.205

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).

<sup>a</sup>Asterisks above a set of impact estimates denotes statistical differences among or between the estimates in the cluster.

<sup>b</sup>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).

n.a. means not applicable.

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

The results for pregnancy risk also differ by rates of sample retention. The smaller subgroup of estimates based on studies that had 80 percent or higher sample retention showed evidence of significantly reducing rates of pregnancy risk (4.8 percentage points). In contrast, the pooled estimates of program impacts on pregnancy risk for studies with less than 80 percent sample retention are near zero and not statistically significant (top panel of Table 9).

The pooled impact estimates also vary significantly depending on the unit of randomization, whether the control group received usual prevention services rather than no services or services unrelated to pregnancy prevention, and the duration of follow-up. For both pregnancy risk and pregnancy, the results of clustered-randomized trials (experiments randomized at the classroom, school or district level) showed smaller estimates and less statistically significant estimates of program impacts for all three outcomes, with those for pregnancy risk and pregnancy being statistically different between the two groups of

studies.<sup>13</sup> The lower statistical significance for studies that randomized clusters of students, in particular, is counterintuitive since none of these studies adjusted for the clustering in computing the standard errors and significance levels (Raudenbush et al. 2005).

For all three 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 risk and pregnancy, 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 and most statistically significant among those studies with the shortest follow-up period. Moreover, the only statistically significant impact estimates that favor the intervention group are for studies that had less than a year of follow-up data—the 9-percentage point reduction in pregnancy risk and the 7 percentage point reduction in pregnancy rates. The only statistically significant impact favoring the control group is the small (0.6 percentage point) 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 changes in ENABL over time or the duration of follow-up.<sup>14</sup> 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.<sup>15</sup>

### ***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, 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

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<sup>13</sup> The pooled estimates of impacts on sexual initiation do not vary between the studies that randomized at the cluster level versus those that randomized individual students.

<sup>14</sup> Six of the nine effect sizes 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.

<sup>15</sup> The number of effect sizes available for the “less than one year” subgroup was quite small (six impact estimates for sexual initiation, five for pregnancy risk and 3 for pregnancy).

criteria for this review.<sup>16</sup> Ten (10) of these 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 C provides a detail of the individual findings from these 12 studies, organized by program type and Appendix D provides full citations.

A total of 12 studies included 25 independent estimates of program impacts on sexual initiation, 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 and less likely to be statistically significant than are those from the quasi-experimental design studies. Moreover, upon pooling experimental and quasi-experimental design studies, the pooled impact estimates for two of the three outcomes, sexual initiation and pregnancy risk, are statistically significant (Table 10, top panel). In contrast, the pooled estimates and those based on just randomized control trials show no evidence of program impacts on any outcomes.

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. For example, in three of the five 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. Both cases where this is not true pertain to the impacts of multi-component youth development programs. The impacts of these types of interventions on pregnancy risk are roughly comparable in size for the randomized control trials and for the quasi-experimental design studies (6.4 and 5.3 percentage points favoring the intervention group). The pooled estimates of impacts on pregnancy rates differ in size (3.7 and 1.3 percentage points, respectively), but not in sign. Moreover, in these latter two cases, the estimates for the randomized control trials and the quasi-experimental design studies do not differ significantly.

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<sup>16</sup> Since our search strategy was focused on systematically searching for and synthesizing randomized control trials, 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 comprehensive systematic review that used similar search strategies, but that also included quasi-experimental design studies.

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	Initiated Sex			Pregnancy Risk			Pregnancy		
	# of impact estimates	Total sample	Estimated impact	# of impact estimates	Total sample	Estimated impact	# of impact estimates	Total sample	Estimated impact
<b>All programs</b>									
Randomized controlled trials	33	31,157	-0.6%	25	25,656	-0.7%	21	15,668	-0.2%
Quasi-experiments	25	32,021	-2.0% **	22	25,537	-3.1% **	20	13,037	-0.9%
All studies	58	63,178	-1.3% **	47	51,193	-2.0% ***	41	28,705	-0.7%
<b>One-time consultations</b>									
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% *
<b>Sex education with abstinence focus</b>									
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% ***
<b>Sex education with contraception component</b>									
Randomized controlled trials	13	15,752	-1.4%	13	12,833	-0.6%	3	1,785	-0.3%
Quasi-experiments	6	4,890	-6.5% ***	3	1,576	-1.8%	2	1,101	1.0%
All studies	19	20,642	-2.9% ***	16	14,409	-0.7%	5	2,886	-0.1%
<b>Multi-component/youth development</b>									
Randomized controlled trials	10	3,926	-1.2%	3	1,141	-6.4%	10	4,351	-3.7% **
Quasi-experiments	2	1,466	-5.3%	2	1,466	-5.3%	3	2,176	-1.3% **
All studies	12	5,392	-2.5% **	5	2,607	-5.8% **	13	6,527	-2.8% ***
<b>Comprehensive community-based programs</b>									
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.

