

Review article

School-based teenage pregnancy prevention programs: a systematic review of randomized controlled trials

Sylvana E. Bennett, M.D.^{a,*}, and Nassim P. Assefi, M.D.^{b,c}

^aDepartment of Reproductive Medicine, University of California San Diego School of Medicine, San Diego, California

^bDepartment of Medicine, University of Washington School of Medicine, Seattle, Washington

^cDepartment of Obstetrics & Gynecology, University of Washington School of Medicine, Seattle, Washington

Manuscript received June 24, 2003; manuscript accepted November 18, 2003.

Abstract

We compared school-based abstinence-only programs with those including contraceptive information (abstinence-plus) to determine which has the greatest impact on teen pregnancy. The United States has one of the highest rates of teen pregnancy in the industrialized world. Programs aimed at reducing the rate of teen pregnancy include a myriad of approaches including encouraging abstinence, providing education about birth control, promoting community service activities, and teaching skills to cope with peer pressure. We systematically reviewed all published randomized controlled trials of secondary-school-based teen pregnancy prevention programs in the United States that used sexual behavior, contraceptive knowledge, contraceptive use, and pregnancy rates as outcomes. © 2005 Society for Adolescent Medicine. All rights reserved.

Keywords:

Teen pregnancy; Abstinence; Abstinence-plus programs; Sex education; Pregnancy prevention; Systematic review

The teenage pregnancy rate in the United States is the second highest among 46 industrialized countries after Russia [1,2]. The birthrate of unmarried American women aged 15 to 19 years quadrupled from 1960 to 1992, reaching a peak in 1991 [3]. Increased sexual activity, increased fertility, increased intended pregnancy rates, and decreased abortion in the United States can theoretically explain these outcomes, but existing data show that low rates of contraceptive use is the major reason [1,4]. Although contraception prevents an estimated 1.65 million teen pregnancies per year in the United States, only 75% of American teenagers use some form of contraception during their first sexual encounter, and less than 30% of sexually active teens 15 to 19 years of age use birth control consistently [5].

Despite data indicating that contraception decreases rates of teen pregnancy [6], there is no consensus on the most effective content of public schools' sex-education curricula,

and few issues have provoked such heated debate. One objection to provision of contraceptive information in schools is the belief that such information leads to inappropriate sexual behavior. In accordance with this view, federal funding for abstinence-only programs increased to its highest level yet in 2001 at 20 million dollars [7]. A recent survey of school superintendents revealed that one-third of school districts in the United States prohibited contraceptive education unless it was to emphasize its limitations [8]. A national survey of middle and high school teachers showed that the proportion of sexual education teachers informing their students that abstinence was the only way to prevent pregnancy and infections rose from 2% in 1988 to 23% in 1999 [9]. Forty-one percent of teachers in 1999 indicated that abstinence was the most important message they wished to convey, vs. 25% in 1988 [9].

In contrast, a recent national survey revealed that 78% of the parents of teenagers believed that their children should learn in school about birth control and safer sex [10]. Medical organizations such as the Institute of Medicine, American Academy of Family Physicians, American College of Obstetricians and Gynecologists, and American Academy

*Address correspondence to: Dr. Sylvana E. Bennett, Department of Reproductive Medicine, UC San Diego Medical Center, 200 West Arbor Drive #8433, San Diego, CA 92103-8433.

E-mail address: sebennett@ucsd.edu

of Pediatrics support the inclusion of contraceptive information with abstinence education to prevent teen pregnancy while also preventing the transmission of sexually transmitted infections [10]. Congress has recently called this approach into question, commissioning a National Institutes of Health study to critically examine the effectiveness of the condom to prevent sexually transmitted infections [11,12].

The content of school-based sex education curricula continues to challenge school boards, politicians, and the public. Abstinence-only programs do not include information on contraception. Abstinence-plus programs incorporate contraceptive information and the prevention of sexually transmitted infections into the curriculum along with abstinence education. By systematically evaluating all published randomized controlled trials on this subject, we sought to compare the effects of abstinence-only and abstinence-plus programs on teenage sexual behavior, contraceptive knowledge, contraceptive use, and pregnancy rates.

Methods

We identified studies of secondary-school-based pregnancy prevention programs in the United States by searching PubMed, Cochrane Registry, CINAHL, Biosis, and Embase for the medical subject heading keywords “teen pregnancy,” “teen abstinence,” “teen pregnancy prevention programs,” and “teen HIV prevention” from January 1, 1980 to September 1, 2002. We included programs with a focus on human immunodeficiency virus (HIV) prevention because these programs aim to reduce risky sexual behavior and secondarily decrease the pregnancy rate. We used references of retrieved articles to find additional studies.