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.

## DISCUSSION

The bulk of 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 an occasional impact estimate that is quite large. 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 five 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.<sup>17</sup> 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. 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). Fourth, the programs that have been evaluated vary in design and social context in ways that limit their generalizability. And, fifth, 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 both within and across the various types of interventions. 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.

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<sup>17</sup> For example, none of the programs evaluated focused solely on suburban or rural youth, while 62 percent of the studies in this review focused primarily on urban youth, and the remainder served adolescents in a variety of areas.

- Abstinence focused sex education programs: Despite a recent rise in the number of abstinence-only programs, there are only three somewhat comparable interventions that met the criteria for inclusion in this review. Moreover, 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. As additional evidence becomes available, it may be valuable to refine the intervention categories so as to achieve greater homogeneity.
- Multi-component youth development programs: The most promising results are for the multi-component youth development programs. Moreover, within this category, the results tend to be most favorable for those programs that worked with middle-school youth and with females. However, there is a paucity of rigorous evaluations of such programs. Moreover, those that have been evaluated vary substantially with regard to their duration, the youth they serve, and the complement of services they offer making it inappropriate to make categorical judgments regarding the effectiveness of this type of intervention.

This review highlights the relative dearth of evidence to judge the effectiveness of particular intervention strategies. Both policy makers and practitioners could better address the sexual health risks of youth if they had 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. For this reason, it will be valuable to add to the number of studies, as well as 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. It also will be useful to evaluate programs implemented in different contexts defined by factors such as the service setting and the socio-economic, religious, and political context of the community.

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## Appendix A: Randomized Controlled Trials Included in Meta-Analysis, by Program Type

### One-time Consultations

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

(Boekeeloo et al., 1999)

##### **Intervention characteristics**

Year(s) of operation: 1995-1997

Setting: This program took place in five managed-care sites in Washington, DC metropolitan area (2 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 audiotaped 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 and findings**

##### 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 sexual activity. 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).

##### **Implications**

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 and findings**

##### 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).

##### **Implications**

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 and findings**

*Sample size*:

Baseline: 51

Follow-up: 39 (76 %)

*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.

#### **Implications**

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 and findings**

*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 an 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 statistically insignificant.

#### **Implications**

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 and findings**

##### *Sample size*:

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

Follow-up: No reports of 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.”

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

##### **Findings**

Some evidence of decreased sexual initiation.

##### **Implications**

This study was based on a small sample size, and the researchers did not statistically account for the fact that classrooms, not adolescents, 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. Some programs 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. Some programs provided peer-led instruction.

#### **Research sample and findings**

##### *Sample size*:

Baseline: 10,600 adolescents

17 Month Follow-up: 7,340 (69%)

*Unit of randomization*: Four study subgroups: two randomized classrooms (one peer-led and one adult-led), one randomized adolescents, and one randomized schools).

*Control group experiences*: Many control group students received “some type of instruction on sexuality” before or during the study.

*Length of follow-up*: 3 months (subgroup) and 17 months (full sample)

##### **Findings**

No differences in sexual initiation, frequency of sexual activity, or contraception use. Some evidence of negative effects on behaviors among subgroups of programs.

##### **Implications**

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. The other groups were randomized at a group level but the statistical analysis did not adjust for this clustering.

## 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 and findings

#### *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 initiation, contraception use, or incidences of pregnancies.

#### **Implications**

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 and findings

#### *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.

#### **Implications**

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 and findings

*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 initiation. 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 initiation or condom use at follow-up. Positive effects on intentions to abstain, particularly among those who were non-sexually active at baseline.

### Implications

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 initiation. 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)

### 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 and findings

*Sample size*:

Baseline: 2,829 adolescents

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

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

*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.

### Implications

The differential treatment effects for boys versus girls suggest that gender may mediate program effects. The authors suggest that the program created a new norm for boys making it more socially acceptable to delay sexual experience.

## 11. 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 and findings

#### *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

Positive effect on sexual initiation for males only. Negative effects on contraception use for females only.

### Implications

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.

## 12. 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

*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 and findings

#### *Sample size*:

Baseline: 469

Follow-up: Family Support: 88%; Periodic Support: 72%; Control group A: 80%

*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.