We systematically reviewed all randomized controlled trials of school-based interventions targeted to prevent teen pregnancy that assessed the following specific outcomes: sexual behavior, including delay in initiation of first sexual intercourse, frequency of sex, and number of partners; contraceptive behavior including contraceptive knowledge, reported use, condom use; and pregnancy rates. We classified studies as “abstinence-only” or “abstinence-plus” based on the description of the intervention. Programs that did not mention providing contraceptive information in their curriculum qualified as “abstinence-only.”

Because our focus was only school-based programs, we did not include teen pregnancy prevention programs in the general community or clinics. Given the impact of culture on pregnancy rates, the differences in baseline pregnancy rates among English-speaking countries, varied media and public health messages from country to country, and the increasing focus on abstinence-only programs in the United States, we examined only American programs. Although we initially intended to conduct a meta-analysis, the heterogeneity of this data (i.e., populations studied, program interventions, outcomes measured, and follow-up times) prohibited this effort. For

each qualifying study, we extracted demographics of the teen participants, description of the program, follow-up times, and funding source.

Results

Summary of programs

Our search identified 19 randomized controlled trials of school-based teen pregnancy prevention programs in the United States from 1980 to 2002, of which three studies were excluded because they did not assess a relevant outcome variable [13–15]. Of the 16 remaining studies, three were found to examine abstinence-only programs, 12 evaluated abstinence-plus programs, and one study compared an abstinence-only with an abstinence-plus program. This last study compared three groups: an unrelated health class control group, an abstinence-only intervention, and an abstinence-plus intervention emphasizing the importance of condom use for sexually active teens [16].

Two of the 12 abstinence-plus studies used the same data set [17,18]. With the exception of the study directly comparing abstinence-only to abstinence-plus programs, all of the studies used the school districts’ existing pregnancy prevention curriculum as the comparison group. Most studies reported outcomes that were surrogate markers for pregnancy. Very few of the studies asked teens directly about pregnancy, and many of the programs had short follow-up times that would not be expected to detect a difference in these outcomes.

Table 1 shows descriptive characteristics for each of the 16 studies. There was wide variability in the setting of the programs from the suburbs to the inner city. The racial composition of the subjects was also highly variable; two studies reported that more than 75% of their subjects were white, and four reported that more than 75% of their subjects were African-American. Five of the 16 studies provided information on the socioeconomic status of the subjects and of these, three included a single statement describing the status of the majority of the students. Follow-up times ranged from a low of 7 weeks to a high of 48 months; 38% had a follow-up time of 6 months or less, and 62% had a follow-up time from 7 to 48 months. There was a wide range in sample size; the smallest study included 36 teens and the largest included 10,600, but 50% of the studies used more than 1000 subjects. The percentage of subjects retained at follow-up ranged from 68% to 100%, and 56% of the studies reported a retention rate of greater than 80% at last follow-up. The funding sources of nearly all studies were from federal or state sources rather than private interest groups.

Sexual behavior

We analyzed sexual behavior by measuring self-reported sexual initiation, frequency of sexual activity, and number

Table 1

Randomized controlled trials of school-based teen pregnancy prevention programs in the United States: summary of subject characteristics, program description, follow-up periods, and funding sources

| Author | Baseline Sample Size and Location | Race or Ethnicity and SES ^a | Program Components and Intensity | Follow-up Period (% Subjects Retained) | Funding |
|---------------------------------|---|--|--|--|---|
| Jemmott et al, 1998 [16] | 659 6th and 7th graders in inner-city Philadelphia, PA | African-American: 100% SES: "low income;" no other data reported | Each intervention used 8 1-h sessions; one stressed delaying sexual activity or reducing frequency of sex, the second stressed condom use, and the third included health issues not related to sexual behavior | 3, 6 and 12 mo (97, 94, 93) | National Institute of Mental Health |
| Basen-Engquist et al, 2001 [17] | 7614, 8319, and 9489 (at baseline, 19 and 31 months) 9th–12th graders from 20 urban schools in northern CA and southeast TX | African-American: 15.6%, Hispanic: 29.8%, White: 28.0%, Asian: 18.8%, Other: 5.5%, Not reported: 2.3% SES: Not reported | Safer Choices: 20 classroom sessions over 2 yrs including small group meeting and role-play, main message is using protection against pregnancy and STIs ^b is a safer choice and abstaining from sexual activity is the safest choice | 19 and 31 mo (74, 68, 72) ^c | Centers for Disease Control and Prevention |
| Coyle et al, 2001 [18] | 3869 9th graders in 20 urban schools in northern CA and southeast TX | African-American: 16.9%, Hispanic: 27.2%, White: 30.2%, Asian: 17.7%, Other: 6.8%, Not reported: 1.2% SES: Not reported | Safer Choices: 20 classroom sessions over 2 yrs including small group meeting and role-play, main message is using protection against pregnancy and STIs is a safer choice and abstaining from sexual activity is the safest choice | 7, 19 and 31 mo (95, 83, 79) | Centers for Disease Control and Prevention |
| Kirby et al, 1997 [19] | 10,600 middle schoolers (average grade 7.5) in multiple settings in CA | Varied by setting, number of students in various settings not provided. Unable to calculate. SES: Not reported | Postponing Sexual Involvement: 5 45–60-min sessions including information on risks of sexual activity, peer pressure resistance and abstinence promotion | 3 and 17 mo (91, 69) ^d | California Office of Family Planning, Cowell Foundation, Packard Foundation, Stuart Foundation |
| Jorgensen et al, 1993 [20] | 91 7th graders in Wilmington DE (39) and West Point, MI (52) | African-American: 42.8%, Hispanic: 6.6%, White: 45.1%, Other: 5.5% SES: "low income" no other data reported | Project Taking Charge: 6-week curriculum for home economics classes including information on anatomy, physiology, STIs, and pregnancy stressing abstinence from premarital sexual activity | 6 weeks and 6 mo (100, 100) | Grant to the American Home Economics Association by the US Office of Adolescent Pregnancy Programs, Department of Health and Human Services |
| Blake et al, 2001 [21] | 389 8th graders in suburban Rochester, NY | White, nonhispanic: 85%, Not reported: 15% SES: Not reported | Managing the Pressures Before Marriage: 5 1-h sessions including abstinence promotion and 5 homework assignments with parental involvement | 7 weeks (90) | Office of Adolescent Pregnancy Programs, US Department of Health and Human Services |
| Aarons et al, 2000 [22] | 522 7th and 8th graders in urban Washington, DC | African-American: 83.5%, Hispanic: 13.0%, Other: 1.5%, Not reported: 1.9% SES: 62.8% enrolled in a free lunch program | Postponing Sexual Involvement combined with small group Self Center model: 8 45-min sessions over 2 mo including abstinence promotion and contraceptive information, small group discussions after program completion | 3, 8 and 14 mo (80, 88, 81) | NIH Office of Research on Minority Health and the National Institute of Child Health and Development |

Table 1
Continued

| | | | | | |
|-----------------------------|---|--|---|---|---|
| Eisen et al, 1990 [23] | 201 8th and 9th graders in urban San Francisco, CA (other subjects from community settings) | African-American: 9.4%, Hispanic: 13.9%, White: 52.7%, Other: 23.4% SES: "mostly low to middle;" data not provided | 12–15-h curriculum including lectures, simulations, discussions, and role-play designed to increase awareness of consequences of sexual activity, benefits of delayed sexual activity and consistent contraceptive use | 12 mo (76) | Texas Department of Human Services, the University of Texas at Austin Research Institute, the Lyndon B. Johnson School of Public Affairs, the Hogg Foundation for Mental Health, the William and Flora Hewlett Foundation, and the National Institutes for Child Health and Human Development |
| Moberg and Piper, 1998 [24] | 2483 6th graders in small cities and towns in WI | White: 96% Other: 4% SES: Not reported | Healthy for Life: 58 lesson curriculum given in 4- week blocks in each of three consecutive yrs or 12 continuous weeks in the 7th grade, topics included peer pressure resistance, abstinence promotion, encouraging future contraceptive use | 12, 24, 36, and 48 mo (92, 86, 80, 68) | National Institute on Drug Abuse and the Robert Wood Johnson Foundation |
| Levy et al, 1995 [25] | 2392 7th and 8th graders in urban Chicago, IL | African-American: 59.4%, Hispanic: 12.7%, White: 23.5%, Other: 4.3% SES: Not reported | Youth AIDS Prevention Project: 10 sessions over 2 weeks including lectures on HIV/AIDS, pregnancy and STI prevention, role-play to improve resistance skills, one group also given assignments to complete with parents | 1 yr (70) | National Institute of Mental Health, US Department of Health and Human Services |
| McBride et al, 2000 [26] | 1042 9–13-year-olds; 690 14–17-year-olds in WA | "Nonwhite": 47% of 9–13-year-olds, 26% of 14–17-year-olds, Not reported: 53% of 9–13-year-olds, 74% of 14–17-year-olds SES: Not reported | Seven different interventions evaluated, 6 in schools and 1 in a clinic all included information on pregnancy and STIs and birth control information | Varied among sites; 5–9 mo, average 7 mo (varied among sites 63–86, average 75) | State Health Department of Washington State |
| O'Donnell et al, 1999 [27] | 1157 7th and 8th graders in urban Brooklyn, NY | African-American: 79.2%, Hispanic: 15.9%, Other and missing data: 4.9% SES: Not reported | Reach for Health Community Youth Service: 80 core lessons over 2 yrs with information on risks of drug and alcohol use and sexual behavior including contraceptive information, also 3 h per week of community service | 6 mo (92) | National Institute for Child Health and Human Development and the National Institute for Nursing Research |