### Implications

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.

### 13. 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 and findings

*Sample size*:

Baseline: 659 adolescents

Follow-up: 636 (96.5%)

*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.

#### Implications

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.

### 14. 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 and findings

*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 initiation, condom use, pregnancies or STDs.

#### Implications

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.

## 15. 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 and findings

#### *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.

*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 initiation or contraception use. Lower sexual activity rates for “changers” (those who initiated sex between baseline and follow-up).

#### **Implications**

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

## 16. 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 and findings

#### *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” (a randomized control group with two self-selected treatments: Intensive or Age Appropriate).

*Control group experiences*: “Usual programming” which 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**

Negative effects on sexual initiation, no effects on condom use.

#### **Implications**

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).

## 17. Untitled – Cognitive behavioral group training program

(Skinke et al., 1981)

### Intervention characteristics

*Year(s) of operation*: n/a

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

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

*Adolescents served*: School-aged adolescents, both genders, never parented children.

*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 and findings

*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.

### Implications

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.

## 18. Focus on Kids- AIDS Prevention Program

(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 and findings

*Sample size*:

Baseline: 383

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

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

*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 and 12 months.

### Findings

Increased condom use at 6 months, but not at 12 months.

### Implications

Authors state that the short-term benefits, but not long-term benefits suggest that future designs of the program should try to sustain outcomes. They also advise that using naturally formed peer networks may be a useful mechanism for delivering programs. The authors did not provide data on changes in sexual initiation by treatment status (they provide this information only for the full sample).

## 19. 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 and findings

*Sample size*:

Baseline: 246

Follow-up: 225 (91%)

*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

Decreased sexual initiation among virgins at baseline, decreased incidences of unprotected sex.

### Implications

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.

## 20. 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 and findings

*Sample size*:

Baseline: 7,616

Follow-up: 5,854 (77 %)

*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

*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 initiation, contraception use or incidences of pregnancies.

### Implications

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 Program

### 21. Teen Outreach Program (TOP)

(Allen et al., 1997)

#### Intervention characteristics

Year(s) of operation: 1991 through 1995 (intervention took place over a single year)

Setting: This program took place either during or after school in 22 sites across the United States (10 percent of all Teen Outreach

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 initiation 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 and findings

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).

#### Implications

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.

### 22. 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 and findings

Sample size:

Baseline: 3,226

42 or 54 months follow-up: 2,610 (81%)

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 initiation, minimal evidence of positive impacts on contraception use, no effects on pregnancies.

#### Implications

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.

### 23. 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

*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

#### Research sample and findings

*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 or pregnancy.

#### Implications

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.

### 24. 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

*Duration*: On average, adolescents participated in 27 hours of services.

*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

#### Research sample and findings

*Sample size*:

Baseline: 690

Follow-up: 507 (73%)

*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 two hours of services.

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

#### Findings

No differences in sexual initiation, one site (Site F) had positive effects on intercourse in the past month and on contraception use.

#### Implications

Methodological weaknesses included small sample sizes in the outcome tables that 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.

## 25. 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 and findings

*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.

### Implications

Twenty-six percent of the subjects switched between treatment and control conditions, compromising the integrity of the experiment. When re-assigning adolescents to their original treatment statuses, the reduction in sexual initiation no longer is statistically significant.

## 26. Children's Aid Society – Carrera Program

(Philliber et al., 2001)

### 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.

*Duration*: Intervention group adolescents participated, on average, in 222 hours of activities.

*Adolescents served*: Boys and girls ages 13 through 15, primarily African-American and/or Latino, low income, approximately 24% were sexually experienced at baseline.

*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 and findings

*Sample size*:

Baseline: 1,163

Follow-up: 941 (81%)

*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 initiation (particularly for females), contraception use, and incidences of pregnancies (particularly for

### Implications

The authors suggest that although there were positive effects on sexual initiation, 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, substantial methodological flaws.
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 appropriate 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
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. 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
7. Coyle, Karin, Basen-Enquist, Karen, Kirby, Douglas et al. (2001). Safer Choices: Reducing Teen Pregnancy, HIV, and AIDS. Public Health Reports: 2001, Supplement 1 (116): 82-93.	Not enough information to create effect size
8. 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 &amp; Behavior</i> , 27 (4): 453-469.	Less than 60% sample retention
9. 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
10. 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
11. 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
12. 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)
13. 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
14. 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
15. 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
16. 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 measures, differential attrition
17. Jemmott, John B. III, Jemmott, Loretta Sweet, Fong, Geoffrey 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
18. 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
19. 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
20. 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

21. 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: 392-400.	No comparable behavioral measure to pool.
22. 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
23. 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
24. 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
25. 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
26. 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
27. 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
28. 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
29. 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
30. 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
31. 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
32. 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
33. 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

Table C.1: Results for Sexual Initiation 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
<b>One-time consultation</b>								
	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
<b>Sex education with abstinence focus</b>								
2. Postrado&Nicholson(1992)	Female	12.8%	13.5%	-0.7%	0.057	257	155	412
<b>Sex education with contraception component</b>								
4. Howard&McCabe(1990)	Both	46.8%	53.2%	-6.4%	0.131	359	141	500
5. Kirby et al. (1991a)	Both	66.0%	75.1%	-9.1% ***	0.049	429	329	758
6. Little&Rankin (2001)	Both	22.9%	31.4%	-8.5%	0.102	166	105	271
7. Nicholson&Postrado (1991a)	Female	64.2%	69.1%	-4.9%	0.084	165	178	343
8. 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
<b>Pooled effects (QEDs); 5 studies, 6 estimates</b>				<b>-6.5% ***</b>	<b>0.022</b>	<b>2,874</b>	<b>2,016</b>	<b>4,890</b>
<b>Multi-component youth development</b>								
9. 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
<b>Pooled effects (QEDs): 1 study, 2 estimates</b>				<b>-5.3%</b>	<b>0.069</b>	<b>731</b>	<b>735</b>	<b>1,466</b>
<b>Comprehensive clinic-based</b>								
11. Furstenberg et al. (1997)	Both	57.5%	58.8%	-1.3%	0.055	348	597	945
12. Guttmacher et al. (1997)	Both	59.7%	60.1%	-0.4%	0.017	5,264	4,264	9,528
13. Hughes et al. (1995)	Both	52.1%	52.1%	-0.1%	0.060	680	257	937
14. 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
15 Kisker et al. (1994)	Both	67.4%	72.1%	-4.7% ***	0.029	3,046	859	3,905
<b>Pooled effects (QEDs): 5 studies, 16 estimates</b>				<b>-0.6%</b>	<b>0.014</b>	<b>13,163</b>	<b>12,090</b>	<b>25,253</b>
<b>All programs: 12 studies, 25 estimates</b>				<b>-2.0% **</b>	<b>0.014</b>	<b>17,025</b>	<b>14,996</b>	<b>32,021</b>

Source: References for these studies are presented in Appendix D.

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

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

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

Intervention Type, Study, Author(s), and Locatin	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
<b>One-time consultation</b>								
1. Winter & Breckenmaker (1991)	Female	2.6%	7.9%	-5.3% ***		228	444	672
<b>Sex education with abstinence focus</b>								
	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
<b>Sex education with contraception component</b>								
3. Gottsegen & Philliber (2001)	Male	15.2%	15.9%	-0.6%	5.9%	335	145	480
5. Kirby et al. (1991a)	Both	19.1%	20.1%	-0.9%	4.8%	429	329	758
7. Nicholson & Postrado (1991a)	Female	15.2%	20.1%	-4.9%	6.8%	164	174	338
<b>Pooled effects: 3 studies, 3 estimates</b>				<b>-1.8%</b>	<b>3.3%</b>	<b>928</b>	<b>648</b>	<b>1,576</b>
<b>Multi-component youth development</b>								
9. 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
<b>Pooled effects: 1 study, 2 estimates</b>				<b>-5.3%</b>	<b>6.0%</b>	<b>731</b>	<b>735</b>	<b>1,466</b>
<b>Comprehensive clinic-based</b>								
11. Furstenberg et al. (1997)	Both	24.1%	20.8%	3.4%	4.7%	348	597	945
12. Guttmacher et al. (1997)	Both	17.7%	16.7%	1.0%	1.3%	5,264	4,264	9,528
14. 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
15. Kisker et al. (1994)	Both	27.2%	35.7%	-8.5% ***	3.0%	3,045	858	3,903
16. Nicholson & Postrado (1991b)	Female	15.5%	18.5%	-3.0%	7.6%	84	265	349
<b>Pooled effects: 5 studies, 16 estimates</b>				<b>-2.7%</b>	<b>2.6%</b>	<b>11,590</b>	<b>10,233</b>	<b>21,823</b>
<b>All programs: 10 studies, 22 estimates</b>				<b>-3.1% **</b>	<b>2.0%</b>	<b>13,477</b>	<b>12,060</b>	<b>25,537</b>

Source: References for these studies are presented in Appendix D.

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

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

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

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

Source: References for these studies are presented in Appendix D.

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

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

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