Table 1
Continued

| Author | Baseline Sample Size and Location | Race or Ethnicity and SES ^a | Program Components and Intensity | Follow-up Period (% Subjects Retained) | Funding |
|--------------------------|---|---|---|--|---|
| Smith 1994 [28] | 120 9th graders in inner-city Queens, NY | African-American: 43.3%, Hispanic: 22.5%, West Indian: 30.8%, Other: 3.3% SES: Not reported | Teen Incentive Program: weekly small group sessions for 8 weeks including teen sexuality, family planning and role play, 6-week career mentorship | 6 mo (79) | New York State Department of Health and Social Services, Private Foundations |
| Herz et al, 1986 [29] | 172 7th and 8th graders in inner-city Chicago, IL | African-American: 100% SES: Mean family income of neighborhood \$8,000 in 1980 | Family Life Education: 10–11 total h divided over 10–15 weeks, including lectures on birth control, anatomy and physiology, discussion of values and attitudes, the “right to say no,” and role-playing | Post-intervention, 12 weeks (87) | Illinois Department of Children and Family Services and Pittway Charitable Trust to the Center for Health Services and Policy Research of Northwestern University |
| Kirby et al, 1997 [30] | 2121 7th graders in urban Los Angeles, CA | African-American: 9%, Hispanic: 64%, White: 5%, Asian: 13%, Not reported: 9% SES: Not reported | Project SNAPP: 8 sessions over 2 weeks including information on the risks of sexual activity, birth control options, assertiveness training, role-playing, and games reinforcing information provided | 5 and 17 mo (73, 77) | California Wellness Foundation |
| Schinke et al, 1981 [31] | 36 10th graders in a public high school in WA | Not reported SES: Not reported | 14 50-min group sessions with lectures on reproductive biology and contraceptive methods, discussions and role-play of decision-making | 6 mo (89) | National Institute of Child Health and Human Development and Maternal and Child Health Training Project 913 |

4653 subjects were at sites that did collect 3-month data and of these 4234 (91%) returned surveys.

^a SES = socioeconomic status.

^b STIs is sexually transmitted infections.

^c These were all cross-sectional samples. The percentages listed are of the number of students who completed the survey with parental consent from the number of students who were enrolled in the classrooms randomly selected for evaluation at three different time points.

^d Some sites at which this study was conducted did not collect surveys at 3 months.

of partners. Fourteen of the identified studies inquired about sexual activity, including all three abstinence-only programs and the abstinence-only versus abstinence plus program. Three of these programs examined whether sexually inexperienced teens exposed to the abstinence-only programs were less likely to become sexually active than controls [16,19,20]. One of these studies did find a statistically significant delay in sexual initiation: 77% of teens in the intervention group remained abstinent at the 6-month follow-up compared with 50% of control teens, $p = .05$ [20]. The abstinence-only study with the longest follow-up time (17 months, compared with 7 weeks and 6 months in the other studies), found no difference in the onset of sexual activity [19]. The study comparing the abstinence-only to the abstinence-plus program found that the abstinence-only group was less likely to report sexual activity at 3 months than the control group (12.5% vs. 21.5%, $p = .05$), but this difference was not significant at 6 or 12 months [16]. Neither of the three studies that asked teens about their frequency of sexual activity over the last 3 months found any differences between abstinence-only and control groups [16,19,21].

Thirteen studies evaluated abstinence-plus programs and 11 of these evaluated some aspect of sexual activity. Eight trials evaluated when teens in the program initiated sexual activity. Five of these studies found no difference between intervention and control groups at follow-up, one found a delay in initiation of sexual activity only in the intervention group's females [22], and another found a delay only in the intervention group's males [23]. The one study that found a statistically significant difference in both males and females reported that 10th graders in the intervention groups, but not eighth or ninth graders, were more likely than controls to report ever having had sexual intercourse, 36% vs. 28%, $p = .05$ [24]. Four studies evaluated the number of teens' sexual partners and there were no differences between intervention and control group students in any study [17–19,25].

Eight studies of abstinence-plus programs asked teens about their frequency of sexual activity. Three found no difference between intervention and control groups. Four studies found that teens in the abstinence-plus program had decreased frequency of sexual intercourse [25–28]. One of these eight studies found that teens in the eighth grade, but not ninth or 10th grade, were more likely to have had sexual intercourse in the past month if they were in the abstinence-plus intervention group, 11% vs. 7%, $p = .05$ [24]. Abstinence-plus programs were not associated with earlier onset of intercourse or increased frequency of intercourse in any other study. In addition, the study comparing an abstinence-plus and an abstinence-only program found that although there was no statistically significant difference in frequency of sexual activity among groups overall, teens indicating sexual experience at baseline assigned to the abstinence-plus intervention reported less frequent sexual intercourse

than sexually experienced teens exposed to the abstinence-only intervention at the 6-month follow-up (adjusted mean frequency 0.55 vs. 2.12, $p = .05$) and at 12 months (adjusted mean frequency 1.34 vs. 3.03, $p = .05$) [16]. The effects of the various programs on self-reported sexual behaviors are summarized in Table 2.

Contraceptive knowledge and use

Contraceptive knowledge and use were measured by self-reported outcomes examining contraceptives in general and condom use specifically. None of the abstinence-only studies evaluated knowledge of contraception, and the one study that asked about birth control use found no difference between groups [19]. Four of the five abstinence-plus programs that evaluated students' knowledge of contraceptives found an improvement in the intervention group compared with the control group at follow-up [22,29–31]. Two showed improvement in both males and females in the abstinence-plus group compared with controls [30,31]. One found that only males in the abstinence-plus group had an improvement in contraceptive knowledge over controls [22], and the fourth found that only females in the abstinence-plus group increased their knowledge compared with controls [29]. The study that compared an abstinence-only and an abstinence-plus program found that students in the abstinence-only group scored lower on a six-point scale of knowledge of correct condom use at follow-up than teens in the abstinence-plus group, 2.49 vs. 3.79, $p = .05$ [16]. Thus, five out of six of the abstinence-plus programs overall showed increased knowledge of contraception in at least one subgroup of teenagers.

Ten of the abstinence-plus studies asked teens about their overall contraceptive use, and five of these showed increased rates in teens in the intervention groups compared with those in the control groups [18,25,26,28,31]. One study found that females, but not males, in the intervention group were more likely than females in the control group to use contraception [22], whereas another found the opposite to be true [23]. Two studies of abstinence-plus programs found that females in the control group were more likely to use effective contraception than females in the intervention group [23,30]. The study comparing an abstinence-plus and an abstinence-only intervention found that sexually experienced teens in the abstinence-plus arm were less likely to report unprotected sex than sexually experienced teens exposed to the abstinence-only arm at the 12-month follow-up (9.7% vs. 32.1%, $p = .05$) [16]. In summary, 7 of 10 programs incorporating abstinence-plus education increased contraceptive use.

None of the abstinence-only studies asked specifically about condom use. Six of the 10 abstinence-plus studies asking teens about their contraceptive practices asked specifically about condom use, and only one found that teens in the abstinence-plus group were more likely to

Table 2

Effect of abstinence-only and abstinence-plus pregnancy prevention programs on teens self-reported sexual behavior, including initiation of sexual activity, frequency of intercourse and number of partners*

| Author | Age of Initiation | Frequency of Intercourse | Number of Partners |
|---|-------------------|--------------------------|--------------------|
| Abstinence-only programs | | | |
| Blake et al, 2001 ^a [21] | – | NS | NS |
| Jorgensen et al, 1993 [20] | ↑ | – | – |
| Kirby et al, 1997 [19] | NS | NS | NS |
| Abstinence-plus programs | | | |
| Aarons et al, 2000 [22] | ↑ ^d | – | – |
| Basen-Engquist et al, 2001 ^a [17] | NS | NS | NS |
| Coyle et al, 2001 ^a [18] | NS | NS | NS |
| Eisen et al, 1990 [23] | ↑ ^e | – | – |
| Kirby 1997 [30] | NS | NS | NS |
| Levy et al, 1995 [25] | NS | ↓ | NS |
| McBride and Gienapp, 2000 [26] | – | ↓ | – |
| Moberg and Piper, 1998 ^b [24] | ↓ | ↑ | NS |
| O'Donnell et al, 1999 ^c [27] | NS | ↓ | – |
| Smith, 1994 [28] | – | ↓ | – |
| Abstinence-only versus abstinence-plus program Jemmott et al, 1998 [16] | NS | NS | – |

↑ Older age of initiation, increased frequency of intercourse or increased number of partners in the intervention group compared to the control group.

NS = Non-significant.

↓ Younger age of initiation, decreased frequency of intercourse or decreased number of partners in the intervention group compared to the control group.

* Outcomes were considered statistically significant at $p \leq .05$.

^a Both of these studies evaluated the Safer Choices Project.

^b Control group was curriculum alone, experimental group was curriculum plus added assignments.

^c The experimental group was exposed to the Reach for Health classroom curriculum and community service opportunities, and the control group was exposed to the curriculum alone.

^d In females only.

^e In males only.

– Indicates the study did not ask about this outcome.

use condoms than controls [18]. In the study that compared an abstinence-only, an abstinence-plus and a control group, the abstinence-plus group reported significantly more condom use than the control groups at all follow-ups with a statistically significant odds ratio of 3.38 at 3 months (95% confidence interval –9.16)[16]. The impact of the programs on contraceptive knowledge, contraceptive use and pregnancy rates are reported in Table 3.

Pregnancy rates

Most studies did not ask teens directly about pregnancy. One abstinence-only program inquired about pregnancy and found no difference between groups at the 17-month follow-up [19]. One of the abstinence-plus programs also evaluated pregnancy rates after the initiation of the program and found no difference between groups [30]. Another study asked teens about prior pregnancy, but did not ask about pregnancy after the program [26].

Discussion

Although teenage pregnancy in the United States has declined over the last decade, it remains a public health

problem. The results of this systematic review show that some abstinence-only and abstinence-plus programs can change teens' sexual behaviors, although the effects are relatively modest and may last only short term. Delay in initiation of sexual activity was shown in one abstinence-only program and two abstinence-plus programs. None of the programs resulted in decreased numbers of partners in sexually experienced teens. Contrary to concerns that abstinence-plus programs may increase sexual activity, all except one of the 11 programs including contraceptive information failed to show an increase in sexual activity or a decline in the age at first intercourse for participating teens. Four abstinence-plus studies found that all teens in the intervention group had decreased frequency of sexual activity compared with controls. The results of these studies call into question the notion that teaching students about contraception in addition to abstinence encourages sexual activity.

Although neither abstinence-only nor abstinence-plus programs had sweeping effects on teens' sexual activity, programs that offered contraceptive education significantly influenced students' knowledge and use of contraception. Over 80% of abstinence-plus programs measuring contraceptive knowledge showed an increase at follow-up. The one study comparing an abstinence-only to an abstinence-

Table 3
Effect of abstinence-only and abstinence-plus pregnancy prevention programs on teens' self reported contraceptive knowledge, contraceptive use and pregnancy*

| Author | Knowledge About Contraception | Contraceptive Use | Condom Use | Pregnancy |
|--|-------------------------------|-------------------------|-------------------------|-----------|
| Abstinence-only programs | | | | |
| Kirby et al, 1997 [19] | – | NS | – | NS |
| Abstinence-plus programs | | | | |
| Aarons et al, 2000 [22] | ↑ ^d | ↑ ^c | – | – |
| Basen Engquist et al, 2001 ^a [17] | – | NS | NS | – |
| Coyle et al, 2001 ^a [18] | – | ↑ | ↑ | – |
| Eisen et al, 1990 [23] | NS | ↑ ↓ ^{c,d} | – | – |
| Herz et al, 1986 [29] | ↑ ^c | – | – | – |
| Kirby et al, 1997 [30] | ↑ | ↓ ^c | NS | NS |
| Levy et al, 1995 [25] | – | ↑ | NS | – |
| McBride et al, 2000 [26] | – | ↑ | – | – |
| Moberg and Piper, 1998 ^b [24] | – | – | NS | – |
| O'Donnell et al, 1999 ^b [27] | – | no <i>p</i> value given | no <i>p</i> value given | – |
| Schinke et al, 1981 [31] | ↑ | ↑ | – | – |
| Smith, 1994 [28] | – | ↑ | – | – |
| Abstinence-only versus abstinence-plus program | | | | |
| Jemmott et al, 1998 [16] | ↑ | ↑ | ↑ | – |

↑ Increased knowledge about contraception, increased contraceptive use or increased condom use in the intervention group compared to the control group.
NS = Nonsignificant.

↓ Decreased knowledge about contraception, decreased contraceptive use or decreased condom use in the intervention group compared to the control group.

* Outcomes were considered statistically significant at $p \leq .05$.

^a Both of these studies evaluated the Safer Choices Project.

^b The experimental group was exposed to the Reach for Health classroom curriculum and community service opportunities, and the control group was exposed to the curriculum alone.

^c In females only.

^d In males only.

– Indicates the study did not assess this outcome.

plus program found that teens in the abstinence-only group scored lower on questions about correct contraceptive use. Seven of the 10 programs that evaluated contraceptive use noted an improvement in the number of teens using contraception.

Several factors make a direct comparison of teen pregnancy prevention programs difficult to do. The diversity in the subject populations is one challenge. Even by limiting studies to those conducted in the United States, the variation in teenage culture seen in these studies, affected by such factors as age, degree of urbanization, minority representation, and class, makes it difficult to meaningfully compare the appropriateness of one intervention over another.

Variability in the particular pregnancy prevention program is another challenge, as each had its own intervention curriculum. Most schools have preexisting sex education programs, so that the majority of students included in these studies had already been exposed to some information before the interventions in these studies. Whether the prior programs included contraceptive information or a strong abstinence message was not disclosed in any study. Also, the control groups in these studies consisted of the standard curriculum already in place in the district, and little explanation of the content of these programs was provided in

general. In addition to differences in the curriculum, some programs used different types of interventions including career mentorship, community service projects, and school-wide activities to complement the classroom teaching.

Each study also varied in the particular outcomes measured. Although the “gold-standard” outcome for these programs would be the number of pregnancies to teenage women at the end of the intervention compared with baseline values, such data are very difficult and costly to acquire. Surveys asking teens about sexual activity and contraceptive use, let alone pregnancy and abortion, are often controversial. The difficulty of obtaining parental consent hinders the collection of complete data sets. The extended follow-up time periods needed to measure an effect on the pregnancy rate can also make these studies prohibitively expensive. Pregnant teenagers are also more likely to drop out of school, making data collection problematic. Obtaining the funding necessary to implement and evaluate these programs can be difficult as federal money is increasingly limited to the evaluation of abstinence-only programs. Finally, small sample sizes limit the generalizability of many studies, and short follow-up times from a few weeks to a couple months do not allow for adequate evaluation of the long-term impact of a program.

The strengths of this review include its systematic evaluation of all published randomized controlled trials of school-based teenage pregnancy programs in the United States with relevant outcome measures. Several published reviews include results from nonrandomized trials [32–34]. Another review of this topic included data from English-speaking countries other than the United States [35]. We attempted to use validated outcome measures that are well-accepted surrogates for pregnancy rates, including frequency of sexual activity and use of contraception [36,37] in contrast to other studies, which have included less reliable outcomes such as intention to abstain from intercourse or to use contraception. Nevertheless, some may criticize our decision to include knowledge as an outcome, as some studies have called into question the correlation of knowledge with behavior [38]. Our comparison of abstinence-only and abstinence-plus curricula would have benefited from standardized outcomes used between studies, such as the Prevention Minimum Evaluation Data Set [39].

Conclusion

Nationwide, over half of teens aged 15 to 19 are sexually active [40]. Most of the decline in the teenage pregnancy rate over the past decade can be attributed to increased contraceptive use, with a small contribution from decreased sexual activity [41]. To reduce the rates of teen pregnancy, programs must either improve teenage contraceptive behaviors, reduce teens' sexual activity, or both. The variability in study populations, interventions, and outcomes of existing school-based trials of teen pregnancy prevention, and the paucity of studies directly comparing abstinence-only and abstinence plus curricula, preclude a definitive conclusion regarding which type of program is most effective. Nevertheless, our results indicate that the majority of abstinence-plus programs increase rates of contraceptive use in teens, and one study showed the effects to last for at least 30 months [17]. Whether abstinence-only or abstinence-plus programs will prove more effective at altering teens' sexual behavior remains an unanswered question. In the absence of strong evidence that either type of program can affect sexual activity, prohibiting contraceptive education in school-based pregnancy prevention programs prevents students' exposure to information that has the greatest potential to decrease the pregnancy rate. However, community attitudes toward teenage sexuality, not evidence-based medicine, may ultimately determine the acceptability of publicly funded, school-based sex education programs.

Acknowledgments

We thank Drs. Anne Davis, Leslie Miller, Susan Reed, Roger Rosenblatt, and Devika Singh for their comments on the manuscript.

References

- [1] Card J. Teen pregnancy prevention: do any programs work? *Annu Rev Public Health*. 1999;20:257–85.
- [2] Singh S, Darroch J. Adolescent pregnancy and childbearing: levels and trends in developed countries. *Fam Plann Perspect* 2000;32:14–23.
- [3] Hogan D, Sun R, Cornwell G. Sexual and fertility behaviors of American females aged 15–19 years: 1985, 1990, and 1995. *Am J Public Health* 2000;90:1421–5.
- [4] Henshaw S, Feivelson D. Teenage abortion and pregnancy statistics by state, 1996. *Fam Plann Perspect* 2000;32:272–80.
- [5] Kahn J, Brindis C, Gleit D. Pregnancies averted among US teenagers by the use of contraceptives. *Fam Plann Perspect* 1999;31:29–34.
- [6] Darroch J, Singh S. Why is teenage pregnancy declining? The roles of abstinence, sexual activity and contraceptive use. Occasional Report, New York: Alan Guttmacher Institute, 1999, No. 1.
- [7] Alan Guttmacher Institute. State-level policies on sexuality, STD education, issues in brief. New York: The Alan Guttmacher Institute, 2001 Series, No. 5.
- [8] Landry D, Kaeser L, Richards C. Abstinence promotion and the provision of information about contraception in public school district sexuality education policies. *Fam Plann Perspect* 1999;31:280–6.
- [9] Darroch J, Landry D, Singh S. Changing emphasis in sexuality education in US public secondary schools, 1988–1999. *Fam Plann Perspect* 2000;32:204–11, 265.
- [10] Hoff T, Greene L. Sex education in America, a series of national surveys of students, parents, teachers and principals. The Kaiser Family Foundation, Sept. 2000.
- [11] US Preventive Services Task Force. Guide to Clinical Preventive Services, 2nd edition. Baltimore: Williams and Wilkins, 1996.
- [12] Cates W. The NIH condom report: the glass is 90% full. *Fam Plann Perspect* 2001;33:231–3.
- [13] Ashworth C, DuRant R, Newman C, Gaillard G. An evaluation of a school-based AIDS/HIV education program for high school students. *J Adolesc Health* 1992;13:582–8.
- [14] Noell J, Ary D, Duncan T. Development and evaluation of a sexual decision-making and social skills program: the choice is yours—preventing HIV/STDs". *Health Educ Behav* 1997;24:87–101.
- [15] Strachan W, Gorey K. Infant simulator lifespace intervention: pilot investigation of an adolescent pregnancy prevention program. *Child Adolesc Social Work J* 1997;14:171–80.
- [16] Jemmott J, Jemmott L, Fong G. Abstinence and safer sex HIV risk-reduction interventions for African-American adolescents. *JAMA* 1998;279:1529–36.
- [17] Basen-Engquist K, Coyle K, Parcel G, et al. Schoolwide effects of a multicomponent HIV, STD, and pregnancy prevention program for high school students. *Health Educ Behav* 2001;28:166–85.
- [18] Coyle K, Basen-Engquist K, Kirby D, et al. Safer choices: reducing teen pregnancy, HIV and STDs. *Public Health Rep* 2001;116(Suppl 1):82–93.
- [19] Kirby D, Korpi M, Barth R, Cagampang H. The impact of the Postponing Sexual Involvement curriculum among youths in California. *Fam Plann Perspect* 1997;29:100–8.
- [20] Jorgensen S, Potts V, Camp B. Six-month follow-up of a pregnancy prevention program for early adolescents. *Fam Relat* 1993;42:401–6.
- [21] Blake S, Simkin L, Ledsky R, et al. Effects of a parent-child intervention on young adolescents' risk for early onset of sexual intercourse. *Fam Plann Perspect* 2001;33:52–61.
- [22] Aarons S, Jenkins R, Raine T, et al. Postponing sexual intercourse among urban junior high school students—a randomized controlled evaluation. *J Adolesc Health* 2000;27:236–47.
- [23] Eisen M, Zellman G, McAlister A. Evaluating the impact of a theory-based sexuality and contraceptive education program. *Fam Plann Perspect* 1990;22:261–71.

- [24] Moberg D, Piper D. The healthy for life project: sexual risk behavior outcomes. *AIDS Educ Prev* 1998;10:128–48.
- [25] Levy S, Perhats C, Weeks K, et al. Impact of a school-based AIDS prevention program on risk and protective behavior for newly sexually active students. *J Sch Health* 1995;65:145–51.
- [26] McBride D, Gienapp A. Using randomized designs to evaluate client-centered programs to prevent adolescent pregnancy. *Fam Plann Perspect* 2000;32:227–35.
- [27] O'Donnell L, Stueve A, San Doval A, et al. The effectiveness of the Reach for Health Community Youth Service learning program in reducing early and unprotected sex among urban middle school students. *Am J Public Health* 1999;89:176–81.
- [28] Smith M. Teen incentives program: evaluation of a health promotion model for adolescent pregnancy prevention. *J Health Educ* 1994;25:24–9.
- [29] Herz E, Reis J, Barbera-Stein L. Family life education for young teens: an assessment of three interventions. *Health Educ Q* 1986;13:201–21.
- [30] Kirby D, Korpi M, Adivi C, et al. An impact evaluation of project SNAPP: an AIDS and pregnancy prevention middle school program. *AIDS Educ Prev* 1997;9(Suppl A):44–61.
- [31] Schinke S, Blythe B, Gilchrist L. Cognitive-behavioral prevention of adolescent pregnancy. *J Couns Psychol* 1981;28:451–4.
- [32] Thomas M. Abstinence-based programs for prevention of adolescent pregnancies. *J Adolesc Health* 2000;26:5–17.
- [33] Franklin C, Corcoran J. Preventing adolescent pregnancy: a review of programs and practice. *Soc Work* 2000;45:40–52.
- [34] Franklin C, Grant D, Corcoran J, et al. Effectiveness of prevention programs for adolescent pregnancy: a meta-analysis. *J Marriage Fam* 1997;59:551–67.
- [35] DiCenso A, Guyatt G, Willan A, et al. Interventions to reduce unintended pregnancies among adolescents: systematic review of randomized controlled trials. *BMJ* 2002;324:1–9.
- [36] Biro FM, Rosenthal SL, Wildey LS, et al. Self-reported health concerns sexual behaviors in adolescents with cervical dysplasia. *J Adolesc Health* 1991;12:391–4.
- [37] Bachanas PJ, Morris MK, Lewis-Gess JK, et al. Predictors of risky sexual behavior in African American Adolescent girls: implications for prevention interventions. *J Pediatr Psychol* 2002;27:519–30.
- [38] Greening L, Stoppelbein L, Jackson M. Health education programs to prevent teen pregnancy. *J Adolesc Health* 2001;28:257–8.
- [39] Card J, Peterson J, Niego S, Brindis C. The prevention minimum evaluation data set (PMEDS) A tool for evaluating teen pregnancy and STD/HIV/AIDS prevention programs. *Eval Health Prof* 1998;21:377–94.
- [40] Kann L, Kinchen SA, Williams BI, et al. Youth risk behavior surveillance—United States, 1997. *MMWR CDC Surveill Summ* 1998;47:1–89.
- [41] Darroch J, Singh S. Why is teenage pregnancy declining? The roles of abstinence, sexual activity and contraceptive use. Occasional Report, New York: Alan Guttmacher Institute, 1999, No. 1.